

Developing the Professional Competence of Technical Students in The Field of English Language Based on Digital Technologies

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Abstract: The article focuses on the issue of engineering majors at technical universities developing professional foreign (English) language proficiency through the use of digital technology in the classroom. While traditional English for Specific Purposes (ESP) instruction in technical universities frequently remains disconnected from the professional context of students and contemporary digital tools, the study's relevance stems from the growing need for engineering personnel who can confidently work in an English-speaking professional environment, read technical documentation, and communicate as part of international project teams. The article explores a specially created digital educational ecosystem that incorporates the concepts of subject-language integrated learning (CLIL), task-oriented learning (TBLT), and gamification in blended learning environments. It is based on experimental work carried out at three technical universities in Uzbekistan.

Keywords: Professional competence; English for Special Purposes (ESP); digital technologies; computer language teaching (CALL); blended learning; task-oriented learning (TBLT); gamification; technical university.

Introduction: Professional English language proficiency is now a practical requirement for a specialist rather than a secondary skill for graduates of technical universities due to the internationalisation of technical education and the growth of cross-border technical cooperation. It is expected of a modern engineer to be able to read and write technical documentation in English, adhere to manufacturer specifications, take part in debates about international standards, and communicate with members of global project teams. However, many technical universities continue to teach English using general language textbooks and conventional, teacher-centered approaches that are not closely connected to the training profile of the students. This lowers academic motivation and the transferability of acquired language skills into professional activities.

Since ESP focuses on analysing learners' specific professional demands rather than developing generic communicative ability as such, methodological

literature has long regarded ESP as a sufficient foundation for resolving this issue. But the second, more urgent issue integrating digital technology into language instruction in a way that is methodologically sound rather than ornamental is not resolved by the ESP approach alone. A comprehensive methodological model that connects particular learning objectives, professionally authentic content, a structured learning process, and verifiable outcomes must incorporate digital tools into ESP classes in order to ensure better learning outcomes.

This article is dedicated to addressing this specific issue: it presents and experimentally verifies the methodology for forming professional English language competence in engineering students based on digital technologies and analyzes the level of integration of these technologies through the SAMR framework. The approach of developing students' professional competence in the field of English through digital technologies is the subject of the research, which focuses on the process of teaching English to students

in technical specialities at higher education institutions. In order to improve the professional competence level of engineering students in English, the study aims to develop, theoretically support, and experimentally test a methodology that integrates a specially developed digital educational ecosystem with approaches established in the methodology subject-language integrated learning (CLIL), task-oriented learning (TBLT), and gamification and to describe this methodology using the SAMR framework.

To achieve the set goal, the following research tasks were addressed: 1) to determine the structure and components of the professional English language competence of engineering students; 2) analyze the didactic potential of digital technologies applied to ESP education in a technical university; 3) develop a methodology that integrates the goal, content, process, and learning outcome into a unified system; 4) develop a digital educational ecosystem implementing this methodology and describe it through the SAMR framework.

Methodological literature views professional competence in a foreign language as an integrative education that integrates linguistic knowledge, discursive competence within a particular professional register, and the capacity to carry out communicative tasks typical of a particular professional domain. It is stressed in foundational works on ESP course design that learning should not be based on a broad language program but rather on a methodical analysis of the students' goal environment, which includes texts, genres, and communicative events they would face in their professional activities. Reading technical manuals and standards, working with instructional and regulatory documentation, taking part in project discussions, and creating technical reports and presentations are all examples of such target situations for engineering students.

Subject-Language Integrated Learning (CLIL) complements this theoretical framework by offering simultaneous instruction in language and specialized content in such a way that language becomes a means of mastering professional knowledge rather than an isolated academic discipline. Applied to a technical university, CLIL principles justify building English language instruction around authentic engineering content - technical drawings, specifications, and

practice-oriented cases - through which the development of language skills and the mastery of professional content mutually reinforce one another.

Task-oriented learning (TBLT), particularly its electronically mediated version, provides the procedural foundation for such integration. Instead of focusing on isolated grammatical structures, a task-oriented approach organizes learning around meaningful, result-oriented tasks. Technology is used to both present tasks and expand the range of authentic tasks that are available, such as working with multimedia documentation from manufacturers, simulating technical correspondence, or collaboratively solving problems using online engineering resources.

Computer language teaching (CALL) research consistently demonstrates that digital tools help learners acquire a language when they increase the amount of real language content available to them, offer opportunities for personalised practice and feedback, and support synchronous and asynchronous forms of interaction that are challenging to use in traditional classroom settings. When used with ESP, the CALL environment enables the creation of glossaries, multimedia resources, and subject-specific text corpora that enhance learning within the students' professional profile.

Lastly, studies on gamification in language education demonstrate that, as long as game mechanics are subservient to methodological goals and do not serve as an end in and of themselves, game elements—such as progression systems, instant feedback, achievement recognition, and structured complexity of tasks—can boost learning engagement and the sustainability of independent practice. These four areas ESP needs analysis, CLIL content integration, TBLT procedural organization, and CALL game-based implementation combine to form the theoretical basis of the methodology described in the article, supporting theories about the digital ecosystem as a key practical innovation. The role of the ecosystem itself in the educational process is further analyzed through the SAMR (Substitution – Augmentation – Modification – Redefinition) framework, which describes the sequential levels of technology integration into learning—from the simple replacement of traditional means to fundamentally new forms of educational activity.

The SAMR framework (Substitution – Augmentation – Modification – Redefinition) describes four sequential levels of technology integration into the educational process: replacement, where a digital tool performs the same function as a traditional one without changing the educational task itself; expansion, where the technology provides functional improvements compared to the traditional tool while maintaining the task structure; modification, where the technology allows for a significant overhaul of the educational task itself; and redefinition, where technology enables types of educational activities that are inconceivable without it. In this article, the SAMR framework is used not as a rigid model, but as an analytical tool that allows for tracking how a specially developed digital educational ecosystem advances ESP learning from simply reproducing traditional materials in digital form to fundamentally new forms of educational activity.

The ecosystem digitises previously used printed materials at the replacement level, such as engineering documentation texts, glossaries, and reading assignments, without changing the nature of the learning activity itself. At the extension level, the platform offers functional features that are not possible when using printed materials, such as tracking student progress across various competency components and providing automated feedback on completed activities. At the transformation level, the technology enables the reworking of the nature of the learning task: students engage in comprehensive, problem-solving-oriented (TBLT) activities using real engineering materials organised in accordance with CLIL principles—imitating technical correspondence and working together on case studies involving specialised online resources—instead of isolated language exercises. Finally, at the redefinition level, the digital ecosystem makes possible forms of learning activities that have no analogues in the traditional classroom—gamified scenarios with a system of progress and recognition of achievements that support students' independent practice during extracurricular time.

Together with a programmer, this digital instructional ecosystem was developed within the parameters of this study. A specialised printed and electronic study guide created for engineering students complements the platform, which integrates professionally orientated assignments, adaptive training, and tracking student

progress in a single learning environment. Technical reading, professional listening, written technical communication, and oral professional interaction are the primary components of professional English language competence. The ecosystem is designed to implement blended learning, which combines classroom sessions with autonomous, technologically mediated practice outside of classrooms. It also enables the instructor to monitor task completion and student effectiveness in these areas.

The SAMR framework, which outlines the successive stages of technology integration into learning—from replacement to redefining the learning task—is used to analyse the methodology for developing the professional competence of engineering students in English that is based on digital technologies and implemented through a specially designed digital educational ecosystem. Theoretically, the approach is based on needs analysis within ESP, content integration of CLIL, procedural organization of TBLT, and game-based implementation using CALL tools. It has the potential to improve engineering students' professional English language proficiency, though this will need to be empirically verified in future studies.

The presented methodology supports the broader methodological stance that, rather than serving as a stand-alone addition to learning, digital technologies most successfully support ESP learning when they are incorporated into a comprehensive methodological framework that makes a clear connection between educational objectives, professionally authentic content, technologically mediated processes, and quantifiable outcomes. When applied to the curricula of technical universities, this means that the use of digital ESP tools must be accompanied by a suitable revision of program content centred around professionally authentic tasks and materials, as well as methodical assessment procedures that enable the verification of learning effectiveness.

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