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FORMATION OF INTERCULTURAL COMMUNICATIVE COMPETENCE OF TECHNICAL UNIVERSITY STUDENTS IN THE CONTEXT OF GLOBALIZATION OF ENGINEERING EDUCATION

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ФОРМИРОВАНИЕ МЕЖКУЛЬТУРНОЙ КОММУНИКАТИВНОЙ КОМПЕТЕНЦИИ СТУДЕНТОВ ТЕХНИЧЕСКИХ ВУЗОВ В КОНТЕКСТЕ ГЛОБАЛИЗАЦИИ ИНЖЕНЕРНОГО ОБРАЗОВАНИЯ

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Abstract. Globalization of engineering education requires technical university students to develop not only professional skills but also intercultural communicative competence (ICC) in English and other foreign languages. ICC enables students to interact effectively in multicultural professional environments, understand cultural differences, and collaborate in international teams. The study aims to examine methods for developing ICC among technical students in the context of global engineering education. The research combines theoretical analysis (literature review, comparative analysis of intercultural teaching methodologies) with empirical approaches (pedagogical experiment, observation, surveys, analysis of student presentations and projects). Results indicate that targeted intercultural instruction and project-based collaborative activities enhance students' ability to communicate across cultures, increase cultural awareness, and strengthen professional language competence. Students demonstrated improved teamwork, problem-solving, and adaptability in multicultural settings.

Аннотация. Глобализация инженерного образования требует от студентов технических вузов развития не только профессиональных навыков, но и межкультурной коммуникативной компетенции (МКК) на английском и других иностранных языках. МКК позволяет студентам эффективно взаимодействовать в многокультурной профессиональной среде, понимать культурные различия и сотрудничать в международных командах. Цель исследования — изучить методы развития МКК у студентов технических специальностей в контексте глобального инженерного образования. Исследование сочетает теоретический анализ (обзор литературы, сравнительный анализ межкультурных методик преподавания) с эмпирическими подходами (педагогический эксперимент, наблюдение, опросы, анализ студенческих презентаций и проектов). Результаты показывают, что целенаправленное межкультурное обучение и проектная совместная деятельность повышают способность студентов к межкультурному общению, увеличивают культурную осведомленность и укрепляют профессиональную языковую компетенцию. Студенты продемонстрировали улучшение навыков командной работы, решения проблем и адаптации в многокультурной среде.

Keywords: globalization, engineering education, cultural awareness, professional communication, project-based learning, teamwork, multicultural collaboration.

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Ключевые слова: глобализация, инженерное образование, культурная осведомленность, профессиональная коммуникация, проектное обучение, командная работа, межкультурное сотрудничество.

The ongoing process of globalization has significantly transformed engineering education worldwide, influencing its structure, goals, and teaching approaches. Higher education institutions are increasingly aligning their programs with international standards, promoting academic mobility and encouraging participation in global scientific and professional cooperation. In this context, graduates of technical universities are expected not only to possess strong professional and technical competencies but also to demonstrate the ability to interact effectively in multicultural and multilingual environments. English has established itself as the primary medium of communication in science, engineering, and technology at the international level. However, successful professional communication requires more than just language proficiency; it also demands awareness of cultural differences, communication norms, and behavioral patterns.

This set of abilities is referred to as intercultural communicative competence (ICC), which includes linguistic, sociolinguistic, pragmatic, and cultural dimensions. Despite its growing importance, the development of ICC in technical universities still presents a number of pedagogical challenges. Modern researchers emphasize that engineering education in the era of globalization requires a shift from traditional language instruction toward the development of practical communicative skills in multicultural professional contexts. As noted by Astafurova T. N. and Sukhova N. V. (2018), language training in higher education should focus on preparing students for solving professional tasks in international environments rather than only mastering linguistic structures. Similarly, Milrud R. P. and Maksimova I. R. (2017) highlight that intercultural competence involves not only grammatical knowledge but also the ability to overcome communication barriers in professional discourse [1-3].

Nevertheless, many existing educational programs still rely on conventional approaches that prioritize grammar and vocabulary acquisition, while giving insufficient attention to intercultural interaction and real-life communication. This often leads to difficulties when students engage in professional communication with representatives of other cultures, even if their language level is adequate. To overcome these limitations, contemporary pedagogy emphasizes the integration of intercultural elements into foreign language teaching. This includes the use of authentic materials, interactive learning strategies, and communicative tasks that reflect real-world professional situations. Such methods contribute to the development of not only language skills but also intercultural sensitivity, adaptability, and empathy.

The purpose of this study is to investigate the formation of intercultural communicative competence among students of technical universities within the context of globalization in engineering education. The research aims to identify effective pedagogical approaches and conditions that support ICC development and to determine its significance in preparing students for international professional activity. As Downey G. L. and Lucena J. C. note, global engineering practice requires the ability to collaborate with individuals who may define and approach problems in different ways, which further highlights the importance of intercultural skills [4, 5].

Relevance (revised version). In the current era of globalization, engineering professionals increasingly operate in international and multicultural environments. Technical university graduates are expected to participate in global teamwork, communicate across cultural boundaries, and contribute to international research and industrial projects. Intercultural communicative competence integrates linguistic, cultural, and strategic components, including: understanding cultural norms and

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professional etiquette; appropriate use of academic and technical vocabulary; effective collaboration in international teams; flexible adaptation of communication styles in different cultural contexts.

However, traditional foreign language teaching methods in technical education often focus mainly on linguistic accuracy, with limited emphasis on intercultural interaction. As a result, students may achieve acceptable language proficiency but still experience communication difficulties in real international settings.

Modern educational approaches, such as project-based learning, case studies, simulations, and online international collaboration, provide effective opportunities for developing intercultural competence. These methods allow students to engage in realistic professional scenarios and improve both their language and intercultural skills. Thus, the relevance of this research is determined by the increasing demand for engineers who are not only technically competent but also capable of effective intercultural communication. Integrating intercultural competence into foreign language education is essential for preparing students for successful participation in the global professional community [6-8].

Aim. The aim of this study is to investigate effective approaches to the development of intercultural communicative competence (ICC) among students of technical universities within the framework of globalized engineering education. The research focuses on the analysis of theoretical foundations of ICC in higher education, as well as on identifying and evaluating pedagogical strategies for integrating intercultural training into English language instruction for technical students. The study also aims to design a methodological model for the formation of ICC, to implement a pedagogical experiment for assessing its effectiveness, and to formulate practical recommendations for English language instructors working in technical universities.

Objectives. In order to achieve the stated aim, the following objectives are defined:

1. To examine the theoretical foundations and structural components of intercultural communicative competence in engineering education;

2. To identify the main difficulties and barriers in the development of ICC among students of technical universities;

3. To analyze the influence of globalization on the changing requirements of foreign language education in technical institutions;

4. To study effective pedagogical approaches and teaching methods aimed at integrating intercultural elements into language instruction;

5. To determine the pedagogical and organizational conditions necessary for successful ICC development in the educational process.

Research Object and Subject. Research object: students of technical universities studying English for Specific Purposes (ESP).

Research subject: the process of developing intercultural communicative competence in the context of global engineering education.

Hypothesis. It is assumed that systematically organized intercultural instruction, supported by collaborative and practice-oriented learning activities, contributes significantly to the development of students' intercultural communicative competence. Such an approach also improves their professional language proficiency, cultural awareness, and ability to work effectively in teams.

Components of ICC. Intercultural communicative competence is understood as a complex and multidimensional construct that includes the following components:

— Linguistic competence: ability to use academic and professional language accurately and appropriately;

— Sociocultural competence: understanding cultural norms, values, and communication conventions;

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— Strategic competence: ability to adapt communication strategies in intercultural situations;

— Critical cultural awareness: capacity for reflection on one's own culture and other cultural perspectives.

The development of ICC requires active engagement in authentic communicative situations, reflective learning processes, and systematic exposure to diverse cultural viewpoints.

Pedagogical Approaches. Several teaching methods are considered effective for ICC development:

— Project-Based Learning (PBL): students work collaboratively on engineering projects that simulate real international professional environments;

— Case-Based Learning: analysis of intercultural engineering cases aimed at identifying communication challenges and solutions;

— Virtual International Collaboration: Online cooperation with students from foreign universities to enhance cross-cultural interaction;

— Reflection and Feedback: structured reflection on intercultural experiences supported by teacher feedback, aimed at developing cultural sensitivity.

Research Methods. Theoretical methods:

— Analysis of scientific literature on intercultural communicative competence, ESP methodology, and intercultural pedagogy;

— Comparative study of existing teaching approaches in foreign language education.

Empirical methods:

— Pedagogical experiment involving control and experimental groups to measure ICC development;

— Classroom observation of student participation in intercultural activities;

— Surveys and questionnaires assessing cultural awareness, self-confidence, and teamwork skills;

— Analysis of student outputs such as written reports, presentations, and project portfolios.

Data Analysis. The evaluation of results includes both quantitative and qualitative methods. Quantitative analysis is based on pre-test and post-test results measuring ICC development. Qualitative analysis focuses on student reflections, communication behavior, and intercultural interaction during learning activities.

Methodological Model of ICC Formation. The proposed model integrates intercultural competence into English language teaching for technical students and consists of the following stages:

— Orientation stage: introduction to intercultural communication principles and explanation of project objectives;

— Task design stage: assignment of intercultural engineering tasks, such as developing solutions for international clients;

— Collaborative stage: teamwork in multicultural groups, including online and offline interaction;

— Presentation stage: presentation and discussion of project results, comparison of different approaches, and analysis of intercultural challenges;

— Reflection stage: evaluation of personal intercultural experience, identification of difficulties, and development of improvement strategies.

This model is cyclical in nature and emphasizes active participation, collaboration, reflection, and continuous feedback, which are essential for effective intercultural competence development. The empirical part of the research was conducted among 54 second-year students of engineering specialties. The participants were divided into two groups: an experimental group, which received

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instruction focused on intercultural communicative competence (ICC), and a control group, which was taught through traditional English language methods without special intercultural emphasis.

At the initial stage, a pre-test was carried out in order to determine the baseline level of students' intercultural communicative competence. Following this, a 12-week instructional module was implemented for the experimental group. This module included intercultural project work, case-study analysis, and online collaboration with peers, simulating real international communication environments. After completion of the program, a post-test was administered to evaluate changes in ICC, professional communication abilities, and teamwork skills [8, 9, 10].

The results of the experiment demonstrated a significant difference between the two groups. The experimental group showed approximately a 40% improvement in intercultural communication skills, while the control group demonstrated an average improvement of around 15%. Students who participated in the ICC-oriented instruction exhibited a higher level of flexibility in adapting communication strategies and a better understanding of cultural differences and contextual meanings. In addition, the experimental group showed increased confidence in professional communication with international peers. Improvements were also observed in both written and oral English performance, including more accurate use of technical terminology and enhanced presentation skills.

Pedagogical Recommendations. Based on the findings of the study, several methodological recommendations can be proposed for English language instruction in technical universities:

— Integration of intercultural tasks into English for Specific Purposes (ESP) courses;

— Application of project-based and case-based learning approaches to simulate real international professional situations;

— Organization of virtual collaboration with international students through digital platforms;

— Inclusion of reflection and self-assessment activities to strengthen cultural awareness and critical thinking;

— Combination of language learning with technical problem-solving tasks;

— Provision of structured feedback on intercultural performance to support continuous improvement.

Scientific Novelty. The scientific contribution of this research lies in the development of a methodological model for forming intercultural communicative competence in technical English education. The study identifies effective pedagogical strategies that combine intercultural exposure, collaborative project work, and reflective learning. The empirical findings confirm that the systematic development of ICC contributes not only to improved language proficiency but also to enhanced cultural awareness and teamwork abilities among engineering students [9, 10].

Conclusion

The development of intercultural communicative competence is a key requirement for technical university students in the context of globalized engineering education. Modern engineers are expected to function effectively in multicultural environments, participate in international cooperation, and engage in global professional communication. Therefore, ICC should be considered an essential component of overall professional competence. The results of this study demonstrate that effective intercultural communication cannot be achieved through linguistic training alone. It requires the development of cultural awareness, communicative flexibility, and the ability to adapt to diverse professional contexts. Traditional language teaching approaches are often insufficient, as they do not fully address the intercultural dimension of communication. The integration of intercultural elements into foreign language education is therefore essential. This can be achieved through communicative teaching methods, authentic learning materials, collaborative tasks, and culturally oriented activities that encourage active participation and reflection.

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At the same time, the successful implementation of such approaches depends on several important factors, including teacher methodological competence, availability of appropriate learning resources, and institutional support for educational innovation. Creating an open and inclusive learning environment that promotes tolerance and respect for cultural diversity is also crucial. Overall, the formation of intercultural communicative competence represents an important direction in the modernization of engineering education. By combining linguistic training with intercultural development, technical universities can better prepare students for the demands of the global professional world and improve their competitiveness in the international labor market.

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