Moodle Platform as a Key to the Effectiveness of Sustainable Development of Higher Education

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Abstract: In the modern world, it is very important to constantly develop the skills of a specialist. From this point of view, the sustainable development of educational technologies is a fundamental factor in the educational process. The objective of the research is to assess the impact of online courses using Moodle platform on the effectiveness of learning a foreign language. The research participants were 1st and 2nd year students of Yaroslavl State Technical University (YSTU), Yaroslavl, Russia. The research period was 2019/2020 and 2020/2021 academic years. The importance of this research is determined by the use of different approaches to grammar learning from the traditional ones. The course is designed in such a way that a student, having understood the grammatical model (formula), trains practical skills. The research results, namely: the students' scores, course completion time, the number of test passes on each topic were collected and analyzed using quantitative and qualitative analysis methods. Students' reviews of the course show not only their interest in this type of educational activity, but also an increase in educational indicators, and, as a result, an increase in cognitive knowledge by 9 %.

1 INTRODUCTION

The sustainable use of digital technologies in teaching a foreign language in universities is due to the steady need to train competitive staff (Saltzberg, and Polyson, 1995).

The COVID-19 coronavirus pandemic has accelerated the transition of universities to mixed and online education. Although earlier models of mixed teaching in universities were actively discussed by scientists of the world community, Russian universities did not strive to turn to such a teaching mode (Collis, 2003).

The so-called Grem model is the most widely used in YSTU. The advantages of this model are: an unlimited number of educational materials of different complexity levels, process cost-effectiveness, 24/7 availability of educational materials, social interaction between the teacher and the student, automation of checking test results process, no need to perform tasks at a strictly defined time, which is the key to the student's personal freedom in choosing the time/ place/ method of learning a foreign language (Garrison and Kanuka, 2004). Moreover, the digital educational environment allows students to choose the most appropriate materials and courses for their educational goals and independently assess their progress.

The Moodle platform is a software tool that provides a unified framework within which students can access a wide range of online resources. It also allows teachers and students to interact at any time. Various assessment tools, such as self-assessment tests, provide instant feedback to students and give both parties of the process an understanding of the knowledge and skills acquired during the course.

The use of Moodle platform in the general (traditional) course of education has been repeatedly described by both Russian (Tyukina, Babayan and Lazović, 2020) and foreign scientists. Moreover, the vast majority of authors noted an improvement in academic performance and an increase in motivation for students to learn a foreign language (Vician and Charlesworth, 2003).

According to the "Law on Education in the Russian Federation", e-learning means "the

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organization of educational activities with the use of information contained in databases and providing its processing of information technologies, technical means, as well as information and telecommunications networks that ensure the transmission of this information over communication lines, the interaction of students and teachers." Distance learning technologies are understood as educational technologies implemented mainly with the use of information and telecommunications networks in the indirect interaction of students and teachers. Organizations engaged in educational activities have the right to apply these types of teaching in the implementation of educational programs in accordance with the procedure established by the federal executive authority (Vician and Charlesworth, 2003).

Effective learning of a foreign language with the help of Moodle began in the 2018/2019 academic year at YSTU. At first, these were just control lexico-grammatical tests. Now the trainer effectively functions in the system of the mixed mode of training, allowing students to eliminate gaps in knowledge of grammar.

In the first semester of the first year of all the specialties at YSTU, the number of learning hours for practical classes is 34-36 hours per semester. The number of students in the group is 12-15 people. A large number of students in a group and a small number of training hours make it difficult for students to effectively perceive information, and significantly reduce the educational process effectiveness. Moreover, the heterogeneity of knowledge, skills and abilities of students coming from different educational institutions leads to the same heterogeneous motivation to learn a foreign language and is a significant problem for a teacher (Universitet sht. Pensel'vanii, 2004).

In the Russian system of compulsory full secondary education (grades 1-11), a foreign language begins to be studied in schools from the 5th grade. Thus, at the time of entering the higher education system, students have been learning a foreign language for 8 years. In some schools, a foreign language is a mandatory subject for learning from the 2nd grade. And such students learn the language for 10 years. But the analysis of students' knowledge at the entrance, intermediate and final lexical and grammatical tests over the past 7 years (2012-2020) shows that, although students learn a foreign language for more than one year, their knowledge is poor and unsystematic, and the results of the entrance tests for about 60-70% of students are depressingly low.

Since learning a foreign language is a complex and complicated process, we decided to introduce an additional online course "English Trainer. Level 1" in order to fill in the gaps in grammar knowledge, increase the motivation of students to learn a foreign language and provide them with the opportunity to successfully pass the intermediate and final tests. The online course "Grammar Trainer. Basic level" considered hereto is designed for 72 academic hours and consists of 5 modules containing 14 grammar sections: noun, adjective, etc. Each topic contains some lecture material and a final test. A final test is provided at the end of the section. Each test on the topic consists of 140 multiple-choice questions. The questions in the test fall out randomly. Thus, the probability of repeating the questions in the final test is very small. In the 2019/2020 academic year, the course was first introduced and tested in the educational process. In the 2020/2021 academic year, the course was recommended by the University's management as mandatory for English-language students of the 1st year of all areas of learning. Since during the 2020/2021 academic year, YSTU took a mixed version of training, the online course was used along with the traditional teaching methods, in order to:

- systematize students' knowledge;
- increase the effectiveness of the educational process;
- increase the motivation of students to learn.

Although our main goal was to improve student achievement in terms of passing the test successfully, the research also revealed additional, accompanying educational goals. Additional educational objectives are:

- developing educational skills in a mixed training mode;
- self-selection of the most appropriate training mode;
- developing time management skills;
- development of self-assessment skills.

To achieve these goals, we have chosen a mixed educational approach, where e-learning is integrated into teaching, learning, evaluation, and feedback in real time. When creating a course on Moodle platform, we used the experience of foreign scientists (Universitet sht. Pensel'vanii, 2004).

By integrating the experience of foreign colleagues in an innovative way, we developed a course in the virtual educational environment of Moodle, which not only provided the necessary content of the theoretical rules of English grammar for successfully passing the intermediate certification

test, but also allowed students to work out their skills to absolute automatism.

Starting from the 2018/2019 academic year, the online course of training was structured into 5 modules, developed, prepared and uploaded to the YSTU Moodle platform. First-year students of the Institute of Chemistry and Chemical Technology and the Institute of Digital Systems practiced these modules for two academic years (2019/2020 and 2020/2021) as preparation for the intermediate test in English. The full course of education includes two intermediate tests in a foreign language and a final test. The score for the final test is presented in the certificate of bachelor's degree.

This article discusses the design, content of the online course and the results of these two years to assess the impact of online courses on the effectiveness of learning a foreign language using the Moodle platform in terms of improving the performance of the intermediate test and the degree of student satisfaction with the mixed learning approach.

Assessment of students' use of the online course "English Grammar Trainer. Level 1" was performed using a specially designed questionnaire, which included the following questions:

1 Will students use Moodle online resources, and if so, how?

2. Do students with the access to online materials have better overall academic performance and intermediate assessment test results?

3. How do students perceive the impact of the online course "English Grammar Trainer. Level 1" on the results of the intermediate assessment test in the discipline "Foreign Language" and understanding of grammatical material?

4. What is the students' opinion about the online course "English Grammar Trainer. Level 1"?

A mixed learning model was used to obtain answers to these questions. The results were extrapolated from Moodle platform and analyzed in comparison with the results obtained when the platform was not used. In addition, the results of the final tests were analyzed. The main characteristics of the students who participated in the research are shown in Table 1.

Table 1: Main characteristics of the research participants.

Academic year	Number of students	M.	F.	%, Institute of Chemistry and Chemical Technology	%, Institute of Digital Systems
2018-2019	171	54.3	49.7	79.5	20.5
2019-2020	185	44.3	55.7	65.9	34.1
2020-2021	196	38.3	61.7	68.4	31.6

2 RESEARCH METHODOLOGY

The research results are based on data extracted from Moodle platform. The statistical analysis of the intermediate assessment test conducted for students and the analysis of the results of the survey of students' subjective perception of educational activities using the Moodle platform were carried out. In particular, we analyzed:

- the model of students' use of the Moodle platform and each module's section;
- improving the results of the intermediate assessment test for students who used the e-learning course;
- percentage of students who have passed the test in two years 2019/2020; 2020/2021.

As for the model of using the Moodle platform by students, we also compared the number of requests to the online course depending on gender and direction of education. We analyzed the training analytics extracted from the Moodle platform after the students completed the course, and organized it in the form of tables representing the number of requests to various resources and activities to get information about the interaction of students with each of them. In terms of improving the results of the intermediate assessment test for students, we compared the results of the intermediate exam obtained by students in 2020/2021 who had access to the training course on the Moodle platform with the results obtained from students in 2018/2019 who did not have access to the electronic training course. To do this, we compared the results of two academic years, presenting them to the ANOVA statistical analysis (Table 2) The results of ANOVA statistical analysis show that the results of students who use an online course in their training (2020/2021) are higher than the results of students who do not use an online course in their training (2018/2019).

Table 2: Number of students, total score (0-1), average score, deviation value.

Academic year	Number of students	SUM of normalized score	MEAN of normalized score	Variance,
2018-2019	171	55.4120	0.6641	0.0412
2020-2021	196	56.8652	0.6827	0.0501

3 RESEARCH RESULTS

Do students use the online resources of the Moodle platform, and if so, how did they use them?

In general, during the fully implemented year of education using Moodle platform, i.e. 2020/2021, students used the platform in preparation for the intermediate test, but they began to use the platform more actively before the final test (according to the Moodle log, there is an increase in the number of requests from students using the platform after the intermediate test date by 230%). 61.7% of students successfully completed the intermediate test (121 out of 196), all of them actively used the platform and made up 97% (163 out of 196). The fact that 97% of active students successfully passed the intermediate test can mean either that learning with the help of the platform is really more effective, or that they were the most motivated and conscientious and would still have passed the intermediate test for positive grades, even without the help of online resources. In particular, before the intermediate testing, 121 students used the Moodle platform system and gained access to its resources (hereinafter referred to as "active students"), while after the intermediate testing and before the final testing, the number of such students increased to 163. Compared to 2019/2020, the number of active students on the platform has increased (+35.3%). The percentage of active women in 2019/2020 was 55.7%; and in 2020/2021 – 61.7% and was slightly higher than that of men (2019/2020, 44,3%; 2020/2021, 38,3%). The share of Institute of Chemistry and Chemical Technology participants was 65.9% in 2019/2020 and 68.4% in 2020/2021 academic years. While the share of Institute of Digital Systems students in the same time frame was 34.1% and 31.6 %, respectively.

3.1 Moodle Platform Usage Models

Here we analyzed the data of the online course for 2019/2020. The total usage indicator can be obtained according to the Moodle content access log data, it shows the level of students' interaction with each module of the course (Table 2), despite the fact that the student can access the information and tests of the modules countless times. Based on data from the Moodle online platform, students did not use forums at all, preferring the traditional face-to-face explanation in class.

Table 3: The number of accesses to the modules of the English Grammar Trainer Level 1 course on Moodle platform.

Resource	References
Module 1	732 (Total)
Nouns	315
Personal Pronouns	417
Module 1 Ouiz	306
Module 2	1314 (Total)
Articles	340
Other pronouns	426
Numerals	476
Adjectives	501
Module 2 Quiz	387
Module 3	1582 (Total)
Auxiliary Verbs	401
Simple Tense	523
Modal Verbs	365
Irregular Verbs	296
Module 3 Quiz	523
Module 4	1192 (Total)
Word order	235
Simple Prepositions	368
There is/are	287
Questions	302
Module 4 Quiz	477
Module 5	561 (Total)
Final Test	561
Forum News	0
Forum for interaction	0

After analyzing the statistical data of the platform, it can be seen that students repeatedly referred to the course materials, as well as repeatedly performed tests of modules. The relatively small number of requests to the Final Test of Module 5 is explained by

the limited number of attempts to pass it (no more than 3), which is set by the course settings.

An unlimited number of test attempts gave students the opportunity to improve their test scores, and, at the same time, increase their self-assessment. In addition, the ability to evaluate their knowledge before passing the final test allows to increase the motivation of students to learn (Lau Gonzalez, Jauregui, Perez, Farinas and Le, 2014).

Do students who have access to online materials have better overall academic performance and intermediate assessment test results?
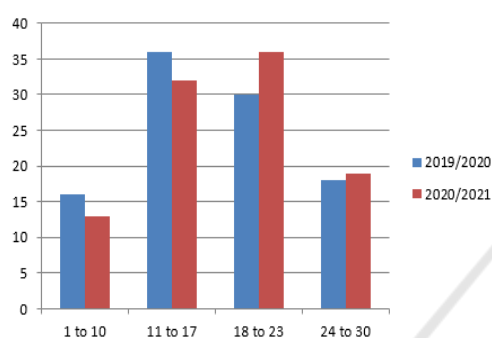

Figure 1: Comparison of the ranges of scores obtained by students in the 2019/2020 and 2020/2021 academic years.

Applying the methodology of qualitative and quantitative data analysis, we can talk about a significant difference with a tendency to significantly improve indicators in favor of a mixed learning model. To demonstrate this difference, we have formed four ranges of scores obtained by students, where from 1 to 10 - unsatisfactory; from 11 to 17 - satisfactory; from 18 to 23 - good and from 24 to 30 - excellent. Comparing the indicators of 2019/2020 and 2020/2021 in Figure 1, it is possible to note with confidence that the use of an online course on the M platform had almost no impact on the academic performance of students with low and high scores, while students with good scores significantly improved their quality indicators. Therefore, expanding the possibilities of classical learning through online resources (mixed method) is not enough to increase the quality indicators of both students with very low and very high indicators. But there is a positive tendency among students with good indicators.

4 CONCLUSIONS

It is difficult for first-year students to adapt to the new higher education system. This is due to a complete change in the learning environment, and due to the lack of students' training in terms of learning a foreign language. Since students' knowledge is heterogeneous, the task of the teacher becomes the need to help such students improve the efficiency of their learning process. Therefore, any resource available to students and which can be used at any free time and in an unlimited number of times becomes an opportunity to train and motivate the training of such students. The use of online courses provides students with this opportunity. However, based on the data obtained from the research, it can be said that students like learning in an online environment, but they are not ready to fully learn online and, therefore, prefer to consult with the teacher in real time. It can also be noted that the online course on the Moodle platform was not fully used by students. Students with low scores did not improve their quality scores, while students with good scores advanced to a higher level. Based on this, it can be concluded that more motivated students can significantly improve their knowledge and test results, and, accordingly, the course score, using online learning tools such as the course on Moodle.

Thus, we can note that the Moodle platform is a useful resource, as it provides students with unlimited educational content in terms of time and number of requests; allows students to increase their self-assessment and adapt more successfully to a new learning environment; allows the teacher to evaluate students' knowledge and get data on the difficulties that students face during the course. Based on this, it is possible to say with confidence that the use of online courses on the platform is an integral and important part of the continuous and sustainable educational process.

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