ГОТОВНОСТЬ ПЕДАГОГОВ К ИНФОРМАТИЗАЦИИ
ICT SCILLS AND COMPETENCIES AMONG TEACHERS

Research article / Научная статья

Approaches to the usage of machine translation systems for the organization of independent work of students of a pedagogical university with English-language scientific texts

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Abstract. *Problem statement.* The article describes and substantiates ways to solve the problem of the lack of approaches to the usage of machine translation systems in the organization of independent work of students of a pedagogical university with English-language scientific texts. The purpose of the described research was to practically confirm the effectiveness of the developed approaches to the study of machine translation systems of scientific texts by students in order to increase the effectiveness of their independent and research work. *Methodology.* The method of analyzing scientific and methodological sources and normative documents related to the problem of organizing independent work of students of a pedagogical university with English-language scientific texts is applied. Methods of comparison and generalization of the obtained results are used in order to determine the effectiveness of the proposed online course "Machine translation of scientific texts". A longitudinal experimental study was conducted. 28 students enrolled in the basic bachelor's and master's degree programs of the Moscow City University were involved in the experimental training. As a part of the ascertaining stage, empirical information was collected and analyzed, which made it possible to clarify the hypothesis of the study and confirm its relevance. At the formative stage of the experiment, the implementation of the developed online course was carried out. At the generalizing stage, the results of the experiment were summarized. *Results.* As a result of teaching students of the pedagogical university the basics of using machine translation systems of English-language texts in their independent work, the following results were achieved: students formed an idea about the

features of translating scientific texts from a foreign language into Russian; studied the possibilities of modern machine translation services; compiled a terminological glossary; acquired skills in machine translation of scientific texts using specialized CAT programs. As a result, the overwhelming majority of students confidently turn to scientific sources in a foreign language by understanding the principles of machine translation; they actively study foreign professional experience, as well as its application in independent research activities. *Conclusion.* The effectiveness of the developed model of approaches to the use of machine translation systems as means of informatization of scientific, educational and practical activities in the organization of independent work of students of a pedagogical university with English-language scientific texts has been experimentally proved.

Подходы к использованию систем машинного перевода для организации самостоятельной работы студентов педагогического вуза с англоязычными научными текстами

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Аннотация. *Постановка проблемы.* В статье описываются и обосновываются пути решения проблемы отсутствия подходов к использованию систем машинного перевода в организации самостоятельной работы студентов педагогического вуза с англоязычными научными текстами. Целью описываемого исследования являлось практическое подтверждение эффективности разработанных подходов к изучению студентами систем машинного перевода научных текстов для повышения эффективности их самостоятельной и научно-исследовательской работы. *Методология.* Применен метод анализа научно-методических источников и нормативных документов, связанных с проблемой организации самостоятельной работы студентов педагогического вуза с англоязычными научными текстами. Используются методы сравнения и обобщения полученных результатов с целью определения эффективности предложенного онлайн-курса «Машинный перевод научных текстов». Проведено лонгитюдное опыт-

но-экспериментальное исследование. В экспериментальном обучении было задействовано 28 студентов, обучающихся на основных образовательных программах бакалавриата и магистратуры Московского городского педагогического университета. В рамках констатирующего этапа был проведен сбор и анализ эмпирической информации, позволившей уточнить гипотезу исследования и подтвердить его актуальность. На формирующем этапе эксперимента осуществлено внедрение разработанного онлайн-курса. На обобщающем этапе подведен итог эксперимента. *Результаты*. В результате обучения студентов педагогического вуза основам использования систем машинного перевода англоязычных текстов в их самостоятельной работе были достигнуты следующие результаты: студенты сформировали представление об особенностях перевода научных текстов с иностранного языка на русский; изучили возможности современных сервисов машинного перевода; составили терминологический глоссарий; приобрели навыки машинного перевода научных текстов с использованием специализированных CAT-программ. Как следствие, мы констатируем уверенное обращение подавляющего большинства студентов к научным источникам на иностранном языке за счет понимания принципов организации машинного перевода; активное изучение ими зарубежного профессионального опыта, а также его применение в самостоятельной научно-исследовательской деятельности. *Заключение*. Экспериментально доказана эффективность разработанной модели подходов к использованию систем машинного перевода как средств информатизации научной, учебной и практической деятельности в организации самостоятельной работы студентов педагогического вуза с англоязычными научными текстами.

Problem statement. One of the important professional qualities of a modern teacher is the desire for constant self-development and improvement of his pedagogical skills. One of the leading roles in professional development is played by the study of the experience of scientists and practicing teachers, including foreign ones, as well as the skill in conducting their own scientific research.

For the Russian system of higher professional education, conducting research work by students is an obligatory part of their development of the educational program. The selection and analysis of scientific and methodical literature related to the object and subject of research is an important part of any pedagogical research. For a more complete and objective study of the issues considered by students in their research, this list should include works by foreign

authors. However, only a small number of works published in foreign languages have an official translation into Russian, which means that a student needs to work with texts in the original language. Obviously, not all students have a sufficient level of a foreign language to read and understand scientific texts with certain specifics, which means they need to translate the text.

Today, machine translation technology is actively developing, is promising and can help in solving this problem. But, despite the seemingly widespread usage of technology, not all students are familiar with machine translation technology and the specifics of its implementation in relation to the specifics of scientific texts. Often their knowledge of machine translation systems is limited by the usage of popular online translators such as Google Translator, Yandex Translator, etc., while a more in-depth knowledge of machine translation systems can help students learn scientific sources in a foreign language, simplifying the process of translation and accelerating the understanding of the text in the native language of the student. With the skill of working with machine translation, a student can quickly translate a text and bring it to an understandable level.

Many domestic and foreign authors have devoted their works to research in the field of teacher training, including in universities[1] [1; 2].

Also, within the framework of this study, scientific works devoted to the study of the functional style of language and the peculiarities of translation of scientific and technical literature (by B.N. Klimzo, N.K. Ryabtseva, Yu.A. Nesterenko, G. Toury, etc.) are of interest[2] [3–6].

The issues of using information and telecommunication technologies in the educational process, including in the independent research work of students, are covered in the works of I.B. Gotskaya, S.A. Bazhenova, A.V. Grinshkun, V.V. Grinshkun, O.Yu. Zaslavskaya, I.V. Robert, and other authors [7–15].

Based on the foregoing, it is suggested that the inclusion of training in the application of machine translation systems in the training program of students of a pedagogical university will contribute to increasing the effectiveness of their independent and research activities. The achievement of this effect will be due to increased motivation to study foreign professional experience and take it into account in their research activities, as well as the formation of skills to work with scientific and methodical sources in English.

The purpose of the research is to develop and implement an online course aimed at preparing students of non-linguistic specialties to use machine translation systems in independent work with scientific texts in English language.

Research methods. The method of analyzing scientific and methodological sources and normative documents related to the problem of organizing independent work of students of a pedagogical university with English-language scientific texts is applied. Methods of comparison and generalization of the

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[1] Levchenko IV, Kartashova LI, Pavlova AE. *Teaching information technologies in the context of informatization of education: learning guide*. Voronezh: Science Book Publ.; 2016.
[2] Kaufman SI. *Specific features of translation of technical text: textbook*. Moscow: Prosveshchenie; 2007.

obtained results are used in order to determine the effectiveness of the proposed online course "Machine translation of scientific texts".

Within the framework of the study, a detailed description of scientific and technical text is given: its concept, types, sub-genres and genres. Understanding this specificity made it possible to analyze the existing approaches to the usage of machine translation when working with scientific texts. It is concluded that in the context of the rapid development of information technology, the quality of machine translation has reached a new level, and this technology is available to a wide range of users who do not specialize in translation activities. Such a simplified algorithm allows you to easily extract the general gist of a text written in an unfamiliar language. However, when preparing scientific and technical texts with a high degree of translation correctness that conveys the author's ideas without distortion, a student needs to do additional work on the translation. The formation of skills for such work is the main task of the proposed educational course.

Results and discussion. In the course of the research, a model of the online course "Machine translation of scientific texts" was developed. The following is defined as an improved general professional competence (GPC): "Is able to understand the principles of operation of modern information technologies and use them to solve the tasks of professional activity".

The program is primarily aimed at students of non-linguistic areas. In the learning process, students will:
- get an idea about the features of translating scientific texts from a foreign language into Russian;
- explore the possibilities of modern machine translation services;
- compile a glossary of terminology;
- learn how to translate scientific texts using specialized CAT programs.

The structure of the online course "Machine translation of scientific texts" is represented by content blocks "Training modules" and "Diagnostics", as well as an indication of the object of study and the teaching aids used from among information technologies. Let's look at each of them in more detail.

Three training modules cover the *theoretical and practical aspects* of studying the topic. Thus, within the framework of the theoretical part, it is implied to familiarize students with introductory concepts, specialized terms regarding the specifics of working with scientific sources, including in foreign languages, as well as the formation of an idea of the possibilities of information and telecommunication technologies concerning machine translation.

The specifics of the course "Machine translation of scientific texts" determine its practical orientation, while the theoretical block, being significantly smaller in volume, is of an introductory nature. In this regard, it is possible to integrate the theoretical part of the online course being developed with such academic disciplines as "Methodology and methods of scientific research", "Information and telecommunication technologies in education".

Mastering the *practical block* by students of the online course is supposed to be through completion of practical tasks that reveal certain aspects of working with applications and machine translation services. After that, students can move on to the final project — individual work with an English-language scientific article corresponding to the field of their scientific interests.

Since the online course in its form implies limited interaction between students and the teacher, special attention is paid to the "Diagnostics" block. As part of the entrance and final diagnostics, it is assumed to use at least two forms of control: online questionnaires and online testing.

The volume of the online course "Machine translation of scientific texts" is 18 academic hours. The distribution by type of academic work is shown in Table 1.

Table 1

Curriculum of the online course "Machine translation of scientific texts"

No.	Name of academic subjects, courses, disciplines (modules), type of certification	Extracurricular training sessions			Extracurricular activities		Forms of certification, control	Labor inten-sity
		Total, hours	Lec-tures	Practical lessons	Video lectures	Inde-pendent work		
1.	Features and specifics of machine translation of scientific texts	2	2			2		4
2.	Basics of working with CAT services for translation	1		1	1	2	Practical work No. 1	4
3.	Implementation of translation work using CAT services	1		1	1	8	Practical work No. 2	10
	Final certification						Test pass (based on the totality of completed practical work)	
	TOTAL	4	2	2	2	12		18

Source: compiled by Tatiana N. Suvorova, Lyubov A. Shunina, Ivan V. Shunin.

The study program and summary of the developed online course are presented in Table 2.

It is recommended to identify the level of foreign language proficiency of students before starting the online course "Machine translation of scientific texts". This can be done using an online survey implemented through any convenient service (Google Forms, Yandex Forms, etc.)

The current control is performed by the course teacher and is mainly carried out by the verification of practical tasks done by students. The online course "Machine translation of scientific texts" provides one independent student homework and two practical tasks.

The self-control carried out by the student during the execution of tasks can be implemented through a system of samples of such tasks that the student can rely on, as well as through a prescribed system of evaluation criteria. Reference sheets, checklists, individual plans, etc. can also be used as auxiliary materials that contribute to the organization of self-control and self-examination of students.

Study program of the online course "Machine translation of scientific texts"

No.	Types of training sessions, educational work	Content
Topic 1. Features and specifics of machine translation of scientific texts	Lecture, 2 hours	Scientific text: the concept, types, and features of translation. Types of machine translation. Analysis of domestic and foreign experience in using machine translation technology to work with scientific texts. Existing approaches to the usage of machine translation when working with scientific texts. Overview of existing CAT services.
	Independent work, 2 hours	Working with recommended literature. Selection of scientific literature (scientific article) for subsequent independent translation. Registration and creation of an account in the CAT service.
Topic 2. Basics of working with CAT services for translation	Video lecture, 1 hour	General functionality of the selected CAT service. The role of a thematic glossary in the translation of a scientific text. The technology of compiling a thematic glossary for translation using the CAT service.
	Practical lesson, 1 hour	Development of a thematic glossary. *Practical work No. 1* Compilation of a thematic glossary in the CAT service interface for a scientific article.
	Independent work, 2 hours	Completion of the compilation of a thematic glossary
Topic 3. Implementation of translation work using the CAT service	Video lecture, 1 hour	The functionality of the selected CAT service for working on the stylistic coordination of the translation of scientific texts. Technologies of translation of scientific texts by means of the CAT service.
	Practical lesson, 1 hour	Translation of a scientific article by means of the CAT service. Assessment of the correctness of the completed translation. *Practical work No. 2* Translation of a scientific article by means of the CAT service.
	Independent work, 8 hours	Completion of the translation of the selected scientific article. Abstracting the translation.
Final certification		Test pass (based on the totality of completed practical work).

Source: compiled by Tatiana N. Suvorova, Lyubov A. Shunina, Ivan V. Shunin.

The final control of the course can be implemented in the form of testing. This will determine the quality and degree of assimilation of the theoretical material of the course. It is advisable to divide the test questions into two types: with a closed and open answer form.

In order to control residual knowledge and skills, it is recommended to conduct a survey of graduates of the course some time after the completion of the course, as well as to interview the scientific supervisors of these students. In this way, it is possible to record and evaluate the degree of formation of the skill of independent work with scientific and methodical sources in a foreign language.

In order to evaluate the effectiveness of the proposed approaches, a pedagogical experiment was organized. The basis of the research is the MCU, the implementation of the developed online course was carried out as a part of the Strategic Academic Leadership Program "Priority 2030".

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A longitudinal method was chosen adequately for the set goal, the main idea of which is that some parameters of the same subjects are subject to research for a limited period of time (before the beginning of the formative stage of the experiment and after its completion).

The number of students is 28 people enrolled in the basic educational programs of bachelor's and master's degrees.

The pedagogical experiment was organized in three stages.

Stating. As a part of this stage, empirical information was collected and analyzed, which made it possible to clarify the hypothesis of the study and confirm its relevance.

Formative. The introduction of an online course on the use of machine translation systems for working with English-language scientific texts under conditions of empirical verification was carried out during the formative stage of the experiment.

Generalizing. The results of the experiment were summarized at the generalizing stage.

Two questionnaires were prepared to determine the initial level of students: "Proficiency in a foreign language" and "Working with scientific sources in a foreign language". The survey was conducted before the start of the course. The results allowed us to determine the following information: the initial level of motivation of students to study foreign professional experience and take it into account in their research activities; the degree to which students have developed the skill of independent work with scientific and scientific-methodical sources in a foreign language; the reasons preventing independent work with scientific and scientific-methodological sources in a foreign language.

The determination of the quality and degree of assimilation of the theoretical material of the course was carried out using testing. Students were offered 10 test questions, with different types of answers, covering the main sections of the theoretical block of the online course "Machine translation of scientific texts". Some of the questions were checked automatically, and some by the lecturer.
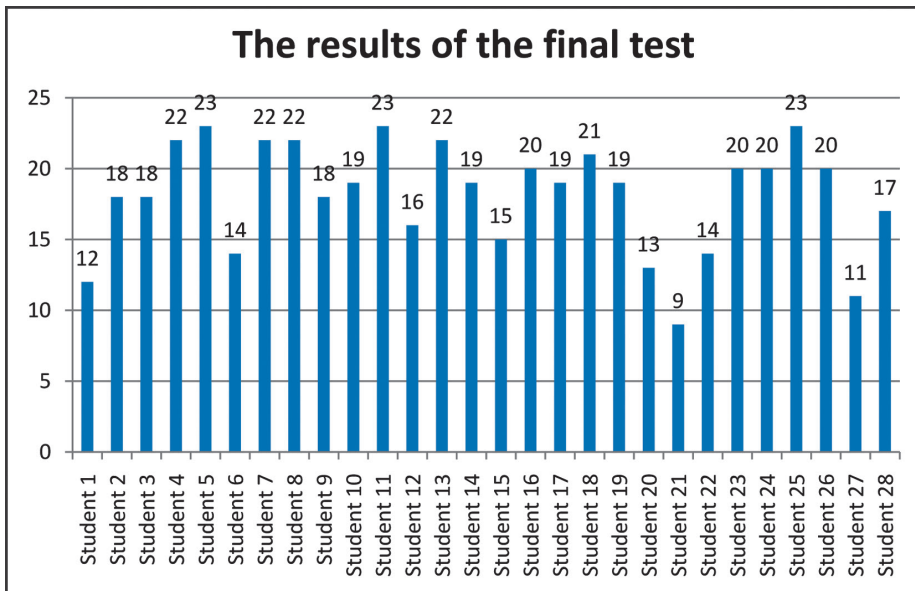
Figure 1 shows the results of the final test in the form of sum of points scored for each student.

The arithmetic mean of the points received is 18.2. This indicator allows us to state that students have mastered the theoretical material of the course at a fairly high level.

Upon completion of the online course "Machine translation of scientific texts", students were asked to re-answer the questionnaire "Working with scientific sources in a foreign language". The generalized results in comparison before the start of training and after its completion are shown in Figure 2.

An increase in positive responses regarding confident access to scientific sources in a foreign language, due to the understanding of principles of organizing machine translation, allows us to state an increase in students' motivation to study foreign professional experience and take it into account in their independent research activities.

Figure 1. The results of the final test of students' assimilation
of the theoretical material of the course

Source: created by Tatiana N. Suvorova, Lyubov A. Shunina, Ivan V. Shunin.
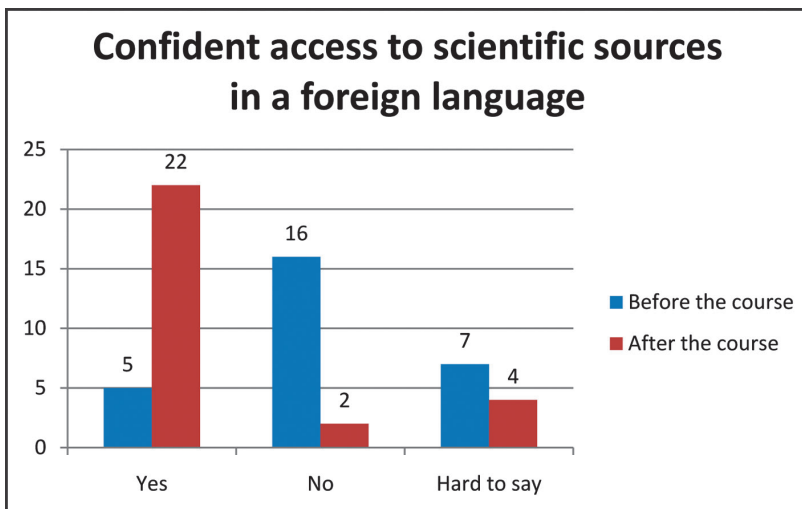
Figure 2. Comparison of the results of the survey "Working with scientific sources
in a foreign language"

Source: created by Tatiana N. Suvorova, Lyubov A. Shunina, Ivan V. Shunin.

Conclusion. The results obtained during the experimental work allow us to confirm the hypothesis put forward: teaching students of non-linguistic specialties the usage of such means of informatization of scientific, educational and practical activities of students as machine translation systems for working with English-language scientific texts increases the motivation of students to study foreign professional experience, forms the skill of working with such texts, which in turn contributes to the effectiveness of students' independent and research activities.

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