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Interactive Computer Technologies in the Educational Process

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ABSTRACT

This paper analyzes the relevance of using interactive computer technologies in the process of teaching a foreign language at a technical university. The author has performed a study to assess the impact of computer training on the quality of language acquisition among students of engineering programs at the Moscow Aviation Institute, trying to determine the most promising technologies for use in the classroom. The author has come to the conclusion that that advanced technologies need to be used to create intercultural professionally-oriented communication in teaching a foreign language. The author notes that the "information era" opens up new opportunities for university teachers, but the most effective way of teaching a foreign language is the combination of traditional methods and modern computer technology. An important aspect of teaching is the teacher's ability to navigate in the ever-increasing flow of information and evaluate the degree of its reliability, as well as teach students to find the necessary information and analyze it.

Key words: Interactive computer technologies, foreign language in a non-linguistic university, computer training, multimedia technologies.

1. INTRODUCTION

The historical period which began in the first years of the new millennium is called the “information era”, reflecting the emergence of new opportunities for information exchange and the active use of interactive computer technologies (ICT) in various areas of social life. Currently, computer technologies have become an integral part of the modern education system. Today's graduate of a higher education institution is a professional who feels at ease in the information environment [1]. The rapid global development of science and technology and the reflection of related events on the Internet, including on foreign-language sites, requires students to constantly work with such information. The process of studying at university involves the active use of computer technologies. Thus, a foreign language program must necessarily include the following aspects: work in electronic libraries; search for necessary information using Internet resources, processing, systematization, and classification of such information; orientation in foreign sources providing information and assessment of the reliability of this information. Therefore, every student should prioritize the ability to quickly navigate the information field. To improve their skills, they need to use the latest teaching methods, closely associated with the development of new technical means.

It should be noted that the involvement of students in the computer-based process of teaching a foreign language at the moment is quite successful. Most students are active computer users and also use other devices, so they are interested in using different ICT when learning a foreign language.

The main objective of this study is to consider a combination of traditional methods of teaching a foreign language at a university and modern **ICT** as a necessary condition for the preparation of a highly qualified professional who is ready to use their skills at the proposed area of work in a specific academic or professional field. This approach contributes to the successful solution of the problem of creating an intercultural communicative professionally-oriented communication in the conditions of student mobility and the internationalization of education systems [2].

Thus, the combination of traditional and computer-based education becomes the main learning strategy, as it provides opportunities for gaining knowledge in a larger format with access to the information space provided by the Internet. By including computer technologies in their course, teachers can create hybrid training courses that include classic educational practice and technological personalized impact on the student. Foreign language skills are a competitive advantage for a future professional that can help in obtaining offers in the labor market [3].

2. METHODS

The study was conducted at the Department of Foreign Language for Aerospace Specialties at the Institute of Foreign Languages of the Moscow Aviation Institute (IFL MAI). The department works with students of the "Aviation Engineering", "Aircraft, Rocket Engines and Power Plants", and "Aerospace" institutes. A face-to-face interview was conducted with the teachers in the department. Our goals

were as follows:

1) to assess the impact of ICT implementation on the quality of language acquisition for engineering students;
2) to identify the most promising ICT for use in foreign language courses.

Participants: 30 teachers from the Department.

3. LITERATURE REVIEW

Both Russian and foreign specialists pay attention to research on the results of ICT implementation in universities. In this regard, aspects related to the use of ICT in the study process are included in foreign language programs.

An analysis of the experience of ***Russian researchers***, in our opinion, should begin with a review of the "Sample program of the 'Foreign Language' course for bachelor's students (non-linguistic universities)" developed at the Moscow State Linguistic University (MSLU) [4]. Guided by the fact that the MSLU determines the main directions of teaching a foreign language at university, let us consider how the idea of using multimedia teaching aids is reflected in this document. In the Program, the goal of the foreign language course for bachelor's students is defined as a set of skills that has to be consistently mastered by students. Among the main skills, the document mentions general competence in the language in question, which includes several aspects, one of which is "the ability to navigate in the media sources of information" [2]. As early as at the undergraduate stage, the program includes such elements of work with the use of ICT as performing Internet search (for creative tasks or individual team projects), on-line consultations with the teacher, writing e-mails, or compiling electronic questionnaires. Upon completion of the foreign language course, students must be able to use Internet technologies for obtaining information [2]. The list of skills in different types of speech-related activities contains various aspects that require the use of ICT [2]:

- (listening skills) understanding various messages in the audio version over the Internet;
- (reading skills) understanding the basic biographical data on famous scientists and cultural figures presented on the Internet;
- (writing skills) writing a personal letter (describing one's achievements in an e-mail); writing one's biography in the electronic form; writing interview questions in an email; writing a request for internship opportunities, etc.

This foreign language program is currently being successfully implemented in non-linguistic universities. Many of the aspects presented in it are developed due to the introduction of the computer component in the studying process. Thus, for example, while mastering the necessary speaking skills the student has to prepare a presentation based on an article. In this case, the student must first find information on the Internet, do a literary review of magazines on a selected topic, and then make a presentation in PowerPoint. Reading skills (understanding the contents of various texts, positions of their authors, conclusions made by the authors, etc.) are also associated with working with websites containing texts on topics of interest to students. Mastering writing skills (writing abstracts for a student conference, preparing abstracts for talks, etc.) is also impossible without using Internet sites to find the necessary information.

All researchers involved in the problems of organizing the educational process in higher education note the constantly increasing flow of information that is characteristic of modern times and analyze possible ways of working in these conditions. Many authors see the prospect of improving the teaching process at university in the development of the "innovative culture of the teacher". It is noted that teachers should be able to use creative approaches in teaching students. One of the key components of the teacher's innovative culture is the willingness to integrate traditional and innovative teaching experience [5].

Analyzing the experience of using ICT in foreign language classes, teachers note that the processes of globalization and the wide development of the information field (Internet, electronic publications, library development, etc.) can fully satisfy the information and educational needs of modern students [6]. The study of the most frequent types of students' work using ICT showed that electronic dictionaries, various applications, news, and thematic sites are the most efficient tools that help students learn a foreign language [7].

It is noted that the active use of various gadgets by modern university and high school students and their ability to find their way in the Internet space allows us to call them "digital natives" (the digital society natives" or "digital generation") [8].

There is an opinion that when organizing the educational process for teaching a foreign language, one should not be limited to old methods and didactic means. Students should pay attention to the possibility of using modern multimedia technologies in the self-mastery of the language. The relevance of this approach is emphasized since the number of class hours provided by the curriculum in non-linguistic universities is decreasing while the need for a high level of language proficiency is increasing [9].

The rapid implementation of information technologies in the educational environment, combined with the latest software and pedagogical tools, allows one to move on to the development and practical use of modern systems of so-called adaptive learning and electronic teaching aids [1].

Through the use of new telecommunication information technologies in the educational process, one can access large amounts of information, and distance learning becomes possible. The graphical appearance of the materials presented increases students' interest in learning a foreign language. However, the implementation of ICT into the educational process does not exclude traditional methods of teaching.

They are combined with ICT at all stages of the educational process, which significantly increases the effectiveness of training, stimulates students to self-improvement, and helps them navigate freely in the information space. All this contributes to the formation of communicative competence 10].

Modern computer technologies have a positive effect on the motivation of students of non-linguistic universities to learn a foreign language, helping to increase the effectiveness of the educational process students' interest in it, and their perseverance in achieving the goal. The practice of using computer technologies at the Moscow State Technical University of Civil Aviation (MSTU CA) and the MAI showed that with this change in the format of conducting classroom and extracurricular activities at the university, the effectiveness of students' independent work increased [11].

Many authors dealing with problems of distance learning note that when developing the structure of a foreign language course, one should consider the need for students to develop all types of speech activities, academic and strategic skills in the field of search, analysis, and processing of information, as well as independent scientific and professional activities. Distance learning gives teachers great flexibility, that is, the ability to adapt, revise, and refine the course of the discipline following the specific needs of students. Teachers can use both the entire course and its components. Achieving the necessary results of mastering the discipline is associated with the use of modern, more effective methods of teaching a foreign language [12, 13].

Analyzing the experience of teaching a foreign language at the MAI, it should be noted that the use of ICT in the teaching process is a necessary component of the educational process [14-16].

Particular attention should be given to studies related to the preparation of presentations. Many researchers consider the goals of the presentation and ways to achieve them and analyze the structure and content of the presentation [17].

The departments of foreign languages at the MAI hold scientific and practical student conferences annually. The preparation and organization of these conferences are currently carried out with the mandatory use of ICT. Students become involved in this work as early as possible. The teacher advises them to use the most advanced methods of searching and presenting information [18].

Presentations of undergraduate students are characterized by a serious professional orientation. Therefore, teachers should help them navigate specialized websites and modern search engines. It seems useful to create a department/institute website that would allow students to share professional experience and discuss issues that they are interested in [19].

In universities, electronic scientific and technical libraries are being created, allowing students and teachers to get acquainted with authoritative scientific publications [20].

In our opinion, one of the possible ways to increase the effectiveness of learning English is the use of mobile phones to listen to English texts. The development of listening skills and teachings is a rather difficult task at a technical university; therefore, such methods are successful and productive [21].

Analyzing various methods of testing knowledge in the learning process, researchers note the important role of computer tests [22].

Significant attention is paid to the features of the university's work in the information era by ***foreign scientists.*** Thus, it is noted that the term CALL (computer-assisted language learning) appeared with the emergence of the first universal computers. In the early 1980s, when personal computers appeared, articles on the use of computers in language teaching started coming out [23].

Summarizing the experience of various authors, we can distinguish a variety of technologies used in teaching a foreign language: wiki (technology for user interaction with a website designed for the collective development, storage, and structuring of information, mainly hypertext); social networking services (Internet services that help people with similar interests find each other and join together in virtual communities); blogs (periodically updated news feed on various topics, each of which can be commented on by readers; a collective discussion board); discussion forums (topics presented on the network node for discussion and open to all their visitors); videoconferencing; podcasts (digital recordings of a radio or television program that can be downloaded from the Internet). In online mode, the teacher can organize online essays, online quizzes, and online exhibitions. The following equipment can be used in the classroom: interactive whiteboards (components of projection equipment for computerized presentations); laptops; mobile phones, etc. The following tools are very useful to use in the learning process: interactive books, online dictionaries. Foreign scholars suggest the use of various websites and systems, such as YouTube (a website for social service for storing, viewing and discussing videos), Skype (a system designed for voice communication over the Internet), PowerPoint, as well as learning management systems, such as Moodle, Blackboard, etc. [23-25].

As 10 years ago, along with a large number of teachers who adhered to traditional approaches, those appeared who used cutting edge technologies. Traditional methods cannot harm the process of learning a language, but the use of multimedia technologies opens up new opportunities for students, making the process of learning a language more interesting for students.

It is currently difficult to imagine learning a foreign language without the use of ICT. The positive impact of innovative technologies in teaching a foreign language on the development of students' creative abilities, analytical thinking, and the ability to work independently [26].

ICT allow for the exchange of information around the world

and help students and teachers quickly receive the most up-to-date information that is necessary for an effective teaching process. At present, the role of the teacher is not only to give the student knowledge but also to teach them to acquire knowledge independently using ICT. The following types of work help the student and teacher constantly monitor the increasing flow of information: search for information on various Internet sites, work with databases, participation in video conferences, participation in scientific societies, receiving information by e-mail, etc. [27].

The beginning of the information era is compared with the beginning of the "car era" at the beginning of the 20th century by some authors while the emergence of new ICT is compared with the appearance of the Ford Model T car. It will take time for society to become accustomed to new technologies and ICT to be fully integrated into various areas of society [28].

It should be noted separately that electronic dictionaries play an important role in learning a foreign language. Among these dictionaries, we can name ABBYY Lingvo (http://www.lingvo.ru), Multitran (https://www.multitran.com), Reverso, etc. For instance, ***ABBYY Lingvo*** makes it possible not only to translate a word or a phrase from one language to another but also listen to the correct pronunciation of it in different dialects, view examples of the use of this word in texts and established expressions, as well as seek help from the community of translators on the site, if this words are not in the dictionary. Besides, one can use a special application for memorizing words: with the exercises included in the Lingvo Tutor, one can memorize the meaning, spelling, and pronunciation of words. We would like to make a separate note on the possibility of using the dictionary as a self-instruction manual (with independent control of word pronunciation and spelling). The information contained in the dictionary is constantly tested for accuracy. A wide range of possibilities of the dictionary allows us to consider it the most convenient dictionary to use at any level of language learning. A major advantage of the ***Multitran*** dictionary is its great thematic diversity, which greatly facilitates the process of translating industry terms. The lexicon of the dictionary is distributed over a large number of topics, for example, aviation, aviation medicine, acoustics, astronomy, astrophysics, aero hydrodynamics, aerodynamics, airports, aerial phototopography, ballistics, biophysics, etc. The ***Reverso*** dictionary is a contextual dictionary where one can find a correct translation of an unknown word or phrase based on already translated fragments of articles, documents, and books [29].

A review of Russian and foreign literature demonstrates the great interest of researchers in the problem of using ICT at universities, characterizing this type of training as a promising direction for the development of higher education.

4. RESULTS AND DISCUSSION

Results of the teachers' survey

To achieve the goals set for the study we had to perform the following tasks:

1. *The objective: to evaluate the degree of ICT proficiency of the Department's teachers.*

The survey showed that all teachers of the Department were currently using ICT: 85% of teachers used them in preparation for classes and in class; 15% of teachers used them mainly for self-education and tracking of modern achievements of science and technology.

2. *The objective: to identify the ICT that are most relevant in the process of teaching a foreign language.*

The teachers were asked to indicate the ICT they used. The results of the survey are shown in Figure 1.

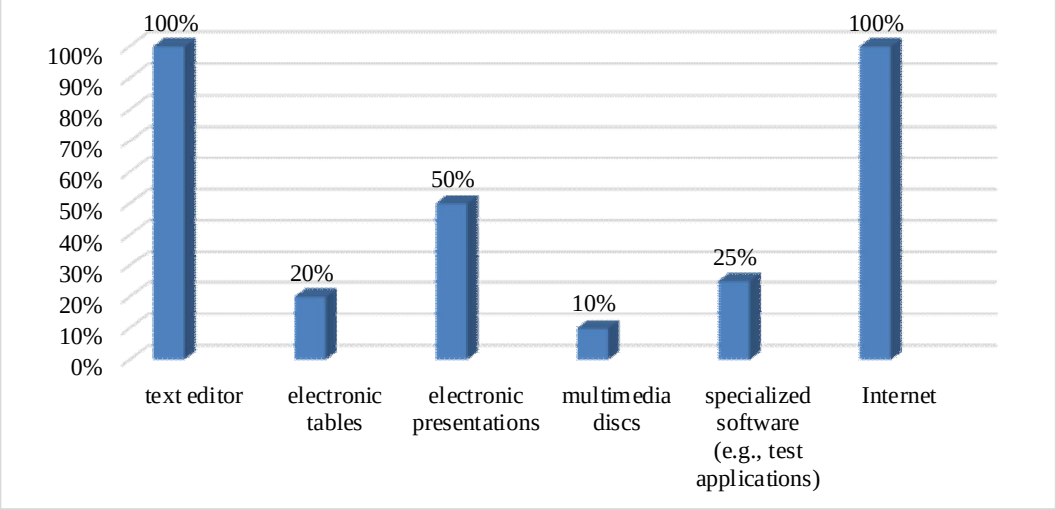

Figure 1: ICT used in the process of teaching a foreign language.

The study showed that all teachers of the Department used the Internet and text editors. 50% of teachers used presentations prepared using Internet sites in their classes. The teachers were less likely to work with multimedia disks (10%). It was noted that the use of presentations in the classroom had a positive effect on learning.

3. *The objective: to assess the intensity of teachers' use of ICT in classes with students.*

Results of the survey: 50% of teachers used ICT in every lesson with the group; 30% used them approximately at every other lesson (50% of the practical lessons of the semester); 5% used ICT in class once per month (25% of practical exercises); 15% used ICT to search for information on aerospace and cultural studies. At the same time, all teachers noted that ICT significantly facilitated the preparation for classes, allowing them to diversify classes and rationally use the time allotted for them.

It can be concluded that the use of ICT is an integral part of the educational process. However, the role of the teacher remains important due to the need for live communication in the classroom.

3. *The objective: to determine the most promising types of work related to the implementation of ICT in the educational process (with an assessment of their benefits).*

The following preferred types of work used in the educational process were named:

1) Work in the Moodle electronic information and educational environment organized at the MAI.

The following features were listed among the advantages of using the Moodle e-learning platform:

- for teachers: the ability to create and store electronic training materials; the ability to change the sequence and method of supplying material depending on the level of knowledge of a particular group; the opportunity to use not only text but also interactive resources of any format (articles from authoritative Internet sites, videos on YouTube, etc.) as a textbook due to the electronic format; support for feedback from students and advice during the execution of independent work; the possibility of more rational use of time; freeing up time for creative work and professional growth (both for the teacher and the student);
- for students: independence from a specific place and time (the ability to set one's own pace of studying the material); the opportunity to allocate time to study various topics and devote more time to complex and most interesting topics; higher work efficiency; increased interest in learning a foreign language.

2) Working with various Internet sites.

The study showed that the most used sites were https://www.nasa.gov/ (NASA) and https://aviationweek.com/ (Aviation Week). The British Council website (https://www.britishcouncil.org/) was used to search for linguistic and cultural information. Besides, the following electronic sources were named: https://www.hindawi.com/journals/ijae/contents/ (International Journal of Aerospace Engineering); https://www.air-cosmos.com/ (a French journal called Air&Cosmos); https://phys.org/space-news/; http://my-aviation.ru/main/aviation-english; https://www.schmohl-gmbh.de/en/home/a-warm-welcome-to-you.html, etc.

When choosing an Internet site, the teachers were guided by its credibility and the degree of reliability of the information provided. The survey highlighted the role of the teacher in organizing the students' search for information the reliability of which is beyond doubt.

3) Work with literature presented in the electronic scientific and technical library (ESTL) of the MAI.

- Based on a modern automated information-library system in the ESTL, an electronic catalog was created, including books, textbooks, periodicals on the profile of the university, etc. The following advantages of ESTL were noted:
- textbooks are translated into electronic form and become available to all students, which solves the problem of a shortage of print media;
- the system grants access to many Russian and foreign electronic resources (Web of Science, Scopus; Springer, American Physical Society, American Mathematical Society), archives of foreign resources (Cambridge University Press, Oxford University Press, The Institute of Physics (IOP)), Infra-M Publishing House Znanium.com, Polpred.com, IVIS, etc. [https://mai.ru/library/about/].

The study showed that 80% of teachers used ESTL while noting the most used sources (Figure 2).

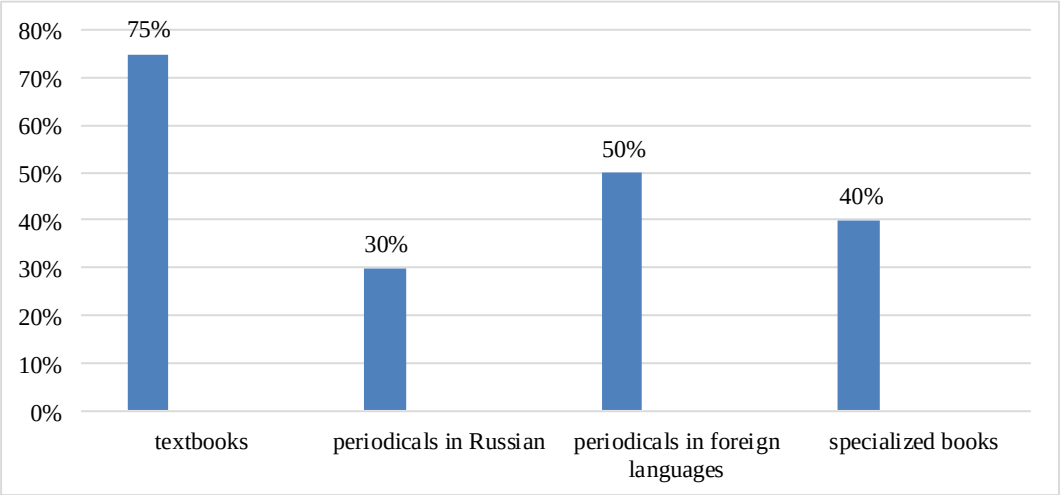

Figure 2: Use of the possibilities of the MAI ESTL by teachers.

Most often, the teachers turned to the ESTL for textbooks (75%). Periodicals in a foreign language (50%) and books for a special field (40%) attracted a lot of interest as well.

4. *The objective: to evaluate the role of ICT in monitoring and evaluating students' achievements.*

The evaluation of the results of the "Foreign Language" course for students of engineering specialties at the departments of IFL MAI is carried out in two stages:

- electronic tests (lexical and grammar exercises);
- an oral exam (conversation with the teacher on the topics covered in class).

The following advantages of this form of control were noted:

1) combined traditional and innovative form of control allows obtaining the most objective assessment of student knowledge, minimizing the factor of interpersonal relations between the teacher and the student;

2) electronic testing significantly saves the time of teachers and students;

3) electronic testing is relevant for distance learning of students (for example, when working with students of the MAI branches in other cities).

5. The objective: to identify the main advantages of using ICT in foreign language classes.

An analysis of the responses of the teachers allowed us to group the opportunities that arise when using ICT in the following groups:

1) Phonetic aspects (listening):

Repeatedly listening to audio materials on the Internet or audio recordings in a foreign language allows students to:

- study the features of pronunciation and intonation models of the studied language;
- feel the difference in using different intonation patterns to express different feelings and emotions;
- work out the correct pronunciation and intonation, pausing in listening to audio materials for the repetition of individual phrases and sentences.

2) Grammatical aspects:

- demonstration of grammar material on a computer facilitates the work of the teacher and has many advantages over the traditional use of the whiteboard;
- test programs help to control the grammar skills of students in an objective way.

3) Lexical aspects:

- use of various foreign-language Internet sites providing information related both to the history of the issue and to the current situation allows students to consider the development of the terminological apparatus in diachrony;
- work with constantly updated and supplemented by new vocabulary electronic dictionaries.

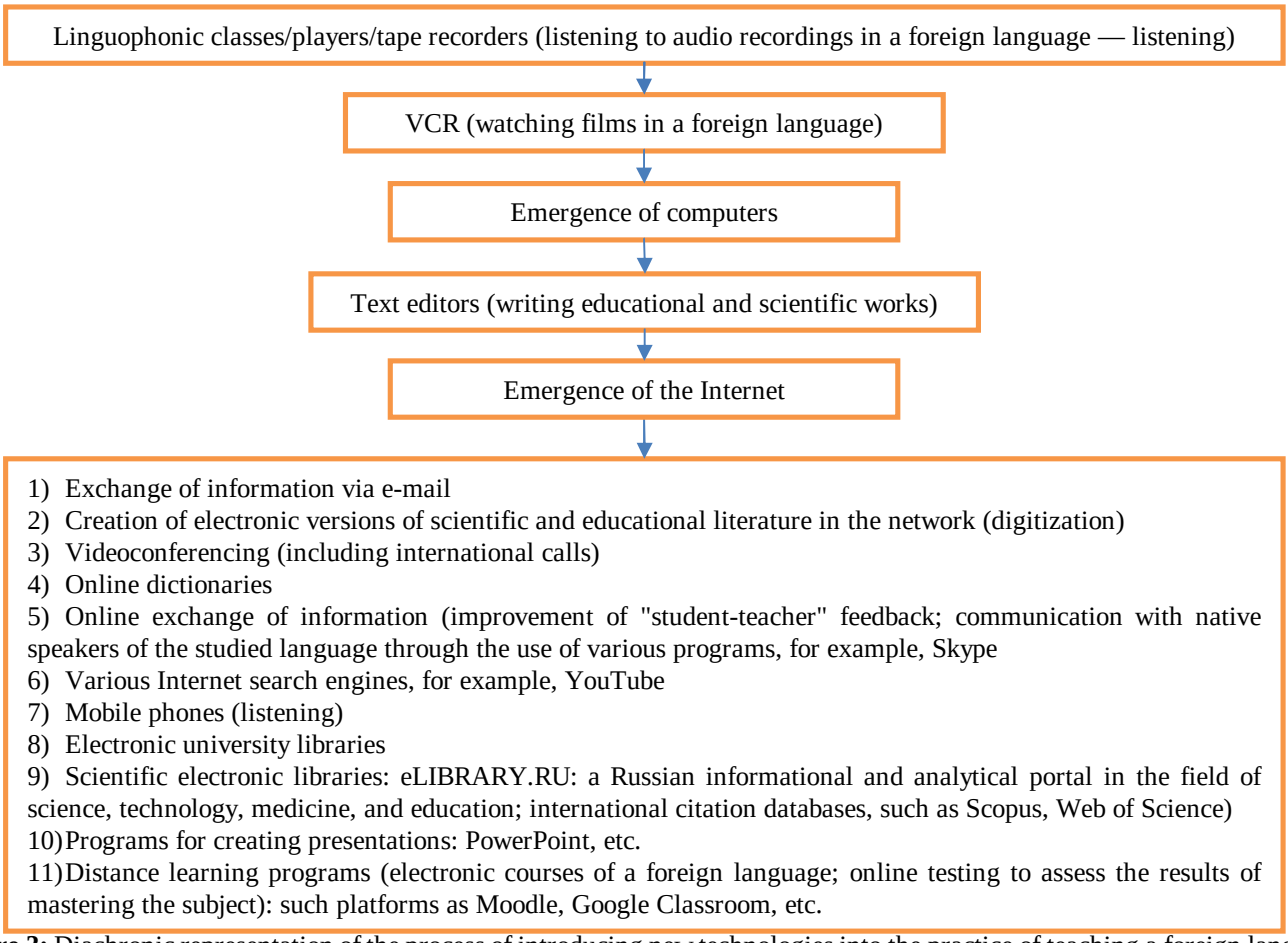

Figure 3: Diachronic representation of the process of introducing new technologies into the practice of teaching a foreign language

4) Using various Internet sites to search for linguistic and cultural information.

5) Writing:

Working with text editors for writing essays, research papers, abstracts, letters (personal and business letters), resumes, reports, etc.

6. The objective: to analyze in diachrony the process of introducing new technologies into the practice of teaching a foreign language.

The study allowed us to identify the following main technologies that are introduced to teaching practice (Figure 3).

5. CONCLUSION

The appearance of such terms as "information revolution" and "information era" indicates the importance of events in society related to the creation of computers, global changes in the extraction, reception, and transmission of information, instant access to various types of information, as well as the development of information technologies. The processes taking place in society could not but affect the development of the higher education system. In this paper, we considered the problems of introducing advanced computer technologies into the process of teaching a foreign language at a technical university. The research was based on the results of a teachers' survey at the foreign language department working with students of aerospace programs. The study allowed us to identify the most relevant and promising ICT for use in the educational process, evaluate the benefits of various types of work using them, determine the main advantages of using ICT in the classroom, and systematize the possibilities that appear in the process of teaching a foreign language using ICT. We reviewed the process of introducing advanced technologies into the teaching process in diachrony.

The study allows us to conclude that the use of ICT is an integral part of the educational process. ICT greatly facilitate the preparation of classes for both teachers and students, activate the cognitive interest of students and develop their interest in the discipline and foreign-language culture. They contribute to the development of sociocultural competence and develop skills of analysis and comparison of information, allowing diversifying classes and rationally using the time allotted for them, implementing a differentiated approach to learning, which consists in focusing on the personality of each student, and improving the process of monitoring the results of mastering the discipline.

However, despite the many advantages of ICT, it cannot be argued that only they solve all the problems in teaching a foreign language. We have concluded that it is advisable to

use a combined traditional and innovative approach. The role of the teacher remains just as important, as the teacher must help students navigate the growing flow of information, as well as teach them how to analyze the information received and use only reliable sources to gain knowledge. In this regard, the teacher has the responsibility associated with the need to constantly develop in the field of modern information technologies, analyze existing sources of information, and be informed about the latest achievements in science and technology.

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