VIRTUAL EDUCATION SPACE AT ESP CLASSES: CHALLENGES AND PERSPECTIVES

Iryna Humeniuk[1], Anastasiia Trofymenko[2], Alina Kruk[2], Iryna Melnyk[2]
[1]Podillia State University, Ukraine;
[2]Kamianets-Podilskyi Ivan Ohiienko National University, Ukraine
irynahumenyuk79@gmail.com, trofimenko2006@gmail.com , krukso@ukr.net,
melnykirina28@gmail.com

Abstract. Higher education has moved to various online platforms in recent years, with virtual classes established following national norms during the COVID-19 pandemic and wartimes in Ukraine. Early engineering education, namely teaching ESP, is directly related to the development of soft skills like time management, teamwork, creative thinking, and digital literacy as well as practical talents like sketching, computer graphics, mechanism projecting, etc. This study examines qualitative data collected from second-year engineering students at the Higher Educational Institution "Podillia State University", Ukraine. The paper is based on instructors' thoughtful observations of instruction in both times of war and the COVID-19 pandemic. The research conclusions offer some important things to think about when assessing the virtual classroom long-term effects on language education and second-year study techniques. The results of this study showed that the use of technology in second-year engineering education, namely the TED Talks application, promoted creative teaching strategies, increased digital literacy, and improved teamwork. Even if online learning achieved its learning goals, there were drawbacks, such as social isolation and low motivation. The study highlights the value of looking at virtual language studios and integrating technology in early engineering education, providing chances for future research and curriculum development. These results are pertinent to educators worldwide who instruct second-year mechanical engineering students in ESP.

Keywords: virtual education space, engineering students, ESP, integrating technology, Ted Talks.

Introduction

Speaking a foreign language is one of the essential elements of a modern person's education; thus, it should be on the list of general competencies for students in all fields. Future experts in a variety of professions now recognize the importance of learning a second language, English being the most important. Foreign language-speaking experts are particularly needed in Ukraine's engineering sector because Ukrainian engineers have the chance to travel to EU nations to learn about the most recent advancements in the industry, exchange experiences, and carry out exciting projects in their home country at a critical juncture. This highlights the industry's economic importance to the nation and assigns higher education institutions the duty of bringing foreign language instruction up to par with international standards. To ensure that students, who will eventually work in the engineering sector, get the most out of their language learning experience and develop their communicative competence, educators must apply cutting-edge techniques that link theory to real-world application. Only in this way can one develop the necessary broad competence of a modern person and cultivate the ability to master a foreign language.

As a result, the social demands for professionals with a high degree of the English language proficiency dictate the relevance of researching the issue of teaching English for professional communication. This necessitates researching how students in technical faculties at contemporary higher education institutions develop their professional foreign language competency. Certain scientific publications need mentioning, as the topic of virtual education spaces for language study has already been explored to some extent by several domestic and international academicians and scientists.

Z. M. Gaffas examined how students perceived their e-learning experiences in virtual and blended English for specified purposes (ESP) classrooms. The findings showed that when it came to the clarity of the course structure, individual learning processes, and learning outcomes, students in both learning styles gave identical assessments. Students' opinions of a lack of contact in both virtual and mixed learning modes – between students and instructors as well as among themselves – represent a particularly significant finding of this study. However, the virtual group students demonstrated a marked increase in their proficiency with the learning management system and said it was simple to use [1].

I. Humeniuk et al analyzed the efficiency of Moodle LMS for mastering language competence by university students. By using student feedback and objective experimental results obtained through statistical methods of data processing, the authors investigated the relationship between the knowledge

acquired by students in online and offline classes and, thus, the overall performance of e-learning, as well as the effectiveness of specific language skills among the main four (listening, speaking, reading, and writing), which proved to be as substantial as in-person study outcomes [2].

D. Kirovska-Simjanoska examined the learning preferences of 14 students (ages 18–20) engaged in an ESP course at Macedonia South East European University. The same pre- and post-learning questionnaires, writing assignments, final tests, and course materials were given to all students, along with the same amount of time to complete the assignments. The study showed that merging the two learning settings is the most effective approach for students to learn. Students learned that some tasks are best completed in a digital environment and others in a classroom setting by completing an assignment both ways. They also defined the preferred learning method and it was stated that digital learning environments could only be effective when they included engaging challenges [3].

L. M. Konoplianyk and Yu. Yu. Pryshupa focused on leveraging modern digital learning technologies to organize formative assessments. The study notes that formative assessment is a procedure used to provide information about students' learning to explain the specifics of adopting it when researching ESP. Formative assessment data is utilized to influence education, modify learning curricula, and meet the needs of students, all of which improve student comprehension and progress in their learning. Since formative assessment helps identify students' misconceptions and ability gaps, the authors argue that it should be implemented as the intermediate step in a balanced method of evaluating students' achievements [4].

The use of computers and the Internet technologies in the classroom within the framework of ESP is covered in S. Živković's study. One of the most difficult jobs is creating and integrating digital technologies into the teaching and learning process. Students can be more engaged and cooperative in the ESP classroom because of the utilization of technology, which raises learning objectives and improves student accomplishment. Enhancing the quality of learning experiences and creating a highly supportive, genuine, social, and productive learning environment that enables students to create pertinent knowledge are the ultimate goals. The purpose of the study is to find out how students feel about using digital tools in the classroom. The study findings demonstrate that students' opinions on computers, the Internet, and their incorporation into the ESP classroom environment are overwhelmingly positive [5].

The issue with e-learning can also be found in the paper by Chaikovska et al., in which the authors examined the state of e-learning at the Engineering Faculty of the State Agrarian and Engineering University in Podilia, specifically through the use of podcasts. They did this by conducting and analyzing a pedagogical experiment that involved 50 first-year high school students. Using a quasi-experiment, two assessment tests administered at the start and finish of the course, respectively, and a questionnaire created by the authors of the paper, the research was centered on speaking and listening comprehension evaluation [6].

However, the focus of virtual education space at ESP classes for engineering students has not yet been examined. Unusual situations necessitate unconventional methods. To create opportunities for future research and curriculum development, the current study aims to demonstrate the importance of considering virtual language studios and incorporating technology into early engineering education. It is anticipated that the findings would become relevant for educators around the globe who teach ESP to mechanical engineering students.

Materials and methods

A combined research model based on quantitative, statistical, qualitative, and descriptive methodologies was started to meet the objectives. We processed the test results of students in two groups – one that learned the language using traditional methods (the control group) and the other that learned the language interactively (using TED Talks, online apps, and platforms) (the experimental group) – by applying quantitative and statistical methods to obtain objective results. To investigate students' perspectives on the discussion of lesson difficulties, a qualitative technique was applied. A written questionnaire survey was used to verify the hypothesis on the efficacy of the virtual learning environment. The research findings and the student questionnaire were analyzed using a descriptive technique. The project involved bachelor students studying engineering specialties such as mechanical

engineering, food technologies and engineering, transport technologies, and automobile transport throughout the 2022-2023 academic year. The course "Foreign Language (English)" requires 3 ECTS credits (90 hours) annually due to the curriculum [7]. Each responder provided their information voluntarily for participation and was informed about the experiment.

The Higher Educational Institution "Podillia State University" served as the basis for the research. Fifty students (respondents) majoring in Agrarian Engineering and fifty students majoring in Transport Technologies represent the educational experiment. The student groups participated in both online and offline lessons according to their bachelor's degree curricula. To achieve the goal of the study, the individuals were split into two groups: the experimental group, which consisted of agrarian engineering majors, and the control group, which consisted of transport technologies majors. Students completed the pre-test at the start of the course and the post-test at the conclusion, in that order. Both exams have comparable material and a similar format, with the main focus being on listening comprehension exercises. The high school curriculum mandates that pupils take an ESP course, which takes two academic hours every week. The syllabus-driven association between in-class work and independent study was 1 to 2. There were the same number of ESP classes in both groups. The experimental group was the only one to use TED Talks and other Internet apps and platforms.

Specifically, Mann-Whitney and Wilcoxon non-parametrical pair tests were used to compare the gains in speaking, listening skills, and use of English assessments as well as the effectiveness of TED Talks and other Internet apps and platforms. With the dependent samples – the pre- and post-assessments within the same group – the Wilcoxon pair test was used. The aforementioned tests were carried out with $\alpha = 0.05$ set as the significance threshold. The statistical software Statistica 10 was used to calculate the data that was obtained.

To investigate the existence of statistically significant differences in individual skills and the success or failure of students within their groups, the pre-and post-test data were evaluated separately within the control and experimental groups.

Results and discussion

Students in the control group took English classes using the textbook Career Paths: Engineering by Charles Lloyd and James A. Frazier, which was created especially for engineering specialty students. Students in the experimental group took English classes that incorporated TED Talks (https://ed.ted.com/educator) and such online resources as Quizlet (https://quizlet.com/class/28339628), Wordwall (https://wordwall.net/uk/myactivities), Nearpod (https://nearpod.com/library/), which were filled by the educators with the professional vocabulary covered in TED Talks. Both student groups were advised to take the post-test, which included speaking, listening comprehension, and use of English activities. To determine whether statistical significance existed, we also computed the p-value while doing the research. The p-value, which ranges from 0 to 1, is commonly used to indicate the statistical significance level. It is appropriate to reject the null hypothesis in light of the lower p-value [8].

The table below displays the congruent results.

Table 1

Results of the pre-test and post-test

Group type	Respondents score	Language skills		
		Pre-test results, %	Post-test results, %	p-value
Listening				
Experimental	91-100	4	9	0.000011
	81-90	12	21	
	71-80	38	49	
	61-70	46	21	
Control	91-100	8	9	0.000212
	81-90	16	20	
	71-80	36	42	
	61-70	40	29	

Table 1 (continued)

Group type	Respondents score	Language skills		
		Pre-test results, %	Post-test results, %	p-value
Speaking				
Experimental	91-100	6	12	0.000040
	81-90	17	24	
	71-80	51	61	
	61-70	26	3	
Control	91-100	6	8	0.021960
	81-90	14	17	
	71-80	47	51	
	61-70	33	24	
Use of English				
Experimental	91-100	8	11	0.000067
	81-90	15	27	
	71-80	38	44	
	61-70	39	18	
Control	91-100	5	9	0.024980
	81-90	12	21	
	71-80	45	50	
	61-70	38	20	

The study findings demonstrated that while students in both groups saw increases in their post-test scores, the experimental group performed better in both speaking and listening comprehension and use of English tests. If their indicators are compared, it might be warranted. It is possible to conclude from an analysis of the experimental group results that 25 out of 50 students improved their grades, compared to 11 out of 50 students in the control group. Similar results were observed in the post-experiment speaking module. Compared to 10 out of 50 students in the control group, 26 out of 50 students in the experimental group saw an improvement in their scores. 21 respondents increased their proficiency in the use of English in the experimental group compared to 18 respondents in the control group respectively. It is clear that the latter result has the least differentiation among the two groups observed but must be noted that in the case of the experimental group grammar and vocabulary were not studied separately but in combination with other tasks – listening or speaking which made the process easier and more fun for students. The following chart was created in light of the findings from the initial diagnostic assessment and the last one for the control group (Table 2).

Table 2

Primary and final assessment outcomes for the control group

Grades	Primary assessment		Final assessment		Variation
	Quantity of respondents	%	Quantity of respondents	%	%
A	2	5	5	12.5	+7.5
B	3	7.5	6	15	+9
C	21	52.5	22	55	+2.5
D	11	27.5	6	15	-12.5
E	3	7.5	1	2.5	-5
Total	40	100	40	100	-

The following chart was created in light of the primary diagnostic test and final diagnostic assessment findings for the experimental group (Table 3). For both student groups, communicative tasks comprising two parts – one focusing on sentence formation abilities and the other on sentence operation – were administered as primary and final assessments. To ascertain whether there is statistical significance in the study, the p-value was calculated. Typically, a p-value between 0 and 1 is displayed. The outcomes of the entire group – not just one student – were estimated to obtain the p-value index. It is specified by the lower p-value that the null hypothesis should be discussed [8]. Table 4 presents the statistical outcomes.

Table 3

Primary and final assessment outcomes for the experimental group

Grades	Primary assessment		Final assessment		Variation
	Quantity of respondents	%	Quantity of respondents	%	%
A	2	5	5	12.5	+7.5
B	4	10	8	20	+10
C	19	47.5	25	62.5	+15
D	13	32.5	2	5	-27.5
E	2	5	-	-	-5
Total	40	100	40	100	-

Table 4

Primary and final assessment outcomes for both groups

Group	Points	Use of English					
		Forming sentences			Performing sentences		
		Primary assessment outcomes, %	Final assessment outcomes, %	p-value	Primary assessment outcomes, %	Final assessment outcomes, %	p-value
Control	90-100	6.0	11.1	0.051221	5.1	10.2	0.051850
	82-89	6.8	11.9		7.7	12.8	
	75-81	50.3	44.2		51.3	46.2	
	66-74	30.2	23.5		28.2	20.5	
	50-65	6.7	9.3		7.7	10.3	
Experimental	90-100	4	18	0.000018	5	20	0.000079
	82-89	8.6	28		7.5	25	
	75-81	50	44		55	50	
	66-74	32	10		25	5	
	50-65	5.4	-		7.5	-	

Following the final phase, students in the experimental group using this method were asked to reply anonymously to a series of statements indicating whether or not they agreed with the statements to gauge the usefulness of the virtual learning environment. Respondents could choose from five multiple-choice questions in the questionnaire. The questions were not open-ended. Completing the questionnaire took roughly five to seven minutes. The questionnaire was designed to ascertain the students' perceptions of the virtual learning environment that was used in the ESP classes. Table 5 below displays the findings from the data analysis of the questionnaire.

Table 5

Questionnaire outcomes

Statement	Highly agree, %	Agree, %	Not certain, %	Disagree, %	Highly disagree, %
The virtual education space for ESP class is rather essential	26	52	12	9	1
The virtual education space for ESP class is more captivating than other methods	17	58	14	8	3
The virtual education space tends to improve speaking skills	11	65	13	5	6
The virtual education space tends to improve my level of English	14	63	14	5	4
I would prefer studying ESP with traditional methods	4	9	27	40	20

It should be mentioned that a large majority of students – 78% – support the use of virtual learning environments in the classroom, and 75% of them think that the interactive teaching methods used in the classroom are very helpful for raising students' English proficiency and speaking abilities.

Thus, the findings supported the following hypotheses: 1) EFL students lack sufficient linguistic competence and are unable to use appropriate language structures to display various facts and attitudes toward them in professional communication until they are given a special ESP communicative course using the virtual education space; 2) The interactive approach to language teaching is more effective than the traditional one in the context of language acquisition, especially in the context of stressful situations and helps students overcome language and psychological barriers and motivate them for lifelong learning [9].

Conclusions

The most important finding of the current study is that, as demonstrated by the statistical analysis of the pre-and post-test results, the use of TED Talk videos in conjunction with Quizlet, Wordwall, and Nearpod apps (based on the TED Talks) significantly improved language skills like speaking, listening comprehension, and use of English while also broadening students' perspectives.

Analysis of the survey and in-person interview revealed that, with the inclusion of interactive approaches, students were more motivated, involved, and engaged in learning professional academic English. Additionally, the content and presentational quirks offered by TED Talks were highly relevant, realistic, and thought-provoking, which sparked important conversations and helped students enjoy the process of learning. According to the present research, 78% of students are in favor of using virtual learning environments in the classroom, and 75% believe that interactive teaching techniques are highly beneficial in improving students' speaking and English competence.

TED Talks allowed students to practice the phonetics, stylistics, lexical construction, and grammatical construction of modern English used in their professional environment at the same time. These talks were given by native speakers and field experts, who are sufficiently proficient and possess accurate and fluent language competence. Additionally, miming and gesturing helped students understand and grasp the main idea of the lesson. In the end, students can benefit from TED Talks in terms of blended or remote learning. The application of virtual education space shows the positive effects of e-learning on university engineering students studying ESP and justifies utilizing contemporary techniques and resources.

Author contributions

Conceptualization, I.H.; methodology, A.T., and A.K.; software, I.M.; validation, I.H., and A.T; formal analysis, A.K, and I.M.; investigation, I.H., A.T., A.K., and I.M.; data curation, I.H., A.T. an I.M.; writing – original draft preparation, I.H.; writing – review and editing, I.H. and A.K.; visualization, A.T., I.M.; project administration, I.H.; funding acquisition, A.K. All authors have read and agreed to the published version of the manuscript.

References

[1] Gaffas Z. M. Students' perceptions of e-learning ESP course in virtual and blended learning modes. Education and Information Technologies. No. 28 (8), 2023, pp. 1-30. DOI: 10.1007/s10639-023-11579-x
[2] Humeniuk I., Kuntso O., Lebedieva N., Osaulchyk O., Dakaliuk O. Moodle as e-learning system for ESP class. Independent Journal of Management and Production. Vol. 12, Isuue 6, 2021, pp. 646-659. DOI: 10.14807/ijmp.v12i6.1755
[3] Kirovska-Simjanoska D. Digital vs in-person learning environment in ESP classrooms: let the students decide. SEEU Review. No. 14 (1), 2019, pp. 36-68. DOI: 10.2478/seeur-2019-0004
[4] Konoplianyk L. M., Pryshupa Yu. Yu. Integrating information technology into ESP classes: use of digital learning tools to support formative assessment. Modern Engineering and Innovative Technologies. Issue 25, Part 3, 2023, pp. 59-66. DOI: 10.30890/2567-5273.2023-25-03-030 (in Ukrainian).

[5] Živković S. The ESP technology-supported learning environment. European Journal of Social Sciences, Education and Research. Vol. 3, Isuue 1, 2016, pp. 154-162. [online] [11.02.2024] Available at: https://revistia.com/files/articles/ejser_v3_i1_16/Zivkovic.pdf

[6] Chaikovska O., Zbaravska L., Bilyk T. Podcasts in teaching EFL for students majoring in engineering. 18th International Scientific Conference "Engineering for rural development", Latvia: Jelgava, 2019, pp. 1915-1920. DOI: 10.22616/ERDev2019.18.N344

[7] Educational and Professional Curriculum "Agri engineering" of the first (bachelor) level of higher education. Field of knowledge 20 "Agrarian sciences and food". 2023, 17 p. [online] [11.02.2024] Available at: https://pdatu.edu.ua/images/navchalna-robota/opp/opp23/opp-b-itf-5-pmoav.pdf?v = 03

[8] McLeod S. What a p-value tells you about statistical significance. Simply Psychology. 2019. [online] [11.02.2024] Available at: https://www.simplypsychology.org/p-value.html

[9] Giorgdze M., Dgebuadze M. Interactive teaching methods: challenges and perspectives. International E-Journal of Advances in Education, Vol. 3, Issue 9, December 2017, pp. 544-548. DOI: 10.18768/ijaedu.370419