

## PERCEPTION OF MASTERS IN ELECTRICAL ENGINEERING OF USING CHATGPT IN ESP LEARNING

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**Abstract.** An essential challenge in ESP learning is the wide variety of skills that must be developed, which range from understanding technical terms, comprehending profession-based texts and writing engineering reports and proposals to the ability to express opinions and technical concepts, give presentations, participate in projects and present research findings. The lack of academic hours for ESP learning in the Masters in Engineering curriculum indicates the need for strategies that assist effective communication in professional contexts and motivation for further ESP self-study. This paper aims to investigate how first-year Masters in Electrical Engineering at the Technical Ukrainian University perceive the use of artificial intelligence (AI) in ESP learning. The research was conducted with a participant group of 48 students from the Department of Engineering and Technology. We designed pre- and post-surveys to measure students' attitudes towards utilizing ChatGPT in ESP learning. The participants completed the surveys at the beginning and completion of a semester ESP course. We used Excel for graphical data analysis. The findings demonstrate that almost half of the respondents had not used ChatGPT in their previous learning. Those students who had used ChatGPT in previous studies implemented this tool as a generator of relevant information, a translator and a vocabulary acquisition platform. Post-survey results indicate that the students revealed the potential of ChatGPT as a conversational partner, technical writing support, a language feedback tool and as an individual ESP tutor. The respondents believe that a language learning system based on ChatGPT can serve to improve further ESP self-study.

**Keywords:** ChatGPT; ESP; Masters in Electrical Engineering; conversational partner; technical writing support; language feedback.

### Introduction

Creation of large language models, such as ChatGPT has led a real revolution in education, foreign language in particular. After all, this language model is capable of performing many functions, starting with vocabulary expansion, grammar guidance and feedback, conversation simulator, and generator of new ideas. With a growing demand for engineers who possess both linguistic proficiency and technical expertise, the integration of artificial intelligence (AI) tools in the ESP (English for Special Purposes) classroom is essential for preparing students with the necessary skills for success in today's rapidly evolving global economy. As a student pursuing Master in Electrical Engineering, the utilization of AI technologies in the ESP classroom not only enhances language learning outcomes but also provides valuable real-world experience in utilizing cutting-edge technologies for academic and professional purposes. The literature has found that the implications of ChatGPT for ESP learning should be thoroughly investigated, especially in the context of teachers' and students' perceptions, the impact on teaching and learning outcomes, and overcoming the difficulties associated with implementation. Only in this way, it will be possible to use the time to the benefit of the educational process.

The research on the implementation of AI language models in EFL (English as a Foreign Language) and ESP learning with university students has increased over the last few years. We performed Google Scholar searches of most relevant academic articles, and conference proceedings on utilizing ChatGPT in higher education. The literature review explored different aspects of utilizing ChatGPT in foreign language learning. Researchers state that ChatGPT is a powerful tool for generating authentic language materials, such as realistic dialogues, news articles, or reading passages, thereby improving students' reading and comprehension skills and language proficiency [1; 2]. ChatGPT can also serve as a teaching assistant which designs bespoke lesson plans, facilitates language learning inside and outside language classrooms, develops customized instructional materials, and gives immediate, individualized feedback [2]. Large language models can also assist in the research, writing tasks and their evaluation [3], as well as in the development of critical thinking and problem-solving skills [4]. Recent studies have found that ChatGPT can help enhance ESP vocabulary learning [5] and improve ESL learners' speaking skills. Researchers from the Cyprus International University concluded that ChatGPT now serves as an engaging and personalized conversation companion, assisting students in developing their technical

English language abilities. ChatGPT helps simplify the learning process by giving examples of conversations that have already taken place between customers and engineers [7]. The studies on students' attitudes towards using ChatGPT in ESP learning are of particular interest to our research. In a study from Har [8], fourteen university lecturers from the Hong Kong University were interviewed along with sixteen students in years 1, 2, and 4. The research results showed that ESL students at the university level preferred to use ChatGPT, while it was also evident that there were high barriers to its use among the teaching staff [8]. Ho [9] emphasized students' need for teacher's instruction despite recognizing ChatGPT efficacy for ESP vocabulary acquisition, translation, grammar checking, and paraphrasing. The author also states that students predominantly exploited ChatGPT to find instant solutions to English learning difficulties [10]. Ukrainian scientists [10] investigated the integration of ChatGPT into engineering English classes and concluded that such integration presents both opportunities and challenges. They compared engineering students' and teachers' perceptions of ChatGPT in ESP learning. As a result, the students found ChatGPT to be a valuable teaching method; the teachers expressed concerns about its impact on academic integrity and the development of essential language communication skills. The divergence of opinions emphasizes the necessity of providing training and support for teachers to successfully incorporate AI tools into their teaching methods and better meet the expectations of students.

There have been attempts to assess the attitude of teachers and students of technical specialities to the use of ChatGPT in ESP teaching and learning and to find out the difference in these attitudes. The research is conveyed in the context of academic integrity and provides strategies for integrating ChatGPT into teaching and learning ESP. In our research, we considered the recommendations of Ukrainian researchers to train teachers on the implementation of artificial intelligence tools in the educational process. Our research was conducted by teachers who completed an online internship in the use of artificial intelligence and was aimed at identifying differences in the attitudes of Masters in Electrical Engineering towards using OpenAI GPT-3 model before and after its application in the ESP course. The purpose of the study is to confirm that activities based on ChatGPT can transform the interaction of engineering students with AI language models from passive to active. Active learning through ChatGPT-based ESP in educational settings can promote meaningful learning experiences and communication practice.

## Materials and methods

The small-scale research was conducted at the "Podillia State University" in Ukraine focusing on the Masters' in Electrical Engineering perception of ChatGPT-based foreign language learning. The quantitative method was utilised to investigate their experience and perceptions of using OpenAI GPT-3 model in EFL learning. Collected from the questionnaire, information was analysed and graphically presented with the help of Excel. The descriptive method was implied for interpretation, systematisation and comprehensive presentation of the research findings.

The study included forty-eight 1st year Masters in Electrical Engineering from the Engineering and Technology Department. The study was designed by the principles of research ethics, such as anonymity, informed consent and voluntary participation. The information for the analysis was collected through 2 survey questionnaires (1 pre-experimental and 1 post-experimental). Pre-experimental and post-experimental questionnaires were identical in content and consisted of 5 questions. The questionnaires included multiple-choice questions and Likert scale statements.

The research consisted of three stages. The first stage of the study was preparatory. It included pre-experimental ESP teachers' certification of AI tools implementation in the educational process and literature review. The online advanced training course was organized by the Ministry of Digital Transformation of Ukraine and was dedicated to artificial intelligence and the future of education. After completing the course and completing the test tasks, the participants received certificates of 30 hours (1 ECTS).

Masters in Electrical Engineering have a compulsory three-credit course in ESP which lasts the spring semester. The second stage of the experiment started in the spring semester of 2023 with the conducting pre-experimental questionnaire on the previous experience or its lack in students' use of artificial intelligence. During the first ESP class the Masters were given instructions on the advantages and drawbacks of ChatGPT in ESP learning. ESP syllabus consists of four basic units: the role of science

in the development of society; international scientific seminar; sociocultural norms of business communication; job search and interview. Exploring the role of electrical engineering in the development of society we used group discussions. Each student was given a specific category: power generation, transmission and distribution, telecommunications, computing and information technology, transportation, and medical technology. We taught the students how to use AI tools to generate ideas for discussion to cover these items, create a vocabulary list on the topic, translate, get explanations of unknown words and the context they can be used, and make questions. Mastering the second unit “International scientific seminar” the students were asked to identify a relevant scientific seminar that is upcoming in their field of electrical engineering and provide a brief overview of the seminar, including its theme, keynote speakers, and target audience. Moreover, they had to analyze the conditions of participation, the registration procedure, and the requirements for the report and presentation. Then, to conduct a role-play on the theme “International Scientific Seminar”, students were asked to use the potential of the chat to find video resources to learn how to give a good presentation. This task was given as part of independent work. Chat GPT provided the students with links to video resources on how to participate in scientific seminars, effective speaking and presentation skills for scientists. Masters in Electrical Engineering used Chat GPT to generate new ideas for their presentations taking into account the topic of their future Master’s thesis. Particular attention was paid to the creation of technical reports focused on their research topics using Chat GPT. The third stage of the study was evaluation. It was the final stage and aimed to explore the attitude of Masters in Electrical Engineering to utilizing Chat GPT in ESP learning. The participants’ perception of AI tools in ESP learning was investigated by conducting a pre and post-questionnaire, the outcomes of which were compared.

## Results and discussion

The pre-experimental questionnaire aimed at determining different aspects of using AI tools in foreign language learning. The post-experimental questionnaire was used to determine the changes in students’ attitudes towards utilizing AI tools in ESP learning after utilizing ChatGPT in ESP instruction. The results were graphically presented with the help of Excel. All survey charts are located on Google Disk [11]. The survey data are presented in Table 1.

The first question concerned the experience of using the modern technology in education, since the students enrolled in a Master degree course from different universities, and only a subset of students earned bachelor degrees at our university. So, to get an overall picture of engineering students’ awareness of technology-enhanced foreign language learning tools we started our questionnaire exactly with this question. More than half of the respondents (59%) were familiar with the technology and used it in their learning. Such data was quite predictable, since 50% of the total number of students in the group, where the experiment was conducted, were graduates of our university. Previous studies conducted with the students of the Engineering and Technology Department showed a positive attitude of students toward technologies and their effectiveness in ESP learning. So, after the experiment, it received a positive response from 91% of respondents.

To answer the second research question regarding the students’ experience of using ChatGPT in their learning, we contrasted the pre- and post-questionnaire results.

Table 1 shows that 48% of participants used ChatGPT in learning. Post-questionnaire results manifested the improvement in students’ awareness of the possibilities of correct and effective use of artificial intelligence tools in ESP learning. To be more precise, before the introduction of AI tools in teaching ESP Masters in Electrical Engineering ChatGPT was mostly used as a search engine, content creation, a translator, and a tool for learning new terminology. A large gap is observed in the category of “tools for creating technical documentation”, a simulator for speaking practice, a language tutor and language feedback. There is a tendency to reduce the use of ChatGPT to find the necessary information and generate ideas. In addition, after the experiment, students reduced their use of ChatGPT for translation. It is obvious that the interviewees learned about other features of ChatGPT and began to intensively use such chat properties as a mentor in training and an interlocutor. Since the students had previous experience with technologies such as Quizlet and TED podcasts, they associated ChatGPT with a tool that improves vocabulary acquisition and speaking skills. So, in the fourth question, respondents believed that the use of ChatGPT would contribute to the development of communication skills and

vocabulary expansion. However, after using the chat, students assumed that this technology would also contribute to the development of technical documentation writing skills (6% before the experiment and 9% after the experiment) and students' self-study (9% and 12%, respectively). The least frequently selected benefit of using ChatGPT after the experiment was the category "improving reading comprehensive skills" (8%).

Table 1

**Student perception of using ChatGPT before and after the experiment**

Statement	Pre-survey	Post-survey
<b>1. I am comfortable with technology-enhanced language learning</b>		
Strongly Disagree	(8) 14%	(1) 3%
Disagree	(12) 27%	(3) 6%
Agree	(23) 48%	(26) 54%
Strongly Agree	(5) 11%	(18) 37%
<b>2. I have experience of using ChatGPT in learning</b>		
Yes	(8) 16%	(46) 97%
No	(40) 84%	(2) 3%
<b>3. I used ChatGPT in EFL learning before /after the experiment as:</b>		
Content provider	(14) 30%	(13) 26%
Individual language tutor	(5) 10%	(7) 16%
Language feedback	(3) 6%	(5) 9%
Tool for learning new terminology	(6) 14%	(7) 15%
Conversational practice	(2) 3%	(3) 7%
Translator	(13) 28%	(8) 17%
Text processing tool	(4) 7%	(2) 4%
Tool for creating technical documentation	(1) 2%	(3) 6%
<b>4. What purpose do you believe a language learning system based on ChatGPT can serve in improving your ESP skills?</b>		
Enhancing vocabulary	(16) 32%	(15) 31%
Practicing grammar and sentence structure	(9) 19%	(6) 13%
Developing oral communication skills	(10) 21%	(14) 27%
Strengthening technical writing skills	(3) 6%	(4) 9%
Improving reading comprehension	(6) 13%	(3) 8%
Improving self-study	(4) 9%	(6) 12%
<b>5. Indicate your overall willingness to use ChatGPT as a language learning tool for ESP</b>		
Strongly Disagree	(2) 3%	(1) 2%
Disagree	(2) 3%	(2) 3%
Neutral	(27) 57%	(10) 21%
Agree	(11) 24%	(24) 52%
Strongly Agree	(6) 13%	(11) 22%

The responses to the fifth question regarding the degree of readiness and desire to use ChatGPT in their further ESP learning revealed that engineering students have a desire to use this technology in foreign language learning. Moreover, the number of respondents who were neutral about the use of this technology during practical classes (57%) significantly decreased after the experiment (21%). As indicated by students' responses more than ½ (52%) of engineering students will use ChatGPT in ESP instruction.

In the present study the experience and perception of using ChatGPT in ESP learning with the Masters in Electrical Engineering before and after the experiments is investigated. Pre and post-survey results have been analysed and compared. Our research is in line with the articles on the numerous benefits of using technologies such as ChatGPT in university ESP teaching and learning. However, there

is no consensus on what competencies ChatGPT assists in developing, students' attitudes towards its implementation and their intention to use AI-based strategies in ESP learning further. It is an undeniable fact that by avoiding studying the advantages and disadvantages of this artificial intelligence tool, foreign language teachers will face the problem of using artificial intelligence to avoid difficulties in learning the discipline [9]. To prevent misuse of ChatGPT by university students, it is up to teachers to study, gain experience in using AI tools, as well as conduct experimental research to form recommendations for the educational community. It is important to remember that the survey results may differ even if the research was conducted within the same country [10]. In this case, the factors of influence may be the educational degree and already acquired competencies, the level of the material and technical base of the institution, and the progressiveness of the teaching staff (meaning the willingness to adapt technologies in education). That is why, despite the common geographic location and engineering specialization of students, their perception of ChatGPT in the two studies differs [10].

The results obtained showed that the majority of students want to use ChatGPT for diverse ESP learning purposes. This finding is consistent with Synekop et al. [10], whose research results revealed that the majority of the students expressed a positive attitude toward AI tools and agreed that it offered more advantages than disadvantages in education [10]. Positive engineering students' attitudes towards utilizing ChatGPT in ESP classrooms can be explained by the fact that technology is typical of Generation Z. Therefore, learning with the help of advanced technology is a completely natural process. In the context of our research, this fact is also explained by the fact that students pursuing a bachelor degree at our university regularly used tools such as online platforms for learning new vocabulary and podcasts in ESP classes.

Regarding the skills ChatGPT will contribute, students' opinions vary. In our study, after the experiment, students concluded that the use of ChatGPT will boost vocabulary acquisition, the development of communication skills and independent work. In a survey conducted also in Ukraine [10], engineering students believe that using ChatGPT can promote the development of research and creative skills. The difference in research results can be explained by intended learning outcomes and, accordingly, preferable AI-based activities in ESP classrooms. In our study we did not have such options as "research skills" and "creative skills". Most likely, further research will consider developing research and creative skills in the context of technical report writing based on the Masters' in Electrical Engineering research work.

## Conclusions

1. Experimental research on the introduction of new technologies in the educational process, artificial intelligence in particular, should be preceded by training of teachers. They need to be informed about the advantages and disadvantages of the technology, know the strategies for its implementation, and thoroughly plan and develop AI-based activities. Proper implementation of ChatGPT will support Masters' in Electrical Engineering ESP learning.
2. The research presented in this paper suggests that continuity is necessary for the experiment to be carried out. To integrate more powerful technologies such as artificial intelligence, students must have experience in using online simulators to learn new vocabulary and algorithms for working with podcasts. Then using AI tools for learning will be appropriate.
3. Research shows that it is quite possible to change students' priorities through the correct implementation of new teaching methods. So, after the experiment, students reduced the passive usage of ChatGPT only as a translator and search engine. They shifted their priorities to active usage of chat as a language mentor to help improve language practice and a simulator for creating technical writing samples.
4. The results of our survey confirm that according to students' points of view thoroughly planned implementation of ChatGPT in ESP teaching by experienced foreign language instructors will help to improve communication skills, learn new vocabulary and motivate to learn the language in self-study mode.

## Author contributions

Conceptualization, O. C.; methodology, A. B. and V. S.; software, I. Z.; validation, O. C., and V. S.; formal analysis, V. S. investigation, O. C., A. B.; data curation, I. Z.; writing – original draft

preparation, O. C.; writing – review and editing, O. C. and V. S. All authors have read and agreed to the published version of the manuscript.

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