THE USE OF MODERN DIGITAL TECHNOLOGIES IN TEACHING FOREIGN LANGUAGES TO ENGINEERING STUDENTS

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Abstract

In the context of rapid globalization and technological advancement, foreign language proficiency has become an essential competence for future engineers. Engineering professionals increasingly participate in international research collaborations, multinational projects, and global labor markets where English and other foreign languages function as primary means of communication. This article examines the role of modern digital technologies in teaching foreign languages to engineering students. It analyzes the pedagogical potential of learning management systems, mobile applications, artificial intelligence–based tools, virtual and augmented reality environments, and massive open online courses. Platforms such as Duolingo, Quizlet, and Coursera are discussed as examples of technology-enhanced learning ecosystems that foster vocabulary acquisition, professional communication skills, and learner autonomy. The article argues that integrating digital tools into English for Specific Purposes (ESP) instruction increases student motivation, supports individualized learning trajectories, and enhances professional communicative competence. At the same time, challenges such as digital inequality, insufficient teacher training, and overreliance on technology are addressed. The study concludes that a balanced pedagogical framework combining digital innovation with methodological rigor is essential for preparing competitive engineers in the global arena.

Keywords: digital technologies, engineering education, ESP (English for Specific Purposes), artificial intelligence, virtual learning environments, mobile-assisted language learning, communicative competence, higher educatio

The 21st century has transformed engineering into a global profession. Engineers collaborate across borders, access international research databases, and contribute to multinational technological projects. English, in particular, has become the lingua franca of science, engineering, and innovation. Consequently, higher education institutions must ensure that future engineers possess not only technical expertise but also strong foreign language communication skills.

Traditional language teaching methods, primarily based on textbooks and classroom-centered instruction, are no longer sufficient to meet contemporary professional demands. The integration of digital technologies into language education offers innovative opportunities for improving effectiveness, flexibility, and learner engagement. This article explores how modern digital technologies enhance foreign language instruction for engineering students and evaluates their pedagogical benefits and limitation

English for Specific Purposes (ESP) is a learner-centered approach that focuses on developing language skills relevant to particular disciplines or professions. For engineering students, ESP courses emphasize technical terminology, academic writing, professional presentations, and intercultural communication.

Digital transformation in education has introduced new methodologies such as blended learning, flipped classrooms, and online collaborative environments. These approaches align well with ESP principles because they allow authentic materials, simulations, and real-world communication tasks to be integrated into instruction. Engineering students can analyze technical documentation, watch industry-related lectures, and participate in international webinars in a foreign language

Digital Platforms and Mobile Applications Mobile-assisted language learning (MALL) has become increasingly popular among university students. Applications such as Duolingo and Quizlet provide gamified vocabulary exercises, adaptive quizzes, and spaced repetition systems that improve retention of technical

terminology. For engineering students, specialized vocabulary sets related to mechanics, programming, electronics, and civil engineering can be developed and shared digitally.

Massive open online courses (MOOCs), including those offered by Coursera, enable students to take engineering-related courses in English. This exposure to authentic academic discourse enhances listening comprehension and discipline-specific language skills. Furthermore, discussion forums encourage written interaction and peer collaboration.

Learning Management Systems (LMS) such as Moodle or Google Classroom facilitate assignment submission, feedback exchange, and progress tracking. Through these systems, instructors can upload technical reading materials, create interactive grammar modules, and organize online discussions focused on professional topics

Artificial intelligence (AI) has introduced adaptive and personalized learning pathways. AI-powered tools analyze learner performance and automatically adjust task difficulty. Speech recognition systems evaluate pronunciation accuracy and provide real-time feedback, which is particularly beneficial for engineering students preparing for international presentations or conferences.

AI-based writing assistants help students improve technical report writing by detecting grammatical errors, stylistic inconsistencies, and vocabulary misuse. Such tools contribute to academic literacy development and increase learner confidence.

Chatbots and virtual tutors simulate professional communication scenarios. For example, a virtual assistant may replicate a job interview or project negotiation, enabling students to practice industry-related communication skills in a risk-free environment

Virtual reality (VR) and augmented reality (AR) technologies offer immersive language learning experiences. Engineering students can participate in

simulated laboratory experiments or factory environments where instructions and communication occur in a foreign language. This contextual learning enhances comprehension and practical language application.

By integrating VR simulations into ESP courses, educators can bridge the gap between theoretical language instruction and professional practice. Students not only learn terminology but also apply it in realistic technical situations

Advantages of Digital Technologies The integration of digital technologies into foreign language instruction for engineers offers several advantages:

1. **Personalization:** Adaptive systems accommodate individual learning speeds and preferences.

2. **Accessibility:** Online platforms provide access to global resources anytime and anywhere.

3. **Authenticity:** Students engage with real-world technical materials and professional discourse.

4. **Motivation:** Gamification and multimedia content increase engagement.

5. **Collaboration:** Digital tools support teamwork across geographical boundaries.

These factors collectively contribute to the development of communicative competence and professional readiness

Despite their benefits, digital technologies present certain challenges. Not all students have equal access to high-speed internet or modern devices, leading to digital inequality. Teachers may lack sufficient training in integrating advanced tools into pedagogical practice. Overdependence on automated systems can also reduce critical thinking and interpersonal communication skills.

Therefore, technology should complement—not replace—methodologically sound instruction. Teacher training programs and institutional support are crucial for effective digital integration.

Conclusion

Modern digital technologies significantly enhance foreign language instruction for future engineers by fostering professional communication skills, learner autonomy, and global engagement. Platforms, AI-based systems, and immersive environments provide innovative opportunities for ESP education. However, successful implementation requires pedagogical balance, teacher preparedness, and equitable access to digital resources.

Preparing engineers for the global workforce demands an educational model that integrates technical expertise with multilingual competence supported by digital innovation. By strategically applying modern technologies, higher education institutions can cultivate competitive, communicative, and adaptable engineering professionals.

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