

WebQuests as a Tool for Developing the Professional Communication Skills of Future Software Engineers in an Inclusive Educational Environment

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Abstract- Modern European countries are actively developing an effective ecosystem of support and professional integration of people with disabilities. In particular, employers receive tax benefits and state incentives for employing specialists with disabilities. In this context, inclusive educational institutions and traditional universities must provide high-quality training for all students to compete in the labour market successfully. Developing soft skills in future engineers, particularly software engineers, is essential. Recent surveys among employers have confirmed their interest in specialists with developed soft skills, including effective communication in at least one, preferably two, foreign languages. One of the effective methods of teaching a foreign language for a professional purpose is using WebQuests. Our study analysed their impact on the educational process with the third-year bachelor students majoring in “Computer Sciences” in an inclusive environment. The research methodology combined quantitative (surveys using the Likert scale) and qualitative (teacher comments) approaches, which allowed us to obtain

a comprehensive assessment of the effectiveness of web quests. A thematic Web quest, “Creating IT startup,” was developed, implemented and adapted for students with special needs (subtitled videos, audio versions of materials, accessible interface). The study results showed that students remembered professional vocabulary better and communicated more effectively in a foreign language in a professional environment. Teachers noted increased students’ involvement in ESP learning and their activity during classes. Respondents confirmed that WebQuests contributed to developing self-study skills essential for training future software engineers. The results proved the feasibility of using WebQuests to teach ESP, especially in inclusive education.

Keywords- *ESP, IT startup, professional communication skills, software engineers, WebQuests*

Online ISSN 2256-070X

<https://doi.org/10.17770/etr2025vol3.8555>

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I. INTRODUCTION

The modern global labour market places high demands on future engineers, who must possess both technical knowledge and developed soft skills. Higher education institutions should prepare specialists with an academic base and technical competencies who can communicate effectively, work in a team, adapt to changes, and think critically.

According to the Vanderlik study "Hard Facts About Soft Skills", in which more than 260 employers participated, 93.1% preferred candidates with developed soft skills. At the same time, 215 respondents noted that they use interviews as the primary method of assessing soft skills, which once again confirms the importance of the ability to communicate effectively. Without the proper level of communication skills, even a high level of technical training does not guarantee success in the labour market.

Institution of Higher Education Kamianets-Podilskyi State Institute is a rehabilitation institution for students with disabilities and other low-mobility groups. The university provides barrier-free access to classrooms and specialized computer laboratories and implements modern technologies for high-quality training of IT engineers.

One of the practical tools for developing professional communication skills in future software engineers is WebQuests. Their use in practical ESP classes contributes to students' ability to work with Internet resources, analyze technical documentation, express their thoughts professionally, and interact with international teams.

Introducing WebQuests into the educational process can be crucial in preparing competitive IT specialists who can work effectively in modern conditions. The present research aims to identify the attitudes of students and teachers regarding the effectiveness of implementing this technology in ESP teaching to future software engineers in an inclusive learning environment.

II. MATERIALS AND METHODS

To search and analyze literary sources related to our research topic, we used the AI platform to analyze scientific publications, such as Semantic Scholar. The platform found 5,010 results for the keywords "Webquest", "ESP" and "Higher Education". After refining the search parameters and adding a technical focus, the number of sources found decreased to 900. Articles that did not correspond to the subject of study, as well as works by authors of the aggressor state following the draft law of the Verkhovna Rada of Ukraine, were excluded. The analysis showed that all researchers recognize Dodge and March as the founders and developers of WebQuests [1] – [4]. They define it as a research-based, reference-oriented activity, which results in students searching for information using Internet resources and video conferences. Many current studies are experimental, with respondents ranging from 30 to 398. The vast majority of studies use surveys and pre- and post-experimental tests.

Since limiting the search to technical majors would narrow our analysis, the literature review includes studies with students from various faculties and majors: mass communications, foreign languages and translation, postgraduate education, architecture, construction, applied arts, economics, and pedagogy. Scientists have studied the impact of WebQuest technologies on various foreign language competencies of higher education students.

In particular, research results have shown a positive impact of this technology on the development of:

- oral communication [5],
- grammatical skills [6],
- academic writing [7],
- reading skills [8],
- digital competencies [9],
- lexical skills [10],
- listening [11].

Several articles analyzed teachers' attitudes towards using web quests in teaching and the features of implementing web technologies in differentiated ESP teaching of future IT specialists [12] and autonomous reading learning [13]. Web technologies contribute to implementing a person-centred approach, individualization and differentiation of learning [14].

Some researchers have suggested making the structure of WebQuest more flexible, for example, not separating the "Process" and "Resources" sections, as well as balancing the level of student autonomy with teacher control [15].

An extended search for additional keywords, such as "inclusive environment" and "universal learning design", revealed limited publications. One of the few sources analyzing the use of the web quest in inclusive education is the work of Kelly [16], which describes the practical aspects of its application in the education of children with special needs.

Thus, the literature review confirms the effectiveness of WebQuest technologies in teaching ESP, particularly in technical education. However, further research is needed to examine their impact on specialized aspects of the learning process in more detail, especially in the inclusive learning environment.

By combining quantitative (survey) and qualitative (teacher comments) research methods, it is possible to comprehensively assess the effectiveness of using Web Quests in teaching English for professional purposes (ESP) to IT students in an inclusive educational environment. In our study, we used the following tools: A WebQuest created by teachers as the primary teaching method; teachers' comments after presentations for a qualitative assessment of language and professional skills development; a Likert-scale survey of students to collect quantitative data on their impressions and the effectiveness of the method and a Likert-scale survey of teachers, which allowed us to assess the implementation of WebQuests from the perspective of teachers.

The experiment was conducted at the Educational and Rehabilitation Institution of Higher Education “Kamianets-Podilskyi State Institute”, the only institution in the region specializing in educating students with special needs. The study was conducted by 24 3rd year students of the Computer Technology major under the guidance of two ESP teachers, a group supervisor, and a specialist from the Faculty of Socio-Psychological Activities, Rehabilitation, and Professional Education. The experiment lasted in the spring semester of 2024.

Given the limited number of teaching hours in the discipline "English for Special Purposes" (18 hours per semester), WebQuests were selected for independent work outside class time. Familiarization with WebQuest technology and presentation defence occurred during practical classes, and communication was maintained through a Viber group. The experiment consisted of several stages:

1. *Initial stage*: familiarization of students with the WebQuest technology; development of two professionally oriented WebQuests by ESP teachers: “Artificial Intelligence and the Future of Programming” and “Developing Startup in the IT Sphere”; choosing a topic that the student liked by voting.

2. *Main stage*: adaptation of the WebQuest considering the inclusive approach (large font, badges, subtitled videos and audio versions of materials); use of interactive resources (MindMeister for mind maps, Quizlet for learning new vocabulary); providing students with the opportunity to choose a convenient format for completing tasks: oral, written or video recording; the result of the work was the preparation of an Elevator Pitch - a short presentation of a startup idea lasting up to two minutes.

3. *Final stage*: Presentation of student projects and their formative assessment by teachers; providing recommendations for improving communication skills and using professional vocabulary.

III. RESULTS AND DISCUSSION

To illustrate the formative assessment of students, we summarized the feedback from the instructors who participated in the experiment:

A. Foreign Language Instructor:

"Approximately 70% of participants demonstrated the ability to use professional vocabulary in their presentations correctly. I want to highlight the students' creative approach to developing mind maps for mastering industry-specific terminology, facilitating better material retention. It is also important that most participants understood and followed the Elevator Pitch format, showcasing their ability to concisely and convincingly present ideas in English. For further improvement, I recommend practicing the integration of professional terminology into real-life communication scenarios."

B. Group Supervisor:

"The lively communication among participants indicates high student engagement with this work format. The reward system using badges proved to be an effective motivator, maintaining student interest throughout all stages of the tasks. Creative assignments fostered critical thinking, teamwork, and self-directed learning skills—essential for future IT specialists. Given this positive experience, I recommend implementing similar formats to integrate language training with professional education."

C. Social Pedagogue:

"The WebQuest proved effective in creating an inclusive educational environment. Thanks to various task formats (oral, written, video), students with special educational needs could choose the best method and highlight their strengths. This format promotes communication skills and supports the principles of inclusive education."

A survey was conducted among 24 students and four instructors to evaluate the experiment's effectiveness. The student questionnaire focused on three key criteria:

1. Interest in Learning (including motivation and engagement in the process).
2. Development of Communication Skills (assessing confidence in English communication and improving teamwork skills).
3. Mastery of Material (applying professional vocabulary in practical situations).

The survey results are presented in Table 1, which lists the parameters of foreign language competencies assessed on a five-point Likert scale (from 1 to 5). The number of respondents, percentage ratio, and average score are indicated for each parameter.

TABLE 1 TABLE 1 TYPE STYLES

Category	Skills	1	2	3	4	5	Mean
Interest in Learning	motivation	8%	1 2 %	2 5 %	2 9 %	2 5 %	3.67
	engagement in the process	8%	1 7 %	2 5 %	3 3 %	1 7 %	3.83
Development of Communication Skills	assessing confidence in English communication	0%	1 2 %	2 5 %	3 7 %	2 5 %	4.04
	assessing confidence in English communication	4%	8 %	2 9 %	3 3 %	2 5 %	4.00
Mastery of Material	applying professional vocabulary in practical situations	4%	8 %	2 1 %	3 3 %	3 3 %	4.08

Analysis of the data obtained shows that most students demonstrate a moderate to high motivation to study (average score — 3.67), which is a positive trend. At the same time, a small percentage of students with a low motivation level was recorded, indicating the need for additional measures to attract them.

The overall indicator of student involvement in the educational process indicates positive dynamics. However, some respondents noted difficulties in integrating into the educational process. This shows the need to improve approaches to stimulating active student participation.

The indicator of students' confidence during communication in a foreign language using web-quest technology (average score — 4.04) deserves special attention, which indicates the effectiveness of interactive teaching methods. In addition, respondents positively assessed the aspects of teamwork, although the results indicate the presence of potential for further improvement in this area.

A significant part of the experiment participants emphasized that WebQuests contributed to using professional vocabulary practically, an essential factor in forming professional foreign language competence.

The results of the teacher survey, presented in the form of a histogram (see Figure 1), allow us to formulate several important conclusions regarding the effectiveness of implementing WebQuests in the educational process of students of technical specialties, particularly future software engineers in an inclusive academic environment.

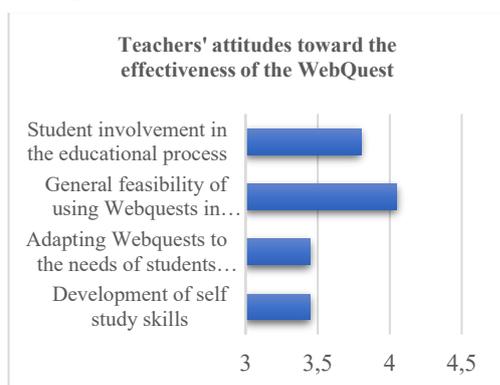


Fig. 1. Teachers' attitudes toward the effectiveness of the WebQuest.

All parameters assessed by teachers demonstrated relatively high results with minimal deviations, confirming the effectiveness of web quests in teaching a foreign language to students of IT specialties. The average score of 3.80 for involving students in the educational process and 4.05 for the appropriateness of using WebQuests indicates the high interactivity of the methodology and its compliance with the needs of students of technical fields. This is especially important for forming professional foreign language competencies of future IT specialists. Although teachers highly appreciated the interactivity of WebQuests, the aspects of developing

independent learning skills (3.45) and adapting to the needs of students with special educational needs (3.45) received average ratings. This indicates the existing potential for improvement in these areas. In particular:

- Developing students' independence requires integrating additional support tools, such as interactive prompts, micro-learning modules, and gamification elements to stimulate interest.
- Adapting for students with special needs requires more flexible technological solutions, for example, using platforms that can customize the interface or implementing tools to support students with sensory or cognitive impairments.
- Learning organisation in an inclusive educational environment requires methodological changes and material and technical base improvements. The use of WebQuests revealed the need to update equipment to create equal access to educational materials for all students.

An important recommendation is to involve scientific and pedagogical workers in international projects with the subsequent use of grant funds for the modernization of the educational environment. This will ensure access to modern equipment and technologies necessary for inclusive learning. Despite the expectations of rapid development of independent work skills, the results showed that students still demonstrate dependence on the teacher, in particular through frequent requests for help when completing web quest tasks. This emphasizes the importance of gradually forming lifelong learning competence by integrating reflection, self-control and self-assessment into the educational process.

The opinions of authoritative scientists and language practitioners agree that WebQuest technology positively impacts the development of foreign language competencies [5] – [11]. Our study is consistent with the results of an experiment [12] on teachers' attitudes to using WebQuests in teaching a foreign language to IT specialists. 87.09% of teachers approve of introducing WebQuests and support partially replacing traditional teaching methods with this technology.

Our results also confirm the importance of developing professional communication skills in foreign languages. At the same time, our study is distinguished by the specificity of the educational environment: we consider WebQuests an effective tool for improving foreign language competence in an inclusive academic environment, particularly for students with special educational needs. However, this does not exclude applying the study results in non-inclusive universities.

One of the requirements for a modern higher education institution is compliance with the principle of barrier-free learning. As a flexible format, WebQuest can be adapted to professional specifics and effectively used in professional foreign language classes for students without special needs. At the same time, implementing WebQuests in an inclusive environment requires additional adaptation of this technology to students' needs. The study provides

examples of online servers that ensure the convenience of using WebQuests by students with special needs.

Student work was assessed in a formative format: participants received feedback in the form of recommendations and wishes from teachers regarding presentations in the Elevator Pitch format. The keywords of these recommendations — professional vocabulary, creative approach, industry terminology, mind maps, Elevator Pitch, badges, professional communication, and principles of inclusion — reflect the main results of implementing WebQuests in the educational process.

The results of the student and teacher survey were unanimous: most students noted the use of professional vocabulary in practice, and teachers emphasized the appropriateness of using WebQuests in an inclusive environment and their effectiveness in increasing student engagement in the learning process.

IV. CONCLUSIONS

1. Analysis of literary sources on the Semantic Scholar platform revealed a limited number of publications devoted to using WebQuests for teaching a foreign language of professional orientation to engineering students and their application in an inclusive educational environment.
2. Their adaptation to students with special educational needs is necessary to use WebQuests effectively in an inclusive university environment. An example of creating such a WebQuests is given in our article. It includes an optimized interface, audio and video support, a reward system, and a convenient and understandable task format.
3. The formative assessment results were reflected in the teachers' recommendations. Analysis of the keywords of these recommendations indicates an emphasis on the practical use of a foreign language in a professional context, which is vital for future IT specialists. In addition, the teachers emphasized the appropriateness of modern methods for mastering new professional vocabulary and optimizing the educational process.
4. According to students, the introduction of WebQuest technology into ESP teaching contributes to the development of communication skills in a professional context. Teachers, in turn, noted this technology's compliance with the inclusive learning format and recorded increased student activity in the learning process.

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