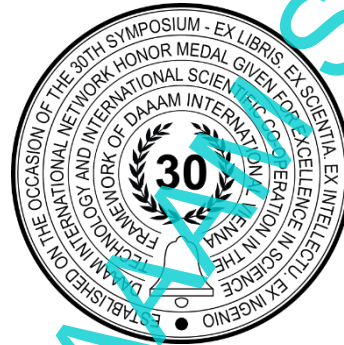


APPLICATION OF MOBILE TECHNOLOGIES TO INCREASE THE EFFICIENCY OF LANGUAGE COMMUNICATIVE SKILLS OF ENGINEERING STUDENTS

Peter the Great St.Petersburg Polytechnic University
Oleg Ipatov, Darina Barinova, Maria Odnokaya, Elena Krylova & Sofia Saramakha



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Abstract

The paper presents the didactic possibilities of mobile technology application in foreign language teaching of engineers. A methodical analysis of the application of mobile learning tools was carried out and the tool that is the most effective for the development of foreign language communicative skills was singled out. Algorithms for using of mobile technology are given in the paper, the results of the experimental research have been analysed and conclusions have been drawn. The article will serve the interest for those who research digital trends in education as well as those who are interested in introducing new teaching approaches into the educational process of engineers.

Keywords: mobile technologies; mobile learning; engineers; foreign language.

1. Introduction

With the advent of digitized education, which provides vast amounts of knowledge and information at any time and place, the need for special competencies in education and learning has arisen. Today, no one questions the fact that it is not just possible, but necessary to introduce digital technologies into the pedagogical process. By the term "mobile technology" handheld devices with mobile applications and Internet connectivity are meant. They allow to learn anywhere and anytime, as well as provide access to up-to-date information and individualized learning. The use of mobile technologies provides flexibility, relevance and efficiency of future engineers training. They contribute to the development of communicative skills adapted to the professional needs of engineers, as well as to the improvement of the quality and efficiency of the educational process. When teaching a foreign language at a university, the most important, in our opinion, is the development of foreign language professionally oriented communicative competence [1], [2]. The aspects of engineering students' communicative skills development are diverse and correlate with different components of the educational process [3], [4]. That is why the priority direction for teachers is modelling of the most relevant and demanded communicative situations with the help of mobile technologies, which will allow to adapt future engineers to the peculiarities of professional communication to the maximum extent possible.

The relevance of the problem stated in the study is due to the need to improve the level of students' oral communicative skills using mobile technologies and the lack of research in this area in teaching engineering students. The aim of the research: to develop a set of exercises using mobile technologies in order to develop the oral foreign language communicative skills of engineering students. Practical significance lies in the development of a set of exercises with the help of mobile learning tools that develop oral foreign language communicative skills of engineering students. Scientific novelty of the research is in the scientific and methodological substantiation of mobile technology application aimed at the development of oral foreign language communicative skills of engineering students, which expands the didactic possibilities of the educational process in learning a foreign language. To achieve the goal, the following tasks were set:

- to study didactic properties and possibilities of mobile technologies application in foreign language teaching;
- to determine the methodological principles of teaching future engineers communicative skills using mobile technologies;
- to analyze the methodological potential of mobile technologies application in teaching foreign language to engineering students;
- to present a system of exercises oriented to the development of oral foreign language communicative skills of engineering students;
- to experimentally test the use of this system and analyze the results obtained.

The didactic essence of the application of these learning tools is to create learning systems that are aimed at the dialogical nature of learning, taking into account the personal characteristics of learners. Thus, mobile learning using mobile devices makes learning truly personalized. This type of learning allows students to choose not only the content of training taking into account their interests, but also the time that students can allocate to training, which makes mobile learning fully student-centered.

The benefits of using mobile technology for learning:

- Access to learning anywhere, anytime.
- Portability and accessibility of mobile devices.
- Possibility of individualization of learning through personalization of learning content.
- Support for learners with disabilities.
- Constant access to all content, to control and self-control materials, to personal files of their cloud storage.
- Transition from informative and communicative learning to interactive learning, participants of the process independently create content and share knowledge in collective activities.
- Faster dissemination of all types of learning material among students.
- Ease of providing educational communications within the group, with the teacher.

Mobile learning is more flexible, non-formal, interactive and individualized. Thus, the introduction of mobile tools in education allows to expand the scope of the curriculum beyond the walls of the educational institution, as it allows you to travel and learn; increases motivation and interest in the learning process, promotes effective learning, allows people with disabilities to learn; promotes better learning and memorization; supports the research process [5]. Using the advantages of mobile learning expands the possibilities of interaction between all participants of the educational process, allowing teachers to apply various forms of learning activities in both in-class and extracurricular activities, more effectively organize independent work of students [6], which contributes to the development of professional competencies of today's professionals.

The following popular mobile technologies stand out at the moment:

- Calendar-planner for controlling the schedule of classes, events and checkpoints (Google Calendar).
- Messengers that can be used to send notifications and reminders about scheduled training events (WhatsApps, Viber, Telegram), as well as individual and group counselling of students.
- Distribution of electronic materials necessary for the class via e-mail and messengers, as well as access to electronic textbooks, dictionaries and reference books (multimedia learning web-resources).
- Multimedia tools for presentation of lecture material (Miro).
- Educational audio files, video files and educational podcasts that can be used for teaching a foreign language (YouTube).
- Webinars for online lectures and training on platforms such as teachbase.ru.
- Platforms for open e-learning (Stepik, OpenEdu, Coursera).
- Cloud services and applications for doing practical work, creating group projects and organizing teamwork (Google Docs, Yandex.Disk).

Telegram can be a more convenient app for learning a foreign language than some other apps for several reasons. For example, compared to WhatsApp or Viber, Telegram has a built-in translator, which allows you to translate messages directly within the app without having to copy and paste text into a translator. In addition, Telegram provides a more flexible structure for organizing foreign-language communication, where you can communicate in a foreign language with other students and teachers, as well as for accessing materials and assignments.

Compared to Viber, Telegram has a more intuitive and simpler interface, which makes it easier to use as a language learning platform. In addition, Telegram allows you to use bots and integrate other applications that help you learn a

foreign language, for example, to improve your vocabulary or to practice pronunciation, to learn technical vocabulary, and to access foreign language materials and video tutorials related to engineering topics.

Compared to Zoom and Skype, Telegram may be more convenient for learning a language on the go, as it does not require installation on a computer and can be used on mobile devices. It provides more opportunities to share materials and homework, as well as to communicate in a foreign language with other students and teachers outside of formal lessons.

Compared to other language learning apps such as Duolingo or Rosetta Stone, Telegram offers a more flexible and adaptive approach to language learning, allowing users to customize the learning process according to their needs. In addition, using Telegram for language learning can be more effective if users are already communicating in a foreign language with native speakers or other learners. Overall, Telegram can be one of the most convenient and effective applications for language learning.

A feature of Telegram is also the ability to create separate topics within a chat room, which makes communication more organized and structured. Each topic can have its own discussion thread, and users can easily find necessary messages and information, even if it was sent long ago, as there is a function to pin the message. These features are especially useful when teaching, as they allow you to create different topics for different aspects of the course, such as grammar, vocabulary, reading, etc. This helps students navigate through the material more easily and facilitates the language learning process.

The effectiveness of using Telegram is also confirmed in studies. First, Telegram has a wide audience of active users. According to statistical data, its Russian audience amounts to 48.8 million people per month. Secondly, researchers note the convenience of Telegram as a platform for creating training courses. For example, the study by T.A. Glebovich and A.D. Novikova emphasizes that Telegram users prefer informative, content-rich text without attention-holding elements, convenient and simple interface that allows creating individual selections of thematic content [7].

The study showed that the Telegram app can be an effective and simple tool for learning English and developing vocabulary. It can improve speaking and writing as well as reading and comprehension of texts. The application can also be used to teach vocabulary words and increase students' interest in learning a foreign language [8].

Telegram has also been confirmed to have a positive effect on improving reading skills in preparation for the IELTS exam. Thus, in the study of Shirinbakhsh&Saeidi, the first group gained knowledge in the traditional way and the second group gained knowledge through Telegram. Statistical analysis of the data showed that the experimental group performed better in the final test. During the study, which is also important, all students agreed that they liked learning through Telegram [9].

Research has shown that Telegram application can facilitate the learning of writing skills. Thus, the result of Alodwan's study, was that there were significant differences between the pre and post test scores of the experimental group, which confirms that using Telegram is an effective method of teaching writing skills. The researcher also noted that teaching using Telegram had a positive impact on the participants because students were required to save and record their writing [10].

A.J. Martin studied the effect of Telegram on foreign language learning motivation, language anxiety, and attitudes toward English language learning. It was found that Telegram instruction can increase the desire and inclination for language learning among English language learners. In addition, Telegram has been shown to have a positive effect on reducing anxiety in international language learners [11].

So, Telegram, a free online application, has it all: a cloud-based file storage system, the ability to organize collaborative online classes, chatbots and the ability to create your own customizable bot for any purpose. Working on different skills in Telegram is very easy, and the app itself is familiar to students and eagerly used by them.

Based on the abovementioned facts the main advantages of Telegram are:

- Messenger is not as boring as, for example, email or the abovementioned social networks: there are stickers, emoji. The ability to add interactive elements makes the messenger more modern and used among students.
- The possibility of microlearning. In their free time, a student can go through a course or answer questions from an instructor or bot, starting or stopping at any moment and at any place without losing progress.
- wide audience: by using Telegram, the student has the opportunity to communicate with a large number of people, bringing together different spheres of life on one platform and gaining knowledge and skills through this communication. The nature of the audience is also important - most of the audience, according to the analyzed sources, seeks self-development and knowledge acquisition. This is due to the fact that there are a huge number of educational channels, educational material and scientific communities in this messenger.
- Research shows that this messenger has a positive impact on students' motivation and reduces anxiety in the process of learning a foreign language.
- The availability of various services and chatbots that enhance the capabilities and functionality of this messenger and provide convenience to users. These tools are able to automate many tasks, such as sending and collecting homework, organizing tests, providing lectures and study materials.
- The ability to create a group chat. Teachers can create a chat group for foreign language students and encourage them to practice speaking with each other. Moreover, students can use messenger to communicate with native speakers of the target language and practice their language skills in a real context.

There is no doubt that for a more effective process of developing students' foreign language communicative skills it is necessary to organize the learning process in such a way that students can easily access information, share knowledge in

online format, which is especially relevant after the pandemic period, it is necessary to use the most effective and modern tools for quality training of future engineers. That is why, the use of modern and up-to-date learning tools can increase student engagement, facilitate and qualitatively improve the learning process. Thus, it is mobile learning that is one of the most relevant types of learning today. This is due to the daily use of mobile devices, which consequently affects their active implementation in the field of education.

2. Methods

Theoretical foundations for the study are the methodological principles of teaching a foreign language in the format of mixed and online learning, principles of professionally-oriented teaching of a foreign language, as well as the basic principles of the communicative approach to teaching a foreign approach to foreign language teaching. The material of the study served as general scientific methods of theoretical research: literature analysis of domestic and foreign authors on the topic of research. As the main methods of research were questionnaire survey, analysis of scientific literature.

3. Experiment

When selecting a learning application, we were also interested in the opinion of the study participants. In view of this, a questionnaire was developed to identify the most used online resources by students in order to find the most convenient platform for teaching engineers. The questionnaire contained multiple choice questions on the topics of the most appropriate resources, messengers and social networks in foreign language learning.

The questionnaire was conducted by means of Google.Forms. 128 first-year master's students (56 female, 72 male students) of St. Petersburg Peter the Great Polytechnic University of engineering profile took part in the opinion poll as well as in the experiment. Students' age range: 20-23 years. The direction of training - engineering systems of buildings and structures. The following results were obtained.

In response to the question, "What resources do you find convenient to use in your teaching?" the following data was obtained:

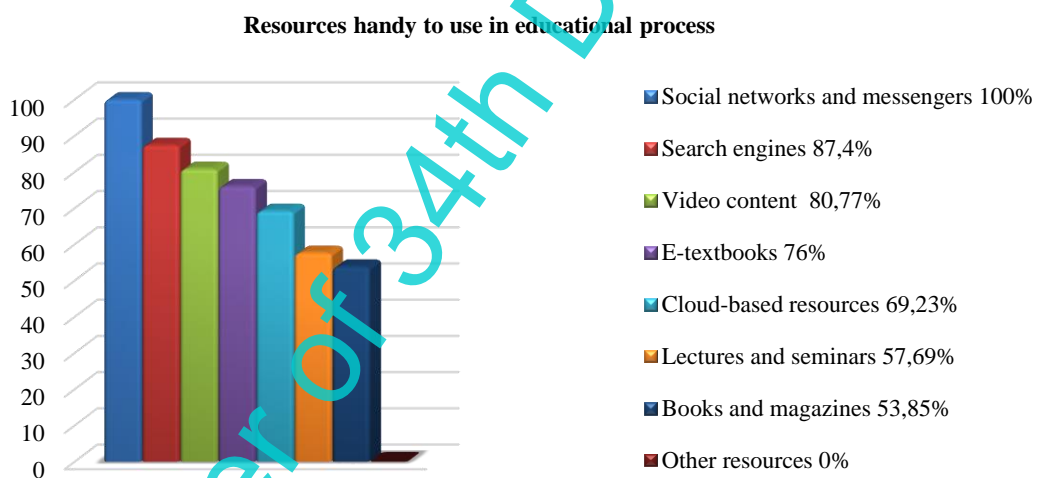


Fig. 1. Results of Questionnaire 1

The data show that the most popular are social networks and messengers, which were chosen by all respondents (100%). Search engines are also widely used (used by 87.4% of students), indicating that students prefer an independent approach to learning. Video content is also popular (80.77% of respondents), which may be due to the fact that visual materials can be more appealing and memorable than textual materials. E-textbooks and cloud resources are also chosen by the majority of students (76% and 69.23% respectively). Books and magazines were chosen by about half of the respondents (53.85%), indicating that traditional methods of learning also remain relevant to some students. Lectures and seminars were chosen by less than 60% of the respondents, which may indicate that students prefer more interactive forms of learning.

Analysis of the answer to the question "What messengers and social networks do you prefer to use in educational process?" showed the following:

Social networks and messengers

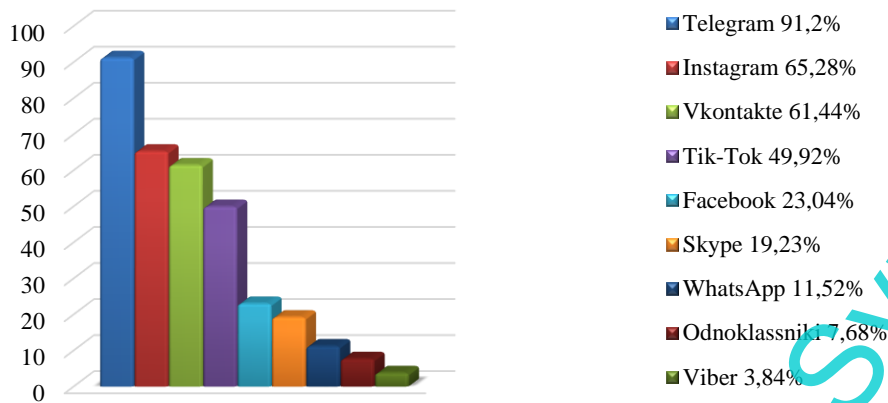


Fig. 2. Results of Questionnaire 2

Telegram is the most popular messenger/social network for use in teaching, among the respondents. It was chosen by 91.2% of respondents, indicating its high popularity in this area. Vkontakte and Instagram are also in high demand among the respondents, with 61.44% and 65.28% choice respectively. This may be due to the fact that they provide the opportunity to communicate with professors and other students, as well as access to various materials and content that can be useful for learning. Tik-Tok also proved to be a relatively popular social network, chosen by 49.92% of respondents. This may be due to the fact that a lot of content related to learning and language learning has recently appeared on the platform. WhatsApp, Viber and Skype proved to be the least popular choices for use in learning, with 11.52%, 3.84% and 19.23% choosing them respectively. This may be because they are less convenient for learning than other messengers/social networks and do not provide as many opportunities to share information and content. Analysis of the answer to the question "Where would it be more convenient for you to communicate with teachers and classmates?" has shown the following:

Means of communication

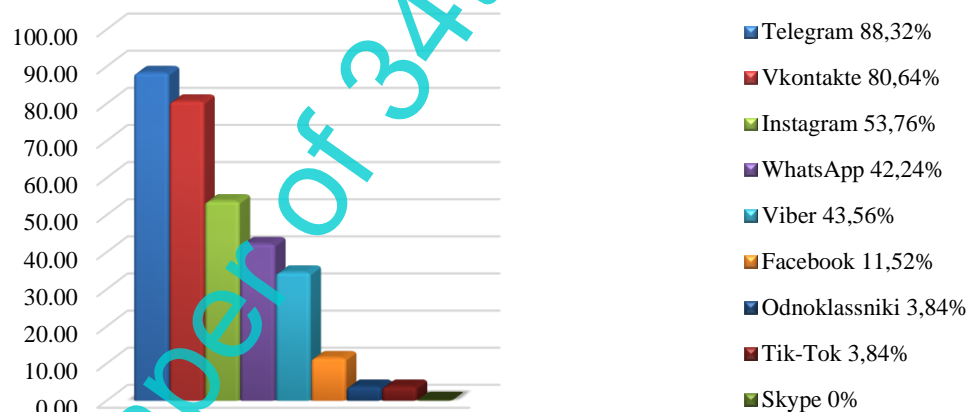


Fig. 3. Results of Questionnaire 3

The data show that the majority of respondents prefer to use messengers and social networks to communicate with the teacher and classmates. In particular, the most popular among respondents was Telegram - 88.32%, which may be due to the fact that this messenger has many features that facilitate the process of communication and organization of group work, including the creation of channels and groups, the ability to send files and exchange messages. The next is Vkontakte, which received the support of 80.64% of respondents. Vkontakte is a popular social network in Russia, and many students may already have an account on this social network, making it a convenient platform for communicating with faculty and classmates. Instagram is next, receiving support from 53.76% of respondents. This may be due to the popularity of this social network among young people and the possibility of using photos and videos for educational purposes.

WhatsApp ranks fourth with 42.24% support, while Viber is in fifth place with 34.56% support. Both messengers are known for their ease of use and widespread popularity in Russia, but they probably do not have as extensive opportunities

for structuring information as Telegram. Facebook received 11.52% support, while Tik-Tok and Odnoklassniki received 3.84% support. Facebook and Odnoklassniki do not have the same widespread popularity among young people in Russia as Vkontakte and may be less convenient platforms for communication for educational purposes. Tik-Tok, on the other hand, is not convenient to use for texting purposes. Skype did not receive support among respondents, which may be due to the fact that it is less popular among young people in Russia and does not offer the same convenience as Telegram or Vkontakte.

Analysis of the answer to the question "Which resource is the most useful for accessing different educational materials?" showed the following:

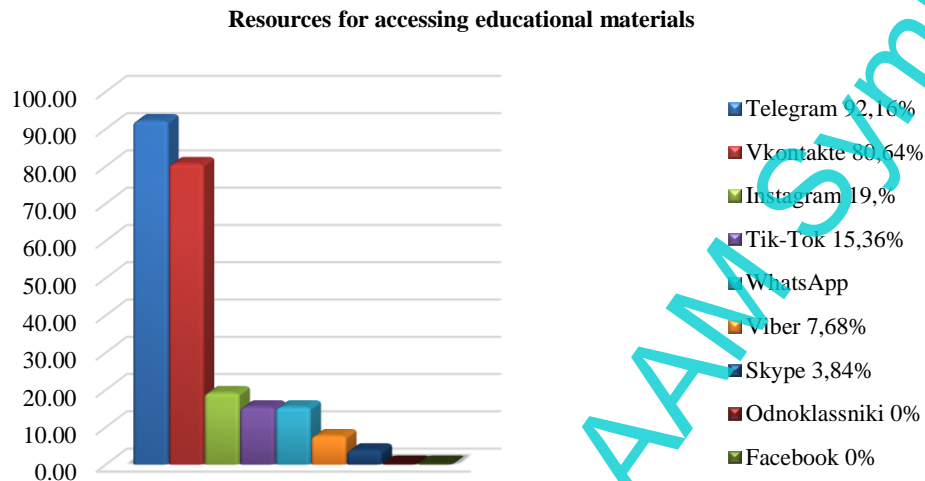


Fig. 4. Results of Questionnaire 4

According to the data, the most useful resource for accessing various educational materials is Telegram with the result of 92.16%. The second place is occupied by Vkontakte with the result of 80.64%, and the third place is occupied by Instagram with 19.2%. WhatsApp and Tik-Tok received approximately the same number of votes, with 15.36% each. Viber and Skype received the least number of votes, respectively, 7.68% and 3.84%. Thus, we can conclude that students prefer to use messengers and social networks to access educational materials, with Telegram and Vkontakte being the most popular among them. WhatsApp and Tik-Tok are used less frequently, and Viber and Skype are practically not used to access learning materials. As the results of the questionnaire have shown, students consider access to such resources as: search engines, electronic textbooks, social networks, messengers convenient for use in learning.

Based on the questionnaire data, we can conclude that Telegram is one of the most popular messengers for teaching a foreign language. More than 88% of respondents believe that Telegram is the most convenient pay-form for teaching foreign language to engineers. This is due to the fact that Telegram has a number of advantages, such as the ability to create separate topics within a chat room, a wide functionality for working with files, the ability to use bots and plug-ins, and a high level of security.

So Telegram as a platform for developing oral foreign language communicative skills of future engineers was chosen.

There is no doubt that for a more effective process of developing students' foreign language communicative skills it is necessary to organize the learning process in such a way that students can easily access information, share knowledge in online format, which is especially relevant after the pandemic period, it is necessary to use the most effective and modern tools for quality training of future engineers.

As a component composition of communicative skills the following key skills necessary for engineering students have been identified:

- Ability to carry out foreign language communication in the course of extracurricular activities.
- Ability to listen to the interlocutor.
- Ability to comment on the received information taking into account the communicative situation.
- Ability to describe and discuss industrial and professional issues.
- Ability to discuss topical issues and express one's point of view.

The tasks engineering students' training are considered, as they reflect the main content of professional training. The complex of exercises included 7 tasks, which were placed in Telegram and all the tasks had professional and communicative orientation.

Tasks of the first stage of training:

Exercise 1. "Speak on your experience in modernizing projects. Have you had to improve or change any projects?"
Development rationale:

1. Foreign language communication skills in extracurricular activities: this exercise requires participants to express their thoughts and experiences in English, which helps to develop foreign language communication skills in the professional field.

2. Listening to the interlocutor. Participants of the exercise listen attentively to the stories of other participants posted in the comments.

3. Ability to discuss topical issues and express their point of view. The exercise allows participants to discuss topical issues related to project modernization. Each participant can express his or her point of view based on his or her experience and propose ideas for improving or changing projects.

Exercise 2. "Look at a slide from an engineering training course. Suggest examples of technical improvements that illustrate each one. Are there other items that could be added to the list?" Development rationale:

1. Foreign language communication skills in the course of extracurricular activities. This exercise requires participants to offer examples of technical improvements in English, which helps to develop foreign language communication skills in the professional field.

2. The ability to comment on the information received in relation to the communicative situation. Participants are required to offer examples of technical improvements that illustrate each point on the slide. This helps to develop the skill of analyzing information and commenting on it according to the communicative situation.

3. Describing and discussing production and professional issues. The exercise requires participants to describe specific technical improvements that can be applied in the work environment of engineering students. Participants can discuss the benefits and possible problems associated with the proposed improvements.

Exercise 3. "In the picture you see several professional questions. Your task is to choose one question and answer it, speaking for at least one minute". Development rationale.

1. Ability to carry out foreign language communication in the course of extracurricular activities. Participants are asked to choose one question and answer it in English for at least one minute. This requires them to use a foreign language to express their thoughts and develops their ability to carry out foreign language communication.

2. The ability to comment on the information received, taking into account the communicative situation. When participants answer a selected question, they should comment and develop their point of view, taking into account the communicative situation. They can give explanations, examples or arguments for their answers, which develops the ability to discuss information according to the communicative situation.

3. The ability to describe and discuss production and professional issues. The exercise requires participants to choose a question related to the professional field and give a detailed answer to it. This develops their ability to describe and discuss production and professional issues related to their field of work.

Participants are also asked to listen to a voice message describing our response to the first question proposed.

The addition of a voice message describing the answer to the first suggested question is an addition to Exercise 3. This allows participants to hear an example answer and visualize how their answer to the question can be structured and developed.

1. Listening to the interlocutor. Listening to a voice message allows participants to practice active listening skills and improve their ability to understand foreign language speech. 2. The ability to comment on the information received, taking into account the communicative situation. After listening to the voice message, participants can comment on and analyze the proposed answer, as well as review the structure, phrases and expressions used to develop their ability to understand the information.

Exercise 4. "Look at the pictures. Have you had a similar experience?" (in the sphere of engineering design making process). Development rationale.

1. Ability to carry out foreign-language communication in the course of extracurricular activities. Participants are asked to look at pictures and express their opinions and experiences in English. This promotes the development of foreign-language communication skill and the use of English to describe their experiences and express their thoughts.

2. The ability to comment on the information obtained in relation to the communicative situation. Participants should comment on the pictures and share their experiences, taking into account the context and communicative situation. This develops the ability to analyze and discuss information.

3. Ability to describe and discuss production and professional issues. The exercise allows participants to describe their experiences and discuss pro-industrial and professional issues related to the situations presented in the photographs. Participants can express their opinions, describe their actions and discuss what actions or solutions can be taken in these situations.

Exercise 5. "Choose one quote and tell whether you agree or disagree and why". Development rationale.

1. The ability to comment on the received information taking into account the communicative situation. Participants should comment on the selected quotation, expressing their position and arguing their views in accordance with the communicative situation. They can use different styles and expressions to express their agreement or disagreement.

2. Ability to discuss topical issues and express their point of view. Participants should express their own point of view on a selected quotation and explain the reasons for their agreement or disagreement. This is conducive to development of the ability to discuss current problems and express their own opinions in the professional field.

Exercise 6. "Watch the video "Top 4 Civil Engineering projects" and answer the questions: 1. Which project caught your attention the most from the point of view of engineering construction? 2. How can the process of building tall skyscrapers be complicated? What problems can engineers face?". Development rationale.

1. Ability to listen to the interlocutor. Participants will listen to a story about different engineering projects presented in the video. This will help develop the skill of active listening and understanding the information provided in the video.

2. The ability to comment on the information received, taking into account the communicative situation. Participants should answer questions by expressing their opinions and commenting on the engineering projects mentioned in the video. This develops the skill of analyzing information and commenting on it according to the communicative situation.

3. The ability to describe and discuss industrial and professional issues. The video presents various engineering construction projects and the participants should discuss them, express their opinions about the projects that caught their attention and consider the difficulties engineers face in building skyscrapers.

4. Ability to discuss current issues and express their point of view. Participants will discuss various engineering projects, expressing their views on which project has attracted the most attention and explaining the challenges engineers face in construction. This promotes the ability to discuss current issues and express their point of view on professional issues.

Exercise 7. "When creative thinking is required to solve professional problems, what are the pros and cons of working individually, in small groups, or in large groups? Choose one and explain." Development rationale:

1. Ability to comment on the received information taking into account the communicative situation. Participants should complete a survey expressing their opinions about the work in a group format or individually.

2. Ability to describe and discuss work and professional issues. Participants should explain why working in an individual/group format is better/worse, in case a creative decision needs to be made. They should also give their own arguments to support their choice.

We should also note that all the exercises are communicative in nature. Exercise 1 realizes the principle of communicative orientation, which consists in creating a situation of communication, where students speak on their experience and comment on the speech of other students; in Exercise 2 we observe the principle of connection with life, which is based mainly on professional orientation, so students activate their professional knowledge and the acquired skills are associated by students with the future application of these skills. Two principles can be attributed to Exercise 3 - interactivity and communicative orientation. Interactivity is realised through the fact that the instructor shares his own answer to the question and encourages students to respond to this message. Also, the proposed exercises at the second stage of training also correlate with the principles of communicative orientation (Exercise 4), visibility (Exercise 5) and use of multimedia (Exercises 6, 7). Visibility is provided by the material with various images, and the principle of multimedia is realized through a video about engineering inventions, as well as a survey.

Tasks requiring the use of English for communication contribute to the development of communication skills on professional topics and vocabulary expansion, which develops the ability to carry out foreign language communication in the course of extracurricular activities. Tasks involving listening to audio and video materials help participants to improve their ability to actively listen to and understand information conveyed in English, which develops the ability to listen to the interlocutor. Tasks that require commenting and analyzing information help to develop the ability to argue, express opinions and adapt to different communicative situations, which develops the ability to comment on the received information taking into account the communicative situation. Tasks related to the description and discussion of professional issues help to develop the ability to clearly and accurately convey information using specialized vocabulary and terms, this develops the ability to describe and discuss industrial and professional issues. Tasks that encourage discussion and expression of one's own point of view on topical issues contribute to the development of critical thinking, the ability to argue one's point of view and participate in professional discussions, which has a positive impact on the development of the ability to discuss topical issues and express one's point of view.

4. Conclusion

The theoretical significance of the study is due to the possibility of further use of the results obtained in pedagogy, scientific research in this area, as well as for making recommendations to teachers in preparation for classes with the use of mobile technologies.

The development of tasks for the development of communicative skills of engineering students using mobile technologies is an effective approach. A variety of assignments such as describing work experience, discussing technical improvements and answering professional questions contribute to the development of communicative foreign language skills. The use of mobile technologies such as voice messaging and mobile applications enables engineering students to effectively develop communicative foreign language communication, listening to the interlocutor, commenting on the information received and discussing professional issues. The study has shown that the application of our proposed system of exercises for the development of communication skills using mobile technologies based on Telegram leads to positive changes in academic performance and improvement of communication skills of participants. This research presents the part of a complex experiment and the results of the follow up investigation will be published as soon as the whole experiment is finished. However there are some limitations: the study only included students from a single university, which may limit the generalizability of the findings to other institutions.

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