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Interdisciplinary ESP course design for tertiary engineering students using professionally oriented situations

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ABSTRACT

This research article presents results of an educational experiment based on applying an English for Specific Purposes (ESP) course tailored for university engineering majors using professionally oriented situational tasks. The distinguishing feature of the course is its interdisciplinary nature. It is not limited to one particular field of engineering but comprises various engineering topics suitable for different technical specialties. The study aimed at identifying the commonly encountered workplace situations in which engineers from various subindustries need to apply English, modelling situational tasks integrated in a multi-disciplinary engineering ESP course, and testing the pedagogical effectiveness of the designed model. The experiment was carried out at one of the best technical universities in Kazakhstan, Satbayev University. It encompassed 60 first-year bachelor students majoring in different engineering specialties, including 30 students from an experiential group. A mixed-methods approach based on both qualitative and quantitative methods was exploited that comprised review and investigation of literature, needs analysis questionnaire among alumni of technical universities, evaluation and adaptation of existing ESP coursebooks, didactic modelling, pedagogical experiment, and comparative analysis and mathematical statistics. The findings show superior efficiency of the suggested interdisciplinary Engineering ESP course over a traditional Professional English course.

Keywords: ESP course design, professionally oriented situations, English for engineers, curriculum development, needs analysis

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INTRODUCTION

In the era of continued globalization, internationalization, and technological development, there is a growing need for qualified engineers capable of communicating effectively in English while fulfilling their professional responsibilities. In order to meet this demand, technical universities worldwide are concerned about developing and offering not only English for General Purposes (EGP), but more importantly, effective courses of English for Specific Purposes ESP) fulfilling the needs of engineering students.

The concept of ESP (English for Specific Purposes) emerged in the late 1960s because of the world's rapid advancements in technical, scientific and economic fields when technological and commercial developments necessitated an international language (Hutchinson & Waters, 1987). According to Hutchinson and Waters (1987), at that time, learners' needs for ma stering a foreign language shifted from personal enrichment and social prestige to achieving targeted

objectives related to professional and academic contexts. In the early 1970s linguists observed a greater expansion of ESP, when different subbranches started to be investigated, with "English for Science and Technology" receiving particular attention (Hutchinson & Waters, 1987). Thus, over 60 years have passed to the present moment since the inception of ESP as a branch of English Language Teaching (ELT).

Widdowson (1997) even argues that ESP holds a greater status than just a subdivision of ELT, stating that ESP should be considered as "English as an international language" (henceforth, EIL), because ESP has made a significant contribution to establishing global political, economic, social, and technological links. "And otherwise, there would, for most people, be little point in learning it at school or university" (Widdowson, 1997).

Considering the status of English as a lingua franca, it is assumed that mastering ESP facilitates communication not only with native speakers but also with international professionals from diverse (Csizér, 2012). Good mastery of ESP equips future and acting engineers with productive (speaking and writing) and receptive (listening and reading) language skills necessary for effective cross-cultural communication in professional contexts.

At present, ESP has many specializations originating from its main branches and sub-branches. Hutchison & Waters (1987) have categorized this specialization in a model known as "the tree of ELT", which outlines three main topical areas (English for Science and Technology, English for Business and Economics and English for Social Sciences) distributed among two types of functional branches: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP). Since then, due to the increasingly diverse demand of stakeholders from various disciplines and industries, many sub-branches have evolved (Dou et al., 2023). For instance, learners can now pursue English for tourism and hospitality, English for pilots, English for surgeons, and other field-specific variants.

Among the versatile selection of ESP, there are various courses related to Engineering subareas, e.g., English for IT, English for Oilmen, English for Metallurgy, etc. This had been the case for Satbayev University as well, as per September 2023, ESP had been taught in a form of a few distinct industry-specific disciplines, named as "Professional English for Biochemical Engineering", "Professional English for Construction", "Professional English for IT", "Professional English for Petroleum Engineering and Geology", "Professional English for Architecture" and "Professional English for Power Engineering". However, for most of the time, English for some of the specialties had not been taught at all because there were a small number of students enrolled. As stated by Kovačević (2023), launching groups with a disproportional number of students is not usually considered reasonable by big faculties of large universities in terms of resource distribution (teaching staff and offices), and the case of Satbayev University was the exact example of this situation.

Moreover, while teaching selected sub-branches of Engineering ESP at Satbayev University, traditional pedagogical methodology was employed, comprising mostly the Grammar-Translation method, which primarily focused on rote memorization of vocabulary and grammatical structures without their proper practical application. The emphasis was placed on reading and translating various technical texts, and a predominantly deductive approach was favoured over inductive learning activities. Considering the mentioned problematic factors, which in turn constitute the topicality of the research, the authors of this article have come to the idea of developing an interdisciplinary ESP course that would cover various engineering topics common to all the engineering programmes taught at the university.

Following a more communicative and learner-centered approach, a combination of task-based language teaching (TBLT), Problem-Based (henceforth, PBL), and Project-Based learning (PjBL) approaches has been chosen as the underlying methodology of the new course. Hence, the aim of the research was defined as follows: based on preliminary needs analysis among technical university alumni, to design an efficient interdisciplinary ESP course for tertiary engineering students using professionally oriented situational tasks. To achieve this aim, relevant and attainable objectives were formulated: 1) to conduct a needs analysis among technical university alumni to identify relevant topics for inclusion in the course modules; 2) to model situational tasks for technical students of Satbayev University within the selected topical modules and incorporate them

in an interdisciplinary engineering ESP course; 3) to examine the effectiveness of the suggested ESP course featuring integrated situational assignments in developing engineering students' foreign language communicative competence by designing and carrying out a pedagogical experiment.

This article presents both the theoretical and empirical findings of the research, which are expected to make a meaningful contribution to the field of ESP, particularly in advancing engineering foreign language education in Kazakhstan and beyond.

METHOD

The study's multifaceted nature necessitated the use of appropriate research methods, namely: literature review and analysis; analytical review of the existing engineering ESP coursebooks; didactic modelling of situational tasks and the ESP course; pedagogical experiment (causal research design); and descriptive and exploratory surveys.

The existing literature on ESP course design and the methodological elaboration and application of professionally oriented situations for forming the technical students' foreign language communicative competence has been reviewed and analyzed in order to define the underlying theoretical and practical dimensions.

In parallel, an online questionnaire was developed in Google Forms for the purpose of conducting a needs analysis, which was distributed among master's students of Satbayev University. Collaboration with technical university graduates was chosen for the needs analysis in accordance with Nurmetov, Siswantoyo, Bakić-Mirić, & Chaklikova (2023), who state that alumni's responses are the most facilitative as they might have had experience of target language application in real workplaces, both local and overseas. Overall, 104 master's students participated in the survey: 68 graduates of Satbayev University (65.4% of the respondents) and 36 graduates of other technical universities (34.6% of the respondents). The latter were the alumni of both local and foreign universities. The questionnaire embraced descriptive and exploratory questions about the respondents' engineering experience, their preferred type of ESP course, topics they would suggest including in it, their intercultural awareness, and recommendations on methodology for teaching the interdisciplinary engineering ESP course.

Likewise, there were questions for identifying what situations the responding engineers encounter in their workplaces that require the ability of listening, reading, writing and speaking in English. Although these were multiple choice questions with some proposed options, the respondents had the opportunity to add their own ideas under the option "Other".

The collected data was subjected to descriptive statistical analysis to facilitate the presentation of findings. Further on, based on the theoretical and practical findings, an interdisciplinary ESP course with situational assignments on engineering topics was didactically modelled. In order to ensure the authenticity of the modelled professionally oriented situations, assignments were adapted from the materials of various existing ESP coursebooks issued for different technical and engineering specialties by reputable publishers like Oxford University Press, Cambridge University Press, Pearson, and Macmillan.

In order to test the educational effectiveness of the proposed methodological model and ESP course, a pedagogical experiment was designed and systematically implemented. The experiment was carried out in the autumn semester of the 2023-2024 academic year. It involved four groups of 1st year baccalaureate students majoring in different engineering specialties of Satbayev University: two control groups (henceforth, CGs) totaling in 30 students and two experimental groups (henceforth, EGs) with the same total number of prospective bachelors (n = 30). To compare the effectiveness of teaching methodologies in the CGs and the EGs, all marks obtained by the students for the pre-test and post-test were statistically compared and analyzed.

FINDINGS AND DISCUSSION

Findings

Results of the needs analysis among alumni of technical universities

The survey involded 104 alumni from various technical universities, representing a diverse range of engineering sub-diciplines, as illustrated in Figure 1. Specifically, 26% of respondents

specialized in the field of Information Technology (27 respondents), 15.40% in Architecture and Construction (16 respondents), 13.50% in Oil & Gas Engineering, 12.50% in Geological Engineering. The remaining 32.70% had a variety of other engineering subfields, including Metallurgical Engineering, Chemical Engineering, Mechanical Engineering, etc.

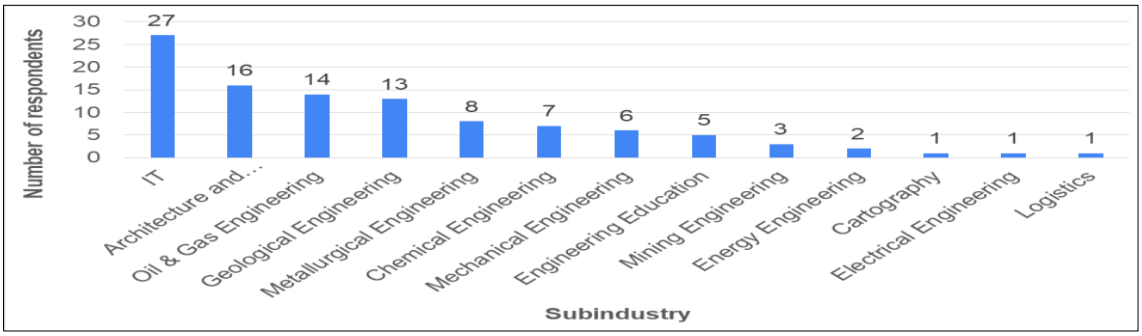

Figure 1. Subindustry distribution among the surveyed alumni

As shown in Figure 2, most of the engineering professionals in the sample expressed a preference for an interdisciplinary Professional English course comprising various engineering topics of different subindustries over a narrowly specialized one dedicated to only one engineering specialty.

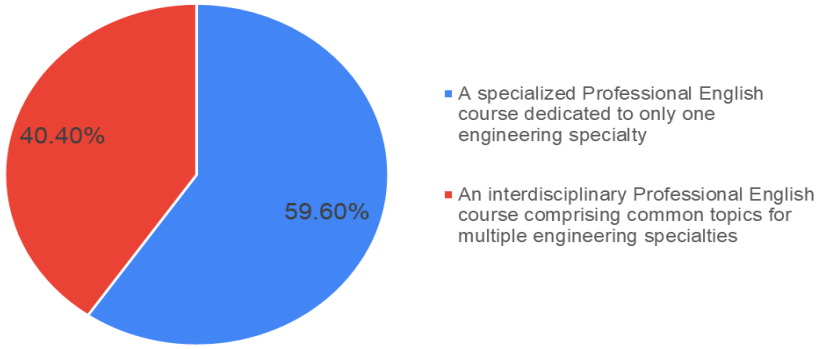

Figure 2. Alumni choice of the professional English course

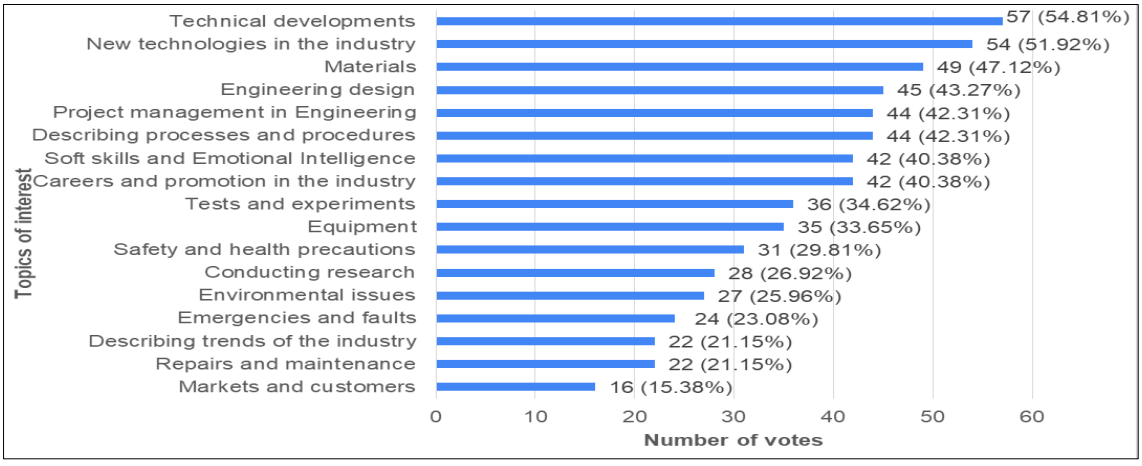

Figure 3. Contextual topics recommended by alumni for an interdisciplinary ESP course

Furthermore, the respondents identified preferred topics for inclusion in an interdisciplinary ESP course. As presented in Figure 3, the most popular themes are “Technical developments” (57 votes/54.81%), “New technologies in the industry” (54 votes/51.92%), “Materials” (49 votes/47.12%) and “Engineering design” (45 votes/43.27%). “Project

management in Engineering" and "Describing processes and procedures" each received support from 44 respondents (42.31%) each. "Coaching, Soft skills and Emotional intelligence" and "Careers and promotion in the industry" also have an equal number of votes – 42 (40.38%) each. The least advisable topics are "Describing trends of the industry" and "Repairs and maintenance" with 22 votes (21.15%) each, and "Markets and customers" which garnered only 16 votes (15.38%).

The alumni were also asked about what kind of situations they encountered in their jobs which require the knowledge of English within four language skills: listening, reading, writing and speaking.

In regard to listening skills (see Figure 4), 60 out of 104 respondents (57.69%) need listening in English while attending different seminars and trainings. Equal portions of the surveyed working engineers experience listening in English while getting oral instructions and in telephone conversations with foreign colleagues – 31 respondents (29.81%) per category. 27.88% (29 votes) of the sample listen to speeches at international conferences, only three engineers out of 104 practices listening in English while talking to their foreign colleagues live.

Figure 4. Workplace situations requiring the ability of listening in English

Furthermore, most of the responding professionals—66 out of 104 (63.46%)—read instructions in English, as exhibited in Figure 5. Approximately half of the sample read emails, reports, and project plans in English, with 56 (53.85%), 50 (48.08%), and 47 (45.19%) respondents, respectively. Meanwhile, 44 surveyed engineers (42.31%) encountered reading strategic documents in English (see Figure 5).

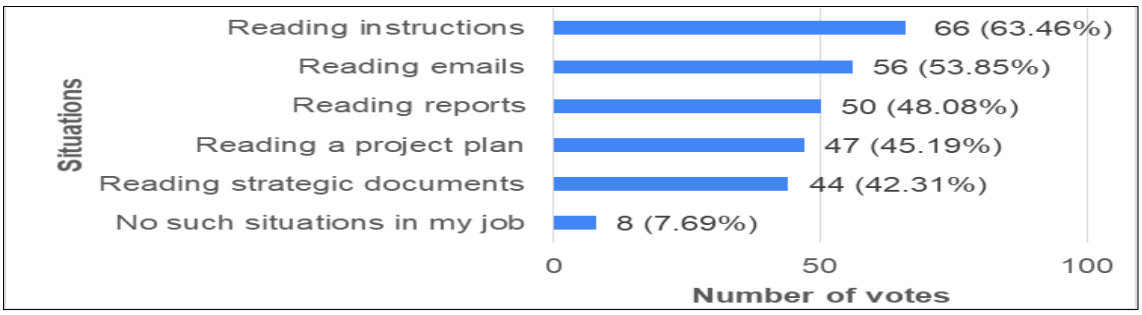

Figure 5. Workplace situations requiring the ability of reading in English

As far as writing skills are concerned, more than half of the respondents (57 votes/54.81%) use English for writing emails, and almost half of them (46 votes/44.23%) indicated that they use English to produce reports. Almost 40% (41 votes) write project plans in English. These and other situations where the surveyed engineers use English in writing are presented in Figure 6. Speaking workplace situations likewise require proficiency in English among the surveyed engineers, as shown in Figure 6. A majority (54.81%) reported using English to deliver presentations, while 47.12% use it to communicate with business partners. Additionally, approximately one-third (29.81%) indicated using English when speaking with customers. Among other professional

situations involving spoken English, three respondents mentioned talking to colleagues, and one engineer highlighted job interviews.

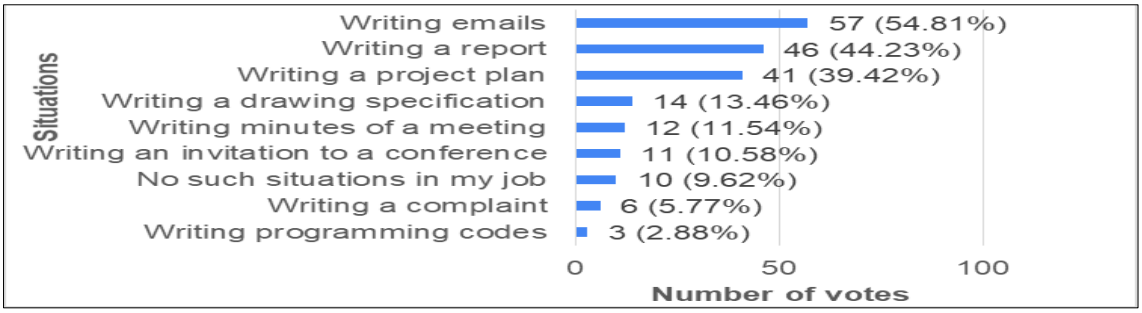

Figure 6. Workplace situations requiring the ability of writing in English

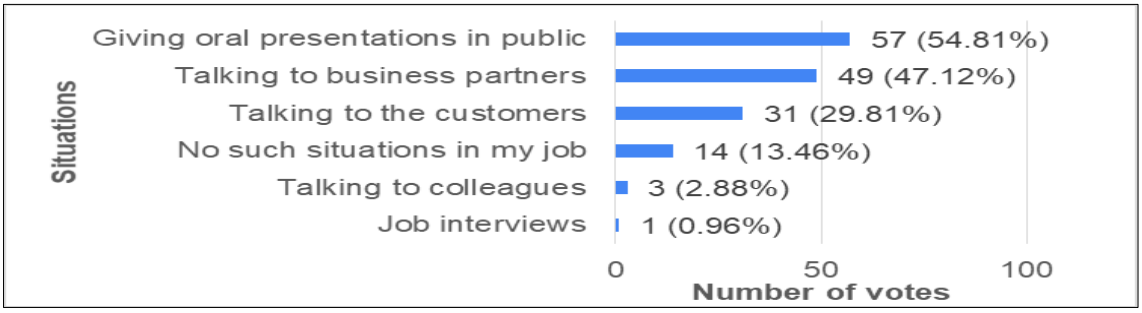

Figure 6. Workplace situations requiring the ability of speaking in English

The final question in the survey aimed to evaluate the respondents' perspectives on the importance of intercultural awareness for engineers. The question was formulated as follows: "To what extent do you agree or disagree with the following statement: 'It is important for engineers to know the peculiarities of intercultural communication, that is, to be able to communicate effectively with representatives of different cultures within personal and professional settings'?"

Respondents were presented with a five-point Likert scale, where "1" denoted "Strongly disagree", "2" – "Disagree", "3" – "Undecided", "4" – "Agree", "5" – "Strongly agree". The generated responses are illustrated in Figure 7.

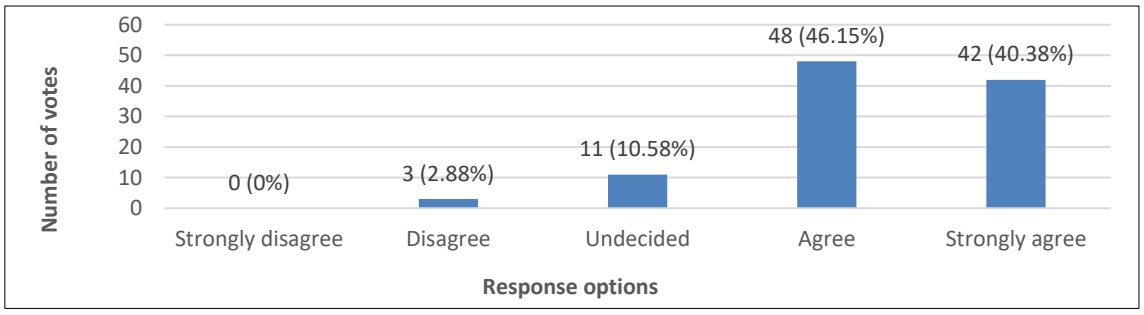

Figure 7. Importance of intercultural awareness for engineers

Figure 7 proves that most of the working engineers (86.53%) in the sample conceive the knowledge of intercultural peculiarities as crucial for their work.

Modelling professionally oriented situations and designing an interdisciplinary ESP course

Based on the results of the needs analysis among alumni of technical universities we developed a set of professionally oriented situational tasks embedded in the most relevant engineering contexts, also identified at the preceding stage. The resulting interdisciplinary ESP course was titled "English for Engineering".

First, taking into account the respondents' preferences regarding topics to be studied in the ESP course, the titles of 10 interdisciplinary modules were as follows: (1) technical developments and new technologies, (2) materials, (3) engineering design, (4) equipment, (5) intercultural communication, (6) procedures and processes, (7) emergencies and safety precautions, (8) environmental issues, (9) engineering career, and (10) project management.

Next, professionally oriented situational tasks were developed based on the adaptation of exercises in the existing ESP coursebooks designed for various technical and engineering specialties, published by prominent publishers like Oxford University Press, Cambridge University Press, Pearson, and Macmillan, and available in the Satbayev University library. A combination of Task-Based Language Teaching (TBLT), Project-Based Learning (PBL), and Problem-Based Learning (case study) approaches were employed in the design of these situational assignments.

As defined by Ellis (2009), Task-Based Language Teaching (TBLT) involves both course design and instructional methodology, meaning that course developers must make decisions regarding the types of tasks to be included, the content of the tasks, and the sequencing of tasks to ensure effective learning. The methodological component is responsible for structuring a task-based lesson and selecting interaction patterns among the learning process participants. Tasks can be classified as focused and unfocused: the former provides opportunities for practicing particular linguistic features in communication, while the latter promotes general communicative language use without focusing on grammar or vocabulary (Ellis, 2009). For this ESP course, the researchers designed both focused and unfocused tasks, as the students were at the Intermediate level and required acquisition of grammatical structures and technical vocabulary necessary for implementing the unfocused communicative tasks. As suggested by Dlaska (1999), one of the benefits of practicing grammar and the four language skills within the context of the subject matter is increasing learners' motivation in the process of foreign language acquisition. The situational tasks involved different interaction patterns: individual, pair, and group work.

For modelling professionally oriented situations in Listening and Reading the sequence of a Receptive Skills lesson was utilized, involving the following stages: Warming-up activity, Lead in, Pre-teaching unfamiliar vocabulary, Predicting the context, Listening or reading for the main idea, Listening or reading for detailed and specific information, Follow up speaking or writing activity, and Feedback on good and inappropriate use of language and skills.

Professional situations in Writing and Speaking were designed in accordance with the order in a standard Productive Skills lesson: Warming-up activity, Lead in, Pre-teaching essential vocabulary items, Presentation of a model, Focus on grammar and functions in the model, Preparation of task by students, Task performance by students, and Feedback on the use of language and skills application. These kinds of lessons were followed by homework designed in the form of case studies, in which the learners were given a problem-based question requiring their solutions and ideas in an oral or written form (for instance, writing an email, taking part in a discussion, etc.).

More comprehensive tasks were designed as Student's Independent Study (SIS), using the Project-Based Learning methodology. Overall, two SIS assignments were pre-designed and integrated into the "English for Engineering" syllabus. Students were asked to brainstorm and choose a country's business culture they would like to learn about more. They had to imagine being the representatives of a Transnational Engineering Corporation with headquarters in that country. They needed to prepare a presentation called 'Our cultural identity' for the prospective business partners from other countries, describing that country's business culture and sharing recommendations on doing business with its people.

The second SIS assignment, called "Engineering project management," had also been designed in the form of a project activity. The students were requested to brainstorm and choose the name of the engineering project their team would like to work on. After that, they were instructed to elaborate on a detailed project plan and had to prepare for its presentation in class.

Pedagogical experiment

The purpose of the pedagogical experiment was to evaluate the effectiveness of the newly developed interdisciplinary ESP course, titled "English for Engineering" designed using the professionally oriented situational tasks pre-modelled within a set of identified most common and useful engineering contexts. This aim was planned to be achieved by comparing the pre-test and post-test results attained by the experimental and control groups.

For both the control groups (CGs) and the experimental groups (EGs), the minimum required level of English proficiency was set at Intermediate (B1) according to the gradation of the Common European Framework of Reference (the CEFR). They were required to demonstrate this level by either passing a mandatory diagnostic test for all the matriculating candidates, which consisted of a Grammar and Vocabulary online test and a face-to-face offline Speaking test. Alternatively, they had another option – to provide a valid IELTS certificate proving the Intermediate level of English (band score of 5.0-5.5). As a result of this foreign language diagnostic test, 60 university enrollees have confirmed the Intermediate level of English. They were then divided into four groups with 15 students in each group. Two groups were appointed as experimental, and the other two as control groups.

60 first-year bachelor students who took part in the pedagogical experiment in control and experimental groups ranged in age from 16 to 20, with a mean of 18 and were enrolled in 18 engineering specialties. The distribution of the students among EGs and CGs and by gender is presented in Table 1.

Table 1. Gender distribution of experimental and control groups

	EGs		CGs	
	Number	%	Number	%
Male students	18	60.00%	17	57%
Female students	12	40.00%	13	43%
Total	30	100.00%	30	100.00%

Table 2 illustrates the names of the learners' specialties and student dissemination among them.

Table 2. Specialty distribution of experimental and control groups

No.	Name of specialty	EGs		CGs	
		Number	%	Number	%
1.	Design	2	6.67%	1	3.33%
2.	Biotechnology	2	6.67%	2	6.67%
3.	Petroleum engineering	3	10.00%	3	10.00%
5.	Applied Geology	3	10.00%	3	10.00%
7.	Information Security	2	6.67%	3	10.00%
8.	Computer Science	4	13.33%	3	10.00%
10.	Robotics and Mechatronics	1	3.33%	1	3.33%
11.	Telecommunications	2	6.67%	3	10.00%
12.	Mining Engineering	2	6.67%	2	6.67%
14.	Metallurgy and Mineral Processing	2	6.67%	3	10.00%
15.	Space Engineering and Technologies	1	3.33%	1	3.33%
17.	Architecture	3	10.00%	2	6.67%
18.	Civil Engineering	3	10.00%	3	10.00%
	Total	30	100.00%	30	100.00%

The CGs were taught a traditional ESP Course, which captured only three professionally oriented technical modules: Oil and Gas, Metallurgy, and IT. The latter were delivered sequentially, meaning students had to study English for a different and unfamiliar technical subindustry until they could be engaged in English lessons related to their engineering sub-sphere. Moreover, a conservative teacher-centered approach was applied to traditional ESP courses with the prevailing Grammar-Translation method. On the contrary, the EGs were subject to the experiential situated inter-disciplinary ESP course based on the student-centered approach,

applying especially pre-modelled professionally oriented situational tasks involving communicative language teaching methodology.

In accordance with the university requirement, the total number of class hours allocated for the ESP course was 45, distributed as three academic hours per week: two offline classes and one online class. Thus, the course lasted for 15 weeks only, from September to December, and was conducted in the first semester of the 2023-2024 academic year.

At the beginning and the end of the course, all the students in both the CGs and the EGs took an additional ESP test examining their preliminary knowledge of professional industry-oriented vocabulary, selected grammar constructions, as well as their listening, reading, writing, and speaking skills within professional contexts. Apart from the technical and engineering content, all test parts included questions on different topics of Intercultural Communication, Engineering Careers, and Emotional Intelligence. The Grammar part aimed at examining the students' knowledge of Passive Voice and Conditionals. As identified by Dlaska (1999), Language for Specific Purposes (LSP) courses typically focus on a limited number of grammar structures that are relevant in most sciences, and it is highly recommended to include them in the syllabus and practice them. The scholar highlights participial structures, adjectival phrases, relative clauses, and Passive Voice structures (Dlaska, 1999).

The results of the pretest and the post-test were subject to thorough analysis. For the purposes of statistical comparison, the average points gained by the students in both the experimental groups (EGs) and control groups (CGs) for each part of the test were calculated using the arithmetic mean of the samples. The findings of this statistical data are presented in Table 3.

Table 3. Average points gained by experimental and control groups for pre-test and post-test

	Maximal number of points	Pre-test, average points gained		Post-test, average points gained	
		EGs	CGs	EGs	CGs
Vocabulary	10	4,5	4,3	9,0	6,0
Grammar	10	4,2	5,1	8,7	5,5
Listening	20	10,1	11,6	17,7	13,2
Reading	20	12,1	12,7	17,5	15,2
Writing	20	10,6	11,2	18,8	10,1
Speaking	20	11,7	12,1	19,4	12,7
Total average points	100	53,2	57,0	91,1	62,7

Discussion

For the purposes of this study, designing the ESP course included the preliminary needs analysis stage widely regarded as a cornerstone of course design by leading scholars in the field (Aliakbari & Boghayeri, 2014; Basturkmen, 2006; Brown, 2009; Chostelidou, 2010; Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Munby, 1978; Richards, 2001; Strevens, 1977; West, 1997). In line with Long's (1996) assertion that learners may not always be a reliable source of information about their ESP needs due to the lack of experience and profound knowledge of their perspective job, we conducted the needs assessment not among the students, but among the alumni of technical universities. These alumni possess a more comprehensive understanding of engineering work and the communicative demands of the profession.

Based on the identified needs of the surveyed alumni of technical universities, essential recommendations can be formulated for the design of a university ESP course for engineers. The ESP course should adopt an interdisciplinary approach, including contexts from various engineering subfields rather than being limited to only one subindustry. In addition to technical and engineering-specific modules, the course should incorporate modules covering necessary areas for future and acting engineers, such as project management, career development, and emotional intelligence, to support students' broader professional competence. All four language skills—listening, reading, writing, and speaking—should be equally emphasized, as engineering professionals are expected to apply each of these skills in a variety of real-world workplace scenarios. Special emphasis should also be placed on the development of intercultural

communication skills; therefore, the professional English course for engineers should encompass a module specifically on intercultural communication.

The final recommendation listed above must be implemented in accordance with the Kazakhstani framework for foreign language education. As the founder of Kazakhstani FL educational paradigm, Professor Salima Kunanbayeva – denotes knowledge and skills of a target foreign language as "intercultural communicative competence". Kunanbayeva (2010) asserts that the final goal of foreign language education should be the formation of a learners' identity as a "subject of intercultural communication" capable of applying the acquired language in various intercultural situations, including professional ones, by virtue of not only the linguistic knowledge and skills (grammar, vocabulary, receptive and productive language skills), but also based on the obtained cognizance of different cultures.

As Bobkina et al. (2023) suggest, not only verbal but also nonverbal communication skills should be integrated into the ESP curriculum, introducing such important cues as facial expressions, eye movements, and posture (applicable for listening and speaking activities). According to the scholars, these elements help circumvent cultural misunderstandings between the communicating parties in traditional and digital contexts.

Furthermore, the results of the conducted pedagogical experiment have proven the effectiveness of the communicative foreign language acquisition (FLA) methods in comparison to traditional ones. Thus, even though the experimental groups (EGs) had a lower average score for the pre-test, they demonstrated greater progress at the end of the course by attaining an average score of 91.1 points for the post-test. Meanwhile, the control groups (CGs) got a 53.2 total average at the pre-test and only 62.7 at the post-test. Hence, the EGs' performance has improved by 71.24%, whereas the CGs' advancement in acquiring ESP has equaled merely 10%.

Therefore, another implication for designing and teaching engineering ESP courses is as follows: in order to smoothly incorporate the real-life professionally oriented situations in the curriculum, a communicative language teaching approach should be virtuously implemented as a combination of Task-Based, Project-Based, and Problem-Based foreign language teaching methods. Supporting this idea, Tawil (2018) enumerates some important advantages of TBLT. First, when learners' complete tasks in the target language, they become more confident users, and their zeal for acquiring an FL increases significantly. Secondly, situational tasks develop automaticity, which is fundamental for the process of stable FL with due efficiency and accuracy. Thirdly, tasks and situations serve as an interactive platform for enriching the learners' vocabulary bank, as through situational tasks they can comprehend new words in various contexts (Tawil, 2018).

According to Hassan, Alawawda et al. (2023), ESP is grounded in a learner-centered approach that emphasizes the development of communicative proficiency in specific professional domains. This learner-centeredness can be achieved via student mutual interaction within a specially tailored ESP environment. The scholars combine various platforms to create this learning environment, including the Flipped Classroom model (Hassan et al., 2023). In this pedagogical research experiment, students in the experimental groups (EGs) had the opportunity to experience a combined mode of study: two hours offline and an hour online per week. Online classes were arranged on the Microsoft Teams platform, where students could exchange their files, upload and demonstrate the complete assignments, give online presentations, and practice conversational activities in breakout rooms – all of these served as a stimulating learning environment.

Besides, the situatedness of the tasks contributed to the learner-centered environment, as the students were engaged in professionally oriented situational assignments based on various communicative language learning methods, like TBLT, PBL, and PjBL. Employment of these kinds of teaching formats and methods targeted the creation of situations close to real-life engineering contexts. Therefore, conceptual features of Situated Language Teaching (henceforth, SLT) have been exploited. Situated learning is defined as a "type of learning which takes place in the same context in which it is applied" (Abdallah, 2015). SLT enhances FLA process by immersing learners in real-life situations in which they can practice their language skills, grammar and vocabulary directly in a variety of formats: online, virtual or authentic language learning

communities, communities of practice, cognitive apprenticeship model, dramatization and TBLT (Abdallah, 2015). Thus, TBLT is envisaged as a form of SLT, if it can create an authentic context within the learning environment. In this regard, we fully endorse Blyth's (2017) recommendation on incorporating immersive technologies in experiential language learning to give ground for simulations of foreign language application within maximally authentic contexts.

CONCLUSION

The aim and objectives of this study have been fully achieved. Based on the findings of a comprehensive needs analysis, an interdisciplinary ESP course for prospective engineers has been designed, incorporating communicative, professionally oriented situations. The latter were tailored using TBLT, PBL, and PjBL methodologies to make the learning environment more authentic and bring the context closer to real-life professional situations in the engineering field. The pedagogical experiment has affirmed the effectiveness of the proposed ESP course and its underlying methodology, with experimental groups demonstrating superior post-test results in comparison to the control groups.

Therefore, curricular developers can adhere to the proposed model while designing an ESP course for tertiary engineering students. Instead of a narrowly specified course that focuses only on one engineering subindustry, they may create an interdisciplinary, or even a multi-disciplinary, ESP course incorporating common topics from multiple engineering fields. Depending on the learner's needs, materials from other industries contributing to the learner's foreign language communicative competence can also be added to the syllabus. Another valuable implication of the research is that a Professional English course for future engineers should be implemented, exploiting interactive and, where possible, immersive teaching methods, such as TBLT, PBL, PjBL, and live or digital simulations. Together, the listed methods can be attributed to a Situated Language Teaching methodology, which aims at establishing a situated environment close to a real-life context where the foreign language can be learnt more efficiently through a set of pre-modelled situations.

The theoretical and empirical findings of the research can be of benefit for the researchers and practitioners in the field of ESP.

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