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INTERNATIONAL STANDARDS AND ADAPTATION OF ENGLISH LANGUAGE COURSES FOR ENGINEERING UNIVERSITIES

In the current context of globalization and international cooperation, proficiency in English is an essential component of professional training for engineering students. The study's relevance is due to the existing gap between international standards of English language teaching and traditional courses for engineering universities, which limits effective communication of students in professional and academic contexts.

The study aims to analyze and justify ways of adapting English language courses for engineering universities in accordance with international standards (CEFR, ABET, ISO) aimed at developing students' linguistic and professional competence.

The methods included analysis of scientific sources and foreign practices of teaching English for engineers (ESP), comparison of traditional and adapted courses, and a description of practical techniques: integration of technical cases, project-oriented learning, role-playing games, discussions, and the use of digital platforms.

The study results demonstrate that adapted ESP courses contribute to the development of technical terminology, documentation skills, presentation and discussion competencies, and team interaction in an international professional environment. Using interactive and gamified methods increases student motivation and knowledge acquisition's effectiveness in real professional situations.

The conclusions are that introducing international standards into English language courses for engineering universities is strategically important for improving the level of education, developing practical skills, and ensuring students' competitiveness in the global labor market. Adapted courses allow Ukrainian engineers to integrate into the international scientific and technical space and participate in joint academic and professional projects.

KEYWORDS: *English for Specialized Purposes (ESP), engineering universities, international standards, CEFR, ABET, adapted courses, technical terminology, project-based learning, digital platforms.*

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Problem statement

In the current context of globalization and active international cooperation, knowledge of foreign languages, especially English, is becoming an essential component of professional training for engineers. Students of technical specialties are increasingly involved in international projects, academic mobility, and cooperation with foreign companies, which requires a high level of foreign language proficiency.

At the same time, there is a significant gap between international standards for teaching English and the traditional courses offered at engineering universities. Most of these courses focus on general language and grammar exercises and do not consider the specifics of professional communication, technical terminology, and practical tasks that future engineers need in an international professional environment.

For Ukraine, the relevance of adapting English language courses for engineering universities is becoming particularly urgent in the current environment. Following the country's increased integration into the European and global scientific and technical space, Ukrainian students increasingly participate in international projects, exchange programs, and internships at foreign universities and companies. A high level of English proficiency is essential for effective communication, understanding technical documentation and standardized instructions, and participating in joint engineering projects.

It is particularly relevant in the context of reforms in the higher education system, which emphasize a competency-based approach and the development of practical skills, rather than just theoretical knowledge. In addition, the current situation in Ukraine, which is associated with socio-political and economic challenges, encourages students to gain competitive advantages in the international labor market. Engineers proficient in English and with skills adapted to their specialty have a better chance of successful professional realization and integration into the global scientific and technical community.

Thus, developing English language courses adapted to the needs of engineering students is strategically important for improving the level of education, competitiveness of specialists, and development of the national engineering industry.

The purpose of this article is to explore ways to adapt English language courses for engineering universities in accordance with international standards. The research objectives include: analyzing international requirements for language training for engineers, identifying the specifics of English for technical specialties, and assessing the possibilities of integrating modern teaching methods and digital platforms to improve the effectiveness of courses.

The methods included analysis of scientific sources and foreign practices of teaching English for engineers (ESP), comparison of traditional and adapted courses, as well as a description of practical techniques: integration of technical cases, project-oriented learning, role-playing games, discussions, and the use of digital platforms.

Results

English language teaching in higher education institutions of engineering profile should be guided by international standards that define the level of language competence and expected learning outcomes. One of the most common standards is the CEFR (Common European Framework of Reference for Languages), which establishes six levels of language proficiency from A1 to C2 and describes competencies in all language aspects: reading, writing, listening, and speaking. For engineering students who plan to participate in international projects or academic exchanges, it is usually recommended to achieve a level of B2–C1, which allows them to work effectively with technical documentation and professional communication [4,7].

In addition to the CEFR, there are professional accreditation standards, such as ABET (Accreditation Board for Engineering and Technology), which provide for the development of professional communication as a component of an engineer's competencies. This means that students must not only know general English, but also have specialized

terminology, project presentation skills, and teamwork skills in an international context.

Another important aspect is the ISO standards for technical documentation, which regulate the structure and language of technical descriptions, instructions, and project documentation. Students who learn English in accordance with these standards gain the practical skills necessary to work with international projects and equipment.

For Ukraine, the integration of these international standards into educational courses is particularly relevant. It allows students to prepare for participation in exchange programs, internships in foreign companies, and joint international research projects, as well as ensuring their competitiveness in the global labor market. Adapting courses to international standards involves not only improving language skills, but also integrating professional vocabulary, project work, and team tasks, which brings learning closer to the real conditions of engineering practice.

Thus, taking international standards into account in English language teaching creates the basis for systematic, effective, and practice-oriented training of engineering students in Ukraine.

English for Engineers (ESP) is characterized by a high concentration of technical terminology and professional vocabulary, which are necessary for understanding and creating technical documents. Studies show that students often seek help not only with architectural terminology, but also with general scientific and academic vocabulary, which indicates the importance of developing general language skills in the context of ESP [10]. Other studies emphasize the importance of developing technical vocabulary for engineering students, as it contributes to a better understanding of technical texts and effective communication in a professional environment [14,6]. ESP training for engineers should be focused on the practical application of language, including working with technical texts such as instructions, reports, drawings, and other documentation. Research shows that existing training programs do not always meet the language needs of engineering students, particularly in aspects related to technical texts [3]. Other studies emphasize the importance of integrating technical writing into ESP training programs for engineers, as it contributes to the development of technical writing skills that are necessary in the professional activities of an engineer [5,2].

Participation in international projects and internships requires students to have a high level of communication skills. Studies show that engineering students need to develop their reading, writing, listening, and speaking skills to participate effectively in academic and professional contexts [8,9]. Other studies emphasize the importance of developing communication skills for engineering students, as this contributes to their ability to interact effectively in international projects and internships [11].

Adapting English courses for engineering students involves using methods that bring learning as close as possible to real professional practice. One effective approach is to integrate technical case studies that allow students to apply their language knowledge in the context of specific engineering situations. For example, a case study may include analyzing a technical problem, writing a report in English, or discussing possible solutions in a team, which contributes to the development of both language and professional competence.

Project-based learning also allows students to perform complex tasks, combining work with technical documentation, drawings, and presentations in English. This approach encourages teamwork, critical thinking, and argumentation skills, preparing students for participation in international projects and internships.

Role-playing games and discussions on technical topics help simulate real professional situations. For example, a “project presentation” or “interview with an engineer” creates an environment for practicing specialized vocabulary and professional communication, while discussions promote the development of critical thinking and collective decision-making skills.

Active use of digital platforms and online resources ensures the interactivity of the learning process. Quizzes, polls, collective boards, and interactive maps allow for instant feedback, stimulate competition and collaboration, and facilitate distance learning, which is especially relevant in today's academic mobility environment.

Redesigning courses in accordance with international standards involves combining all

of these methods. For example, an English language course for engineers could be structured as follows: integration of technical case studies into each lecture (e.g., analysis of a problem in a ventilation system or optimization of a bridge design with a description of materials in English), completing projects in teams using online tools (creating joint technical presentations in Miro or Padlet, developing English-language reports based on laboratory work), regular role-playing games to practice presentations and discussions (e.g., "interview with an engineer," where one student presents a new technology, and others ask professional questions in English), as well as a system of assessment through points, levels, and awards to increase motivation (using Kahoot to test knowledge of terminology and create leaderboards for team projects). This approach ensures that the course meets CEFR standards and ABET professional requirements, preparing students for international academic and professional challenges. In addition, the integration of simulations of real-life work situations, such as modeling an international engineering team meeting to discuss production processes, helps students develop both professional communication and critical thinking skills.

The English language course for engineers, adapted to the international CEFR and ABET standards, combines interactive methods, gamification, and practical tasks. One of the key aspects is mastering technical terminology. To this end, students complete tasks to learn English terms in the fields of materials science, mechanics, and electronics using online quizzes on Kahoot! or flashcards on Quizlet. Such interactive exercises allow students to quickly reinforce professional vocabulary and stimulate healthy competition among students.

Working with technical documentation is an important part of the course. Students analyze English-language instructions, drawings, and specifications, prepare translations and explanations, and discuss the results on the Padlet platform. This allows them to combine the development of reading and comprehension skills for technical texts with teamwork.

Great attention is paid to preparing and delivering presentations. For example, students prepare an English-language presentation of a new device or design using diagrams and charts in Miro, and then present them in class in the format of a role-playing game called "Project Presentation." The audience asks clarifying questions, simulating real professional discussions, which develops oral speech and presentation skills.

Discussions and debates on technical topics allow students to develop critical thinking and argumentation. They discuss the advantages of different materials, optimal production technologies, or energy-saving methods, using professional vocabulary in English. Online tools such as Mentimeter help organize voting and surveys during discussions, encouraging active participation from each student [12].

Project-based learning is the basis for integrating language skills with professional tasks. Students jointly develop prototypes, create English-language reports, prepare technical documents, and presentations for team projects. Such tasks not only develop language skills but also form teamwork and professional communication skills in an international environment.

Gamification is used to increase motivation and engagement. Students take quizzes on the Kahoot! and Quizizz platforms, earn points, badges, and levels, which motivates them to achieve better results. Competition between teams enhances interactivity, and joint tasks stimulate cooperation and the development of communication skills.

Simulations of real professional situations create conditions for the practical application of knowledge. For example, students participate in simulating a working meeting of an international engineering team, where they discuss the optimization of production processes or the solution of technical problems. The online platforms Padlet and Miro allow students to develop diagrams and plans, while role-playing games train presentation and negotiation skills in English [15].

The integration of all these methods — interactive, gamified, and project-oriented — provides comprehensive training that meets international standards and prepares students to participate in real international projects, internships, and professional activities in a global engineering environment.

Let's present a detailed version with specific tasks and instructions for each module

of the English language course for engineering majors

1. Module “Technical Terminology and Vocabulary.” Task: create a personal database of terms from materials science, mechanics, and electronics.

Methods: use Quizlet for flashcards with technical terms and definitions; weekly quizzes on Kahoot! to reinforce terminology. Example task: Students receive a list of 20 new terms related to engine parts. They need to correctly match the term with the definition in Quizlet and take a quiz on Kahoot! for team ranking.

2. Module “Working with technical documentation.” Task: analyze English-language instructions and drawings, compile a short technical description.

Methods: use Padlet to collectively post translations and explanations of technical texts. Project work: prepare a short English-language instruction for a laboratory experiment or model. Example task: Students receive English-language instructions for assembling a mechanism. They need to translate the key steps, explain the functions of the parts, and post them on a shared Padlet board for discussion with the group.

3. Module “Presentations and Role-playing Games.” Task: prepare presentations on technical projects, practice negotiations and speeches. Methods: Role-play “Project Presentation”: a student presents an engineering project in English to an audience that asks clarifying questions; role-play “Interview with an Engineer”: one student is an engineer; another is a colleague or journalist who asks professional questions.

Example task: A group of students prepares a presentation of a new drone prototype. One student presents the technical characteristics, while others ask questions about materials, energy consumption, and optimization.

4. Module “Discussions and Debates on Technical Topics.” The task is to discuss professional issues and make decisions as a team.

Methods: discussions using Mentimeter for voting and surveys; debates “for and against” the choice of technology or material.

Example task: Students debate which material is better to use for the body of a robotic device: aluminum or plastic. Each team prepares arguments in English and gives examples of the material's use in industry.

5. Module “Project-based learning.” Task: develop an English-language project as a team, including preparation of documentation and a presentation.

Methods: use Miro to develop diagrams, technical charts, and project planning; prepare reports, presentations, and technical documentation in English.

Example task: A group of students develops a prototype of an automated device. They compile technical documentation in English, draw diagrams on Miro, and prepare a presentation for demonstration in class or online.

6. Gamification and Motivation module. Task: to introduce game elements to stimulate learning. Methods: use of points, levels, and badges to evaluate participation in quizzes, assignments, and projects; creation of team and student leaderboards. Example task: Students receive points for each successful quiz or presentation. The teams that score the most points during the month receive a “gold badge.”

The further development of adapted English courses for engineering students involves the systematic combination of technologies, innovative methods, and international standards. First, the role of digital platforms and virtual environments for modeling professional situations is growing. Using the tools such as VR simulations of engineering laboratories, interactive online laboratories, and platforms for teamwork allows students to practice practical skills in a safe and realistic context; using gamification is expected to expand to increase student motivation and engagement. For example, point systems, levels, and rewards can be integrated not only to assess knowledge but also to encourage active participation in team projects, technical debates, and simulations of international negotiations.

The promising area is the development of interdisciplinary courses that combine English language learning with professional engineering competencies. These could be courses that simultaneously cover technical cases, ISO standards, international technical documents, and project documentation, allowing students to comprehensively prepare for international challenges in their professional activities.

In addition, it is important to develop a system for training teachers, ensuring their

competence in the use of innovative teaching methods, interactive platforms, and the adaptation of courses to international standards. Cooperation with international partners, exchange of experience, and participation in professional development programs will help maintain the relevance and effectiveness of courses.

Given the processes of globalization, Ukraine's integration into the European educational space, and the growing need for international professional communication, adapted English language courses are becoming a key element in the training of competitive engineers. The further development of such courses will contribute to improving the quality of education, developing practical skills, and preparing students to participate in international projects and academic exchanges.

Conclusions and prospects for further research

In the current context of globalization and the development of international cooperation, English is an integral part of the professional training of engineers. An analysis of international standards, such as CEFR and ABET, shows that successful student participation in international projects, academic exchanges, and professional activities requires language proficiency at a level not lower than B2–C1 and the ability to apply technical terminology in a professional context.

Research shows that traditional English language courses do not always take into account the specifics of the engineering profession and the needs of students in working with technical documentation, projects, and team interaction. The introduction of adapted ESP courses that integrate technical case studies, project-based learning, role-playing, discussions, and digital platforms ensures the comprehensive development of students' language and professional competencies.

The redesign of courses using interactive platforms, gamification, and simulations of real professional situations stimulates students' motivation, activity, and practical training. This approach develops technical writing, presentation, teamwork, and communication skills in an international environment, which meets the current requirements of the global labor market.

For Ukraine, the integration of international standards into the curricula of engineering universities is particularly relevant. It contributes to increasing the competitiveness of students, developing their practical skills, readiness to participate in international projects and academic exchanges, and forms the foundation for further improvement of the national engineering education system.

Thus, adapted English courses for engineers not only improve language proficiency, but also provide practical training, meet international standards, and promote the integration of Ukrainian students into the global scientific and technical space.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this manuscript. Furthermore, the author has fully adhered to ethical standards, including those related to plagiarism, data falsification, and duplicate publication.

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МІЖНАРОДНІ СТАНДАРТИ ТА АДАПТАЦІЯ КУРСІВ АНГЛІЙСЬКОЇ МОВИ ДЛЯ ІНЖЕНЕРНИХ УНІВЕРСИТЕТІВ

У сучасних умовах глобалізації та розвитку міжнародної співпраці володіння англійською мовою є необхідною складовою професійної підготовки студентів інженерних спеціальностей. Актуальність дослідження обумовлена існуючим розривом між міжнародними стандартами викладання англійської мови та традиційними курсами для інженерних університетів, що обмежує ефективну комунікацію студентів у професійному та академічному контекстах.

Метою дослідження є аналіз та обґрунтування шляхів адаптації курсів англійської мови для інженерних університетів відповідно до міжнародних стандартів (CEFR, ABET, ISO), спрямованих на формування мовної та професійної компетентності студентів.

Методи включали аналіз наукових джерел та зарубіжних практик викладання англійської мови для інженерів (ESP), порівняння традиційних та адаптованих курсів, а також опис практичних методик: інтеграція технічних кейсів, проєктно-орієнтоване навчання, рольові ігри, дискусії, використання цифрових платформ.

Результати дослідження демонструють, що адаптовані курси ESP сприяють розвитку технічної термінології, навичок роботи з документацією, презентаційних та дискусійних компетенцій, а також командної взаємодії в міжнародному професійному середовищі. Використання інтерактивних та гейміфікованих методів підвищує мотивацію студентів і ефективність засвоєння знань у контексті реальних професійних ситуацій.

Висновки полягають у тому, що впровадження міжнародних стандартів у курси англійської мови для інженерних університетів є стратегічно важливим для підвищення рівня освіти, формування практичних навичок та забезпечення конкурентоспроможності студентів на глобальному ринку праці. Адаптовані курси дозволяють українським інженерам інтегруватися в міжнародний науково-технічний простір і брати участь у спільних академічних та професійних проєктах.

КЛЮЧОВІ СЛОВА: *англійська мова для спеціалістів (ESP), інженерні університети, міжнародні стандарти, CEFR, ABET, адаптовані курси, технічна термінологія, проєктно-орієнтоване навчання, цифрові платформи.*

Конфлікт інтересів

Автор заявляє, що конфлікту інтересів щодо публікації цього рукопису немає. Крім того, автор повністю дотримувався етичних норм, включаючи плагіат, фальсифікацію даних та подвійну публікацію.

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