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RESEARCH ARTICLE OPEN ACCESS

Developing Learner Autonomy In Medical English Vocabulary Acquisition Among Multilingual Pharmacy Students Through Educational Technologies

Ikramova Shoxsanam Ravshanboy qizi

Tashkent Pharmaceutical Institute, Department of Uzbek literature and language, Uzbekistan

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ABSTRACT

This study investigates the impact of educational technologies (EdTech) on the development of learner autonomy in acquiring technical and non-technical English vocabulary in emergency medicine among multilingual pharmacy students. Participants included first-year Arab and Hindi students and second-year Uzbek, Russian students at Tashkent Pharmaceutical Institute. Over a four-month period, English lessons emphasized professional terminology, interactive activities, and self-directed learning. Findings indicate that the use of EdTech tools significantly improved students' vocabulary retention, usage, confidence, and autonomous learning behaviors. This study underscores the critical role of technology-assisted ESP instruction in fostering professional competence in multilingual pharmacy classrooms.

Keywords: Learner autonomy, educational technology, emergency medicine vocabulary, pharmacy students, multilingual instruction.

INTRODUCTION

Proficiency in English, particularly in medical and technical vocabulary, is essential for pharmacy students to ensure effective communication, comprehension of professional literature, and overall clinical competence. Teaching medical terminology in multilingual classrooms poses unique challenges, as students come from diverse linguistic backgrounds with varying levels of prior English knowledge. These differences can affect vocabulary acquisition, confidence, and participation, highlighting the need for tailored instructional strategies.

This study investigates the role of educational technologies (EdTech) in fostering learner autonomy—defined as the ability of students to take control of their own learning, select appropriate strategies, and engage independently with educational materials—among multilingual pharmacy students at the Tashkent Pharmaceutical Institute. Two groups were observed: first-year Arab and Hindi students, and second-year Uzbek, Russian students. Over a four-month period, lessons focused on teaching general medical terminology and professional vocabulary across multiple topics, including hospital team roles, patient records, accidents, and emergency procedures.

To enhance learning outcomes and encourage autonomous study, a variety of EdTech tools were integrated into the curriculum. These included interactive platforms for vocabulary drills, online quizzes using Quizizz and Bamboozle, digital flashcards for memorization, Wordwall activities for interactive matching and fill-in exercises, and YouTube videos demonstrating medical procedures and hospital workflows. By combining traditional instruction with these technology-enhanced methods, students were able to practice both technical and non-technical medical vocabulary, improve listening and speaking skills in authentic contexts, and gain confidence in professional communication.

This approach not only promotes vocabulary retention but also fosters self-directed learning behaviors, collaboration among students from different linguistic backgrounds, and

critical thinking skills necessary for their future pharmacy careers. The study aims to demonstrate that integrating EdTech into medical terminology instruction can significantly enhance learner autonomy, engagement, and proficiency in multilingual educational settings.

LITERATURE REVIEW

Recent research highlights that learner autonomy is a critical factor in English for Specific Purposes (ESP) contexts, particularly in professional and healthcare education. Autonomous learners, defined as students who can set their own learning goals, select strategies, and monitor their progress, have been shown to retain and apply specialized vocabulary more effectively than those relying solely on instructor-led guidance (Boulton, 2018; Smith & Lee, 2020). Developing autonomy not only improves vocabulary acquisition but also enhances students' confidence and long-term engagement with professional content.

Educational technologies (EdTech) have been demonstrated to significantly enhance autonomous learning by providing resources for self-paced practice, immediate interactive feedback, and gamified learning activities (Reinders & Wattana, 2019; Liu et al., 2021). Tools such as mobile applications, online platforms, interactive quizzes, digital flashcards, and video tutorials increase student motivation, engagement, and opportunities for repeated practice, which is especially valuable in healthcare education where precise terminology is essential (Ahmad et al., 2022; Zhang et al., 2021).

Despite the growing use of EdTech in language learning, only a limited number of studies have explored its effectiveness among multilingual pharmacy students, whose diverse linguistic backgrounds influence their learning strategies, vocabulary retention, and classroom participation. Multilingual learners may face challenges such as interference from their native languages, differences in prior vocabulary knowledge, and varying comfort levels with independent study, all of which can impact ESP outcomes (Alshammari, 2021; Rahman & Karim, 2022).

This study contributes empirical evidence from the Tashkent Pharmaceutical Institute by examining how EdTech tools—such as Quizizz, Bamboozle, Wordwall, YouTube videos, and interactive platforms—support the acquisition of both technical and non-technical medical vocabulary and foster learner autonomy among students from different language groups. The integration of these technologies into instruction allows students to engage with medical terminology in authentic contexts, practice independently or collaboratively, and receive immediate feedback, thereby enhancing both their language proficiency and self-directed learning skills.

By addressing the gap in research on multilingual pharmacy education, this study provides insights for educators seeking to implement technology-enhanced ESP instruction that promotes learner autonomy, vocabulary retention, and active engagement in professional contexts.

METHODOLOGY

The study involved 56 participants divided into two cohorts based on language background and academic year:

Group A: First-year Arab and Hindi students

Group B: Second-year Uzbek and Russian students

Instruction focused on teaching technical and non-technical medical terminology across multiple topics, including hospital team roles, patient records, accidents, and general medical procedures. The teaching approach integrated educational technologies (EdTech) to enhance learner autonomy, vocabulary acquisition, and engagement. Specifically, students participated in:

- Interactive learning platforms for vocabulary drills and listening exercises
- Online quizzes via Quizizz and Bamboozle to reinforce understanding and provide immediate feedback
- Digital flashcards for memorizing technical and non-technical terms
- Wordwall activities for matching, categorizing, and fill-in-the-blank exercises
- YouTube tutorials demonstrating medical procedures, hospital workflows, and patient interactions
- Role-play and group discussions to practice speaking, questioning, and summarizing patient information

To evaluate learning outcomes, pre-tests and post-tests were administered to measure vocabulary retention, comprehension, and practical usage. Additionally, classroom observations documented students' engagement, participation, and independent study behaviors. The observations captured how students interacted with EdTech tools, collaborated with peers from different linguistic backgrounds, and applied learned terminology in authentic contexts.

Data analysis employed both quantitative and qualitative methods. Descriptive statistics summarized performance outcomes from pre- and post-tests, highlighting improvement in vocabulary scores. Thematic analysis of observation notes and students' self-reflections identified patterns in autonomous learning behaviors, engagement strategies, and challenges encountered during EdTech-assisted instruction.

This comprehensive methodological approach enabled evaluation of not only academic performance but also the development of learner autonomy. By integrating EdTech tools into vocabulary instruction and combining quantitative and qualitative assessments, the study captured the dual impact of technology-enhanced ESP instruction on both linguistic competence and independent learning skills among multilingual pharmacy students.

RESULTS

The study's results indicate a significant improvement in both groups' mastery of medical terminology, confirming the effectiveness of EdTech-enhanced instruction in fostering learner autonomy and vocabulary acquisition.

Group A (Arab + Hindi, first-year students) demonstrated particularly strong performance in oral tasks and interactive activities such as role-play, group discussions, and EdTech-based quizzes. These students were highly engaged during vocabulary drills on platforms like Quizizz and Wordwall and benefited from repeated practice with digital flashcards. The use of YouTube tutorials further supported listening comprehension and contextual understanding of professional terms. Their pre-test average score of 45 increased to a post-test average of 78, showing a 73% improvement.

Group B (Uzbek + Russian, second-year students) excelled in reading and writing assessments, particularly in completing patient summaries, accident descriptions, and professional correspondence tasks. The integration of EdTech tools facilitated independent study and self-paced learning, with students often using interactive quizzes and Wordwall exercises outside the classroom to reinforce learning. Their pre-test average of 50 rose to a post-test average of 82, reflecting a 64% improvement.

The overall average across both groups was 47.5 on the pre-test and 80 on the post-test, resulting in an overall improvement of 68.5%. These results suggest that EdTech integration positively correlates with vocabulary retention, confidence, and autonomous learning behaviors. Observations indicated that students frequently revisited flashcards, participated actively in gamified quizzes, and collaborated with peers to complete interactive tasks, demonstrating both independent and group-based learning strategies.

Table 1: Pre- and Post-Test Scores for Medical Vocabulary by Group

Group	Pre-test score	Post-test score	Improvement
Arab + Hindi (1st year)	45	78	73%
Uzbek+Russian (2nd year)	50	82	64%

Total/average	47.5	80	68.5 %

Additionally, qualitative classroom observations revealed that students using EdTech tools exhibited higher levels of engagement compared to traditional methods. For example, students in Group A often led discussions, guided peers through quizzes, and actively used YouTube demonstrations to understand medical procedures. Group B students demonstrated meticulous note-taking and consistent practice with Wordwall and digital flashcards, reflecting a self-directed approach to mastering professional terminology.

Overall, the results underscore the value of blended EdTech-supported instruction in multilingual pharmacy classrooms, as it enhances both language proficiency and learner autonomy, while accommodating diverse learning preferences and linguistic backgrounds.

DISCUSSION

The findings of this study suggest that educational technologies (EdTech) play a crucial role in promoting autonomous learning in multilingual pharmacy classrooms. By integrating interactive platforms, gamified quizzes, digital flashcards, and mobile applications such as Quizizz, Bamboozle, Wordwall, and YouTube tutorials, students were able to engage independently with complex technical and non-technical medical vocabulary. These tools provided scaffolds for self-paced learning, allowing students to review terminology repeatedly, monitor their progress, and participate actively without constant instructor guidance.

The use of gamification and interactive exercises enhanced student motivation and engagement, as evidenced by increased participation in oral and written tasks, frequent use of flashcards, and active collaboration in group activities. Group A (Arab + Hindi students) particularly benefited from role-play and discussion-based activities, improving oral communication skills, while Group B (Uzbek + Russian students) excelled in reading and writing tasks, highlighting the flexibility of EdTech tools to accommodate different learning preferences and linguistic backgrounds.

These findings are consistent with recent studies demonstrating that EdTech supports ESP vocabulary acquisition and learner autonomy in higher education contexts (Liu et al., 2021; Rahman & Karim, 2022; Ahmad et al., 2022). By providing immediate feedback, self-paced practice, and interactive challenges, technology-assisted instruction enables students to take control of their own learning, reinforcing both knowledge retention and application in authentic professional scenarios.

Despite the overall positive outcomes, several challenges were observed. Managing diverse linguistic proficiency levels required careful differentiation, ensuring that all students, regardless of prior English knowledge, could participate meaningfully in activities. Some students initially struggled with navigating multiple digital tools simultaneously, emphasizing the need for structured guidance in early stages. Nevertheless, continuous exposure and sustained use of EdTech platforms appear to enhance long-term vocabulary retention, confidence, and independent learning behaviors.

Furthermore, the study highlights the importance of blending traditional teaching methods with technology-enhanced activities. While EdTech tools promoted autonomous engagement, teacher facilitation remained essential for scaffolding complex concepts, clarifying misunderstandings, and guiding reflective practices. In multilingual settings, such a blended approach ensures equitable participation and maximizes the benefits of independent learning while addressing diverse learner needs.

Overall, this study demonstrates that EdTech-supported instruction not only improves medical vocabulary acquisition among multilingual pharmacy students but also cultivates self-directed learning habits, peer collaboration, and critical thinking skills necessary for professional competence in healthcare contexts. Future research should explore longitudinal effects of sustained EdTech use, examine specific tool effectiveness for different language groups, and investigate how autonomous learning skills transfer to other domains of pharmacy education.

CONCLUSION

The integration of educational technologies into English for Specific Purposes (ESP) instruction, particularly in teaching medical terminology, has demonstrated a significant positive impact on both learner autonomy and vocabulary acquisition among multilingual pharmacy students. The findings of this study indicate that EdTech-supported learning environments enable students to engage more actively with technical and non-technical medical vocabulary, practice independently, and develop confidence in professional communication.

By incorporating interactive platforms, gamified quizzes, digital flashcards, and multimedia resources, instructors can create flexible and inclusive learning experiences that accommodate diverse linguistic backgrounds and learning preferences. The results suggest that technology-enhanced instruction not only improves immediate learning outcomes but also fosters essential autonomous learning behaviors such as self-regulation, self-assessment, and sustained engagement with learning materials.

This study provides practical implications for educators, curriculum designers, and higher education institutions seeking to modernize ESP instruction in pharmacy and medical education. Integrating EdTech tools into curriculum design can support differentiated instruction, promote equitable participation in multilingual classrooms, and enhance students' readiness for real-world professional contexts.

Future research should explore the long-term retention of medical vocabulary acquired through EdTech-assisted instruction, investigate cross-cultural and linguistic differences in learner autonomy development, and examine teacher perspectives on the challenges and benefits of technology integration. Longitudinal studies and mixed-method approaches could further contribute to optimizing technology-enhanced ESP learning environments and strengthening professional language education in multilingual settings.

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