Building a technology for mass organisation of distance learning for students in quarantine based on the Moodle platform

Oleg M. Spirin[1], *Kateryna R.* Kolos[2,3], *Olena A.* Kovalchuk[4] and *Olena O.* Demianchuk[5]

[1]*Institute for Digitalisation of Education of the NAES of Ukraine, 9 M. Berlynskoho Str., Kyiv, 04060, Ukraine*

[2]*Silesian University of Technology, 2A Akademicka Str., 44-100 Gliwice, Poland*

[3]*Zhytomyr Polytechnic State University, 103 Chudnivska str., Zhytomyr, 10005, Ukraine*

[4]*Zhytomyr Ivan Franko State University, 40 Velyka Berdychivska Str., Zhytomyr, 10008, Ukraine*

[5]*Municipal Institution "Zhytomyr Regional Institute of Postgraduate Pedagogical Education" of Zhytomyr Regional Council, 15 Mykhailivska Str., Zhytomyr, 10014, Ukraine*

Abstract. The COVID-19 pandemic has necessitated the rapid transition to distance learning for students worldwide. This paper examines the current state of distance learning implementation in secondary schools of the Zhytomyr region in Ukraine. A survey of 2445 teachers found that most were using various software tools for distance learning without a unified learning management system. Analysis of the Moodle, Google Classroom, and "My Class" platforms showed Moodle to have significant advantages for supporting distance learning. To enable schools to leverage Moodle, an "Educational Portal for Secondary School" was developed at Zhytomyr Polytechnic State University using the Moodle platform. Based on this Moodle portal, the paper proposes a technology for the mass organisation of distance learning during quarantine. The technology combines the tools, electronic resources, course structure, and tutor competencies required for effective distance learning implementation.

Keywords: distance learning, Moodle, technology, mass organisation, quarantine, students, general secondary education

1. Introduction

1.1. The problem statement

The education landscape has undergone a significant transformation with the widespread adoption of distance education worldwide. Acknowledging its social significance, distance education has become a crucial component of the global education system, with a substantial increase in the number of individuals pursuing higher education through this mode [11]. The growth is evident, with approximately 50 million people benefiting from distance education in 1997, reaching 90 million in 2000, and an anticipated 120 million by 2023 [18].

✉ Oleg.Spirin@gmail.com (O. M. Spirin); kateryna.kolos@polsl.pl (K. R. Kolos); olenka-ko@ukr.net (O. A. Kovalchuk); demya.olena@gmail.com (O. O. Demianchuk)

🌐 https://iitlt.gov.ua/eng/structure/detail.php?ID=308 (O. M. Spirin); https://omega.polsl.pl/info/author/PSL7c16cf371b4b4987bb48388e59ba5004/ (K. R. Kolos)

ⓘD 0000-0002-9594-6602 (O. M. Spirin); 0000-0002-1038-8569 (K. R. Kolos); 0000-0003-1261-538X (O. A. Kovalchuk); 0000-0003-1845-9664 (O. O. Demianchuk)

The evolving educational landscape in Ukraine witnessed the formalisation of "Regulations on distance learning" in 2013 by the Ministry of Education and Science [13]. The onset of the COVID-19 pandemic in 2020 prompted the Ukrainian government to implement quarantine measures, leading to the closure of educational institutions across the country [4, 5]. In response, educational leaders had to swiftly transition to distance learning to ensure continuity in the educational process [14].

While many educators are familiar with distance education, the rapid adoption of new technologies, methods, and forms of learning poses challenges. An educational portal was created to support teachers in this transition, offering methodological and didactic materials, Ukrainian e-encyclopedias, multimedia textbooks, and interactive online resources as part of the ongoing education and science reform.

1.2. Related works

The National Report on the Status and Prospects of Education Development in Ukraine emphasises the need to modernise all pedagogical system components, including information and educational environments, to ensure equal access to quality education [8]. The Concept of Digital Economy and Society of Ukraine for 2018–2020 underscores the importance of a national policy for the digitalisation of education, focusing on the development of distance education using cognitive and multimedia technologies [3].

Bykov et al. [2] notes that among the most modern educational technologies that have actively declared themselves at the end of the 20th century and have become widespread in developed countries nowadays, there are distance learning technologies that support and provide distance education. Besides the distribution of the world, educational space takes place, and distance education plays a leading role in this process, significantly diversifying the market of educational services.

Carambas and Espique [6], Lytvynova and Demeshkant [12], Semerikov et al. [16], Tkachuk et al. [19] have explored various aspects of distance education, from theoretical and methodical considerations to technological and practical implementations. However, the challenges specific to distance learning for students in general secondary education remain a focus for further investigation.

At the same time, the distance learning problem for general secondary education students still needs to be fully resolved. There are some research studies dedicated to the technology of the organisation of mass distance learning at the level of teachers of individual subjects (student-tutor), each working relatively isolated from colleagues (volumes and deadlines coordination).

Instead, American Association for the Advancement of Science [1] notes that during the quarantine period, the so-called "emergency distance learning" is introduced, which is not identical to distance learning. The scientist notes that "the main purpose of such training is to provide temporary reliable access to studying and pedagogical support during the crisis, but not to create a reliable educational ecosystem. This is a triad situation: extraordinary and accountable goals, students' teacher assessment and evaluation expectations. Mostly lower in quarantine conditions" [1].

We partly agree with American Association for the Advancement of Science [1], as according to epidemiologists, an outbreak of a coronavirus pandemic can last for several years; moreover,

outbreaks and other infections unknown to humanity are also not ruled out. So, it is indispensable to organise an effective distance learning system for students during the quarantine, elements of which can be successfully used in traditional and inclusive education.

Nowadays, under such extraordinary conditions (for education organisers, teachers and students) as [15]: lack of opportunity to use other forms of education, lack of access to the premises of educational institutions, in isolation under quarantine restrictions, – there are problems at the institutional level – at the level of the educational institution there is a requirement for the more coordinated organisation of the educational process, including the selection and usage of not only one or a limited number of platforms by teachers within the educational institution taking to the consideration the required level of informational security and health but also the selection of "home-setting" recommended means which might be installed outside the educational institution on students' devices to work with files of certain types and formats.

This also applies to teachers, the vast majority of whom must use their software/hardware ICT tools, serve and maintain them in working condition at their own expense, and provide proper access to the Internet. At the same time, the problems and tasks of the institutional level may be increased by the difficulties of the regional level connected with different levels of infrastructure development of different territories, communities, settlements, and their areas, including low speed and quality of data transmission in relevant segments of the Internet, and even sometimes lack access to the network itself.

In the current circumstances, where traditional forms of education are limited, the institutional-level challenges in coordinating and selecting appropriate educational platforms become paramount. These challenges extend to teachers and students who must navigate issues related to infrastructure, access to the Internet, and the use of personal devices. This necessitates the development of scientific and methodological support for the mass implementation of distance learning at the institutional level during quarantine.

1.3. Research methodology

To address these challenges, our research employs a multifaceted approach. Theoretical methods involve an analysis of regulatory documentation related to education in Ukraine, including the organisation of the educational process, the development of distance learning, and the broader educational landscape. Additionally, surveys of pedagogical workers provide insights into the current state of distance learning in general secondary education.

Empirical methods include conversations with participants in the educational process, direct and indirect monitoring of distance learning implementation, and expert assessments. These methods contribute to the identification, analysis, and systematisation of the functions performed by tutors in the distance learning environment.

In pursuing our goal, we aim to develop a technology for the mass organisation of distance learning for pupils during quarantine, explicitly leveraging the Moodle platform. Through these research methods, we seek to enhance our understanding of the challenges and opportunities associated with distance education in the context of evolving global circumstances.

2. Research results

2.1. Basic concepts

Distance education is an individualised process of education, which occurs mainly through the indirect interaction of distant participants in the educational process in a specialised environment that operates based on modern psychological, pedagogical and information and communicative technologies [20].

Kremen [7] defines distance learning as a form of organisation and implementation of the educational process in which participants carry out educational interaction (both synchronously and asynchronously in time), mainly extraterritorially based on digital technologies.

An online course is a set of educational and methodical materials and educational services created in a virtual learning environment for the organisation of distance learning based on information and communication technologies [2].

Studying, using online courses is an interactive process, based primarily on the paradigm of modern education, which aims to create an interactive communicative network space, identify individual characteristics of each participant, and, of course, stimulate him to find an independent solution to any problem; moreover, it encourages to self-education [10].

2.2. The structure of the distance course

The main components of the distance course are:

- the system of educational and methodical materials;
- the system of educational services.

It is desirable to have a structure in online courses that will help create conditions for learning in activities and cooperation.

For students of general secondary education institutions, it is best to use a weekly course format – which provides time for students to study educational materials independently or with the support of a tutor in accordance with the curriculum for homework, recreation, hobbies and self-improvement. Therefore, while developing a distance course for students of general secondary education institutions, it is necessary to consider this principle.

In figure 1 shows an example of the structure of a distance course for a particular class. This structure provides:

1. The entire period, while distance learning, is divided into weeks: the dates of each of school weeks are indicated (March 30 – April 5, April 6 – April 12, etc.);
2. In each of these weeks, the days for studying (from Monday to Friday) with the indication of the date (Monday (March 30), Tuesday (March 31), etc.) are indicated;
3. In each of the days, the training sessions and their duration are indicated according to the schedule;
4. Teachers fill in the content of each of these classes, choosing the necessary activities (tasks, tests, choices, seminar, etc.) and resources (page, file, URL, etc.).
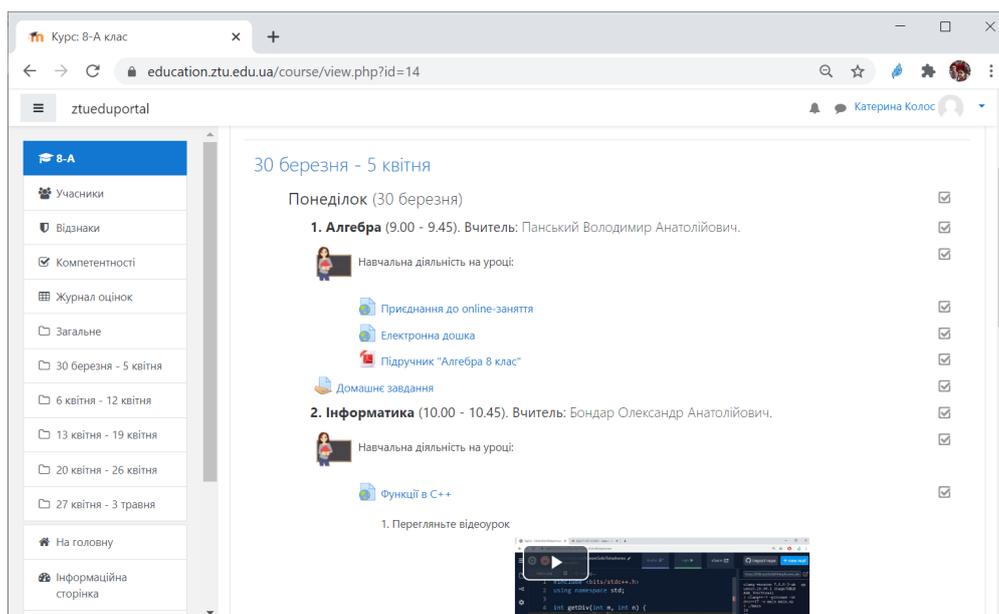
Figure 1: An example of the structure of a distance course.

The distance course, located in a virtual learning environment, provides learning process management and administration; providing knowledge by studying theoretical material; self-control; the formation of skills and abilities based on the received knowledge; fixing the material; joint activities of students in small groups; synchronous and asynchronous communication; control the learning and understanding of theoretical material; doing of practical tasks and their control [10].

2.3. Tutor as an organiser and leader of the distance learning

In distance learning, a tutor is vital for conducting classes with students and creating an appropriate learning environment. A tutor manages the learning process as an activity and tries to provide the planned results both in the acquired knowledge and skills and the acquired personal abilities of students [10].

It is challenging to adapt learning materials to the requirements of students because these requirements often become known during the training itself. Therefore, the adaptive role is usually performed by the tutor.

A tutor is often more than a source of information. A tutor can help the student to become sufficiently autonomous; it can teach them to learn independently.

The distance course tutor does much of what a teacher does in traditional teaching, for example, leading a group in a discussion using effective techniques. However, it works in an electronic environment where participants are not placed in one real room at a specific time. The tutor teaches to communicate using different styles, approaches, language means of communication, examples, and questions that are used to improve the learning process in the

group [10].

Most teachers believe learning to manage distance learning is just mastering new software or developing computer skills and adding information technologies to an established learning system. This is a misconception.

Successful distance learning management cannot be achieved through classroom experience only. Tutor skills cannot be acquired due to the lectures or observations primarily because they contain many areas, directions and responsibilities that are rarely used, and we do not observe them in traditional teaching [9].

For the organisation of distance learning in an educational institution, the tutor must have the following basic competencies:

- to know the basics of telecommunicate etiquette;
- to have informational navigation skills;
- to be able to work with LMS;
- to be able to create web pages;
- to have a certain computer-based learning environment (CBLE);
- to be able to use a range of services provided by this environment;
- to be able to present educational material, to ensure effective, individual, independent of the place and time, student's work;
- to know the methods of intensification of the student's activity in the network and to be able to use them during distance learning;
- to know the peculiarities of student's independent activity during distance learning;
- to be able to conduct psychological and pedagogical testing and analyse the current activities of students;
- to be able to prevent and solve conflict situations;
- to know active teaching methods (collaborative learning, project method, multilevel learning, research, search methods, etc.);
- to be able to conduct role-playing online games;
- to help students to be active in a computer-based learning environment, systematically motivate students to learn;
- to provide a personal approach, give some advice and consultation, etc.;
- to determine the effectiveness of students' learning activities through feedback;
- to determine the necessity for the formation and development of new subject competencies of students, following the content of education, and also to be able to improve its quality;
- to determine the level of assimilation of new knowledge and skills by students within the subject;
- to carry out high-quality content of distant courses, as well as pedagogically balanced selection of ICT used during the training;
- to identify the problems with student registration, record and notation keeping, etc.
- to be able to integrate full-time and distance learning;
- to master a method of forming systemic thinking, including critical thinking, and also the student reflection, as a means of evaluation of their activities for further improvement;

- to be able to organise and conduct online classes in real-time;
- to use actively the communicative capabilities of computer networks to organise communication among the participants in the learning process;
- to be able at least to adjust and correct the existing courses according to the new educational process requirements if there is no opportunity and possibility to create a new one.

In addition to the competencies mentioned before, considerable attention must be paid to the issues related to the subject-subject relationship in the learning process, pedagogical approach and support, opportunities for communication, adaptation, motivation and learning management.

The quality of distance learning mostly depends on the tutor's skills, who must effectively direct the group and individual learning process in the right direction. A competent tutor can create a learning environment where the participants together define the essence and generate ideas and understanding.

In general, the tutor's activity is a model of systematic organisation of learning, which involves combining the perception of theoretical information with their transformation into personal knowledge, as well as the broadest expansion, distribution and deepening of this knowledge by students (through analysis and search) during practical implementation.

2.4. Student as the main person in distance learning

The main person of distance learning is a student, so the effectiveness of learning must be assessed according to the following indicators:

- the attitude of students to distance learning;
- the student satisfaction with the learning process;
- the student achievement.

As a rule, the student feels comfortable in the learning environment if he is responsible enough for learning [10]:

- sets real goals;
- monitors his/her progress;
- reflects understanding;
- finds good support both among tutors and classmates.

High motivation and self-discipline are the primary conditions and contributions to student success in DC. Additional learning success factors are the willingness to ask for help and a responsible attitude to distance learning.

Students evaluate the quality and positive features of interaction with the tutor based on reliable and timely feedback.

While organising distance learning, the tutor must understand and consider that the student needs some help at all stages of learning.

At the beginning of the student's studying, it is necessary to get acquainted with the structure and content of the distance course.

The tutor should be able to characterise the training course's main basics to help establish communication among the participants of the distance course.

The tutor's advice on planning educational activities, their organisation, formation and improvement of learning skills, and the process of learning technical and informational means is crucial for students. During the studying, students need some advice on [10]:

- planning the schedule of the day;
- self-organisation;
- improving learning skills;
- learning a new means of information transfer;
- solving technical problems;
- doing some educational tasks;
- non-formal learning with other students;
- self-assessment of the quality of the studied material;
- fulfilment of the tutor's requirements;
- doing some tests and control tasks.

As everybody knows, students can differ significantly in their style of perception, processing and use of information in educational activities, and the ability to communicate and collaborate. Hence, the tutor must use a differentiated approach to work with students.

Not providing assistance in technical and organisational matters on time is the most disorganising for students. It creates a feeling of confusion, anxiety and frustration; the contradiction in the interpretation of instructions appears when students do not receive quick feedback from their tutor.

It is often believed that all difficulties disappear in the first weeks of training. However, the research shows that students may experience anxiety and frustration at later stages of the course, but they are afraid to write to the tutor about it. So, the tutor must be able to predict the possible complications in processing this or that material for the student in the learning process and prevent them in the methodological developments [10].

2.5. Distance learning tools

Current distance learning is based directly on information and communication technologies, so the organisation of distance interaction among participants in the learning process requires not only connection and free access to the Internet but also the availability of software.

For the effective implementation of distance learning in educational institutions, one of the critical tasks is the pedagogically balanced selection of software that considers the educational institution's demands and capabilities. Based on this software, distance communication between tutors and students must be implemented, providing access to electronic educational resources for educational purposes and maintaining the appropriate level of education.

To study the current state of the organisation of distance learning in general secondary education from 8 to 22 April 2020, a survey of teachers of Zhytomyr region [17] was conducted,

which was attended by 2445 respondents, among them: 63% – subject teachers of the 5th–11th grades, 20% – primary school teachers, 8% – principals and deputy principals, 2% – teacher assistants and 7% – other teachers (educators of extended day groups, teachers, organisers, psychologists, social educators) (figure 2).
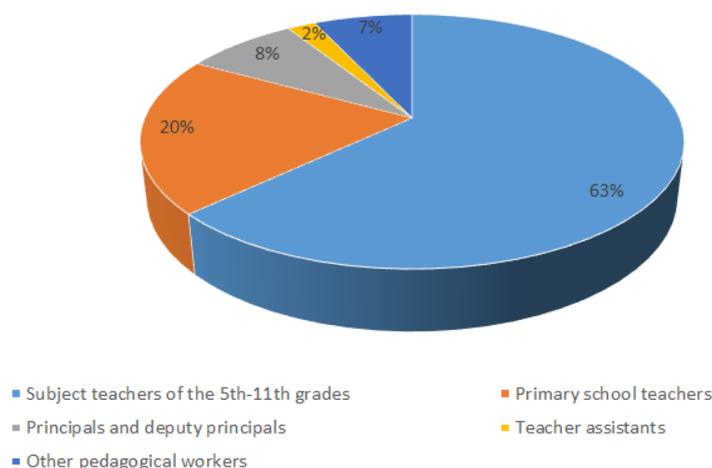
Figure 2: Distribution of respondents according to the positions.

Since the total number of teachers of general secondary education institutes in the region is more than 20,000 people, per the recommendations for the formation of the sample [17], the available group of survey participants is representative, and the results are 95%

According to the survey results, 2% of respondents noted that they had yet to organise the distance learning system for students, and 2% of respondents partially use distance learning technologies (figure ef fig3).

At the same time, 96% of respondents carry out regular distance learning, among which 89% have introduced this form of education only since March 12, 2020 (since the introduction of quarantine throughout Ukraine) (figure 3).

83% of teachers have the necessary technical support and equipment, but the biggest problem for distance learning participants is high-speed Internet access. Also, for the implementation of distance learning, each teacher of Zhytomyr region uses only those software tools which he knows and can use to implement the planned activities during distance learning, in particular:

- For message distribution and file exchange: 92% – Viber, Telegram, 61% – e-mail; 51% – social networks, 9% – Google Classroom;
- For the presentation of educational material: 90% – Google cloud services (YouTube, Drive, Slides, Docs, Sites, Classroom), 25% – Zoom, 20% – educational platforms ("My class" and others);
- To monitor students' learning activities: 42% – Viber, 16% – e-mail, 14% – Google Classroom, 13% – "My class", 10% – Google Forms and others.
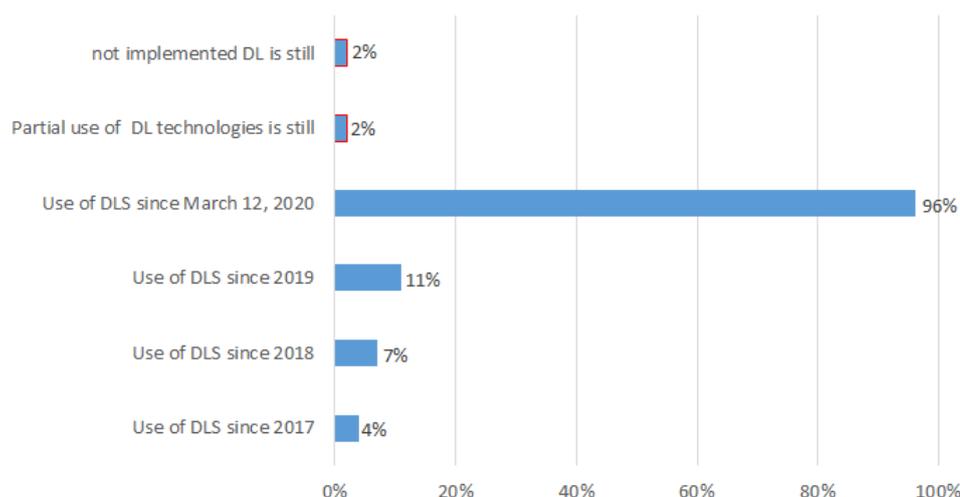
Figure 3: Use of distance learning system by pedagogical workers.

However, according to our observation, it is difficult for students to acquire new knowledge and skills; using such a variety of ICT for distance learning overloads and disorganises them. The lack of a single learning environment in such kind of "distance learning", where there is a proper schedule of classes, established the system of interaction among students and independent educational activities. So in other words, it distracts students' concentration and attention, reduces motivation to learn, increases mental stress, and negatively affects learning outcomes. It is necessary to conduct thorough psychological and pedagogical research on these issues.

Only 59% of respondents must use special distance learning platforms to implement distance learning in general secondary education institutions, in particular: 37% – Google Classroom, 20% – "My class", 2% – Moodle (figure 4).

Each platform chosen by the pedagogical staff contains the necessary means for implementing the digital learning process. As we can see looking at the obtained data, the numerical value of the levels as for the manifestation of the criteria for the selection of distance learning platforms for general secondary education institutions is the lowest in "My class":

- Organisational criterion: 0.08;
- Training and resource criterion: 0.1;
- Constructive criterion: 0.08;
- Analytical and evaluation criterion: 0.16.

According to all the criteria for selecting distance learning platforms for general secondary educational institutions, the numerical value of the level of manifestation in "My Class" is 0.42.

Higher numerical values of levels as for the manifestation of the criteria for selection of distance learning platforms for educational institutions are observed in Google Classroom:

- For personal account:
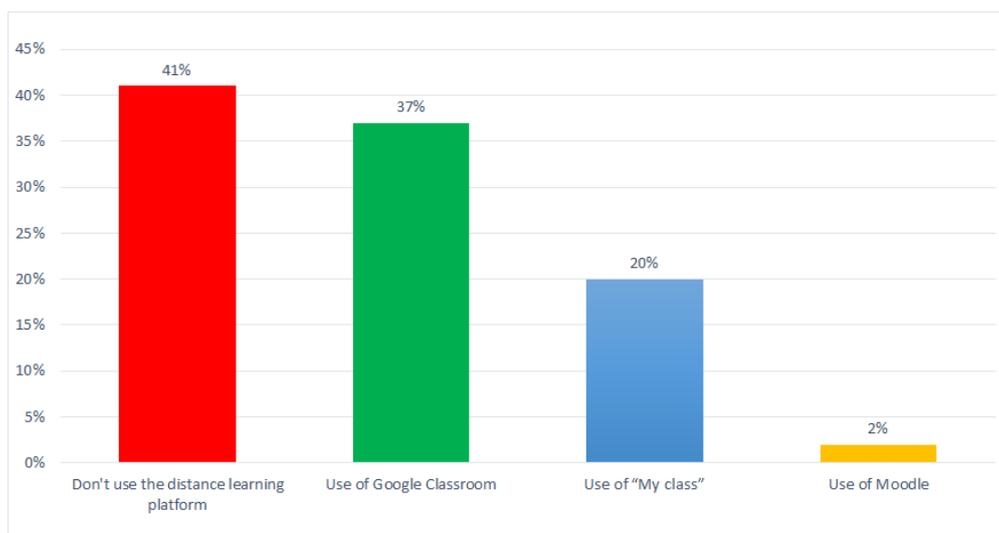
Figure 4: Use of distance learning platforms by pedagogical staff.

– Organisational criterion: 0.10;
– Training and resource criterion: 0.20;
– Constructive criterion: 0.15;
– Analytical and evaluative criterion: 0.10.

- For the account of the educational institution:

– Organisational criterion: 0.10;
– Training and resource criterion: 0.22;
– Constructive criterion: 0.15;
– Analytical and evaluative criterion: 0.10.

According to all the criteria for selecting distance learning platforms for general secondary educational institutions, the numerical value of the level for the manifestation in Google Classroom for a personal account is 0.55. For an account of an educational institution, it is 0.57.

At the same time, we can see that the "My Class" platform has higher numerical values regarding the level of manifestation of the constructive criterion than Google Classroom. In contrast, Google Classroom has insignificant advantages in learning and resource criteria.

The highest numerical values of the level of manifestation of the criteria for the selection of distance learning platforms for educational institutions belong to the Moodle platform:

- Organisational criterion: 0.11;
- Training and resource criterion: 0.31;
- Constructive criterion: 0.21;
- Analytical and evaluation criterion: 0.22.

Overall, according to all the criteria for selecting distance learning platforms for general secondary educational institutions, the numeral value of the level of the manifestation in Moodle is 0.84, which indicates the significant advantages of the Moodle platform and the advisability of its use in general secondary education.

To use the Moodle platform, it is necessary to deploy it on the servers of the educational institution. However, most educational institutions need the technical and financial capacity to do it.

Therefore, based on the technical means of the State University "Zhytomyr Polytechnic", the electronic resource "Educational portal for general secondary education institutions" was established and developed based on the Moodle platform. Any institution can use it.

2.6. The background for the usage of the "Educational portal for general secondary education"

To allow teachers of general secondary education institutions to use this electronic resource, it is necessary:

1. General secondary education institution to apply to the State University "Zhytomyr Polytechnic". To do this, filling in the form according to the sample: https://bit.ly/3duqfcK is compulsory.
2. After registering this or that general secondary education institution on the specified portal, the responsible person of an establishment gets the login and the administrator's password.
3. Then the responsible person of the general secondary education institution, having identified himself/herself (using the provided login and the password) on the Educational portal for general secondary education institutions" will have an opportunity to register all the participants of distance learning of the establishment: teachers, lecturers, masters and pupils.
4. Thus, each participant will be able to access the definite electronic educational resource according to their login and password: teachers will have the opportunity to create and fill in the content of distance courses, and in the future – to carry out direct distance learning of students based on these courses.

After scanning the application submitted by general secondary education institution, the State University "Zhytomyr Polytechnic" creates a subcategory with the name of the registered institution of general secondary education (for example, Secondary school I–III degrees No. 33 of Zhytomyr) in the category of the relevant administrative unit (for example Zhytomyr), where the responsible person of the registered institution has the opportunity to allocate subcategories – parallels (for example 5th grade, 6th grade, 7th grade, 8th grade, etc.) and to create some definite distance courses according to the names of the classes (for example, 8-A, 8-B, etc.) (figure 5), and teachers will be able to fill with the content these courses following the curriculum, selected forms and developed programs (figure 1).

General education institutions of Zhytomyr (17) and Vinnytsia (2) regions have joined the "Educational portal for general secondary education institutions" on January 18, 2021, including:
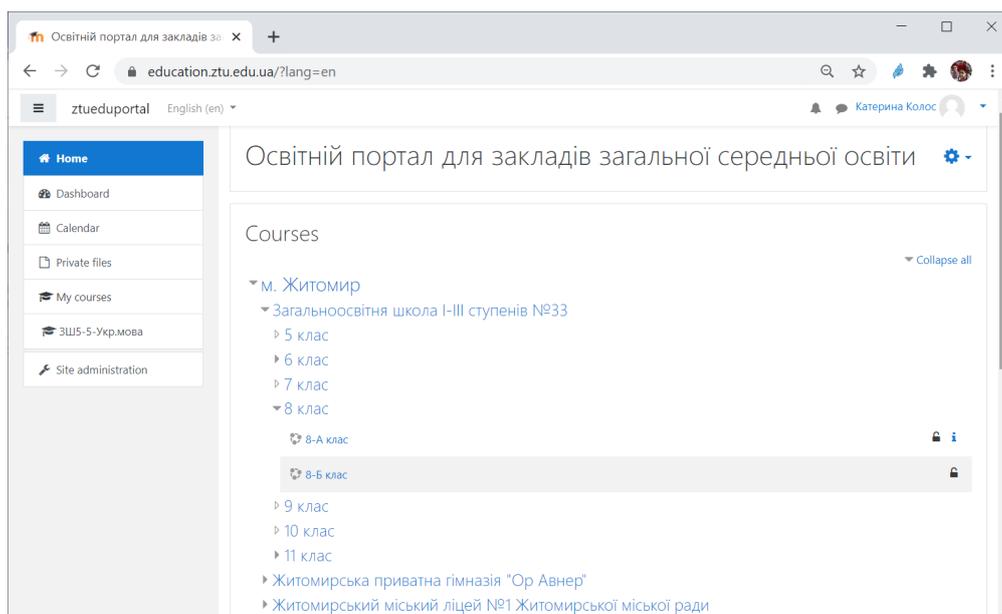
Figure 5: The structure of the "Educational portal for general secondary education institutions".

- Zhytomyr:

    – Secondary school of I–III degrees No. 33;
    – Zhytomyr private gymnasium "Or Avner";
    – Zhytomyr local lyceum No. 1 of Zhytomyr City Council;
    – Zhytomyr local lyceum No. 2 of Zhytomyr City Council;
    – Zhytomyr Technological College of Kyiv National University of Construction and Architecture.

- Berdychiv:

    – Berdychiv Vocational College of Industry, Economics and Law;
    – Berdychiv educational complex No. 4.

- Korosten:

    – Secondary school No. 11.

- Olevsk:

    – Olevsk secondary school of I–III degrees No. 3.

- Berdychiv district:

    – Starosolotvyn institution of general secondary education of Hryshkivtsi village council;
    – Ivankivtsi secondary school of I–III degrees of the Department of Youth Education and Sports of Semenivka village council.

- Lyubar district:

    - Berezivska secondary school of I–II degrees;
    - Velykovolytska secondary school of I–II degrees of Novograd-Volynsk district;
    - Zholobnenska secondary school of I–III degrees;
    - Ivankivtsi secondary school of I–III degrees of the Department of Youth Education and Sports of Semenivka village council.

- Khoroshiv district:

    - Budo-Ryzhanska secondary school of I–III degrees;
    - Chervonohranitnyanska secondary school of I–II degrees.

- Vinnytsia region:

    - Tomashpil secondary school of I–III degrees – gymnasium;
    - Makhnovskaya secondary school of I–III degrees.

Besides, based on this portal, the State University "Zhytomyr Polytechnic" organised distance training of pedagogical and scientific-pedagogical workers within the course "The organisation of mass distance learning during the quarantine" (108 hours). To register for this course, you must fill in an electronic form: https://forms.gle/MrKTtMwfziQ9hyw38.

Thus, within the definite course from October 5, 2020, to January 5, 2021, at the State University "Zhytomyr Polytechnic" 31 people improved their skills: 8 teachers of general secondary education (Zhytomyr local lyceum No. 1, Makhnovskaya Secondary School of I–III degrees of Vinnytsia Kozyatyn district, Velykovylytsia Secondary School of I–II degrees of Lyubar village council, Berdychiv education complex No. 4, Zhytomyr Technological College) and also 13 pedagogical and scientific-pedagogical employees of higher educational establishments (Municipal institution "Zhytomyr Regional Institute of Postgraduate Pedagogical Education" of Zhytomyr Regional Council, Zhytomyr State University named after Ivan Franko).

The training was conducted according to a special professional (certified) professional development program of pedagogical and scientific-pedagogical workers (tutors). Taking into consideration the organisation of mass distance learning during the quarantine, the following topics were studied within this program:

1. Distance learning: relevance, features and principles of the construction, ways of development and scope.
2. The current state of distance learning in educational institutions of Ukraine.
3. Means of organisation of distance learning.
4. Comparative analysis of distance learning platforms.
5. Moodle system as a means of effective mass distance learning.
6. The development of the structure of the distance course.
7. Designing of the distance course.
8. Informational content of the distance course.
9. The development of distance course design.

10. Monitoring system of distance learning quality.
11. A tutor as an organiser and a leader of the distance course.
12. A student (listener) is the main person in distance learning.
13. The practice of developing and using a distance course on the Moodle platform.
14. The organisation of educational activities in a computer-oriented educational environment of an educational institution.

After successful training, all the participants received the professional development certificate (figure 6).

Figure 6: The certificate of professional development according to the special professional (certificate) program of professional development for pedagogical and scientific-pedagogical workers (tutors) as for the organisation of distance learning during the quarantine.

3. Conclusions

The research revealed that a significant majority of teachers in the Zhytomyr region (96%) have adopted regular distance learning, with 89% implementing it since March 12, 2020, following the introduction of quarantine in Ukraine. While 83% of teachers reported having the necessary technical support, the primary challenge identified for distance learning was the lack of high-speed Internet access.

Teachers predominantly rely on familiar software tools for distance learning activities, with only 59%

The analysis indicated that Moodle exhibited the highest level of manifestation across all criteria, suggesting its significant advantages and preference for use in general secondary education institutions. However, considering the technical and financial constraints of deploying Moodle in many institutions, the State University "Zhytomyr Polytechnic" developed the "Educational Portal for General Secondary Education Institutions" on the Moodle platform.

Several educational institutions in Zhytomyr and Vinnytsia regions have successfully adopted this portal, providing teachers and students with a unified platform for distance learning.

The research also emphasised the importance of tutor competencies in managing distance learning effectively. A tutor plays a crucial role in creating a conducive learning environment, providing support, and fostering student communication and collaboration.

Furthermore, the research identified key challenges and opportunities in the current landscape of distance learning, such as the need for a comprehensive approach to software selection, the significance of high-speed Internet access, and the crucial role of tutors in guiding students through the learning process.

In response to these findings, the State University "Zhytomyr Polytechnic" organised a specialised professional development course for pedagogical and scientific-pedagogical workers. The course covered various aspects of distance learning, including the organisation of mass distance learning during quarantine, the selection of distance learning platforms, and the development of distance courses on the Moodle platform. The successful completion of this course resulted in the issuance of professional development certificates.

References

[1] American Association for the Advancement of Science, 2021. COVID-19 and extended online learning. Available from: https://www.sciline.org/covid-expert-quotes/online-learning#toc.

[2] Bykov, V.Y., Kukharenko, V.M., Syrotenko, N.H., Rybalko, O.V. and Bohachkov, Y.M., 2008. *Technology for creation of a distance course.* Kyiv: Milenium. Available from: https://lib.iitta.gov.ua/2398/.

[3] Cabinet of Ministers of Ukraine, 2018. Concept of development of digital economy and society of Ukraine for 2018-2020. Available from: https://zakon.rada.gov.ua/laws/show/67-2018-%D1%80#Text.

[4] Cabinet of Ministers of Ukraine, 2020. On amendments to the resolution of the Cabinet of Ministers of Ukraine of March 11, 2020 No. 211. Available from: https://www.kmu.gov.ua/npas/pro-vnesennya-zmin-do-postanovi-ka-a262.

[5] Cabinet of Ministers of Ukraine, 2020. On prevention of the spread on the territory of Ukraine of acute respiratory disease COVID-19 caused by coronavirus SARS-CoV-2. Available from: https://zakon.rada.gov.ua/laws/show/211-2020-%D0%BF#Text.

[6] Carambas, J.R. and Espique, F.P., 2023. Lived experiences of teachers and students in distance education: shift from traditional to online learning. *Educational Technology Quarterly*, 2023(4), p.422–435. Available from: https://doi.org/10.55056/etq.606.

[7] Kremen, V.H., ed., 2008. *Encyclopedia of education.* Kyiv: Yurinkom Inter.

[8] Kremen, V.H., ed., 2016. *National report on the state and prospects of education in Ukraine.* Kyiv: Pedahohichna dumka. Available from: https://mon.gov.ua/storage/app/media/nrk/Analitychni-materialy/7-natsionalna-dopovid-pro-stan-i-rozvitok-osviti-v-ukraini.pdf.

[9] Kukharenko, V., 2007. *Distance learning.* Kyiv: Kompiuter.

[10] Kukharenko, V., Syrotenko, N., Molodykh, H. and Tverdokhliebova, N., 2005. *Distance learning process.* Kyiv: Milenium.

[11] Kukharenko, V.N., 2023. MOOCs: an insider's perspective on a novel educational method with historical, organizational, participatory, and evaluative aspects. *Educational Dimension*, 9, p.59–119. Available from: https://doi.org/10.31812/ed.610.

[12] Lytvynova, S. and Demeshkant, N., 2021. Distance learning in primary school during the COVID-19 pandemic: results of the "SMART KIDS" experiment. *Educational Dimension*, 5, p.61–74. Available from: https://doi.org/10.31812/educdim.4718.

[13] Ministry of Education and Science of Ukraine, 2013. On approval of the Regulations on distance learning. Available from: https://zakon.rada.gov.ua/laws/show/z0703-13#Text.

[14] Ministry of Education and Science of Ukraine, 2020. About organizational measures to prevent the spread of coronavirus COVID-19. Available from: https://mon.gov.ua/ua/npa/pro-organizacijni-zahodi-dlya-zapobigannya-poshirennyu-koronavirusu-s-ovid-19.

[15] Reshchuk, K. and Lukashova, S., 2020. From 15 to 68 million deaths from coronavirus. As others expect. Available from: https://www.pravda.com.ua/articles/2020/03/17/7243880/.

[16] Semerikov, S.O., Vakaliuk, T.A., Mintii, I.S. and Didkivska, S.O., 2023. Challenges facing distance learning during martial law: results of a survey of Ukrainian students. *Educational Technology Quarterly*, 2023(4), p.401–421. Available from: https://doi.org/10.55056/etq.637.

[17] Survey of pedagogical workers of Zhytomyr region on the organization of distance learning, 2020. Available from: https://docs.google.com/forms/d/1f-9Z9IL3WNZuyDDshmZhR86guLpb1yyphd8sfujyuhw/viewform?edit_requested=true.

[18] Tatarchuk, H., 2020. Institutionalization of distance learning: the sociological aspect. *Obrazovanye*, 1(1), pp.63–72.

[19] Tkachuk, V.V., Yechkalo, Y.V., Semerikov, S.O., Khotskina, S.M., Markova, O.M. and Taraduda, A.S., 2022. Distance learning during COVID-19 pandemic: mobile information and communications technology overview. *Educational Dimension*, 7, p.282–291. Available from: https://doi.org/10.31812/educdim.7612.

[20] Verkhovna Rada of Ukraine, 2017. Law of Ukraine "On Education". Available from: https://zakon.rada.gov.ua/laws/show/2145-19/page#Text.