Listening Comprehension Proficiency Development of Information Technology Students in ESP classroom

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Abstract. The article describes the 2013–2019 study, conducted at Taras Shevchenko National University of Kyiv (Ukraine), and involved 221 undergraduate students of Computer Science and Cybernetics Faculty. The research aimed at developing students' motivation to self-improvement of foreign language (FL) proficiency as a whole and listening comprehension competence in particular. We made a primary focus on listening comprehension improvement in the English for Specific Purposes (ESP) classroom since the students had performed poorer in listening than in the other ESP final exam activities. A new methodology for listening comprehension skills development through computer-assisted training activities related to the participants' professional environment (technological) was proposed. The experiment, which encompassed a three-stage metacognitive strategy training based on TED Talks online conference resource, was carried out. New was the idea that the students multitasked at all experiment stages – Listening Comprehension Input, Live Listening Comprehension, Listening Comprehension Output – that is, combined a "live listening" activity with reading, writing and speaking practice. Statistical analysis of the 2013-2019 ESP exam results based on the descriptive method, single-factor ANOVA and effect size measurement quantitatively proved the efficacy of the implemented methodology. The worked-out methodology might be used an alternative to traditional teaching techniques due to approach fruitfulness.

Keywords: English for Specific Purposes; undergraduate students; final exam; listening comprehension development; computer-assisted methodology.

1. Introduction

In the era of rapid information and technological society development, the high level of FL proficiency is the priority requirement to meet the challenges faced in higher education.

Many researchers underline the benefits and the effect of the computer-assisted technology use compared to older traditional learning (Clements & Sarama, 2003; Glaubke, 2007; Kauffman, 2004; Patel, 2013; Stošić, 2013). Ahmadi (2018) states that the application of technology has considerably changed English teaching methods. It provides so many alternatives as making teaching exciting and more productive in terms of advancement (Ahmadi, 2018, p. 115–125). Maxwell (1998) indicated that using technology in a classroom offers exciting ways to connect the students with the target language and culture, and build a community standard of language learners around the world. Altun (2015) admits that when computer, internet, smart boards, cell phones, video games, music players, etc. are used in the target language learning process, students' motivation and language awareness are raised. The digital generation of teachers and students is engaged with technological tools and involved in the target language through technology. Teaching by using traditional methods is no longer motivating and enjoyable for learners. Learners are more interactive, and learning outcomes bring about efficient results (Altun, 2015, p. 22–27).

Since computer-based communication used in education has become more popular and sophisticated, integrating technology into the teaching-learning environment is a useful and alternative agenda to Ukrainian educators. The application of technology-based teaching and learning has become a significant part of Taras Shevchenko National University's national curriculum, in the first place at the Faculties of Computer Science and Cybernetics and Information Technologies. Since the students have computer sciences specialization, the professionally oriented teaching plays a crucial role in enhancing students' quality learning. Taking into account a course specialization, the requirement for successful FL teaching is to apply multimedia and computer-based language practices. As the final exam results reflect some weaknesses in the students' language competence in general and listening comprehension (LC) performance in particular, our study aims to emphasize the necessity and effectiveness of using authentic multimedia resources in developing student's listening skills.

2. Literature review

Nowadays, in the high-tech era, people's perception is mostly screen-based. In real-life situations, today's "digital" users are poor listeners. The students mostly perform unsatisfactorily in LC tests when being checked. So, the students fail to listen and, as a result, communicate comprehensively and adequately in professional situations. That is why to develop LC competence has become the mainstream of modern training approaches.

In his practical guide for teachers, Harmer (2007) believes that successful listening practice should include both intensive i.e., in the classroom, and extensive or outside the classroom, teaching techniques. According to Harmer

(2007), a combination of in- and out-of-the-classroom practice becomes "successful" when it boosts language learning motivation and, on the other hand, develops overall students' academic performance (Harmer, 2007, p. 144–145). Live listening learning source as a "real-life face-to-face encounter in the classroom" (Harmer, 2007, p. 134) is becoming more and more productive in today's classroom.

Vovk (2016) worked out the elaborated comprehensive methodology as an exact system of communicatively and cognitively stipulated assignments. Accordingly, passing through pre-listening, in-while listening and post-listening stages, students acquire congruous habits, skills and abilities that constitute LC competence. But a year before, in McCaughey's study, it was said that at first glance such a three-stage strategy could seem like "a classic listening lesson" (McCaughey, 2015, p. 3). McCaughey infers that the role of a pre-listening stage, which provides students with "a motivational and organizational set for a certain activity" (Vovk, 2018, p. 27), is rather doubtful. He accepts that quite a long pre-listening activity like the introduction of new vocabulary, practice of complicated grammatical structures, or different types of questions can hardly target listening practice at all. Instead, McCaughey (2015) suggests practicing active listening activity in the classroom. While correlating ideas or events, reflecting on ambiguous words, making anticipations and conclusions, listening "between the lines," forming personal judgments as to the received message etc. (McCaughey, 2015, p. 10), students do increase the effectiveness of aural comprehension.

High-tech development always encourages innovative training approaches to perfecting students' academic performance and listening skills, in particular. The necessity of novel approaches' implementation in the classroom is becoming more challenging within the ESP environment because ESP teachers have to integrate not only the language but also the content (Kenny, 2016, p. 260). According to Anthony, the concept of English for professional needs could be defined as a specific "approach to teaching" or a certain "attitude of mind" (Anthony 2018, p. 18). Since any teaching method could be "appropriate" in the ESP classroom and the best approach is an "adaptive" one (Kenny, 2016, p. 257, 260), an idea that ESP classroom is rather fruitful for innovations, both in tools and methods, is crucial in *Innovating Pedagogy 2019* report (Ferguson et al, 2019).

In Kavaliauskienė and Anusienė's study (2009), a "podcasting" approach as one of the online communication technologies aimed at extra listening practice, both inside and outside the classroom, was suggested. In researchers' opinion, audio publishing online resources provide students and their educators with such a training technique that is "an exciting way to explore and discover educational content" (Kavaliauskienė & Anusienė, 2009, p. 28) and result in learning process inspiration. The researchers implemented a combination of multitasking and "blended learning", the concept suggested by Pete Sharma and Barney Barrett (Leithner, 2009). It enabled the learners to carry out listening tasks under non-threatening conditions and at convenient time with a follow-up ESP classroom

discussion, self-evaluation, peer reflection on skills development and summarizing the students' listening experience in their individual weblogs.

Chmel (2015) also supports the idea of the overall integration of modern technical aids into teaching and learning ESP. The researcher infers that to develop professional and communicative competence of students becomes successful when multimedia resources are actively applied in teaching ESP. In the study, a video is featured as an underestimated learning tool that triggers active learning, stimulates visual and auditory receptors, develops attention and memory, assists language skills mastering, and consequently, learners' self-confidence building (Chmel, 2015, p. 56–59).

To increase understanding of a listening text and improve the learner's listening skills, L2 learners are equipped nowadays with authentic listening materials, specifically those ones that can be used with technology. TED Talks lectures are becoming a powerful and useful tool in the English classroom as an extensive listening resource. Ahluwalia (2018) mentions that "TED stands for Technology, Entertainment and Design" (Ahluwalia, 2018, p. 80). It started in 1984 as a conference for giving a common platform to the people from the corresponding worlds. Since then, it has transformed from a small-scale, elitist conference into a popular, influential, large-scale, web-mediated platform widely used for educational purposes worldwide.

The use of authentic TED Talks provides students with comprehensive listening practice. Extensive listening, as defined by Renandya and Farrell (2011), is "all types of listening activities that allow learners to receive a lot of comprehensible and enjoyable input" (Renandya & Farrell, 2011, p. 5). TED Talks lessons integrate academic listening skills using real-time authentic monologues to reflect both EAP curriculum and realistic situations (Dudley-Evans & St John 2005; Field 1998). Theunissen (2014), in his study *Analysis in the visual channel in the corpus of TED Talks presentations*, emphasizes that TED Talks show many contextual parallels: conference context, live audience, form, length, type of speakers and topics. Approximately one-third of the TED Talks is about issues related to science or technology (Sugimoto et al, 2013, p. 673). TED makes scientific knowledge available to a broad audience, a phenomenon known as science popularization. Science-based content of TED Talks provides excellent opportunities to develop students' listening ability in EFL teaching for special purposes course at Computer Science and Cybernetics Faculty of Taras Shevchenko National University of Kyiv.

3. Materials and methods
In our research, we conducted a case study aimed at university undergraduates' listening proficiency development. The study encompassed both quantitative and qualitative analysis of the data on the participants' ESP final exam academic performance, as well as the analysis of their self-evaluation and pair-work discussion on LC test results, worksheets and after-listening questionnaire completion. The case was a single-setting ESP university course and the analysis

unit was 221 fourth-year students of the Faculty of Computer Science and Cybernetics of Taras Shevchenko National University of Kyiv.

The following research questions were central in the study:
1. Which ESP final exam activity did the students obtain the lowest results in?
2. What L2 teaching technique to introduce to meet the IT learners' needs?
3. To what extent did TED Talks L2 listening resource develop the students' ESP final exam performance?

The obtained data was analyzed through statistical methods, namely descriptive statistics, effect size measurement, and single-factor ANOVA.

4. Participants and setting

Over a five-year period (from fall 2013 to summer 2019), the language competence development of the undergraduates of Computer Science and Cybernetics Faculty of Taras Shevchenko National University of Kyiv within the ESP course was studied. The ESP final exam results were selected at the end of each academic year.

The study included the following stages:
- The collection of 2013–2017 ESP final exam results.
- The processing and analysis of 2013–2017 ESP final exam results.
- The implementation of a computer-oriented ESP teaching technique (2017–2019).
- The collection of 2017–2019 ESP final exam results.
- The processing and analysis of 2017–2019 ESP final exam results.
- Statistical analysis of 2013-2019 data.

A total of 221 participants, particularly 17 in 2013–2014, 38 in 2014–2015, 56 in 2015–2016, 44 in 2016–2017, 31 in 2017–2018 and 35 in 2018–2019 a. y. were involved in the investigation majoring in *Applied Mathematics*, *Informatics*, *System Analysis*, *Software Engineering*, and *Program Engineering* at one of the top universities in Ukraine. They were the fourth-year university students who attended the ESP course and passed the final exam. By the time of the final exam, the students had undertaken both a general English university course and ESP course for two years each. All participants were native Ukrainian speakers with A2–B2 L2 proficiency levels (the data is not included in Table), and none of them had officially studied English in any English-speaking country. The participants of the last two years (31 and 35) were selected based on the criterion of a similar FL proficiency level (B1).

In our research, the ESP training course as a crucial step forward to students' future successful FL professional interaction was organized according to the ESP National Curriculum for Universities (Bakaeva et al, 2005) and the university official curriculum (Rebenko, 2017), in particular. The course covered total of 144 academic hours (4 credits according to the European Credit Transfer and Accumulation System) in the 7th and 8th terms for the fourth-year IT students of Taras Shevchenko National University of Kyiv. The undergraduates took the

final exam on ESP course where their listening, writing, reading and speaking language proficiencies were evaluated. The assessment was undertaken following a set of five *Common Reference Levels* (ranging from A1 to C1) within *The Common European Framework of Reference for Languages* (Nikolaieva, 2003).

The ESP final exam at the University of Kyiv is traditionally conducted in 2 days – at first, the students take listening and writing comprehension exam sections, then – their reading and speaking skills are examined. Following the *Common European Framework* standards, a particular ESP Examination Certificate is issued by the university board in case an examinee reaches B2 fluency competence in reception, production, and interpretation performance. To be awarded the proper certificate, a candidate must gain an average minimum of 76 points on the four exam activities combined.

The task format for ESP final exam was adopted from the last test samples for Bachelor's level available at the *ESP National Curriculum for Universities* (Bakaeva et al, 2005, p. 104–107). Table 1 reveals the structure of 2013–2019 ESP final exam.

Table 1: 2013–2018 ESP final exam format

Exam periods	Skill assessed	Number of tasks	Timing	Weighing
Day 1	Listening	3	about 30 min	25%
	Writing	3	about 60 min	25%
Day 2	Reading	3	about 60 min	25%
	Speaking	3	about 15 min	25%

Listening ESP final exam tasks were objective and included (1) information ordering task, (2) True / False answers task, and (3) multiple-choice task. The sample of the latter task is shown in Appendix 1. The following examinees' skills were testable: understanding both details and the overall message, locating specific information in a recording, keeping the development of an argument and test instructions etc. Writing ESP final exam tasks tested the students' ability to (1) trace the coherence of the ideas in a gapped text and fill in the gaps with the most relevant to a real job-focused situation option (from 3 to 5 words each), (2) single out the article key ideas and review them in a list of keywords and/or phrases keeping to a minimum of 5 units, and (3) sequence information, scan the text and write a summary (from 10 to 12 sentences in each response).

Reading ESP final exam presupposed closed-format tasks of the following types: (1) matching task, (2) multiple-choice task, and (3) gap-filling task. The examinees were about to show their skills in deciding whether the information implied in certain paragraphs corresponds to the suggested headings; understanding specific text information and choosing from the options given; recognizing the option which suits a text gap the best to form a logical

statement. Speaking ESP final exam included two-part assessment – spoken production and spoken interaction. In Part 1, an examinee was asked to choose an exam card on a specialism-related topic and answer five rounding-up questions (about 1 min for each response). In Part 2, an examiner provided a student with 2 or 3 pictures to describe and engaged him/her into more detailed topic-related interaction (up to 5 min). In Part 3, an examinee made a speech (up to 5 min) on a home-prepared topic according to the card number he/she selected.

The text types on all four ESP final exam language skills were related in their content both to the IT profession and academic studying. The idea of tasks "authenticity" was kept.
The stages of the research conducted within 2013–2019 academic years at the University of Kyiv are described below.

The collection of 2013–2017 ESP final exam results

Throughout four academic years, the students' ESP final exam results on listening, writing, reading and speaking comprehension exam sections were selected. Figure 1 reveals the results obtained.
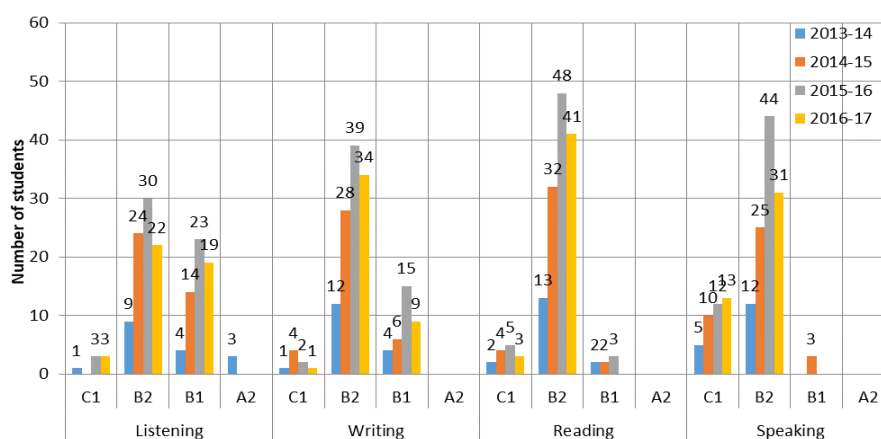

Figure 1: Assessment Results on English for Specific Purposes Final Exam (2013–2017)

The processing and analysis of 2013–2017 ESP final exam results

To analyze the data obtained, it was relevant to calculate the average academic performance on each exam activity. We took C1 level as 96-100 points (average 98); B2, B1 and A2 – 76-95 points (average 86), 61-75 points (average 68) and 46-60 points (average 53) correspondingly. To make calculations, we applied Microsoft Excel and obtained the following results shown in Table 2.

Table 2: Average grading score on ESP final exam activities from 2013 to 2017

Ac. year	Listening	Writing	Reading	Speaking
2013–14	76,65	82,47	85,29	89,53
2014–15	79,37	84,42	86,32	87,74
2015–16	79,25	81,61	86,11	88,57
2016–17	79,05	82,59	86,82	89,55
Mean	*78,58*	*82,77*	*86,14*	*88,85*

The data displayed in Table 2 makes it vivid that the students' LC performance is the weakest of all exam activities because it is assessed with the lowest points. Although the undergraduates gained B1–B2 in all exam activities, in Listening Comprehension section, the number of B1 and even A2 exam levels is the most numerous. Objectively better results were earned in Writing Comprehension Exam section, where not a single examinee was evaluated weaker than B1. The learning outcome in Reading Exam section appears to be more productive, according to the data shown in Figure 1. As for the highest examination activity results, it is Speaking part that shows the most numerous C1 and B2 levels. The diagrams in Figure 1 prove quite a stable tendency for the audience under investigation – gaining far higher results in Speaking exam activity than in Listening.

5. Results and discussion
As soon as the first research question was answered, we considered it inappropriate for the students to feel a lack of efficient practice of LC skills. So, we decided to introduce ESP teaching technique targeting at meeting the FL learners' needs within academic and professionally-oriented environments.

The implementation of a computer-oriented ESP teaching technique (2017–2019)

Research methodology
This part covers the implementation of a digital-oriented training technique aimed at practicing the professionally focused listening tasks use in the classroom and analyzing the results of the undertaken Listening Comprehension English Exam Demo-Tests for ESP course.

It addresses the research tasks, participants, materials, procedure, and data analysis.

Research tasks
Developing LC proficiency through exposure to authentic speech is currently considered to be the most crucial skill in language learning. It is significant for learners to use specific listening (metacognitive, cognitive, and socio-affective) strategies based on their own learning needs. In many studies, the findings indicated that more-proficient listeners used strategies more often than less-proficient ones. According to Berne (2004) and Ak (2012) more skillful listeners use a lot of strategies and can activate their existing linguistic knowledge to understand better.

To improve the understanding of English listening test for ESP university course applied at Computer Science and Cybernetics Faculty**,** we involve metacognitive strategy training with TED Talks videos. The research attempted to motivate students in professional text listening outlines the following tasks:
- to present a computer-oriented training technique for English LC boost;
- to provide listening practice using TED Talks online resource, followed by Worksheets completing;

- to evaluate the effective implementation of LC strategy into the professionally-oriented English language course;
- to motivate the students to practice further self-directed activities.

Participants
To conduct the study 31 (2017-18) and 35 (2018-19) students of the Faculty of Computer Science and Cybernetics were selected. All the participants were the fourth-year students, whose average age was 20, represented different departments such as Applied Mathematics, System Analysis, Program Engineering, and Programming.

Materials
For our research, we used the videos in Science and IT Technology category that were held at multiple TED Talks events available on the website www.ted.com. The length of the selected video varied between 5 and 7 minutes, suitable for the intermediate and upper-intermediate students. Each video was watched twice.

Content-based TED Talks videos (Science, Technology, IT breakthroughs) were used as the listening practice text to go along with the two listening task worksheets to assess LC improvement. TED Talks have been recognized as useful not only for improving teaching (Takaesu, 2013) but also for providing an evocative substance that inspires teaching and learning (Banker et al, 2012). Flowerdew and Peacock (2001) highlight that TED Talks replicate the real-time, authentic monologues required in creating goal-specific, interactive listening. Hence, learners can acquire, retain and retrieve information using realistic deep-end, parallel processing opportunities to develop their academic listening. To our mind, TED Talks is indispensable in listening skills development for its topic novelty, authenticity, the choice of influential speakers, and on the other hand, a wide range of digital options to be successfully applied in the educational process. They are as follows: video scenes, subtitles, full-text transcripts, play speed, reading list link on the topic related information, footnotes link covering corresponded quotes and references, and comments.

To fulfill the above tasks, we carried out quantitative and qualitative methods of data collection. The instruments used in this study were: LC final exam Demo-Test practice, Worksheets 1 and 2, Questionnaire. The purpose of Worksheet 1 was to know about LC problems, in particular about the difficulty in understanding the lecture itself without video and transcripts (speed speech, pronunciation, unfamiliar words, complex grammatical structures, professionally-oriented vocabulary). Worksheet 2 was focused on group work to compare student answers and analyze the test mistakes. The Questionnaire was used to get information about the increased listening strategy employment and potential student attitude improvements after practicing the LC final exam Demo-Test. The Questionnaire consisted of 5 post-training evaluation questions. The data obtained through the questionnaire and the worksheets were organized and analyzed qualitatively. A follow-up data-analysis was provided with qualitative and quantitative survey to verify each of the four research tasks.

Procedure
Our research encompasses three stages: Listening Comprehension Input (LCI), Live Listening Comprehension (LLC), and Listening Comprehension Output (LCO).

Listening Comprehension Input
a) Before listening, the participants received ten comprehension questions related to the content of the TED Talks lecture they were about to hear (see Appendix 2). The questions were compiled under the format of the ESP final exam multiple choice task in LC. The participants were asked to read the questions carefully before listening to the LC Exam-Demo Test resource. The learners were also presented the website (www.ted.com) before using the video.
b) The participants listened to the material for the first time. They were told that they would listen to the authentic IT Technology-based TED Talks without transcripts or subtitles to understand the general meaning. After listening, the students answered comprehension questions.

Live Listening Comprehension
a) After a short break, the learners listened to the presentation for the second time and watched the online conference. Afterwards, the participants completed their Worksheet 1 notes (see Appendix 3), indicating how difficult they had found the passage and how much they thought they had understood.
b) The learners then watched and listened to a content-based video with subtitles and transcripts. The examiner provided the students with the correct answers to the comprehension test. The learners corrected the mistakes, if any, and added Worksheets 2 notes (see Appendix 4), collaborating with their co-participants.

Listening Comprehension Output
The learners were asked to reflect on how successful the applied strategy in practicing LC skills development was, to write down the pluses and minuses of their experience with TED Talks video into the Questionnaire (see Appendix 5) and what they could do differently next time.
Table 3 displays the stages mentioned above.

Table 3: Listening comprehension skills development study timeline

1.	Listening Comprehension Input	a. Pre-training preparation	5 min
		b. LC final exam Demo-Test practice	15 min
2.	Live Listening Comprehension	a. Video resource practice Worksheet 1 completion	15 min
		b. Subtitles resource practice Group reflection Worksheet 2 completion	15 min
3.	Listening Comprehension Output	a. Post-training evaluation	5 min
		b. Questionnaire	10 min
Total			65 min

In contrast to standard LC test preparation (2013–2017), from 2017 to 2019, we focused on the application of content-oriented real-life visual test preparation to develop students listening ability in EFL teaching for specific purposes. According to Hamouda (2013), a learning environment for listening skills, which is a so-called laboratory besides cassettes tapes, tape recorders, and written listening texts, is a vital key affecting the quality of both learning and teaching listening skills. Our university-conducted research showed that the undergraduates from the Faculty of Computer Science and Cybernetics of Taras Shevchenko National University of Kyiv improved their LC skills more efficiently after we provided them with a professional environment listening with video and transcript support. The test assessment data obtained were the following: in 2017–2018, 3 students acquired C1, 22 – B2, and 6 – B1 level; in 2018–2019, there were 7, 26, and 2 correspondingly. The data obtained from the Worksheets revealed that the prevailing difficulties the interviewed subjects had in LC test were: speech speed, special vocabulary, and complex grammar structures. Background knowledge about a particular topic also influenced their comprehension during listening. In addition to the unknown vocabulary and the difficulty of grammatical structures, the lack of visual support was one of the main reasons why most students couldn't understand the whole talk. The challenge of remembering the context without seeing the speaker was mentioned as the main factor that negatively influenced LC. After adding the video and transcript, the learners reported about effective improvement in understanding of the spoken text.

Based on the students' responses toward the given questionnaire, the majority of them considered themselves "good" in listening skills, outlined the intends to increase awareness and confidence in listening strategies and showed interest in completing visual listening task material at the FL exam. They claimed that the implementation of TED Talks helped them in assisting LC confidence.

Thus, we can sum up that using TED Talks in the Listening Comprehension English Exam Tests for ESP University course created a significant impact in the evolution of language acquisition as a whole and listening skill in particular.

The collection of 2017–2019 ESP final exam results
The results of the final exam on ESP, taken by the fourth-year students of the Faculty of Computer Science and Cybernetics of Kyiv University in 2017–2018–2019 a. y., are shown in Figure 2.
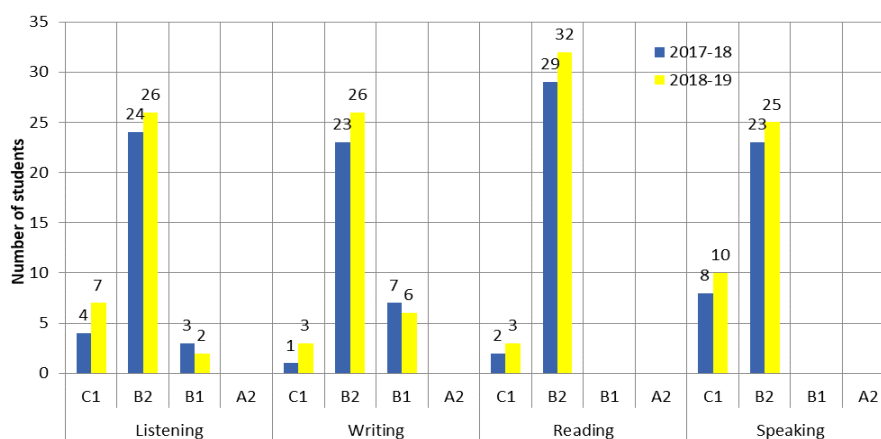
Figure 2: Assessment Results on English for Specific Purposes Final Exam (2017–2019)

The processing and analysis of 2017–2019 ESP final exam results
As shown in Figure 2, the undergraduates passed the exam successfully and achieved high points in all activities. To analyze the data, we again calculated an average grading score and displayed the results in Table 4.

Table 4: Average grading score on ESP final exam activities from 2017 to 2019

Ac. Year	Listening	Writing	Reading	Speaking
2017–18	85,81	82,32	86,77	89,10
2018–19	87,37	83,94	87,03	89,43
Mean	*86,59*	*83,13*	*86,90*	*89,27*

The findings determined an average grading score in each test activity within two academic years. It enabled us to compare student performance with the previous years' results quantitatively. From Table 2 and 4 data, we could see that LC performance of 66 students, experienced our computer-oriented FL learning approach in the ESP classroom, had arisen in 10 % compared to the exam results of the previous academic years. The average grading score in the rest three exam activities had also increased but not significantly – nearly 1% each. Slight development in writing comprehension performance can be explained by worksheets and questionnaire completion practice. Reading and speaking exam performance results remain stable and relatively high since the participants perceive most FL information in digit and have enhanced fast reading skills. As for FL speaking proficiency, the majority of the examinees are fluent speakers, and random grammar mistakes made by them affect neither the flow of speaking production nor their thought accuracy.

Aimed to evaluate the efficiency of the computer-oriented training technique implemented in ESP class, we applied descriptive analysis and effect size measurement (Table 5).

Table 5: Descriptive statistics on students' LC performance before and after implementation of ESP training methodology

Indicator	*Before*	*After*
Mean	78,58	86,59
Standard deviation	1,293419	1,103087
Standard error of mean	0,64671	0,78
Coefficient of variation, %	1,64599	1,273919
Effect Size		6.664

Table 5 reveals the rise of mean values in 8 points and points deviation decrease that feature effectiveness of ESP students' training due to advanced training method implementation. Additionally, statistically significant development of students' LC performance is proved by effect size value in 6.664 points.

Aimed to evaluate the significance of computer-oriented training technique implementation, we applied a single-factor analysis of variance (ANOVA), see Table 6. Sum-of-squares (SS) measures the total variation among the six values: students' final exam results between before and after methodology implementation are more varied than within each group. Mean squares (MS) determine whether a computer-oriented training technique is significant. As shown, the influence of implemented ESP technique on the students' LC final exam performance is more significant than the difference in final exam average performance within each student group due to participants' peculiarities with insignificant error probability (p-value< .002).

Table 6: Single-factor ANOVA results

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	85,547	1	85,547	54,876	.00178	7,709
Within Groups	6,236	4	1,559			
Total	91,782	5				

In our experiment, we modified Harmer's idea of "a real-life encounter in the classroom" (Harmer, 2007, p. 134) into computer-based LC practice through TED Talks video conference online resource. Test completion at LCI stage – the first stage of the experiment conducted – introduced a pre-listening practice activity and marked a starting point in the students' dynamic LC skills development. Authentic listening was implemented into LC practice activities at LLC stage of our experiment and projected in ESP classroom. In the conducted research, we applied Kavaliauskienė and Anusienė's model of question survey (2009) to collect data for further analysis. We developed the idea aimed at examining learners' perceptions of computer-oriented TED Talks online conferences through the author-originated questionnaire and worksheet tools. Worksheets and questionnaire completion, implied at LCO experiment stage, made the worked out methodology complete and consistent.

Most participants reflected positively on TED Talks classroom implementation and became highly interested in using this technology in post-exam environments. Hence, the applied methodology resulted in encouraging the students to practice and enhance the acquired LC skills in their self-learning language processes. Such after-listening practice activities as pair work discussion, group reflection, and post-training peer evaluation stimulated the students' "live" LC skills enrichment and motivation to further self-development aimed at succeeding not only in upcoming ESP final exam, but also in future professional interaction. Emphasizing practical outcomes, we addressed to Dudley-Evans and St John' idea (1998) about integrating academic listening skills at the real-time authentic professional-oriented TED Talks lessons to reflect both EAP curriculum and specific needs of our learners. Thus, the results obtained prove the effectiveness of the methodological approach implemented in the ESP classroom.

6. Conclusions

The reality of contemporary society is such that professional communication takes a special place in scientific etiquette and information technology culture. Universities all over the world and in Ukraine, in particular, are in charge of keeping today's professional environments developed. One of the most efficient tools to meet the needs of both the students and their future employers is the ESP training course aimed at improving the students' L2 proficiency of their L1 job-focused systematic knowledge and boosting communication competence within FL academic and professional environments.

The study, conducted at Taras Shevchenko National University of Kyiv from fall 2013 to summer 2019, targeted 221 undergraduates of Computer Science and Cybernetics Faculty, who attended the ESP course. A four-year investigation of Research Question 1 resulted in a diagnosis of the weak points in both the students' ESP final exam results as a whole and ESP listening skills training in particular. Designed to meet the IT learners' needs, a computer-oriented LC development teaching technique was implemented in ESP classroom following Research Question 2. Metacognitive strategy training with content-based TED Talks videos involved 66 participants and took two academic years. It provided the students with a productive set of activities within a three-stage experiment, activated four main learning styles (visual, aural, verbal, kinesthetic), encouraged both in- and out-of-the-classroom discussion, and motivated the participants for further listening skills practice. New was that we broaden the tools of a typical "live listening" technique and penetrated the students into their natural environment – technological provision. It made the ESP lesson dynamic, the students interested, and their listening skills improved. In Research Question 3, we measured the progress the participants made. The data obtained showed that there was a stable tendency for the successful improvement of listening skills of the undergraduates who participated in our investigation. The computer-oriented ESP teaching methodology applied proved to be efficient because the students' motivation was increased, and ESP final exam results in listening were developed. According to the data obtained, we consider the

further reorganization of the current ESP curriculum at the University of Kyiv rather perspective.

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Appendix 1
Listening Comprehension Exam Demo-Test 1
Directions: You will hear a radio program on which the host, Amanda, talks about digital detox phenomenon. For questions (1-10), choose the correct answer (A, B or C).

1. The radio host says that a digital detox ...
A   means we are in front of screens all the time.
B   is something younger people are trying more.
C   is important for our health.

2. Which sentence is not true about Amanda Vince's job?
A   She is online a lot of the time.
B   She follows fashion on social media.
C   She uploads her own videos to social media.

3. What is the name of the book that influenced Amanda?
A   Log Off: How to Stay Connected After Disconnecting
B   Log Off: How to Disconnect and Stay Disconnected
C   Log Off: Advice for the Digital Detox

4. Amanda realised that most of the times she looked at the phone because she was:
A   afraid to miss a call from parents
B   trying to avoid something happing to her
C   to be disconnected

5. The first step in a digital detox is to get rid of distractions, such as ...
A   noises the phone makes.
B   screens in your home and workplace.
C   the bright colours on your phone.

6. Amanda removed notifications from ...
A   her close family and friends.
B   everything except important people in her life.
C   everything except very important work-related things.

7. The book also suggested that ...
A   we replace digital distractions with real-world ones.
B   we think about the reason we are looking at our phones so much.
C   we try to be more polite with our phones around people.

8. Amanda and her partner ...
A   tried a two-day digital detox first.
B   found it impossible to completely disconnect.
C   found it very easy to do a digital detox for a weekend.

9. Amanda believes that a digital detox ...
A   is not a good idea if you have a lot of work.
B   is better if it's for a week, not just a weekend.
C   is something everyone will enjoy.

10. Did Amanda advise to remove digital addiction...?
A   for the whole week
B   for the whole summer
C   at your own pace.
(video is available at https://learnenglish.britishcouncil.org/upper-intermediate-b2-listening/digital-detox-podcast)

Appendix 2
Listening Comprehension Exam Demo-Test 2
Directions: You will hear an official TED conference talk presented by Sarah Bergbreiter, the head of a micro-robotics development team. For questions (1-10), choose the correct answer (A, B or C).

1. What makes it complicated to design ant-like robots?
A   to figure out how to make the robots operate.
B   to provide sensor-controlled functions.
C   to combine sensor, power and control mechanisms.

2. Which insect feature should be copied to make robots move easily over rough terrain?
A   a small body size.
B   an energy storage ability.
C   a mix of hard and soft tissues.

3. What is crucial in a robot jumping mechanism?
A   the power spring stored for energy release.
B   the motor fixed on a robot's body.
C   the tweezers applied by graduate students.

4. What happened to the 4-millimeter-sized machine?
A   it stopped being robust.
B   it lost its jumping ability.
C   it has been lost.

5. What triggers micro-robot legs to move?
A   a silicon rubber joint.
B   an embedded magnet.
C   an external magnetic field.

6. Which robot model is in the developers' current disposal?
A   one centimetre in size robot.
B   a robot that is a few millimetres on a side.
C   a 3D printed robot that is faster than cockroaches.

7. What is the research team going to do next?
A   to add more bio-inspired functions.
B   to implement advanced fabric.
C   to increase light emitting on the robot.

8. What does the speaker's most favourite video depict?
A   a tiny mechanism turning into a big flash.
B   a wired-up machine jumping through the air.
C   an autonomous robot moving in response to light switches.

9. Which of the following robot application is NOT mentioned?
A   to search for natural disaster survivors.
B   to inspect public institutions.
C   to swim through some liquids of human body.

10. Which field is about to change much?
A   construction.
B   micro-robot modelling.
C   protection of termites in Africa and Australia.

(video   is   available   at https://www.ted.com/talks/sarah_bergbreiter_why_i_make_robots_the_size_of_a_grain_of_rice?language=en#t-350285)

Appendix 3

Listening Worksheet 1

Name_____

Directions: Answer the following questions as you listen to the tape script.

1. Reflect on how well you listened.

a. Did you understand everything that you listened to?
_____

b. Did you find it easy to understand the meaning of the spoken text without seeing the speaker's body language?
_____

 c. Did you find it difficult to understand real-life lecturer speech?
_____

2. Write down any words or phrases you did not understand that you would like to look up the definition.
_____
_____
_____

Appendix 4

Listening Worksheet 2

Name_____

Directions: Answer the following questions as you watch and listen to the video.

1. Did the video help you in perceiving the material? What was the main message of the TED Talks?
_____
_____

2. What were the key terms used by the speaker?
_____
_____

Check and correct the mistakes if any. Exchange the test papers with your partner. Discuss and explain the mistakes made by your partner.
_____
_____
_____

Appendix 5

Questionnaire

1. How do you assess your listening skills?

_____
_____

2. Do you think that LC final exam Demo-Test practice with TED Talks videos is a good way to improve listening skills?

_____
_____

3. Which activity in LC final exam Demo-Test practice with TED Talks videos is a good way to improve listening skills?

_____
_____

4.What will you do differently next time?

_____
_____

5. Please write any comments or suggestions about future listening activities.

_____
_____
_____