European Journal of Contemporary Education
E-ISSN 2305-6746
2023. 12(3): 948-961
DOI: 10.13187/ejced.2023.3.948
https://ejce.cherkasgu.press

Information Technology in Foreign Language Distance Teaching to Students of Technical Specialties

Elena N. Ovchinnikova [a, *], Yuriy N. Kozhubaev [a], Viacheslav Yu. Ivanov [a], Larisa I. Pechinskaya [b]

[a] Saint-Petersburg Mining University, Saint-Petersburg, Russian Federation
[b] Saint-Petersburg Polytechnic University, Saint-Petersburg, Russian Federation

Abstract

This article analyzes the applicability of information technology in Foreign Language distance teaching to students of technical specialties. The article reviews modern technology of Foreign Language distance teaching to students of technical specialties, exploring their advantages and disadvantages. The LMS (Learning Management System) is theoretically analyzed. The principles and features of educational courses developed on the Moodle platform are discussed. A set of English vocabulary and grammar exercises and tests is developed, using the distance learning technology of the «Distance Learning Technology Portal of Peter the Great St. Petersburg Polytechnic University». The experiment was conducted to confirm the effectiveness and feasibility of using distance learning technology based on the Moodle distance learning management system in the study of foreign language by first-year students of technical specialties of Peter the Great St. Petersburg Polytechnic University. Statistical analysis of the results of the post-experimental cross-section in the experimental and control groups was conducted, using Student's t-test. The article demonstrates the effectiveness of remote support for undergraduate students of non-linguistic specialties studying the basic course of English. It is concluded that it is expedient to include the Moodle distance learning system into the educational process.

Keywords: distance learning, information technology, foreign language, LMS learning management system, Moodle platform.

1. Introduction

In the modern world of information, foreign language teaching is increasingly implemented with digital technology and information resources.

* Corresponding author
E-mail addresses: Ovchinnikova_EN@pers.spmi.ru (E.N. Ovchinnikova), kozhubaev_yun@pers.spmi.ru (Yu.N. Kozhubaev), Ivanov_VYu@pers.spmi.ru (V.Yu. Ivanov)

It is not a recommended, but an obligatory requirement in the system of modern education to use information technology in Foreign Language distance teaching to students of technical specialties (Meirovitz et al., 2022; Vinogradova et al., 2022; Murzo et al., 2019).

The relevance of the chosen topic is due to the lack of the required number of classroom hours for the study for foreign languages in the educational program for students of non-linguistic specialties. In this connection, it is rather problematic for students of technical areas of training to master foreign languages without the use of computer technology and information resources, including distance learning technologies (Saba, 2003; Gerasimova et al., 2022; Clement et al., 2017).

The research object is the process of teaching Foreign Language to students of non-linguistic specialties, including technical fields.

The subject of the research is the use of information technologies in distance learning of a foreign language for students of non-linguistic specialties.

The main purpose of this study is to test the effectiveness of the use of distance technologies in teaching students of technical specialties the discipline «Foreign Language».

In order to achieve the goals, the following tasks must be accomplished:

- to analyze the possibilities of using distance technologies in teaching the discipline «Foreign Language» to students of technical specialties;
- to conduct an experimental test of the effectiveness of teaching English to students of technical specialties based on the distance learning system Moodle.

2. Materials and methods

In the course of the study, the following methods were applied: an analytical review and generalization of scientific and methodological sources, observation, pedagogical diagnostics and reflection.

The Federal State Educational Standards for Higher Education states, that undergraduate students of technical and non-linguistic fields of study must have the following general professional and general cultural competencies:

- the ability to implement intercultural and communication based on written and oral communication;
- the self-education ability;
- the experience of using modern information educational technology, applied software for solving professional tasks;
- the ability to process and analyze information, using information and computer technology (Ovchinnikova et al., 2022; Varlakova et al., 2023; Samylovskaya et al., 2022).

Today, communication in a foreign language is becoming an increasingly essential component necessary for the future professional activities of graduates (Skornyakova et al., 2022; Mikeshin, 2022; Krainiukov et al., 2020). Thus, the role of the Foreign Language subject increases significantly, especially for undergraduate students of non-linguistic fields (Fandey, 2012).

Teaching foreign languages nowadays is practically impossible without the technical means and technology of distance learning (Folomkin i dr., 2022; Ignashchuk i dr., 2015; Polat, 2005).

The following procedures must be implemented in order to incorporate information technology for education:

- development of remote platforms providing learning opportunities;
- introduction of distance technology into the overall system of self-study;
- evaluation of the effectiveness of the use of distance learning technologies (Osipova, Goreva, 2014; Medeshova et al., 2022; Beloglazov i dr., 2017).

In modern education, information educational technology, including tools for distance learning support, has become widespread. For example, in Russia, more than 80 % of educational institutions effectively implement information educational technology for education and training (Shestakova et al., 2023; Ershova i dr., 2019; Krotova et al., 2019). Easy access and cost-effectiveness make these systems forward-looking learning tools (Gianelli, 2018; Bobkova, 2018).

Taking into account the studies, an analysis of the main advantages and disadvantages of modern training systems based on distance information technology was conducted (Kwary et al., 2018; Andrews, 2011; Bećirović et al., 2022). The analysis data are presented in Table 1.

Table 1. Advantages and disadvantages of the distance learning system

Advantages	Disadvantages
Personal approach (teacher can be in regular interactive contact with students, exchange information with students on various forums, webinars, in chat rooms)	Without direct supervision by the teacher, students may do less well
Versatility (opportunity to learn on-the-job)	Some specialties, such as medicine, are difficult and partially impossible to learn through a distance learning program
Flexibility (opportunity to learn at your own pace and at the right time)	There is no "live" communication between the teacher and students
Cost and time savings (reduced cost of travel to the place of training)	The content of distance learning courses does not always meet the learning objectives
Long-distance action (the ability to study does not depend on the location of educational institutions and residence of students)	The complexity of conducting practical classes and laboratory exercises

It can be seen from the Table 1 that, the use of remote support tools in addition to traditional teaching is reasonable and even necessary in today's world (Ponomarenko i dr., 2019; Vasin, 2016; Dabletova et al., 2017).

To implement distance support in addition to the traditional teaching of Foreign Language, modern educational technology implemented in various services are used: databases, portals; digital libraries and dictionaries; information and educational websites (Sveshnikova et al., 2022; Oblova et al., 2020; Kassymova et al., 2023).

The use of these services in the learning process has certain advantages and disadvantages (Table 2).

Table 2. Advantages and disadvantages of modern Internet technology

Advantages	Disadvantages
Diversity of material	Mismatch between the volume and complexity of information and the specific level of students
Increases the motivation of students.	Limited control over the learning process
Promotes the formation of information competence of students	Mismatch between these services and the objectives of the educational process
Helps develop students' independence	Redundancy of posted information

From Table 2 it follows that the Internet technology implemented in the above services can be used for training, but their use must be substantiated (Bersin, 2004; From, 2017; Ustyuzhanina i dr., 2018).

In contrast to the use of individual Internet services, the use of learning management systems such as LMS (Learning Management System) or educational platforms appears to be the most efficient, due to their lack of the aforementioned disadvantages. These systems were created purposefully to organize the educational process.

LMS is a universal platform. This platform performs the following basic functions:

- provides for controlling and registering user access to the learning content;
- produces reports on the results of training;
- gives students access to the learning portal in order to provide instructional content;
- provides a universal interface necessary for the learning process and teacher-student interaction;
- organizes communication between teachers and students;

This list shows that the LMS is a multipurpose system and implements quite a number of functions. LMS is just a platform which includes hardware and software as well as the organization of distance learning. Figure 1 shows the structure of the LMS (Learning Management System).

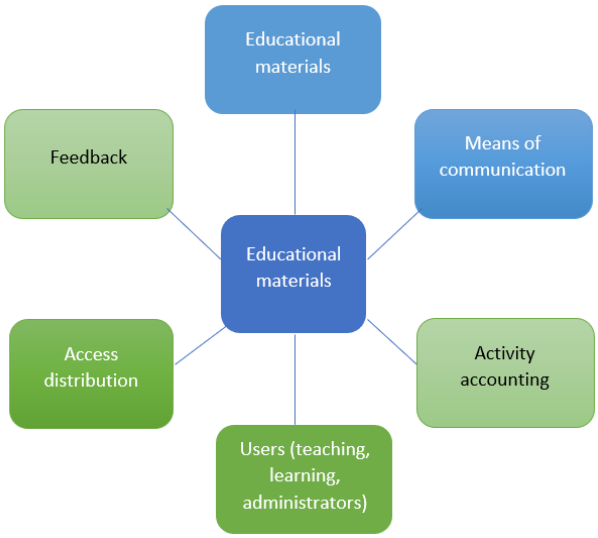


Fig. 1. Structure of the LMS

Among the freely distributed LMS, the most widespread are distance and network learning systems created on the Moodle platform (Modular Object-Oriented Dynamic Learning Environment) related to the LMS (Learning Management System) (Zmeev i dr., 2018; Rymanova et al., 2015).

But with all the advantages of this training technology, there is a question of the effectiveness of these tools (Nikonova et al., 2023). The effectiveness of using remote support tools based on the Moodle platform in teaching students of technical specialties a foreign language reflects the measure of consistency of the results obtained with the tasks and goals of the educational process with a minimal consumption of time and labor of students and teachers.

The evaluation of the efficiency of using the portal of information educational technologies based on the Moodle platform can be a criterion and justification for its use in the learning process. Therefore, in the next section, we will experimentally test the effectiveness of remote support tools.

2.1. Experimental testing of the efficiency of the portal of information educational technology based on the Moodle platform

To assess the effectiveness of using the portal of distance learning technology based on the Moodle information platform in teaching to students of non-linguistic specialties Foreign Language, an experiment was conducted.

We emphasize that the discipline «Basic course of a foreign language» refers to the main part of the cycle of foreign language learning by students of technical specialties and is studied in semesters 1-3.

The total number of hours for three semesters of the Basic Course of Foreign Language subject, according to the curriculum, is usually less than 300 academic hours, which is insufficient for the complete study of the course, so the independent students' work on additional exercises as well as vocabulary and grammar tests using distance learning technology appears to be the most effective way to improve the understanding of the material.

The aim of the study was to determine whether the use of remote information technology contributes to better understanding of the material when teaching students of technical specialties a foreign language.

In order to achieve this goal of the study, the following tasks were set:

1) choose experimental and control subgroups;

2) explain the details of the experiment to the students of the experimental subgroup;

3) conduct a defining pre-experimental cut (pre-test) in the control and experimental subgroups in order to identify the level of knowledge of a foreign language (English);

4) develop additional exercises as well as vocabulary and grammar tests using the learning platform Moodle;

5) task the students of the experimental group to independently mastering the additional educational material, well as grammar and vocabulary tests, posted on the portal of distance educational technologies based on Moodle distance learning systems;

6) conduct a post-experimental cross-section (control test) in the control and experimental subgroups to identify the level of foreign language (English) skills;

7) analyze the results of the control test in the experimental and control subgroups.

The study involved first-year students of the Institute of Industrial Management, Economics and Trade of the St. Petersburg Polytechnic University, studying in the field of training 38.03.01 «Economics and Management at the Enterprise». To implement the research objectives, two study groups of non-linguistic students studying the discipline «Basic course of a foreign language» were selected from the general lecture stream.

Each group consisted of 15 students, with 8 male and 7 female students of 17-19 years old. Thus, the students were divided into control and experimental groups by using the serial (nested) sampling.

During the educational experiment, a stating (pre-experimental) test was conducted in the control and experimental subgroups (Table 3). The Application (Figure 1) shows a fragment of the pre-experimental slice (pre-test).

Table 3. Results of the pre-experimental slice in the control and experimental subgroups

Control group		Experimental group	
Student	Result, %	Student	Result, %
Student #1	42	Student #16	67
Student #2	42	Student #17	52
Student #3	59	Student #18	52
Student #4	70	Student #19	49
Student #5	28	Student #20	33
Student #6	42	Student #21	58
Student #7	42	Student #22	51
Student #8	41	Student #23	52
Student #9	45	Student #24	35
Student #10	58	Student #25	48
Student #11	45	Student #26	57
Student #12	59	Student #27	34
Student #13	68	Student #28	72
Student #14	54	Student #29	41
Student #15	43	Student #30	70
Average value	49.2	Average value	51.4

From Table 3 it follows that the results of the pre-experimental slice in the control and experimental groups are almost the same – they differ by about 2 %.

Then students from the experimental group were given the task to independently master the additional educational material posted on the portal of distance educational technologies “Portal of DOT SPbSPU” based on Moodle distance learning systems.

Teaching materials used to teach first-year university students were selected as material for the development of additional exercises as well as vocabulary and grammar tests, using distance learning technologies based on the Moodle platform.

When selecting vocabulary tests and assignments, the «Work» topic was chosen (Cotton et al., 2008). For the development of grammar tests and assignments, the «Present Perfect Simple and Continuous» topic was chosen.

In the portal of distance learning technologies based on Moodle distance learning systems, we were created an additional block «Extra Module on Work», containing additional exercises, as well as lexical and grammar tests (Application, Figure 2).

The Application presents examples of a lexical test (Figure 3-4) and examples of a grammatical test (Figure 5-6) in the developed additional block «Extra Module on Work».

After the students from the experimental group independently worked out all the additional exercises, as well as lexical and grammatical tests using distance learning technologies, a post-experimental slice (control test) was carried out to determine the degree of assimilation of a foreign language. The fragment of the post-experimental slice (control test) is presented in the Application (Figure 7).

Table 4 shows the results of the post-experimental slice.

Table 4. Results of the post-experimental slice in the control and experimental subgroups

Control group		Experimental group	
Full name	Result, %	Full name	Result, %
Student #1	56	Student #16	72
Student #2	71	Student #17	84
Student #3	54	Student #18	71
Student #4	65	Student #19	81
Student #5	57	Student #20	66
Student #6	36	Student #21	83
Student #7	62	Student #22	54
Student #8	51	Student #23	86
Student #9	33	Student #24	77
Student #10	51	Student #25	68
Student #11	49	Student #26	81
Student #12	59	Student #27	62
Student #13	70	Student #28	81
Student #14	61	Student #29	81
Student #15	64	Student #30	78
Average value	55.93	Average value	75

The final indicators of pre-experimental and post-experimental slices are generalized in the diagram (Figure 2).

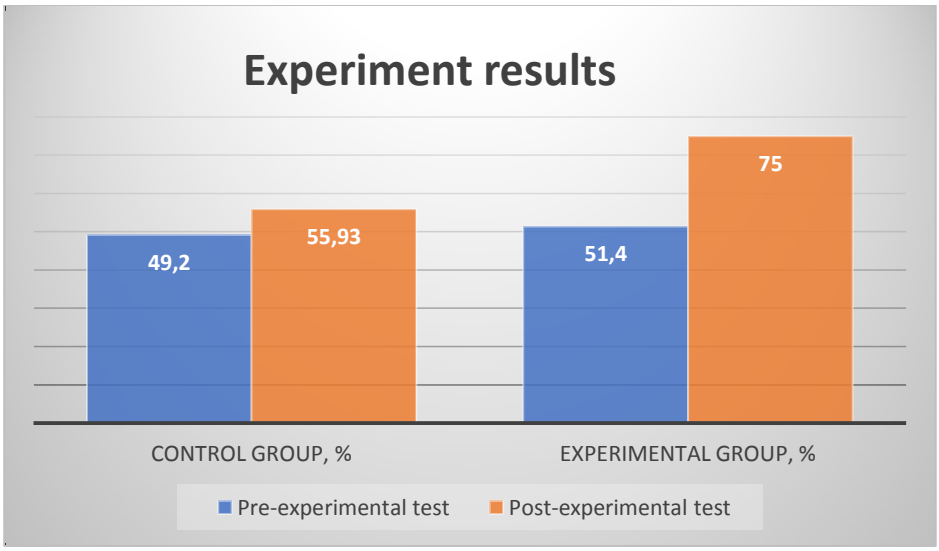


Fig. 2. Results of pre-experimental and post-experimental slice in control and experimental groups

The results presented in the diagram demonstrate that independent work with the "Additional module on work" block created on the Moodle learning platform allowed students from the experimental subgroup to show significantly better results in solving the vocabulary and grammar test during the post-experimental slice, compared to the control group.

Empirical data obtained during the experiment were analyzed using statistical analysis. If the distribution type or the sample distribution function is given to us, then the problem of assessing the differences between two groups of independent observations can be solved using parametric statistical criteria (Rock et al., 2016).

To analyze the results of the post-experimental cross-section in the control and experimental groups, Student's t-test was used. Student's t-test is used to test the hypothesis of equality of the general averages of two independent, unrelated samples (the so-called two-sample t-test).

$$t_{emp} = \frac{x_{av} - y_{av}}{\sigma_{x-y}}, \quad (1)$$

where x_{av}, y_{av} are the arithmetic mean of the control and experimental groups, σ_{x-y} is the standard error of the difference in the arithmetic mean.

$$\sigma_{x-y} = \sqrt{\frac{\sum(x_i - x_{av})^2 + \sum(y_i - y_{av})^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}, \quad (2)$$

where n_1, n_2 are the values of the first and second samples respectively.

If $n_1 = n_2$, then the standard error of the difference in the arithmetic mean is determined by the formula:

$$\sigma_{x-y} = \sqrt{\frac{\sum(x_i - x_{av})^2 + \sum(y_i - y_{av})^2}{(n-1)\cdot}}, \quad (3)$$

where n is the sample size.

Calculation of the number of degrees of freedom is carried out according to the formula:

$$k = n_1 + n_2 - 2 \quad (4)$$

If the samples are numerically equal, $k = 2n - 2$.

Then we need to compare the obtained value of t_{emp} with the theoretical value of t_{crit} - the Student distribution. If $t_{emp} < t_{crit}$, the hypothesis H_0 is accepted, otherwise, the null hypothesis is rejected and the alternative hypothesis is confirmed. If the empirical value of t obtained during the experiment is higher than the tabular value, then there is a reason to accept the alternative hypothesis H_1 that students in the experimental group on average show a higher level of knowledge.

3. Results and discussion

The calculation of the Student's t-test based on the results of the pre-experimental slice in the experimental (sample B.1) and control (sample B.2) groups is presented in Table 5.

Table 5. Results of Student's t-test

No.	Samples		Deviations from mean $(x_i - x_{cp})$		Deviation squares $(x_i - x_{cp})^2$	
	B.1	B.2	B.1	B.2	B.1	B.2
1	72	56	-3	0.07	9	0.0049
2	84	71	9	15.07	81	227.1049
3	71	54	-4	-1.93	16	3.7249
4	81	65	6	9.07	36	82.2649
5	66	57	-9	1.07	81	1.1449
6	83	36	8	-19.93	64	397.2049

7	54	62	-21	6.07	441	36.8449
8	86	51	11	-4.93	121	24.3049
9	77	33	2	-22.93	4	525.7849
10	68	51	-7	-4.93	49	24.3049
11	81	49	6	-6.93	36	48.0249
12	62	59	-13	3.07	169	9.4249
13	81	70	6	14.07	36	197.9649
14	81	61	6	5.07	36	25.7049
15	78	64	3	8.07	9	65.1249
Amounts:	1125	839	0	0.05	1188	1668.9335
Average:	75	55.93				

Result: t_{emp} = 5.2.

The value of t_{emp} obtained in the experiment is compared with the table value of t_{crit}. The table value of t_{crit} is 2.05, assuming the risk of an error of judgment in five cases out of a hundred (significance level = 5 % or 0.05).

If the empirical value of t_{emp} obtained in the experiment exceeds the table value, then there is a reason to accept the alternative hypothesis (H_1) that the students of the experimental group, on average, showed a higher level of knowledge. In the experiment, t_{emp} = 5.2. The table value of t_{crit} is 2.05. Thus, we get $t_{emp} > t_{crit}$, from which follows the conclusion about the advantage of experimental learning.

The obtained empirical value t_{emp} = 5.2 is in the zone of significance ($p < 0.01$). Consequently, the students from the experimental group showed an average higher level of knowledge compared to the control group.

4. Conclusion

Application of information technologies in distance learning of students of technical specialties to a foreign language allows effectively organize students' independent work on additional exercises as well as vocabulary and grammar tests taking into account the insufficiency of classroom hours for the full mastering of Foreign Language.

The final results of the experiment prove that independent work with the «Additional module on work» block created on the Moodle learning platform allowed students from the experimental subgroup to show significantly better results in solving the vocabulary and grammar test during the post-experimental slice, compared to the control group. Thus, the effectiveness of the use of information technology in distance learning of students of technical specialties to a foreign language is confirmed.

Summing up, we note that the use of remote support for students studying Foreign Language greatly facilitates the control of students' learning activities, because it allows teachers to track the progress of each individual student (which is impossible with a frontal check of homework in the classroom) and, accordingly, stimulates students to work more efficiently. This saves the teacher a lot of time, because the check is done automatically. After analyzing the results of different tasks, the teacher can focus on the issues that have caused difficulties, without wasting time on the analysis of successfully completed tasks, which reduces the cost of training time.

The conducted research proves the effectiveness of the use of modern distance technologies in teaching students of technical specialties a foreign language.

References

Andrews, 2011 – *Andrews, R.* (2011). Does E-Learning Require a New Theory of Learning? Some Initial Thoughts. *Journal for Educational Research Online*. 3 (1): 104-121.

Beloglazov i dr., 2017 – *Beloglazov, A.A., Beloglazova, L.B.* (2017). Modelirovaniye tekhnologiy internet-obucheniya [Modeling of Internet-learning technologies]. *Vestnik RUDN. Ser.: Informatizatsiya obrazovaniya*. 14(1): 83-91. [in Russian]

Bersin, 2004 – *Bersin, J.* (2004). The blended learning book: best practices, proven methodologies, and lessons learned. San Francisco: Pfeiffer. 330 p.

Bećirović et al., 2022 – *Bećirović, S., Ahmetović, E., Skopljak, A.* (2022). An Examination of Students Online Learning Satisfaction, Interaction, Self-efficacy and Self-regulated Learning. *European Journal of Contemporary Education*. 11(1): 16-35.

Bobkova, 2018 – *Bobkova, I.A.* (2018). Elektronnaya shkola kak sostavlyayushchaya tsifrovoy ekonomiki [E-school as a component of the digital economy]. Analiz i modelirovaniye ekonomicheskikh i sotsial'nykh protsessov. Matematika. Komp'yuter. Obrazovaniye: Sb. nauchn. trudov. M.- Izhevsk: NITS «Regulyarnaya i khaoticheskaya dinamika». 25: 79-87. [in Russian]

Clement et al., 2017 – *Clement, J., Miles, M.* (2017). Screen schooled: Two veteran teachers expose how technology overuse is making our kids dumber. Chicago: Chicago Review Press. 272 p.

Cotton et al., 2008 – *Cotton, D., Falvey, D., Kent, S.* (2008). Language Leader Intermediate Coursebook. Edinburgh: Pearson Education. 185 p.

Dabletova et al., 2017 – *Dabletova, A.H., Kassymova, A.H., Mukanova, A., Bisenova, G., Zhanuzakova, Z.* (2017). Digital educational resources as part of a digital educational space for a future computer teacher. *Indian Journal of Science and Technology*. 10(2): 1-16.

Ershova i dr., 2019 – *Ershova, N.Yu., Nazarov, A.I.* (2019). Printsipy formirovaniya obrazovatel'noy sredy setevogo obrazovaniya [Principles of formation of the educational environment of network training]. Monografiya. Saratov: Vuzovskoye obrazovaniye. 83 p. [in Russian]

Fandey, 2012 – *Fandey, V.A.* (2012). eoretiko-pragmaticheskiye osnovy ispol'zovaniya form smeshannogo inoyazychnogo (angliyskogo) yazyka obucheniya v yazykovom vuze [Theoretical and pragmatic foundations of the use of the form of mixed foreign language (English) teaching language in a language university]. Avtoreferat disser. kand. ped. nauk: Moskva. 23 p. [in Russian]

Folomkin i dr., 2022 – *Folomkin, A.I., Chupin, S.A., Trubetskaya, O.V., Sharok, V.V.* (2022). Razrabotka programmy-trenazhera na osnove neyrosetevykh tekhnologiy dlya razvitiya zarazhennogo myshleniya uchashchikhsya [Development of the trainer program based on neural network technologies for development of spatial thinking of students]. *Perspektivy nauki i obrazovania*. 57(3): 582-602. [Electronic resource]. URL: https://pnojournal.wordpress.com/2022/07/03/folomkin/ (date of access: 01.07.2023). [in Russian]

From, 2017 – *From, J.* (2017). Pedagogical digital competence – between values, knowledge, and skills. *Higher Education Studies*. 7(2): 43-50.

Gerasimova et al., 2022 – *Gerasimova, I.G., Pushmina, S.A., Carter, E.V.* (2022). A fresh look at blended learning: Boosting motivation and language acquisition in an ESP course for engineering students. *Global Journal of Engineering Education*. 24(1): 52-58.

Gianelli, 2018 – *Gianelli, M.* (2018). Elektronnoye obucheniye v teorii, praktike i issledovaniyakh [E-learning in theory, practice and research]. *Voprosy obrazovaniya*. 4: 81-98. [Electronic resource]. URL: https://vo.hse.ru/article/view/15575 (date of access: 01.08.2023). [in Russian]

Ignashchuk i dr., 2015 – *Ignashchuk, E.V., Kirichenko, V.I., Kobylyanskaya, I.N.* (2015). Osobennosti ispol'zovaniya distantsionnykh tekhnologiy v uchebnom protsesse [Features of the implementation of distance technologies in the educational process]. *Elektronnoye obucheniye v postoyannom obrazovanii*. 1(2): 63-67. [Electronic resource]. URL: https://cyberleninka.ru/article/n/osobennosti-vnedreniya-sistemy-distantsionnogo-obrazovaniya (date of access: 11.07.2023). [in Russian]

Kassymova et al., 2023 – *Kassymova, G.M., Tulepova, S.B., Bekturova, M.B.* (2023). Perceptions of digital competence in learning and teaching English in the context of online education. *Contemporary educational technology*. 15 (1). DOI: https://doi.org/10.30935/cedtech/12598 (date of access: 30.05.2023).

Krainiukov et al., 2020 – *Krainiukov, S., Spiridonova, V.* (2020). On how students of humanitarian and engineering specialties perceive their educational and professional activities: Psycho-semantic analysis. 131: 856-863. [Electronic resource]. URL: https://link.springer.com/chapter/10.1007/978-3-030-47415-7_92 DOI: 10.1007/978-3-030-47415-7_92 (date of access: 30.05.2023).

Krotova et al., 2019 – *Krotova, S.Y., Ilin, A.E., Chirgin, A.V.* (2019). Analysis of software products for processing the results of spectroscopy. *International Journal of Mechanical Engineering and Technology*. 10(1): 1823-1832.

Kwary et al., 2018 – *Kwary, D.A., Fauzie, S.* (2018). Students' achievement and opinions on the implementation of e-learning for phonetics and phonology lectures at Airlangga University.

Educ. Pesqui., São Paulo, 44. DOI: http://dx.doi.org/10.1590/S1678-4634201710173240 (date of access: 30.05.2023).

Medeshova et al., 2022 – *Medeshova, A., Kassymova, A., Mutalova, Z., Kamalova, G.* (2022). Distance Learning Activation in Higher Education. *European Journal of Contemporary Education*. 11(3): 831-845.

Meirovitz et al., 2022 – *Meirovitz, T., Russak, S., Zur, A.* (2022). English as a foreign language teachers' perception regarding their pedagogical-technological knowledge and its implementation in distance learning during COVID-19. *Heliyon*. 8 (4). DOI: https://doi.org /10.1016/j.heliyon.2022.e09175 (date of access: 30.05.2023).

Mikeshin, 2022 – *Mikeshin, M.I.* (2022). Tekhnonauka, obrazovaniye i filosofiya [Technoscience, education and philosophy]. *Gornyi Zhurnal*. 2022(11): 78-83. [Electronic resource]. URL: https://www.rudmet.ru/journal/2163/article/35959/doi:10.17580/gzh.2022.11.13 (date of access: 01.07.2023). [in Russian]

Murzo et al., 2019 – *Murzo, Y., Sveshnikova, S., Chuvileva, N.* (2019). Method of text content development in creation of professionally oriented online courses for oil and gas specialists. *International Journal of Emerging Technologies in Learning*. 14(17): 143-152.

Nikonova et al., 2023 – *Nikonova, E.N., Shchetinina, A.T., Pivkina, N.N., Yakhyaeva, K.M.* (2023). Using Artificial Intelligence Tools in Teaching a Foreign Language in Higher Technical Institutions. *European Journal of Contemporary Education*. 12(2): 578-589.

Oblova et al., 2020 – *Oblova, I.S., Gerasimova, I.G., Sishchuk, J. M.* (2020). Gender segregation in STEM education and careers in Russia. *Global Journal of Engineering Education*. 22(2): 130-135.

Osipova, Goreva, 2014 – *Osipova, L.B., Goreva, O.M.* (2014). Distantsionnoye obucheniye v vuze: modeli i tekhnologii [Distance learning at the university: models and technologies]. *Sovremennyye problemy nauki i obrazovaniya*. 5: 723. [Electronic resource]. URL: https://science-education.ru/ru/article/view?id=14612 (date of access: 10.05.2023). [in Russian]

Ovchinnikova et al., 2022 – *Ovchinnikova, E.N., Krotova, S.Yu.* (2022) Training of mining engineers in the context of sustainable development: a moral and ethical aspect. *European Journal of Contemporary Education*. 11(4): 1192-1200.

Polat, 2005 – *Polat, E.S.* (2005). Organizatsiya distantsionnogo obucheniya v Rossiyskoy Federatsii [Organization of distance learning in the Russian Federation]. *Informatika i obrazovaniye*. 4: 25-33 [in Russian]

Ponomarenko i dr., 2019 – *Ponomarenko, T.V., Nevskaya, M.A., & Marinina, O.A.* (2019). Innovative learning methods in technical universities: The possibility of forming interdisciplinary competencies. *Espacios*, 40(41), 16-32. [Electronic resource]. URL: http://www.revistaespacios.com/a19v40n41/19404116.html (date of access: 20.05.2023). [in Russian]

Rock et al., 2016 – *Rock, A.J, Coventry, W.L, Morgan, M.I, Loi, N.M* (2016). Teaching Research Methods and Statistics in eLearning Environments: Pedagogy, Practical Examples, and Possible Futures. *Frontiers in Psychology*. 7: 339.

Rymanova et al., 2015 – *Rymanova, I., Baryshnikov, N., Grishaeva, A.* (2015). E-course Based on the LMS Moodle for English Language Teaching: Development and Implementation of Results. Procedia – Social and Behavioral Sciences. 206: 236-240. [Electronic resource]. URL: https://www.sciencedirect.com/science/article/pii/S1877042815051496?via%3Dihub (date of access: 21.05.2023).

Saba, 2003 – *Saba, F.* (2003). Distance education theory, methodology, and epistemology: A pragmatic paradigm. Handbook of distance education: New Jersey: Lawrence Erlbaum Associate Publishers: 3–20.

Samylovskaya et al., 2022 – *Samylovskaya, E., Makhovikov, A., Lutonin, A., Medvedev, D., Kudryavtseva, R.-E.* (2022). Digital Technologies in Arctic Oil and Gas Resources Extraction: Global Trends and Russian Experience. *Resources*. 11(3): 29.

Shestakova et al., 2023 – *Shestakova, I., Morgunov, V.* (2023). Structuring the post-COVID-19 process of digital transformation of engineering education in the Russian Federation. *Education Sciences*. 13(2): 135. [Electronic resource]. URL: https://www.mdpi.com/2227-7102/13/2/135 (date of access: 21.06.2023).

Skornyakova et al., 2022 – *Skornyakova, E.R., Vinogradova, E.V.* (2022). Fostering Engineering Students' Competences Development Through Lexical Aspect Acquisition Model.

International Journal of Engineering Pedagogy. 6 (12): 100-114. DOI: https://doi.org/10.3991/ijep.v12i6.33667 (date of access: 23.06.2023).

Sveshnikova et al., 2022 – *Sveshnikova, S.A., Skornyakova, E.R., Troitskaya, M.A., Rogova, I.S.* (2022). Development of engineering students' motivation and independent learning skills. *European Journal of Contemporary Education*. 11(2): 555-569.

Ustyuzhanina i dr., 2018 – *Ustyuzhanina, E.V., Evsyukov, S.G.* (2018). Tsifrovizatsiya obrazovatel'noy sredy: posledstviya i posledstviya [Digitalization of the educational environment: opportunities and threats]. *Vestnik REU im. G. V. Plekhanova*. 1(97): 3-12. [in Russian]

Varlakova et al., 2023 – *Varlakova, E., Bugreeva, E., Maevskaya, A., Borisova, Y.* (2023). Instructional design of an integrative online business English course for Master's students of a technical university. *Education Sciences*. 13(1). [Electronic resource]. URL: https://www.mdpi.com/2227-7102/13/1/41 DOI: 10.3390/educsci13010041 (date of access: 13.06.2023).

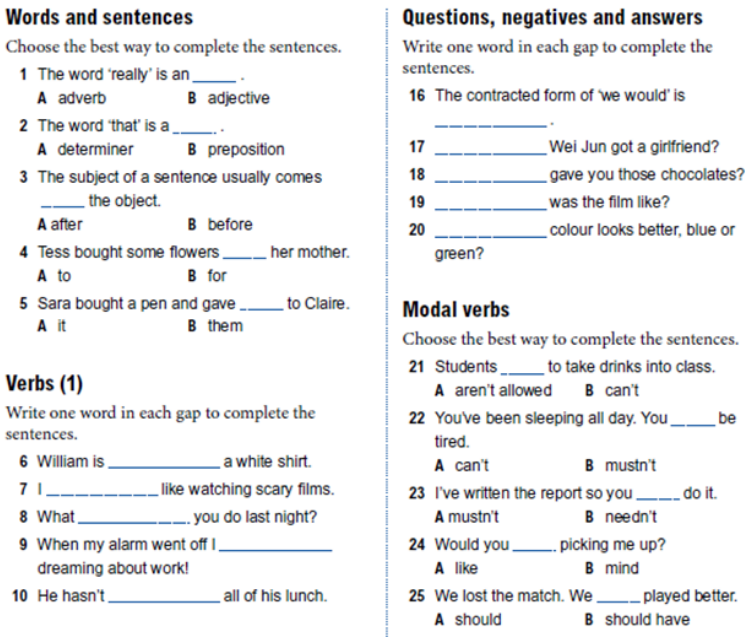
Vasin, 2016 – *Vasin, E.K.* (2016). Smeshannoye obucheniye na osnove informatsionnykh tekhnologiy kak forma realizatsii uchebnogo protsessa v obshcheobrazovatel'noy shkole [Blended learning based on information technology as a form of implementation of the educational process in a general education school]. *Vestnik Tambovskogo universiteta*. 21: 33-41. [in Russian]

Vinogradova et al., 2022 – *Vinogradova, E.V., Borisova, Y.V., Kornienko, N.V.* (2022). The Development of Creative Thinking in Engineering Students Through Web-related Language Learning. Lecture Notes in Networks and Systems: Technology, Innovation and Creativity in Digital Society. 345: 881-891. DOI: https://doi.org/10.1007/978-3-030-89708-6_71 (date of access: 10.06.2023).

Zmeev i dr., 2018 – *Zmeev, M.V., Kamalov, R.R., Makurin, A.I.* (2018). Distantsionnoye obucheniye v programmnoy srede Moodle: ot uroka do kursa (uchebnoye posobiye dlya prepodavateley i prepodavateley) [Distance learning in the Moodle software environment: from lesson to course (a manual for teachers and educators)]. Glazov: ANO Tsentr NIOKR «Universum» 118 p. [Electronic resource]. URL: https://ano-universum.ru/pluginAppObj_10214/Uchebnik-Moodle.pdf (date of access: 10.06.2023). [in Russian]

Appendix

Methodological materials for the study



Words and sentences

Choose the best way to complete the sentences.

1 The word 'really' is an ____ .
A adverb B adjective

2 The word 'that' is a ____. .
A determiner B preposition

3 The subject of a sentence usually comes ____ the object.
A after B before

4 Tess bought some flowers ____ her mother.
A to B for

5 Sara bought a pen and gave ____ to Claire.
A it B them

Verbs (1)

Write one word in each gap to complete the sentences.

6 William is _____ a white shirt.

7 I _____ like watching scary films.

8 What _____ you do last night?

9 When my alarm went off I _____ dreaming about work!

10 He hasn't _____ all of his lunch.

Questions, negatives and answers

Write one word in each gap to complete the sentences.

16 The contracted form of 'we would' is _____ .

17 _____ Wei Jun got a girlfriend?

18 _____ gave you those chocolates?

19 _____ was the film like?

20 _____ colour looks better, blue or green?

Modal verbs

Choose the best way to complete the sentences.

21 Students ____ to take drinks into class.
A aren't allowed B can't

22 You've been sleeping all day. You ____ be tired.
A can't B mustn't

23 I've written the report so you ____ do it.
A mustn't B needn't

24 Would you ____ picking me up?
A like B mind

25 We lost the match. We ____ played better.
A should B should have

Fig. 1. Fragment of the pre-experimental slice (pre-test)

Fig. 2. Additional block «Extra Module on Work»

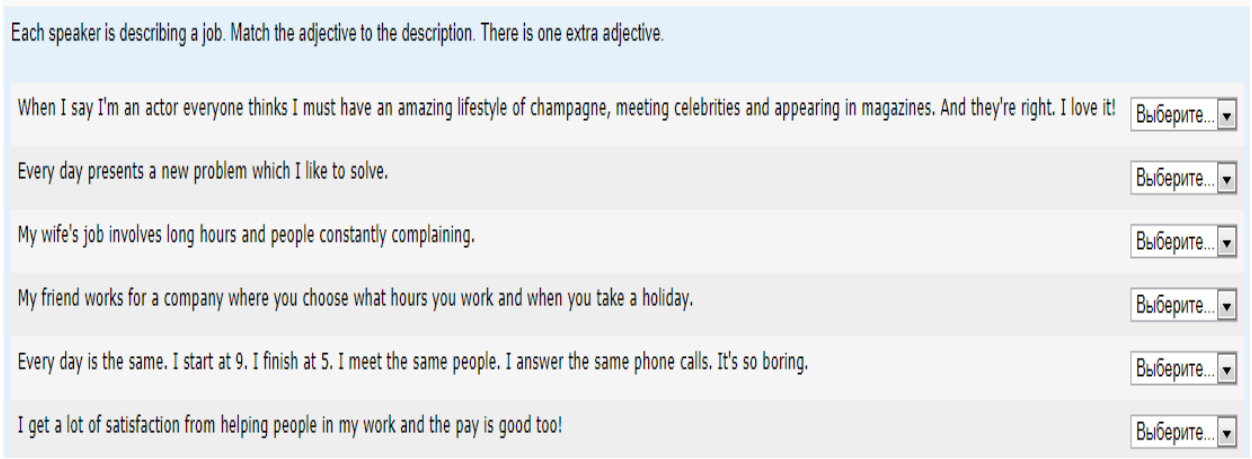


Fig. 3. Example of a vocabulary test in the developed additional block «Extra Module on Work»

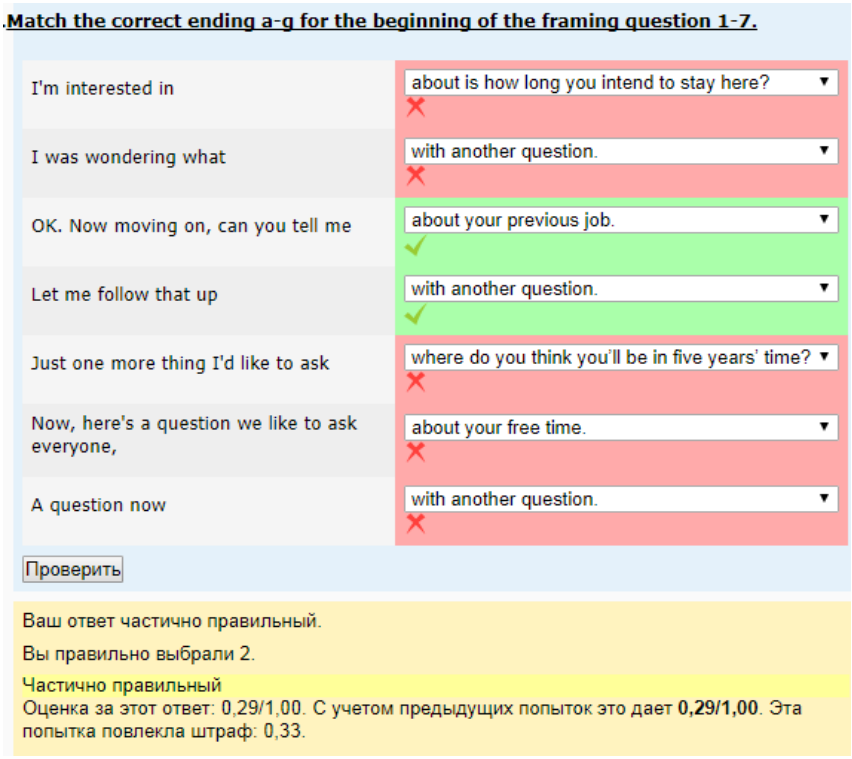


Fig. 4. Example of a vocabulary test in the developed block «Extra Module on Work»

Figures 5-6 show examples of a grammar test in the developed block «Extra Module on Work».

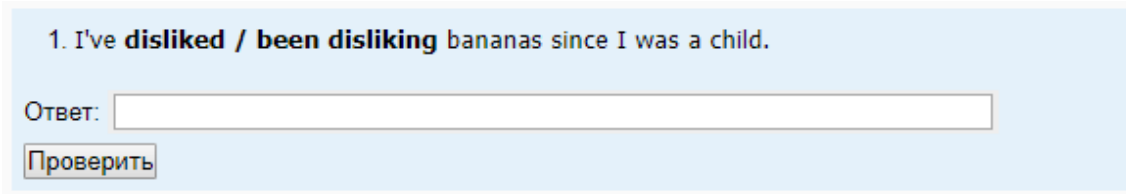


Fig. 5. Example of a grammar test in the developed additional block «Extra Module on Work»

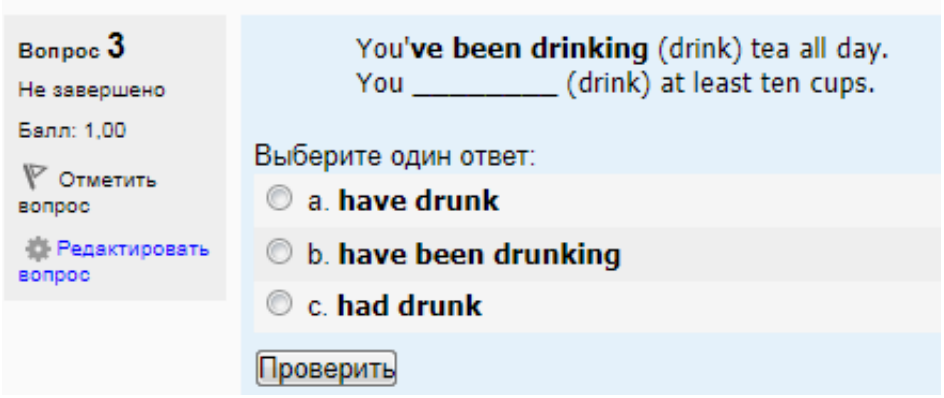


Fig. 6. Example of a grammar test in the developed additional block «Extra Module on Work»

1.1. Each speaker is describing a job. Match the adjective to the description. There is one extra adjective.

glamorous / exciting / rewarding / challenging / flexible / stressful / repetitive

1) I get a lot of satisfaction from helping people in my work and the pay is good too! _____
2) Every day presents a new problem which I like to solve. _____
3) When I say I'm an actor everyone thinks I must have an amazing lifestyle of champagne, meeting celebrities and appearing in magazines. And they're right. I love it! _____
4) My wife's job involves long hours and people constantly complaining. _____
5) Every day is the same. I start at 9. I finish at 5. I meet the same people. I answer the same phone calls. It's so boring. _____
6) My friend works for a company where you choose what hours you work and when you take a holiday. _____

1.2. Complete the sentences with one of the following adjectives + the correct preposition:

afraid / different / interested / proud / responsible / similar / sure

1) I think she's arriving this evening but I'm not _____ that.
2) Your camera is _____ mine but it isn't exactly the same.
3) Don't worry. I'll look after you. There's nothing to be _____.
4) 'Do you want to watch the news on television?' 'No, I'm not _____ the news.'
5) The editor is the person who is _____ what appears in a newspaper.
6) Mrs. Davis is a very keen gardener. She's very _____ her garden and loves showing it to visitors.
7) I was surprised when I met her for the first time. She was_____ what I expected.

Fig. 7. Fragment of the post-experimental cross-section (control test)