

# Modern aspects of the implementation of interactive technologies in a multidisciplinary university

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**Abstract.** The article discusses modern aspects of the implementation of interactive technologies in a multidisciplinary university. The characteristic features of interactive technologies are described, the feasibility of their use in the educational process is substantiated. Particular attention is paid to the consideration of the didactic potential of interactive technologies in a higher educational institution. The importance of interactive technologies in comparison with traditional teaching methods is discussed, which allows organizing effective interaction of all participants in the educational process, planning joint work, correctly allocating resources, and providing the necessary tools for solving educational problems. In conclusion, it is determined that interactive technologies contain great potential for their application in the educational process of a multidisciplinary university, which requires further study, including the development of software and methodological support.

## 1 Introduction

In connection with the rapid development of information and computer technologies (ICT), the education process is undergoing changes. The process of introducing distance educational technologies into the system of higher education is taking place. In the modern Russian educational system, particular importance is given to the implementation of the competency-based approach, which provides for the wide use in the educational process of interactive forms of conducting classes (interactive seminars, discussions, computer simulations, business and role-playing games, analysis of specific situations, etc.) in combination with extracurricular work in order to form and develop professional skills of students.

In the Russian sphere of education, the approach to understanding the intellectual value of information, the way it is received, and also the ability to use it correctly is changing. Another important aspect of the methodological work of a university teacher is the organization of students' academic work, both classroom and extracurricular, carried out without his direct contact with the teacher or controlled by the latter indirectly. In order to

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correctly organize the student's educational work, it is necessary to apply algorithmized training with clearly defined stages of interactive technology [1]. An analysis of the studies revealed that students with a high level of achievement benefited from the curriculum, regardless of whether it was presented with an algorithmic prescription or without it, while for students with a low level of achievement, the use of an algorithmic prescription played a decisive role [ 2, 3].

The use of interactive technologies in the educational process is the subject of works by foreign researchers such as Oh.E. Young et al [4], C. Smaniotto Costa et al [5], M. Holenko Dlab et al [6], M.B. Ibáñez et al [7] and others, both Russian and, in particular, M. Odinskaya [8-10], T.V. Samosenkova [11], S.V. Barabanova [12], T. Noskova [13], T. Pavlova et al [14], O. Yakovleva et al [15] and others. An analysis of the researchers' work shows that there is a positive experience in using interactive technology, in particular, in the conversational bot to identify students' attitudes toward intimidation problems. In addition, the results showed that the role of the agent influenced students' attitudes toward the bully factor. The implications and future research regarding the use of conversational bots in education are discussed. Researchers draw conclusions about the increase in awareness and propaganda requirements for involving society in the production of public open spaces, aimed at expanding knowledge about the relationship between space and social practice of students in the direction of a more inclusive and interactive process of joint creation of public space.

The practical significance of the research is that teachers need to actively consider the type of interactive technology design that they choose when preparing their interactive collaborative classes, both classroom and extracurricular, and choose the appropriate design for the complexity level of the planned task.

In this article, the authors show that interactive technology has a positive effect on student learning outcomes. However, the impact varies depending on whether students were enrolled in public or private schools. Research results show that interactive learning technologies can be used as an effective learning environment.

Information and communication technologies (ICT) are an integral part of modern post-industrial society, the economy of which is dominated by the innovative sector of the knowledge industry. The use of ICT in education provides great opportunities, so a significant number of developed countries these days integrate them into the educational process. Today, both students and teachers can no longer do without the help of the Internet, about 90% of all existing information is stored in digital format. Paper carriers are less and less used by students; all the necessary training materials can be downloaded to any mobile computer device. Learning Internet portals with interactive exercises and distance learning sessions with a teacher through video communication are gaining more and more influence in the field of additional language education. Whether the effect of the use of modern ICT in teaching foreign languages is definitely positive or negative is not known for certain.

## **2 The main part**

Since ICT is a relatively young phenomenon and is in a state of constant development, time must pass before researchers can evaluate its impact on education, the psychological state of students and their personal development. The main arguments in favour of the positive impact of ICT integration on the learning process are as follows:

- The possibility of transforming the model of the educational process “one education for life” into the model of “lifelong education throughout life”. So, for example, according to the requirements of the Federal State Educational Standard, a graduate student should have such a general cultural competence as the ability to independently acquire through

ICT and use new knowledge and skills in practical activities. The integration of ICTs in training can help an undergraduate engineer to master the specified required competence, directly related to the concept of continuing education;

- Changing the role of the teacher. The use of ICT in training provides an opportunity for a teacher to change the role of a lecturer reading a ready-made information to a consultant, a manager who operates with the course of project work, allowing students to independently acquire the necessary knowledge [16, 17];

- The ability to free the teacher from unproductive routine operations. For example, the availability of electronic textbooks, electronic educational-methodical complexes (EUMK) allows you to free the university teacher from the need to print, photocopy, send educational materials, since any student has access to them at any time using a mobile computer device;

- Increasing motivation and, as a result, activity due to the greater attractiveness of ICT for students than exercises in textbooks and diversity in the educational process. ICT educators emphasize their motivating function. It should be borne in mind that modern students are a new generation that has grown up in the face of widespread computerization;

- An increase in the volume and importance of students' independent work. In the context of a reduction in class hours, the independent work of students becomes an important and integral part of mastering the program of any discipline;

- Flexibility and autonomy of e-learning - classes at a convenient time at the usual pace, outside the limits and limitations of classroom learning, as well as constant interaction, regardless of the location of the participants in the communication. ICTs give us the opportunity to implement models of both distance and blended learning, and, as a result, the ability to meet the special needs of various categories of students;

- The Council of Europe document, updated in 2018, on the Common European Framework of Reference for Languages, highlights a new component of language proficiency - Online Interaction. Communication on the Internet is always carried out by means of a machine, which means that it is unlikely to ever be exactly the same as face-to-face communication. New properties of group interaction on the Internet appear, which are almost impossible to reflect in traditional scales of competencies, focused on human behaviour in speech or writing. For example, there is the availability of resources used in real time. On the other hand, there may be misunderstandings that are not detected (and not corrected) right away, as is often easier in person.

### **3 Method and technology**

Given the unconditional presence of a negative impact on the educational process of excessive enthusiasm by modern ICT students, the solution to this problem seems to be to use the capabilities of the same ICT in the process of teaching program disciplines in an adequate amount. According to a study by the Organization for Economic Co-operation and Development (OECD), limited access to ICT in the classroom has a better effect on academic performance than their complete absence; however, overuse of ICTs leads to a significant reduction in academic performance [18]. The use of ICT in the process of teaching program disciplines, on a well-thought-out didactic basis, gives undoubted advantages to the teacher and student, as well as provides much greater flexibility and adaptability of the educational process to specific learning conditions and tasks. In order for the teacher to use ICT in the process of preparing students, it is necessary to develop and create didactic resources of a new type: printed teaching materials and duplicating EUMK.

The authors have developed such didactic materials for SPbPU graduate students studying in the areas of training: Power engineering and electrical engineering; Heat power engineering and heat engineering; Construction; Biotechnology The scientific novelty of

these didactic materials lies in the fact that in addition to authentic scientific texts in the specialty, as well as a variety of language and speech exercises that contribute to the development of practical knowledge of the English language, allowing it to be used in their future professional activities, they contain linguistic and computer tasks that have their own the goal is the formation of a general cultural competency, which is the ability to independently acquire through ICT and use in practice new knowledge and skills, as well as the formation of a new language proficiency component that complements the Language Portfolio, Internet Interaction skills. Each set of copyrighted didactic materials of a new type contains a classic printed educational-methodical complex and an electronic educational-methodical complex duplicating it, developed on the Moodle platform.

The basis for the development of didactic materials for three areas of foreign language training for engineers of the Peter the Great Polytechnic University was the principles highlighted in the research process. The basic principle of constructing educational material is the principle of competencies formation, due to the fact that the main goal of the competency-based approach is to prepare a specialist who knows the theory and knows how to apply it in practice, due to the need to ensure the level of their professional training that meets the requirements of the modern labour market. However, an analysis of modern textbooks, both Russian and foreign, shows the lack of specialized textbooks in each direction in sufficient volume. This problem was solved by developing a separate specialized training manual for each area of preparation: a training complex; Practical course of teaching English in a multidisciplinary university ("Power Engineering and Electrical Engineering", "Thermal Engineering and Heat Engineering"); educational-methodical complex Practical course of teaching English in a multidisciplinary university (construction); educational-methodical complex Practical course of teaching English in a multidisciplinary university. Biotechnology.

Another important principle is the principle of continuity. On the one hand, it assumes a logical sequence and connection between the program of specialized discipline and the content of a foreign language textbook in a specialty, i.e. The main topics studied in the framework of specialized disciplines should correspond to the topics of the textbook on a foreign language. Each manual consists of 8 lessons, the content of which covers the main aspects of the professional activity of an engineer.

Each lesson contains a fragment of an authentic scientific text (2000 characters), as well as exercises aimed at developing and improving lexical and grammatical skills, and developing language skills. The grammatical material of the manual covers the basic phenomena of the English language necessary for reading and translating specialized technical and scientific literature. The manual is equipped with training assignments to consolidate the studied material and a list of used sources of information, answers to exercises and a dictionary, which includes the basic scientific terms found in the texts. Exercises are selected to maximize the coverage of terminology that students in the professional field need. At the end of each lesson there is a training task for annotating the text you have read, as well as a description of the drawing or diagram, which helps to improve oral communication skills. To consolidate the material, each lesson provides for independent work of students (abstract of the English text and translation of the Russian text on the same subject into English), which can be done both in the classroom with the teacher, and individually as homework. To complete educational tasks for translation, the ability to use electronic dictionaries, search engines, etc. is required. The application contains audio material that allows you to train the perception of a foreign language by ear, as well as remember the correct pronunciation of the terms used in the texts.

The third principle of building a textbook is the principle of scientificness, on which, first of all, the selection of material for a textbook is based. The meaning of this principle is to use only scientifically based educational information that has undergone a special

examination, since the key point is the development of professional thinking and professional consciousness. And this suggests that text material in the specialty should be selected with the participation of specialists in a particular field. In order to comply with this principle, specialists in the specialized field of training were involved in the development of each training manual. Each text of the manual is equipped with a specially designed system of exercises that are complex in nature. The texts presented are selected according to the thematic principle and are intended for the development of various types of reading (learning, viewing and search). When selecting textual material and lexical units for active assimilation, the authors used original English and American sources.

The principle of accessibility is no less important when compiling a textbook. When selecting educational material, the teacher must take into account how accessible he is for the students, use teaching methods that correspond to the level of their development in order to maximize the possibility of independent work both in the classroom and during extracurricular work. The principle of accessibility implies the conformity of the content, methods and forms of training with the age characteristics of students, their level of development. Each manual of a new type contains a variety of exercises and linguo-computer tasks that contribute to the development of practical skills in English, allowing them to be used in their future professional activities. The content of the manual is determined by the needs of young specialists in communication in a foreign language in the scientific and professional field, as well as the requirements of modern educational standards and programs for teaching English to students of a technical profile. The purpose of this manual is the development of students' language and speech material in the specialty in English: improving reading skills in the specialty; oral and written scientific communication skills; listening skills of special texts; skills in working with electronic resources.

Many educators put the principle of visibility in the first place. The principle of visibility expresses the need for students to form ideas and concepts on the basis of all sensory perceptions of objects and phenomena and is realized through the use of an interactive approach.

The principle of autonomy and modularity implies that the content of both the chapter module itself and the component parts should be structured in accordance with an understanding of the essence of modular training, i.e., not only the selection and transmission of information, but also the possibility of assimilation in offline modes, separately from other modules. Thus, the teacher and students can independently determine the sequence of passage of individual topics. Each manual is equipped with assignments to consolidate the studied material and a list of sources of information used, answers to exercises. Particular attention is paid to the development of academic writing, which is devoted to a special section of the manual. Each lesson is preceded by a list of key terms and phrases; contains fragments of an authentic scientific text; exercises aimed at developing and improving lexical and grammatical skills; development of language and speech skills. Exercises are aimed at processing terminology, its consolidation and activation. Each lesson includes tasks for listening to thematically relevant video clips from popular science and scientific programs. Tasks for annotating the read text, describing drawings or diagrams, preparing presentations contribute to the development of oral communication skills. Preparation of presentations on the proposed topics will contribute to the development of search and information competence of students, as involves the use of modern tools (mental maps, interactive posters and presentations, a cloud of keywords) to create them.

The principle of training in cooperation makes sense not only when planning a lesson, but also when drawing up the tasks of a textbook, which can be offered as mini-projects, round tables, conferences, discussions, presentations, role-playing games, problem

situations, etc., thus the competence basis of foreign communication of future specialists is being formed. To consolidate the material passed, each lesson provides for independent work of students, which includes tasks on the material passed, and also contains a translation of the text from Russian into English on the topics studied and creative / search tasks for preparing presentations and conducting small studies in linguistic buildings in mini groups or couples. Assignments for independent work can be performed both in the audience with the teacher, and as homework, both individually and as a team. Working with the manual in general and translation tasks in particular requires the ability to use electronic dictionaries, search engines. This manual can be used both independently and in addition to the main textbook of the course recommended by the work program for the discipline. Didactic materials of a new type, developed on the basis of the principles highlighted during the study, provide engineers with ample opportunities to search, process and master the necessary theoretical material, as well as when performing practical and control tasks, conducting self-monitoring and conducting independent search training activities.

## 4 Discussion

The developed teaching aids using interactive technology can successfully interact with traditional means and forms of training, which will contribute not only to the transfer of knowledge and the formation of a competency base in the specified subject area, the formation of foreign language communicative competence, the optimization of the educational process, but also to increase students' motivation for learning .

The need for conceptual understanding of the problem of competent work with intellectual knowledge presented, both in electronic and classical form, is due to the country's transition to new socio-economic conditions that require the creation of interactive training systems that contribute to ensuring high quality training of future professionals.

As the practice of training specialists in various professional fields shows, the most effective technologies are interactive learning, as they work not only at the cognitive level, but also at the emotional, behavioural. For example, the critical thinking technology allows students to actively engage in discussion of the goal, followed by the formulation of the topic of the training session. To do this, create a problematic situation and organize a training dialogue. The peculiarity of the organization of the educational dialogue in the training session is that the independent work of students proceeds in the form of business interaction: the student receives direct instructions, recommendations and algorithms by the teacher to organize independent activities, and the teacher performs the function of managing learning through accounting, control and correction of erroneous actions. Students enjoy the interactive form of work, as it stimulates their desire to independently acquire knowledge, to critically interpret the information received.

Another of the techniques of interactive technology can be the formation of a cluster. You can start creating it by inviting groups of students to familiarize themselves with the pre-selected text on the topic. Then, with the help of the teacher, one part of the cluster is filled, but the second can be offered to fill in already for groups of students on their own. Thus, the applied technology of cooperation - work in groups contributes to the development of such system-activity competencies as interest, listening ability, flexibility of thinking, and speech culture.

One of the important skills that a teacher must currently form is the ability to search and select the right information. To do this, you need to learn to highlight the main and to formulate the problem in a capacious way. It is popular with university teachers to compose syncwines, which allows you to check at any stage in the class what associations have formed among students on this topic. The situation analysis method stimulates the use of

literary sources, consultations and strengthens the desire to acquire theoretical knowledge in order to get answers to the questions posed, helps the student to learn to determine the main meaning of the situation, finish building it, formulate a professional problem and find a solution. So, for example, in the topic “Bacteria characteristics”, students are invited to analyze specific situations. In this case, you can use the case technology. The student or group of students is given a set of theoretical materials on the signs by which bacteria are distinguished, as well as a package with tasks - specific life situations. In groups with limited analytical capabilities, you can embed an approximate analysis parsing algorithm into the package. This form of training contributes to the development of students' system-activity competence, as well as social interaction and the development of value-semantic competencies.

One of the most promising methods of interactive learning is role-playing. The advantage of the game method is the maximum individualization of training, meaningful applications in individual experience, the development of imitation reality as a learning tool. The use of role-playing games in training allows us to solve a number of problems: a professional gets the opportunity to psychologically “try on” the interactive space from various positions; the behavioural repertoire is enriched by testing non-stereotypical patterns of behaviour; Sensitivity and tolerance towards other subjects develops; breaks down some stereotypes of professional perception.

In the process of role-playing, psychological information is appropriated to a new level, since the acquired information becomes professional knowledge of a particular person only when it becomes a structural part of the cognitive sphere of the personality. A 21st century specialist should be able to organize his own activities, choose typical methods and methods for fulfilling professional tasks, and evaluate their effectiveness and quality. To create this competence, the teacher cannot do without using the technology of creating projects. For example, in the process of teaching the discipline “a foreign language in professional activity”, such projects as “Amazing bacteria” were created and presented (studying the structural features and vital functions of bacteria, determining their positive and negative effects on human life), “Bacteria in the service of humans” (study of the influence of bacteria on the processes taking place with us and around a person, a detailed examination of the positive role of bacteria), "Analysis of the conditions of the nutrient medium of bacteria" (study environmental conditions conducive to the growth and reproduction of bacteria). The groups, working on projects, not only gathered a huge amount of material, but also developed practical recommendations that were brightly and unusually presented either in multimedia presentations or in practical matters - the volunteer movement.

You can highlight a certain result of the application of interactive teaching methods in the educational process. With a systematic and competent application of the active learning method in the educational process, the following results can be expected: creative, generating student activity is formed; positive motivation of educational activity is being strengthened, since now the student himself acts as an active participant in the training; develops flexibility, variability, analytical function of thinking, reflective abilities; business communication skills are being formed; cognitive pluralism develops; the self-assessment mechanism of students is being improved, since during classes they gain more opportunities through inclusion in various role systems to show, compare and evaluate themselves; the flexibility of the system of methods for obtaining information and creative work with it is being formed; skills are developed for solving non-standard problems (which is achieved by bringing training closer to the conditions of practical activity); experience is gained in self-posing a problem, isolating a problem and making a decision; the ability to build a coherent monological reasoned statement is being developed.

## 5 Conclusion

Summarizing all that has been said, it can be argued that the prospects of this study seem to be in the further development of the problem of forming the competence base of foreign professional communication of future engineers, and the implementation of the proposed principles in the textbooks under development with integrated blended learning in the preparation of students of non-linguistic universities. In our opinion, the creation of a new type of didactic materials using interactive technology should lead to a qualitative change in the process of foreign language training for professionals in various fields. The main method for assessing learning outcomes is monitoring the growth of creative independence and the skills of new knowledge for each student. Whatever side we look today at the tasks set by new standards for educators, the use of interactive technologies is indispensable. Only by applying them will we be able to fulfill the social order of society: to form a socially active initiative creative person. In conclusion, we conclude that interactive technologies require further study, including the development of software and methodological support.

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