European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com

e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2022.03.79

FaR 2021
International Forum "Freedom and responsibility in pivotal times"

DIGITAL INNOVATIONS IN TEACHING INFORMATION TECHNOLOGIES AT HUMANITARIAN UNIVERSITY

Olga Y. Rodkina (a)*, Dmitriy Yu. Akatev (b), Galina V. Kurisina (c),
Christina M. Khristoforova (d), Vera A. Nikolskaya (e)
*Corresponding author

(a) Nizhny Novgorod State Linguistic University. N.A. Dobrolyubova, 31a, Minin'sStrit, Nizhny Novgorod State University of Architecture and Civil Engineering, 65, IlinskayaStrit, Nizhny Novgorod, Russia, olgarodkina04@gmail.com
(b) Nizhny Novgorod State Linguistic University. N.A. Dobrolyubova, 31a, Minin'sStrit, Nizhny Novgorod, Russia, akatjev@lunn.ru
(c) Nizhny Novgorod State Linguistic University. N.A. Dobrolyubova, 31a, Minin'sStrit, Nizhny Novgorod, Russia, kgs20@yandex.ru
(d) Nizhny Novgorod State Linguistic University. N.A. Dobrolyubova, 31a, Minin'sStrit, Nizhny Novgorod, Russia, Kristina160198@gmail.com
(e) Nizhny Novgorod State Linguistic University. N.A. Dobrolyubova, 31a, Minin'sStrit, Nizhny Novgorod, Russia, nivr08@rambler.ru

Abstract

The article discusses the use of innovative digital technologies in the process of teaching students in the humanitarian areas in order to achieve the required level of mastering digital competencies. In modern conditions of the global transformation of socio-economic processes, possession of information communication technologies (ICT) for solving professional problems, as well as organizing communication and professional interaction based on remote technologies, are necessary skills for successful implementation in almost all areas. In this regard, the formation of appropriate competencies in teaching students is one of the most important tasks of modern education. The proposed work presents the author's approach to the formation of the basic content of the disciplines of the information technology block for students of the educational sphere. Its distinctive feature is the use of the capabilities of modern computer technologies for the formation of educational content of the XXI century together with the capabilities of innovative types of network communication for organizing the learning process in synchronous and asynchronous forms. This methodological approach, according to the authors, will allow solving the main technological problems of implementing digital education, supporting a continuous, individually oriented, flexible and dynamic learning process that meets the requirements of the time. The presented methodology can be in demand for Russian and foreign students enrolled in the Master's programs "Education and Pedagogical Sciences", "Psychological Sciences", as well as teachers to improve their skills in the field of methods of teaching ICT disciplines.

Keywords: Learning innovations, digital competencies, individual achievements, distance technologies, platform Moodle

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

The current situation in the country and in the world has shown necessity to use innovative information and communication technologies in teaching. Relevance of the proposed work is due to the need of the Russian society in teachers of a new generation, ready for challenges of future digital society and integration into the global educational space, focused on the implementation of professional pedagogical functions in the context of digitalization and personalization of education.

The choice of the topic of the article determined the current problem of the discrepancy between the high requirements for the ICT competencies of future teachers, on the one hand, and the lack of their training according to the existing professional education programs, on the other. Inclusion of the proposed innovations in the process of teaching modern information technologies to students at Russian universities in the psychological and pedagogical areas will help to solve this problem.

The content of the work is aimed at the formation and development of key competencies of the teacher of the future, able to actively apply information and communication technologies in an innovative educational environment. At the present time, when the educational process is often implemented online, the use of distance education (DE) technologies in the educational process is one of the most urgent areas in improving the quality of education at a university. In this direction, the best practices of online learning, the experience of leading universities are used, digital tools of educational activities are widely introduced, which provide an opportunity to organize an assessment of the individual achievements of students. Particular attention in the work is paid to the issues of online teaching of disciplines directly related to the information and technical block. These are, for example, Modern Information Technologies (MIT), students of pedagogical areas, the practical side of which is considered by the example of the experience of organizing the educational process for junior students at a linguistic university.

2. Problem Statement

Analysis of the curricula and content of disciplines in psychological, pedagogical and methodological blocks of basic professional educational programs (BPEP) in pedagogical areas of various profiles leads to the conclusion that there is no integrated approach to the formation and development of information and communication competencies and their implementation in the educational process. However, as time shows, it is already impossible to imagine the modern educational process without new information, in particular, distance learning technologies. The accumulated domestic and foreign experience of informatization of educational environment testifies that it makes it possible to increase the efficiency of the educational process, expand its scope, provide teachers with opportunities that have not yet been available to update the content of education, its forms, design a learning environment capable of forming specialists ready for new knowledge, technology, challenges.

The article studies approaches to solving a problem of an integrated approach to the formation and development of information and communication competencies and their implementation in the educational process using distance learning technologies, as well as monitoring the independence of students' tasks and assessing the results of their learning.

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

3. Research Questions

The problems of forming competencies in the field of ICT among students are discussed in many scientific publications by Russian and foreign authors (DigCompEdu…, 2021; Sukhanova & Balunova, 2018; Vinogradova & Klobukova, 2018; Zierer, 2019). According to a research by the Institute for Education Development Strategy of the Russian Academy of Education, digital and communicative literacy is the basis for the development of global competencies (Basyuk & Kovaleva, 2019).

To solve the problem of an integrated approach to the formation and development of information and communication competencies based on BPEP for pedagogical areas of training, it is necessary to perform a number of tasks:

- to provide an innovative technical and technological component of teacher training in the field of information and communication technologies, taking into account the current process of modernization of education;

- to develop innovative training content that reveals relevant issues of the use of innovative information technologies in accordance with the priority direction of the national project "Education 2020" (Education 2020…, 2019);

- to consider systems for organizing distance learning and learning management systems. To provide skills of working in learning management system (LMS) and technology for creating educational and methodological content of electronic distance courses. Show the capabilities of LMS platforms in the technology of managing the educational process and monitoring the work of students;

- to consider possibilities of organizing network interaction: to give skills to work with the means of conducting online conferences, platforms for organizing webinars, working with the YouTube service and cloud technologies for organizing on-line and off-line training;

- combine all the content developed during the course through innovative information technology tools and forms of education within the framework of online courses (webinars, hand-outs, synchronous and asynchronous educational activities) in one educational product - a distance learning course developed and posted on the selected LMS platform.

Most of these tasks can be effectively accomplished online. Russian and foreign universities are actively developing and using distance-learning platforms that make it possible to design e-courses taking into account the formation of the required competencies. The most famous DE platforms are Moodle, BlackBoard, ATutor, iSpringOnline, Stepik.

NGLU named after N.A. Dobrolyubova selected and used the Moodle platform for more than ten years (Akatiev & Kuritsyna, 2017), one of the advantages of which is its focus on the joint activities of a student and a teacher. The platform's tools make it possible to conduct surveys, online and offline seminars, exchange files of any format, and allow assessing the activity of students in discussions. The obtained information is the basis for making decisions for each student, the distribution of individual tasks, and online consultations (Andryukhina et al., 2020; Gershunsky, 1998; Rodkina & Nikolskaya, 2019).

When organizing distance learning, perhaps the most problematic is the issue of assessing the knowledge of students. In the absence of personal contact with the student, questions that are fundamentally new in relation to the classical form of education arise when giving marks, for example, about the degree

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

of independence of the tasks performed. As modern researchers in the field of pedagogy note, in distance learning, the tasks of control and verified assessment of educational activity are becoming one of the key tasks in the design and use of training courses (Donina et al., 2020; Kolykhmatov, 2019; Nikulicheva, 2020; Zierer, 2019). When carrying out current control, the organization of independent work and regular computer testing are of great importance. These types of control allow one to obtain an objective assessment and conduct an operational analysis of the quality of individual educational achievements of students.

Summing up in the description of general issues and tasks of the formation of ICT competencies of students in pedagogical areas of study, it should be noted that all of them are associated with the use of modern information and communication and distance educational technologies. On the one hand, they are directly the subject of study; on the other – they are a tool for the implementation of the educational process. According to experts in the field of DE, in modern conditions of active development and constant updating of these technologies, it is necessary to conduct special training of teachers who are able to organize the educational process in a distance mode using modern hardware and software systems (Rodkina & Nikolskaya, 2019; Shibankova et al., 2019; Tregubova et al., 2019). So in the European model of digital competences DigCompEdu (Digital Competence of Educators), competencies, including digital ones, are considered, which should be formed in a modern teacher for effective professional activity using the tools of the digital educational environment (Potemkina, 2018).

4. Purpose of the Study

The purpose of the work is to consider ways to form students' complex technological competence in the use of innovative information and communication technologies in education using distance-learning technologies.

5. Research Methods

When carrying out the research, the methods of theoretical analysis in combination with experiment and observation were used, including a descriptive method, methods of interpretation, comparison and generalization.

6. Findings

To form students' complex technological competence in the use of innovative information and communication technologies in education, the main types of work in educational activities were proposed and tested:

- use of innovative technical and software tools of information technologies in education: electronic document management, interactive presentations, designers and services for visualizing information and working with infographics, tools for creating mind maps (Mindmaps), services for creating educational didactic games, interactive tests, dialogue simulators;
- use of virtual and augmented reality technologies;

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

- use of the method of project assignments in the organization of practical and independent work of students in mini-groups to master the methods and means of interactive types of interaction of participants in the educational process;
- expanding the possibilities of organizing distance learning based on LMS platforms, such as, for example, Moodle;
- optimization of work based on network communication technologies for the implementation of synchronous and asynchronous learning.

An important feature of the proposed approach to the formation of the training course is its practical orientation. In the course of mastering the disciplines of the information and technical block (in NGLU, the specified unit is represented by one basic discipline "Modern information technologies"), students acquire practical skills in working with the information and communication technologies under consideration, namely:

- master scribing technologies; create mind maps (Mindmaps), timelines;
- develop elements of educational games and / or game exercises, practice in the creation of dialogue simulators; develop tests using universal online constructors;
- create elements of their distance courses (for individual tasks) in the Moodle system: structure and place prepared resources and tasks, learn to create test questions of various types, master the possibilities of interacting with listeners and managing the course in a playful way, creating a group of their fellow students;
- master the technology of work in conferencing systems using the examples of Zoom, Skype and Google Hangouts;
- learn to organize network project activities using Google Docs services;
- master the technology of work on the creation of open and closed channels for the organization of asynchronous forms of education on the example of posting previously recorded conferences on the YouTube channel.

The result of the work for students is the creation of their own pedagogical and technological product according to the proposed methods. Particular attention is paid to the possibilities of integrating all the considered technologies for the formation of a single content of a digital educational environment for teaching.

In addition, in order to overcome the previously mentioned problem of monitoring the independence of students' tasks and assessing their learning outcomes, the authors propose to use the capabilities of the distance-learning platform. On the Moodle platform, you can organize individual work in the form of online consultations, completing additional tasks, placing and receiving files containing multimedia information. Regular testing on each topic passed is important. Teaching experience shows that it is enough to create tests for 15-20 questions, randomly selected from the appropriate database, and with an arbitrary order of answer options. The creation of such databases of test questions for each topic of the course is a rather laborious process, but it is certainly justified from the point of view of the possibility of their further long-term use on a regular basis to quickly check the level of mastering the material covered in an automatic mode. The Moodle platform allows you to create open and closed test questions, various in their form and methods of presenting the material. In addition to simple question types with one or multiple choice, with

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

a numerical or text value, you can create questions for the correspondence of lists, graphical, for example, questions with dragging values into text fields or questions with dragging markers on graphical images, as well as questions with a free answer as text or file, such as audio. After testing, the teacher can only check and analyze the results. For this, the Moodle platform provides a number of tools that allow you to automatically create operational reports in tabular and graphical forms with the ability to view the general (by group) result, as well as detailed by student or by question. Figure 01 shows an example of a fragment of a table of test results with details on the questions, where you can identify the features of the assimilation of the material, see the questions that cause the greatest difficulties. Analysis of the answers of each student allows you to obtain information about the individual preparedness of the student and outline actions to improve the level of knowledge.

Time taken	Grade/100.00	Q. 1 /5.00	Q. 2 /5.00	Q. 3 /5.00	Q. 4 /5.00	Q. 5 /5.00	Q. 6 /5.00	Q. 7 /5.00	Q. 8 /5.00	Q. 9 /5.00	Q. 10 /5.00	Q. 11 /5.00
20 mins 14 secs	**81.67**	✔ 5.00	☑ 2.50	✔ 5.00	✖ 0.00	☑ 1.67	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	☑ 2.50
15 mins 3 secs	**95.00**	✖ 0.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00
22 mins 31 secs	**76.67**	✖ 0.00	☑ 2.50	✔ 5.00	✖ 0.00	☑ 4.17	✖ 0.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00
18 mins 13 secs	**85.00**	✖ 0.00	☑ 2.50	✔ 5.00	✔ 5.00	☑ 2.50	✔ 5.00	✔ 5.00	✖ 0.00	✔ 5.00	✔ 5.00	✔ 5.00
30 mins 1 sec	**100.00**	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00	✔ 5.00

Figure 1. A fragment of the table of test results

From the table of test results, you can identify unsuccessful students and organize individual work with them. This work can be organized by means of the Moodle platform in the form of online consultations, additional tasks and retesting.

An integral indicator of the quality of mastering material on a specific topic within the framework of current control gives a statistical variational series of assessments based on the results of performing test tasks, presented in a graphical form (Figure 02).

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

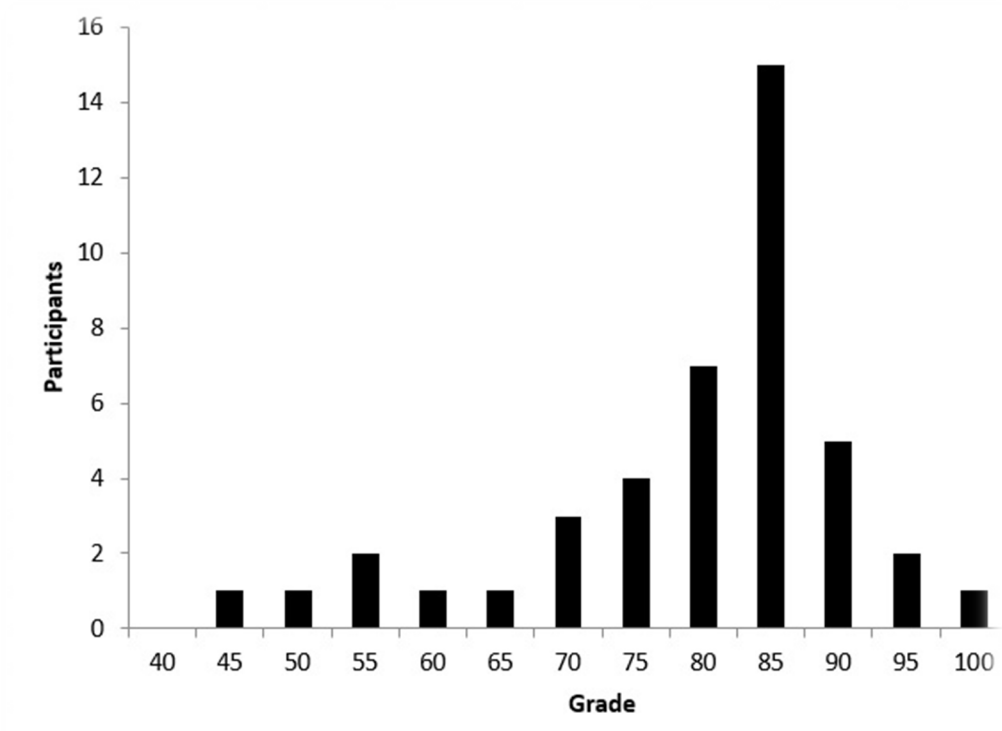

Figure 2. The graph of the distribution of students' test marks

Analysis of the results shows that the majority of students received a mark above 70, which is a satisfactory result for this topic. The graph shows that 18% of students have a mark below 70%, which corresponds to an unsatisfactory mark according to the established criteria.

Determination of the degree of independence of completed tasks and assessment of individual achievements of students using distance-learning technologies can be effectively carried out in the presence of biometric identification. For example, when answers to tasks contain speech files. At the departments of NSLU, such methods of information exchange are actively used. To show the possibilities of information technologies, to increase interest in classes, as well as to determine the degree of independence of the tasks performed, software and hardware systems allow. When conducting classes in the disciplines "Modern Information Technologies", "Mathematical Foundations of Information Processing" and others, a software and hardware complex is used based on the "Audacity" program, a microphone and acoustic systems. Audacity is freely available and can be referenced in Moodle. Students also need a microphone and speaker to do their homework. The hardware and software complex based on the Audacity program allows you to perform the following operations:

- to record a speech signal in MP3 format and others;
- to analyze speech signals in time;
- to select and change the required areas on the chart;
- to calculate the spectra of speech signals, that is, perform frequency analysis;
- to calculate the pitch of the main tone and display on the graph;
- to calculate and display the spectrum of speech signals depending on time, that is, in the form of a sonogram.

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

The main task contains the study of speech signals in the time and frequency domain. The graphic display of the sounding speech (Figure 03) can be changed, listened to, etc.

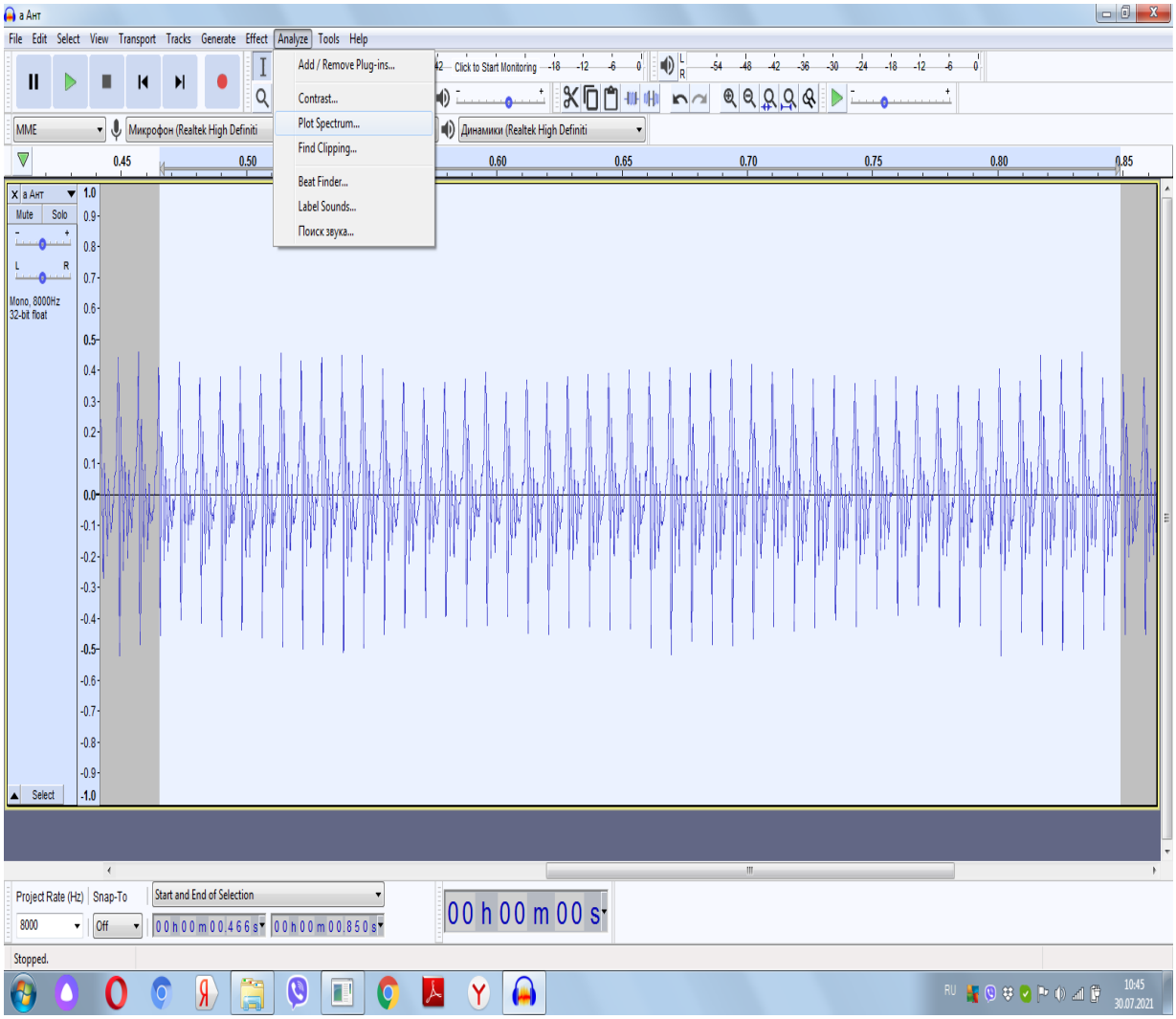

Figure 3. Selecting and changing the required area on the graph, for example, to obtain a spectrum of speech signals (Analysis tab)

Representing the signal in the frequency domain as a power spectrum (Figure 04) allows you to analyze speech sounds, conduct a comparative analysis of the speech of speakers, etc.

When performing various tasks, students, in addition to the processing results, send their speech files to Moodle, which allows identification and assessment of individual achievements.

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

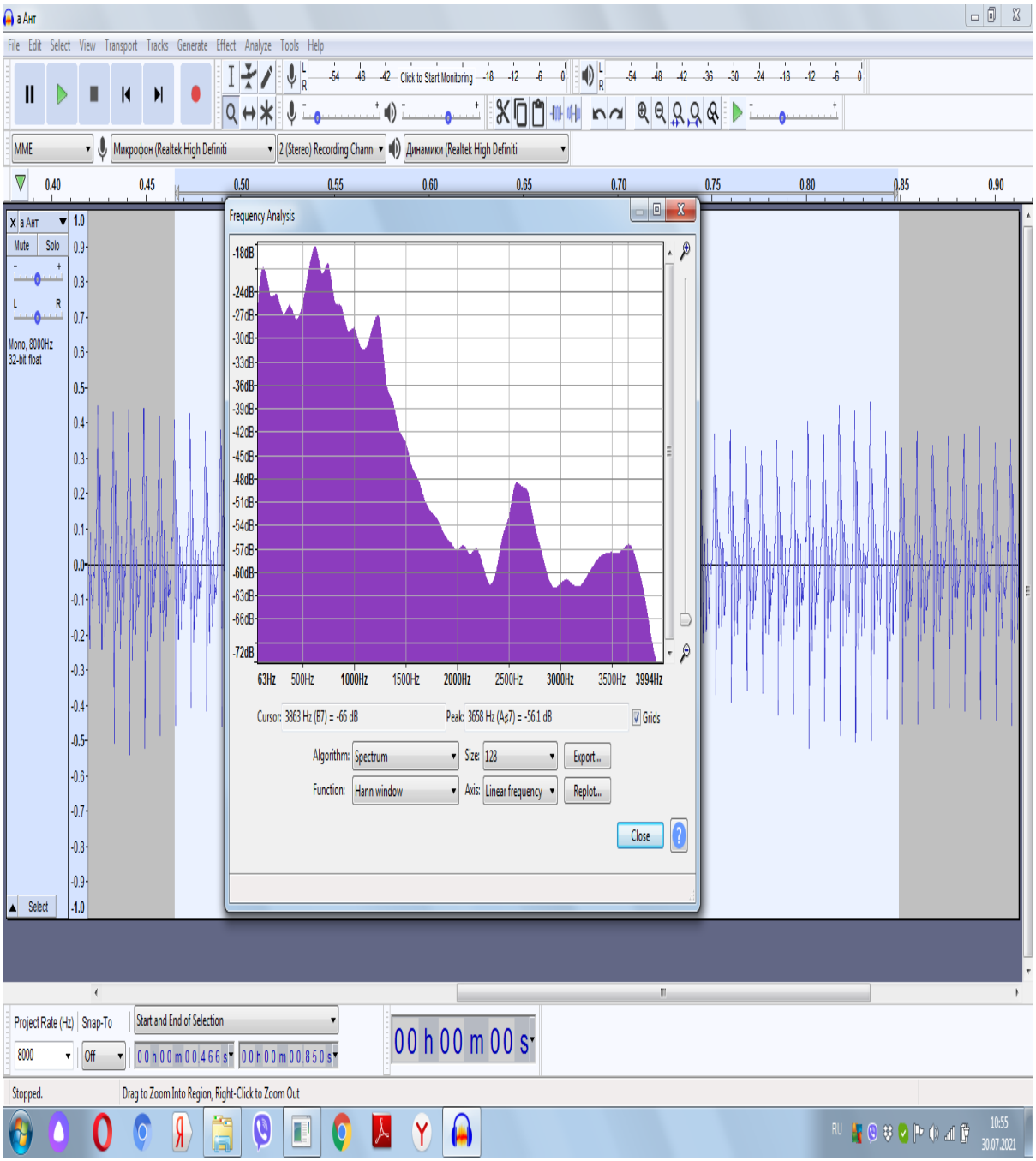

Figure 4. Calculation of the spectrum of speech signals

Thus, the joint use of the Moodle platform and special information technologies allows one to increase interest in classes, as well as to determine the degree of independence of the tasks performed. As a result of the analysis of completed assignments, the teacher makes decisions aimed at improving the quality of teaching specific disciplines.

7. Conclusion

The use of work recommendations in the educational process of universities will increase the efficiency of professional training of future teachers, considering the new requirements of the education

https://doi.org/10.15405/epsbs.2022.03.79
Corresponding Author: Olga Y. Rodkina
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

system in the context of the global digitalization trend using modern innovative means of network interaction, distance technologies and systems.

The presented work may be in demand for Russian and foreign students enrolled in the Master's programs "Education and Pedagogical Sciences", "Psychological Sciences". It will also be relevant for teachers of any level in order to improve their qualifications in the field of teaching methods for ICT disciplines in non-core areas of training and the use of distance technologies in education.

References

Akatiev, D. Yu., & Kuritsyna, G. V. (2017). The specifics of the implementation of e-learning and distance learning NSLU on the platform Moodle. *Vestnik of Nizhny Novgorod State Linguistic University*, *38,* 166-175.

Andryukhina, L. M., Sadovnikova, N. O., Utkina, S. N., & Mirzaakhmedov, A. M. (2020). Digitalization of vocational education: prospects and invisible barriers. *Education and Science, 22*(3), 116-147.

Basyuk, V. S., & Kovaleva, G. S. (2019). Innovative project of the Ministry of Education "Monitoring the formation of functional literacy": main directions and first results. *Domestic and Foreign Pedagogy, 1*(4(61))*,* 1333.

DigCompEdu: The European Framework for the Digital Competence of Educators. (2021). *Joint Research Center, European Union*. https://ec.europa.eu/jrc/en/digcompedu.

Donina, O., I., Ivanushkina, N. V., Aryabkina, I. V., Chernykh, A. I., Gemranova, A. D., & Chernova, Yu. A. (2020). Genesis of methodological approaches to definition and organization of University information and education space. *Amazonia Investiga, 9*(29), 417–426.

Education 2020: National Project Educational Institutions. (2019). https://edu.gov.ru/national-project/about/

Gershunsky, B. S. (1998). *Philosophy of education.* A textbook for students of higher pedagogical Psychological and Social Institute.

Kolykhmatov, V. I. (2019). Education of the future: digitalization technologies. *Modern Education: Content, Technology, Quality, 1,* 12-15.

Nikulicheva, N. V. (2020). Organization of distance learning at school, college, university. *Open Education, 24*(5).

Potemkina, T. V. (2018). Foreign experience in the development of a teacher's digital competence profile. *Scientific Support of the Personnel Development System, 8*(2)*,* 25.

Rodkina, O. Ya., & Nikolskaya, V. A. (2019). Problems of the formation of ICT competencies among bachelors of humanitarian training areas based on current standards. *Modern Humanities Success*, *6,* 165–170.

Shibankova, L. A., Ignatieva, A. V., Belokon, I. A., Kargapoltsev, S. M., Ganaeva, E. A., Beroeva, E. A., Trubenkova, S. N., & Kozlova, E. B. (2019). Institutional mechanisms of University teacher professional development. *Humanities and Social Sciences Reviews, 7*(4), 1061-1068.

Sukhanova, N. T., & Balunova, S. A. (2018). Reflective and creative approach in training universal bachelor students. *Problems of Modern Pedagogical Education. Ser.: Pedagogy psychology, 61 Part 1,* 303–307.

Tregubova, T. M., Ainoutdinova, I. N., Tregubov, Y. M., & Nikolaeva, A. B. (2019). Teachers' professional development in the process of workers' training for World skills championships participation. *ARPHA Proceedings IFTE-: V International Forum on Teacher Education. Part I: Teacher Education and Training,* 725-734.

Vinogradova, E. N., & Klobukova, L. P. (2018). In search of the golden mean: online and offline distance learning. *Vestnik of the Peoples' Friendship University of Russia. Ser.: Educational Issues: Languages and Specialty*, *15*(2), 195–209.

Zierer, K. (2019). *Putting Learning Before Technology!: The Possibilities and Limits of Digitalization*. Routledge.