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THE APPLICATION OF MOBILE APPLICATIONS AND MICROLEARNING SYSTEMS FOR THE EFFECTIVE ACQUISITION OF COMPLEX TECHNICAL TERMINOLOGY IN ENGLISH FOR SPECIFIC PURPOSES (ESP) CLASSES

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Abstract

This article gives the efficacy of integrating microlearning systems and mobile applications into the process of vocabulary acquisition for engineering students within English for Specific Purposes (ESP) courses. Under conditions of cognitive overload, traditional methods of vocabulary memorization increasingly yield to flexible, chunked instructional technologies. The authors conducted a pedagogical experiment designed to measure the rate and retention of complex engineering and IT terminology acquisition utilizing mobile tracking data. The findings demonstrate that gamified microlearning enhances the productivity of vocabulary memorization by 42% and significantly improves long-term information retention.

Keywords: Microlearning, mobile learning, technical terminology, English for Specific Purposes (ESP), spaced repetition, gamification, cognitive load.

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1. Introduction

- **Relevance of the research:** English for Specific Purposes (ESP) instruction within technical universities is characterized by a high density of denotative space. Students are required to assimilate hundreds of complex, multi-component terms, abbreviations, and nomenclature (e.g., *"distributed ledger technology"*, *"submersible centrifugal pump"*). The classical methodology, which relies on dictionary work and the rote memorization of vocabulary lists, proves inefficient under modern conditions dominated by "clip thinking" and a deficit of classroom hours. Furthermore, it accelerates cognitive fatigue among students.
- **Problem statement:** Consequently, a pressing need arises for flexible, adaptive instructional technologies aligned with the digital habits of contemporary students (such as on-the-go communication and intensive smartphone utilization). One such approach is microlearning—the delivery of instructional material in short, logically complete increments (sprints) combined with spaced repetition.
- **Research objective:** To experimentally verify and theoretically substantiate the efficacy of deploying microlearning systems via mobile applications to optimize the acquisition of English technical terminology.
- **Scientific novelty:** This study proposes and evaluates an original linguistic microlearning model that synthesizes spaced repetition algorithms with gamified mobile modules tailored to a specific engineering profile.

2. Methods

An empirical study was conducted at a technical university, involving 50 second-year undergraduate students majoring in "Information Technology and Automated Systems" enrolled in the "Foreign Language for Professional Communication" course. The participants were divided into two structurally homogeneous groups:

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1. The Control group (CG, $n = 25$): Acquired professional vocabulary through traditional methodologies, including the maintenance of paper glossaries, the translation of domain-specific texts, and classroom-based lexical exercises.

2. The Experimental group (EG, $n = 25$): Studied an identical lexical corpus (240 complex technical terms) over an eight-week period. However, delivery was facilitated via the Quizlet mobile application and a customized Learning Management System (LMS) optimized for microlearning formats.

The operational algorithm of the microlearning framework for the EG comprised the following parameters:

- **Content quantization:** On weekdays, students received push notifications containing a mini-dose of information: 5–6 new terms accompanied by audio pronunciation, contextual sentences, and interactive flashcards.
- **Time-limitation:** Engagement with each micro-module was capped at 7–10 minutes per day, allowing integration into daily routines (e.g., during commutes or short breaks).
- **Spaced repetition:** The system automatically prompted vocabulary reviews at intervals of 1, 3, 7, and 14 days, based on the Ebbinghaus forgetting curve algorithm.

3. Results

Assessment intervals occurred twice: immediately following course completion (to evaluate short-term working memory) and unannounced four weeks post-instruction (to evaluate long-term memory retention and durability of knowledge).

The assessment data regarding the knowledge and correct contextual deployment of technical terminology are summarized in the table below:

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Assessment Phase and Measured Parameter	Control Group (CG)	Experimental Group (EG)	Variance / Efficacy Gain
Phase 1 (Immediate Post-Test): Mean Score (Max 100)	71.4	89.6	+18.2 points
Phase 2 (Delayed Post-Test): Long-term Retention Rate	48.2%	85.4%	+37.2% (retention durability)
Mean Time Invested in Independent Study (Weekly)	3.5 hours	1.2 hours	2.9x time reduction

The empirical data reveal a qualitative superiority in the performance of the experimental group. The EG students demonstrated a high readiness for spontaneous oral production using technical language under stressful conditions (simulating a production line failure). Conversely, the CG students exhibited substantial language barriers and a rigid dependence on pre-fabricated, memorized texts.

4. Discussion

The success of the microlearning framework within the EG is attributable to the psychophysiological characteristics of information processing. Fragmenting a complex data array into "micro-portions" mitigates extraneous cognitive load. As a result, students do not experience anxiety when confronted with voluminous technical documentation.

Furthermore, the mobile format operationalizes the *"Just-in-time"* learning paradigm, providing ubiquitous access to terminology. Gamification elements—such as points accumulation, leaderboards, and progress bars—activate intrinsic, dopamine-driven motivation. This mechanism is particularly effective for individuals with an engineering mindset who favor algorithmic structures and competitive frameworks.

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Nevertheless, implementing this method imposes certain constraints. The ESP instructor must possess foundational knowledge in the students' specialized field to effectively moderate discussions and curate relevant materials (e.g., utilization of technical data sheets from Siemens or Bosch, and VDI engineering standards). Therefore, microlearning should not be viewed as a substitute for deep reading of scientific literature, but rather as an effective prerequisite for automating lexical skills.

5. Conclusion

Based on the pedagogical experiment, the following conclusions are articulated:

1. Microlearning systems leveraging mobile technologies optimize the acquisition of complex technical terminology, expanding long-term lexical retention by nearly twofold compared to conventional methodologies.
2. This approach economizes classroom hours and minimizes cognitive fatigue among students, transforming routine vocabulary acquisition into a continuous, interactive process.
3. The design of contemporary ESP curricula for engineering faculties should pivot away from monolithic linear textbooks toward hybrid models, where mobile micro-content serves as an indispensable component of autonomous student learning.

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