

# **CURRENT ISSUES IN THE IMPLEMENTATION OF BLENDED LEARNING IN VOCATIONAL EDUCATION**



*MONOGRAPH  
2023*

NATIONAL ACADEMY OF EDUCATIONAL SCIENCES OF UKRAINE

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**Institute of Vocational Education of the NAES of Ukraine**



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The monograph presents the experience of implementation of blended learning in vocational education, highlights the national context of the development of blended learning in Ukraine, characterizes the peculiarities of training teachers of vocational education institutions for the organization of blended learning.

The publication is addressed to representatives of legislative and executive authorities, public and professional organizations, managers and pedagogical staff of vocational (vocational-technical), professional higher and higher education institutions, methodologists of scientific (educational) and methodological centers (offices) of vocational education, researchers, postgraduate students, doctoral students and all those who study and organizes blended learning.

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# **PREFACE**

The modern world is undergoing rapid changes driven by global digitalization processes, which actively influence all spheres of human activity, including education. The transformation of educational systems has become a necessity, defining new approaches to organizing the educational process, forming professional competencies, and preparing personnel for the challenges of the digital society.

This monograph is dedicated to the pressing issues of implementing educational digital technologies, their impact on the educational environment, the peculiarities of their implementation in various contexts, and the results of adapting European experience to domestic conditions. The chapters of the monograph cover a wide range of relevant topics, including theoretical and methodological aspects of organizing the educational process under blended and distance learning conditions, and organizational and methodological foundations for developing the digital culture of participants in the educational process.

Special attention is paid to methodologies that ensure the effective organization of distance and blended learning under modern challenges, which are critically important for the Ukrainian educational space; the development of digital culture among participants in the educational process; the optimization of distance testing; the creation of electronic learning courses; and the formation of professional mastery and digital competencies of education subjects.

The monograph presents the results of scientific research that highlight urgent issues of using digital technologies in the conditions of distance and blended learning for future qualified workers, ensuring the quality of education through the development of digital culture among vocational education students and teachers, forming value-based principles and ethical standards among participants in the educational process, and implementing electronic systems for self-assessment of professional pedagogical activities.

The authors analyze the challenges faced by educators and students and propose innovative approaches to solving urgent problems, revealing the value-based principles and ethical standards of interaction in the educational process.

This monograph will be a useful tool for educators, education managers, researchers, and all those who seek to expand their knowledge about organizing modern learning in the context of digital transformation. We hope that the presented material will inspire new scientific inquiries and contribute to the development of future-oriented education.

# CHAPTER 1

THEORETICAL AND  
METHODOLOGICAL ASPECTS  
OF ORGANIZING THE EDUCATIONAL  
PROCESS  
IN THE CONDITIONS  
OF BLENDED AND DISTANCE  
LEARNING

## 1.1. DIGITALIZATION OF THE EDUCATIONAL PROCESS IN THE IMPLEMENTATION OF DISTANCE LEARNING

### *ЦИФРОВІЗАЦІЯ ОСВІТЬОГО ПРОЦЕСУ ПРИ РЕАЛІЗАЦІЇ ДИСТАНЦІЙНОГО НАВЧАННЯ*

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*The author reviews the peculiarities of digitalized learning process organisation in the hardware and software environment of learning management systems in the context of vocational education and training. The author notes the complexity of the transition to the Industry 4.0 and mentions the risks connected with the named process in the vocational education and training. In such conditions it is important to develop effective models of public and private partnership, to decentralize administration and financing and, above all, to assure the vocational education and training quality. Using the software and hardware complexes of learning management systems is one of the means able to ensure the implementation of such tasks and to avoid risks in the sphere of vocational education and training. At the same time the learning process taking place in such an environment becomes digitalized, which, on the one hand, gives it additional advantages (easy access to training data regardless of time and place, individualisation of students' learning paths, broad multimedia resources, etc.) and, on the other hand, requires solving complex tasks in distance courses designing. The author focuses on the methodology of distance courses designing, so it is very important for vocational education and training institution to ensure the realisation of the following five main components: regulatory, financial, technical, personnel, teaching and methodological support. It is emphasised that distance course designing becomes the most important aspect of implementing the modern digitalized learning process. The structure of creative group in distance courses designing is grounded, which comprises: a specialist in the relevant vocational sphere, specialist in distance learning, technical specialist (system administrator or distance courses programmer) and digital content designer. It is underlined that assigning the task to design a distance course only to a teacher is unacceptable. At the same time, the process of learning digitalization in an education institution cannot be limited to introducing a learning management system.*

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*Автор розглядає особливості організації цифровізованого навчального процесу в апаратно-програмному середовищі систем управління навчанням у контексті професійно-технічної освіти. Автор відзначає складність переходу до Індустрії 4.0 та зазначає про ризики, пов'язані з названим процесом у професійній освіті та навчанні. У таких умовах важливо розробити ефективні моделі державно-приватного партнерства, децентралізувати управління та фінансування і, насамперед, забезпечити якість професійної освіти та навчання. Використання*



програмно-апаратних комплексів систем управління навчанням є одним із засобів, здатних забезпечити виконання таких завдань та уникнути ризиків у сфері професійної освіти та навчання. Водночас процес навчання, який відбувається в такому середовищі, стає цифровим, що, з одного боку, дає йому додаткові переваги (легкий доступ до навчальних даних незалежно від часу та місця, індивідуалізація траєкторії навчання студентів, широкі мультимедійні ресурси, та ін.), а з іншого боку, потребує вирішення складних завдань при проектуванні дистанційних курсів. Автор акцентує увагу на методології проектування дистанційних курсів, тому для закладу професійно-технічної освіти дуже важливо забезпечити реалізацію п'яти основних складових: нормативно-правового, фінансового, технічного, кадрового, навчально-методичного забезпечення. Наголошується, що проектування дистанційного курсу стає найважливішим аспектом впровадження сучасного цифрового процесу навчання. Обґрунтовано структуру творчої групи з проектування дистанційних курсів, до складу якої входять: фахівець відповідного професійного спрямування, фахівець з дистанційного навчання, технічний спеціаліст (системний адміністратор або програміст дистанційних курсів) та дизайнер цифрового контенту. Наголошується, що доручення розробки дистанційного курсу лише викладачеві є неприпустимим. Водночас процес цифровізації навчання в закладі освіти не може обмежуватися впровадженням системи управління навчанням.

**Ключові слова:** професійна освіта та навчання, цифровізація, оцифрований процес навчання, цифрове навчальне середовище, система управління навчанням, дистанційний курс.

**Keywords:** vocational education and training, digitalization, digitalized learning process, digital learning environment, learning management system, distance course.

The process of the world society transition to the Industry 4.0 has caused the need for fundamental modernization of all spheres of human life, including vocational education and training. At the same time researchers point out that there are a number of systemic problems in Ukraine which complicate this process greatly. Among the main problems researchers distinguish the following: low attractiveness and accessibility of vocational education and training; vocational education and training institutions' educational process provision with qualified and motivated teaching and other staff; disparity of training content with the modern requirements of labour market concerning the level of skilled workers' professional competency; creation of modern learning environment, the system of internal and external quality assurance of vocational education and training, etc. (Radkevych, et al, 2018). The tasks of assuring the quality of education, decentralizing administration and financing, creating effective models of public and private partnership has appeared on the agenda (Ministry of Education and Science of Ukraine, 2018).

V. Bykov and A. Gurzhii works are dedicated to enlightening the conceptual bases of informatisation and digitalization of education. A wide range of problems concerning the use of modern electronic means in the learning process of vocational



education and training institution are enlightened in the O. Spirin, A. Kalenskyi, M. Pryhodii works. Methodological aspects of distance vocational learning are disclosed in a number of works by L. Petrenko, S. Kravets. The use of electronic education resources and creating SMART-complexes for vocational education and training are revealed in the O. Humennyi, A. Kononenko, L. Lypska works.

One of the most important means that has great potential in solving these problems is the skilled workers' distance vocational learning, which is based on modern digital technologies, including specialized hardware and software complexes – learning management systems. However, the results of a large-scale fundamental study of the methodological foundations of the skilled workers' distance vocational learning conducted by the Laboratory of Distance Vocational Learning of the Institute of Vocational Education and Training of the National Academy of Educational Sciences of Ukraine (Radkevych and Artiushyna eds., 2017; Radkevych, 2018) showed that the major difficulties are the proper organization of the distance learning process, in particular, in terms of ensuring the interoperability among its various participants.

In accordance with the "Regulations on Distance Learning" (Order of the Ministry of Education and Science of Ukraine dated April 25, 2013 No 466), "subjects of distance learning are persons who study (pupil, student, listener), and those who provide the learning process in a distance mode (teaching staff, academic staff, methodists, etc.)" (Ministry of Education and Science of Ukraine, 2013). It is suggested that distance learning technologies in vocational education and training institutions can be used in organising the learning process in the initial vocational training, retraining or in-service training programs, as well as in studying the vocational theoretical disciplines (Ministry of Education and Science of Ukraine, 2013).

As mentioned above modern LMS are complex digital hardware and software complexes that can fully implement almost all aspects of the modern learning process, in particular: assessment of the process of professional competences acquiring by a student; statistics collection, analysing and saving concerning each aspect of the student's activity (group of students, institution as a whole) within the LMS; the ability to set up a complex analysis to ensure the quality of education (BigData basic level), etc.

Distance learning specifics in vocational education and training institution presupposes implementation of vocational and practical training "in a distance mode and/or full-time mode in the form of on-the-job training, different forms of practice, conducted at the workshops, polygons, simulators, racetracks, in education and production units, training enterprises, on the workplaces in the spheres of production and services, etc. or using the distance learning technologies if relevant web resources and access to them are available" (Ministry of Education and Science of Ukraine, 2013), i.e. in a mixed mode (blended learning).

So, learning management systems are not only a didactic tool, but also the core of digital learning environment of a vocational education and training institution. Such a

powerful influence on all components of the learning process transforms not only the ways of interaction between its participants, but, first of all, changes both the composition of participants and their functions. The list of subjects of distance learning process should be supplemented by engineering, technical and additional personnel (system administrators, programmers and other IT specialists, distance learning administrators, engineering and technical staff, etc.).

Involvement of these specialists enables implementation of organizational and pedagogical conditions for distance vocational learning, formulated by S. Kravets (2018). These conditions are grouped into three blocks taking into account regulatory, technical, pedagogical, personal and professional requirements for informatization of education:

- organizational and technical (availability of legal and regulatory support for distance vocational education; availability of a specialized learning management system),
- content and processual (designing and placing modern distance courses in the electronic environment; use of blended learning in the professional training of students and listeners),
- personal and professional (level of students' and listeners' mastering the IT technologies; continuous development of teachers' readiness to introduce distance learning technologies).

In the following article we will focus on the content and processual block, because, as the results of our study showed, the greatest problem for vocational education and training institutions is the complexity of the process of distance courses designing and placing.

For learning management systems, for example, for the LMS Moodle, which is the most widespread in Ukraine, the main content unit is a distance course. Distance courses may consist of an unlimited number of topics, but topics themselves cannot exist independently outside the distance course (Bazeliuk, et al., 2018). It is possible to construct the controlled learning paths by configuring the access system to the distance course topics. Due to this, learning management system easily implements the mechanisms of the so-called "guided self-education of students".

It is important to implement the five main components – regulatory, financial, technical, personnel, teaching and methodological support – to accomplish the tasks of distance learning in the vocational education and training institution. All components of distance learning are interconnected and interdependent, and therefore mistakes or lack of implementation of one of the components will significantly affect not only the effectiveness of distance learning, but also the possibility of its functioning. For example, insufficient financial support significantly affects the technical component, complicates the development of teaching and methodological support for distance learning and the educational process as a whole. Problems with staffing will not allow

to realize the possibilities of learning management systems to the fullest, which affect the quality of students' learning.

In the context of vocational education and training at the first stage, it is important to ensure a balanced implementation of the first three components, since the personnel, teaching and methodological support depends considerably on the selected learning management system. The peculiarities of choosing the learning management system for vocational education and training are described in detail in O. Bazeliuk article (2016).

As O. Spirin emphasizes "the use of ICT in education can take place in a variety of organizational forms: online courses, online counselling, online trainings, hackathons, webinars, the use of interactive electronic tutorials, electronic virtual laboratories, electronic social networks, visiting interactive science museums, creation of presentations, scientific platforms for communication, international scientific contests, virtual technology parks and others" (Bazeliuk, at al., 2018).

Each of these forms is realised within a concrete distance course. So, distance course is the main content unit in distance learning. Hence, the development of the distance course becomes very important aspect in implementing the distance learning process (Bazeliuk, at al., 2017).

The distance course, in its turn, has four main components: technical; educational and content; educational and processual; multimedia. Today, the task of distance courses designing lies on the teaching staff of the vocational education and training institutions, who independently select the training content, predict and build the students' learning paths, develop the digital content design and, finally, program it by themselves in the learning management system. Such a wide range of tasks cannot be implemented without loss of quality at each stage. It especially concerns the multimedia component that affects the visual design and is perceived by the students first, and the technical component, errors in which can lead to a complete stop of the learning process. Such an approach to distance courses designing is marked by a significant overload of teachers and the need to perform tasks beyond their competence.

Therefore, a group of specialists should be involved in ensuring the quality of distance course content and multimedia filling, the correct didactic organization of the process, the provision of a qualitative visual component, as well as the correct transfer and stable work of a distance course in the learning management system. Taking into account the specifics of the educational process in the vocational education and training institutions, we consider that this group of specialists should consist of: a specialist in the relevant vocational sphere, specialist in distance learning, technical specialist (system administrator or distance courses programmer) and digital content designer.

We consider that the proposed structure of creative group in distance courses designing is able to realize each of the components of the distance course on a high professional level and not only provide didactically correct learning process, but also further improve the distance course under the specific conditions of a vocational

education and training institution, update the content, adapt it not only for different groups of students, but also to ensure the implementation of a student-centred approach to the learning process in a vocational education and training institution.

Digital distance learning technologies, in particular, in vocational education and training, are based on the principles of open education, are the most advanced promising technologies of its organization and have a decisive impact on the nature and pace of digitalisation of the education system as a whole. The organization of the digital learning process in a vocational education and training institution should be carried out in the environment of learning management systems by a group of specialists consisting of: a specialist in the relevant vocational sphere, specialist in distance learning, technical specialist (system administrator or distance courses programmer) and digital content designer. We consider that it is unacceptable to require from vocational education and training institutions teaching staff to design distance courses without the participation of the proposed group of specialists. The process of learning digitalization in an institution cannot be limited only by introducing only learning management systems. The digitalisation of vocational education and training is not only filling it with modern electronic means, but, first of all, the appearance of new opportunities for its global structural analysis and the selection of vectors of development based on it, which either significantly accelerate the skilled workers training, or will enable students to acquire a higher level professional competence. Thus, in our opinion, research on the introduction of SMART technologies, electronic management systems and automated analytics in vocational education and training institutions becomes promising.

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## 1.2. ORGANIZATION OF TESTING IN THE MOODLE ENVIRONMENT

### ОРГАНІЗАЦІЯ ТЕСТУВАННЯ В СЕРЕДОВИЩІ MOODLE

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*On the basis of the conducted analysis it has been established that nowadays the lecturer needs to possess the means, methods and technologies of distance learning. A lecturer's activity during the organization of distance learning is subject to significant changes. His primary task is to prepare a distance learning course, based on existing sources, original author's works, which are included in its thematic sections. The article deals with the analysis of research degree of the problem of developing and using an electronic form of test control of a learning level in the Moodle system.*

*Results: the program "Moodle Converter" was developed, which realized the functions of files converting and software testing. It has been established that despite the simplicity of an outlined system, there are some difficulties with a rational use of time while preparing test tasks. Accordingly, the material has been presented on the development of an information technology of an automatic input of test data into a distance Moodle system, as well as the approbation of a mentioned technology. Information about the author's program testing in higher education institutions is presented.*

*It has been found that a large number of surveyed lecturers have some difficulties with creating tests in the Moodle remote system. At the same time, the experiment showed that using "Moodle Converter" creates the preconditions for optimization of the mentioned process, it becomes possible to save considerable time for preparation of test tasks, which can be used at different stages of classes.*

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*У статті проаналізовано ступінь дослідженості проблеми розробки і використання електронної форми тестового контролю рівня засвоєння знань, що є актуальним для підвищення ефективності та якості дистанційного навчання в системі Moodle. Представлено матеріал щодо розробки інформаційної технології автоматичного введення тестових даних у дистанційну систему Moodle, а також апробації зазначеної технології. Розроблено авторську програму «Moodle Converter», де реалізовані функції конвертування файлів і проведено тестування програмного забезпечення.*

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**Ключові слова:** дистанційне навчання, тестування, система Moodle, тестовий контроль, Moodle Converter

**Keywords:** distance learning, testing, Moodle system, test control, Moodle Converter.

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A rapid development of digital technologies facilitates human activity in all spheres of life. A modern educational environment also cannot be imagined without informatization and computerization. New digital technologies help to learn educational material better, use time rationally, optimize individual and independent work of both a teacher and a student.

One of the most striking examples of modernization of a modern educational system using digital technologies is the implementation of distance learning. Distance learning is a remote extensive system of knowledge transfer using various tools and technologies, which help students obtain the necessary information for the use in practice (Dolynskiy, 2010, p. 202). It is a form of organization of an educational process, which is based on an independent work of students and the use of modern information and communication technologies. Distance learning should educate a person, who has the desire and ability to communicate, learn and self-educate. So, the issues, related to the improvement of existing distance learning platforms seem to be relevant.



The problem of distance learning organization is deeply revealed in the works of T. Anderson, M. Rosenberh, V. Bykov (2015), Ye. Dolynskyi (2010), N. Morze, V. Kukhareenko, Y. Bohachkov, Y. Tryus, B. Shunevych. The issues of distance learning methodology were considered by N. Klokar (2012), R. Maier, as well as N. Syrotenko, O. Rybalko. Management of the distance learning system was studied by T. Kravchynska (2017), S. Sysoieva, V. Osadchyi, K. Osadcha. Peculiarities of the organization of technical support of distance learning are covered in the works of P. Brokwell, R. Davis, P. Kiellier.

Analysis of the research results on this issue allowed us to understand the main advantages and disadvantages of using information and communication technologies in the establishments of higher education.

A growing popularity of distance learning in different countries seems logical. A striking example is the virtual universities, created in the United States of America and Canada. In contrast to traditional forms of education, a student has the opportunity to take basic distance learning courses at any university. In European countries, there are also open universities of distance education, i. e. a group of educational establishments implementing distance learning programs (Bykov, Hrytsenchuk and Zhuk, 2015, p. 78).

Methodology of such training presupposes the use of new digital technologies, which include satellite television, computer networks, multimedia, etc.

Ukraine has also implemented distance learning, which is regulated by the Regulation on Distance Learning of April 24, 2013 (Verkhovna Rada of Ukraine, 2013). According to the Regulation, distance learning acts as a separate form of learning, and as an auxiliary one when using traditional forms: full-time, part-time, etc. The training of distance learning specialists requires a separate permit from the Ministry, but the decision to use distance learning technologies as an auxiliary form for traditional ones is made by the educational establishment itself. It made it possible to implement the Moodle system in an educational process.

According to T. Kravchynska, a distance learning system Moodle has become the most widespread among such programs. The main characteristics of the system that determine its popularity among software of this type are: advanced functionality (the presentation of material, knowledge testing, the analysis of listener's activity, ease of updating the content; the ability to create copies, high stability); tools for developing and editing educational content, integration of various educational materials for various purposes and support for the international standard SCORM – the basis for the exchange of electronic courses, which provides the transfer of resources to other systems (from other systems); the availability of a set of blocks of material in training courses that can be used in other courses; intuitive interface and learning technology (the ability to easily find the help menu, the easiness of move from one section to another, the instructor's tips, etc.) determine the convenience and easiness of use of the system; the availability of the Moodle.org website, which is the so-called information

battery, a platform for exchanging opinions among Moodle users – any system administrator, lecturer, researcher, designer or developer. The site is constantly evolving to meet the needs of society (Kravchynska, 2017, pp. 123-124).

A system Moodle is distributed under the GNU Public License and has an open code (Open Source), which allows a free use of the software. Moodle belongs to the Learning Management System class, used to develop, manage and distribute online learning materials with shared access. Materials are created in a visual educational environment with the task of sequence of study. A program interface is translated into more than 75 languages, including Ukrainian.

Using Moodle, a lecturer can create courses, filling them with material in the form of texts, supporting files, presentations, questionnaires, etc. Based on the results of students' tasks, a lecturer can give grades and comments (Klokar, 2012, p. 39). Thus, the Moodle system may be used both as a centre for creating educational material and to provide interaction between participants of an educational process.

Despite the simplicity and adaptability of the web-interface, preparation for work in the Moodle system is still time-consuming. In particular, in our opinion, the form for creating distance testing is quite inconvenient. A distance testing is a progressive form of learning that allows the assessment of students' academic achievements to be more effective and fair. The use of distance testing in comparison with other means of control has a number of advantages (Bilousova and Kolhatin, 2008, p. 119):

- universality, the possibility of application at all stages of a learning process;
- objectivity, which has a positive stimulating effect on an educational activity of students;

- the possibility of its use not only to control knowledge, skills and abilities, but also to improve the quality of a professional training of students in general.

Thus, a distance testing is not only a means of obtaining the necessary information about the dynamics of processes taking place in the establishments of higher education, but it also performs the function of motivation, and, hence the management of cognitive activity of students.

Therefore, to simplify the introduction of test tasks and glossary, in a distance system Moodle, we have developed software "Moodle Converter". The C# programming language and Windows Presentation Foundation technology were used to implement the program. The author's program has the following structure: Home page and Xaml containers, Windows UI controls, C# code, a deployment package.

The program interface is developed in the file "MainWindow.xaml". The Xaml – Grid container was used to compose the main page. To implement the conversion Windows UI controls: StackPanel, Menu, RichTextBox, DockPanel, Button were used.

The code was written to manipulate the controls.

For the main functions, the code looks like this:



– the function "Create test"

```
private void CreateTest_Click(object sender, RoutedEventArgs e)
    {
        try
        {
            Options_Click(sender, e); string richTextQuestions = new
                TextRange(richTextBox.Document.ContentStart,
richTextBox.Document.ContentEnd).Text;
            string richTextAnswers = new TextRange(richTextBoxAnswers.Document.ContentStart,
richTextBoxAnswers.Document.ContentEnd).Text;
            CompleteTest = Core.Convert.ToGift(richTextQuestions, richTextAnswers);
            Save_Click(sender, e);
        }
        catch
        {
            MessageBox.Show
        }
    }
}
```

– the function "Create glossary"

```
try
{
    string richTextQuestions = new TextRange(richTextBox.Document.ContentStart,
richTextBox.Document.ContentEnd).Text;
    List<string> ListQuestions = new List<string>(richTextQuestions.Split(new string [] {
Environment.NewLine }, StringSplitOptions.None));
    List<string> listTerm = new List<string>();
    for (int i = 0; i < ListQuestions.Count() - 1; i++)
    {
        if (ListQuestions [i] != Environment.NewLine && ListQuestions [i].Contains(" - "))
        {
            listTerm.Add(ListQuestions [i].Substring(0, ListQuestions [i].IndexOf(" - ")));
            listTerm.Add(ListQuestions [i].Substring(ListQuestions [i].IndexOf("
- ") + 3));
        }
        else
        { i++;
        }
    }
    xDocument = Core.Convert.ToXml(listTerm); Save_Click(sender, e);
}
catch
{
    MessageBox.Show;
}
}
```

– the function "Export test"

```
private void GiftToTxt_Click(object sender, RoutedEventArgs e)
    {
        try
        {
```

```
Open_Click(sender, e);
richTextBox.AppendText(Core.Convert.ToTxt(xDocument).ToString());
    }
    catch
    {
    MessageBox.Show
    }
    }
```

– the function "Export glossary"

```
private void GlossaryToTxt_Click(object sender, RoutedEventArgs e)
{
    try
    {
    Open_Click(sender, e);
    richTextBox.AppendText(Core.Convert.ToTxt(xDocument).ToString());
    }
    catch
    {
    MessageBox.Show
    }
    }
```

– the function "Random order"

```
private void Random_Click(object sender, RoutedEventArgs e)
{
    try
    {
    Open_Click(sender, e);
    richTextBox.AppendText(Core.RandomLine.RandomQuestions());
    }
    catch
    {
    MessageBox.Show;
    }
    }
```

The program can be used to work with a distance education system Moodle

version 3.7.2 and previous versions. To use the program you need to create a new document or open an existing one using the appropriate menu items, you can also drag a text file to the appropriate area of the program. The program provides the ability to create a test or glossary for a Moodle system from a text file, convert a GIFT or XML file into a text file, randomly arrange the questions and answers of an open test.

The file for conversion must meet the requirements:

- to converse a text file to a GIFT file, the questions must be separated according to the settings, the answers must be on the right side of the window (numbering is optional);
- to converse a text file to an XML file, the definitions and meanings must be separated by a hyphen or paragraph;
- conversion in a text file does not require additional settings.

To use the "Random order" function, the file must meet the items in the settings.

Also, when saving the file, you need to pay attention to its format.

Software user manual

To create and import a test in Moodle, you need to follow these steps:

1. Open a text file with the tests by clicking File-Open Document or "Open" on the toolbar. Copy the answers to the appropriate area on the right. The result is shown in *fig. 1*.

2. Click "Create Test", a settings window will appear in which we select the appropriate formatting of our file. Then click "OK", the file is automatically converted and a window for saving the file appears, select the format \*.txt and save (*Fig. 2*).

3. Open Moodle, move to the training course, create a new test or select an existing one, on the control panel, select "Question Bank" -Import and import questions (*Fig. 3*).

4. Imported questions can be added to the test via a control point "Edit test" by clicking "Add" from the Question Bank (*fig. 4*).

To create and import a glossary in Moodle, follow these steps:

1. Open a text file with the definitions by clicking File-Open Document or "Open" on the toolbar. The result is shown in *fig. 5*.

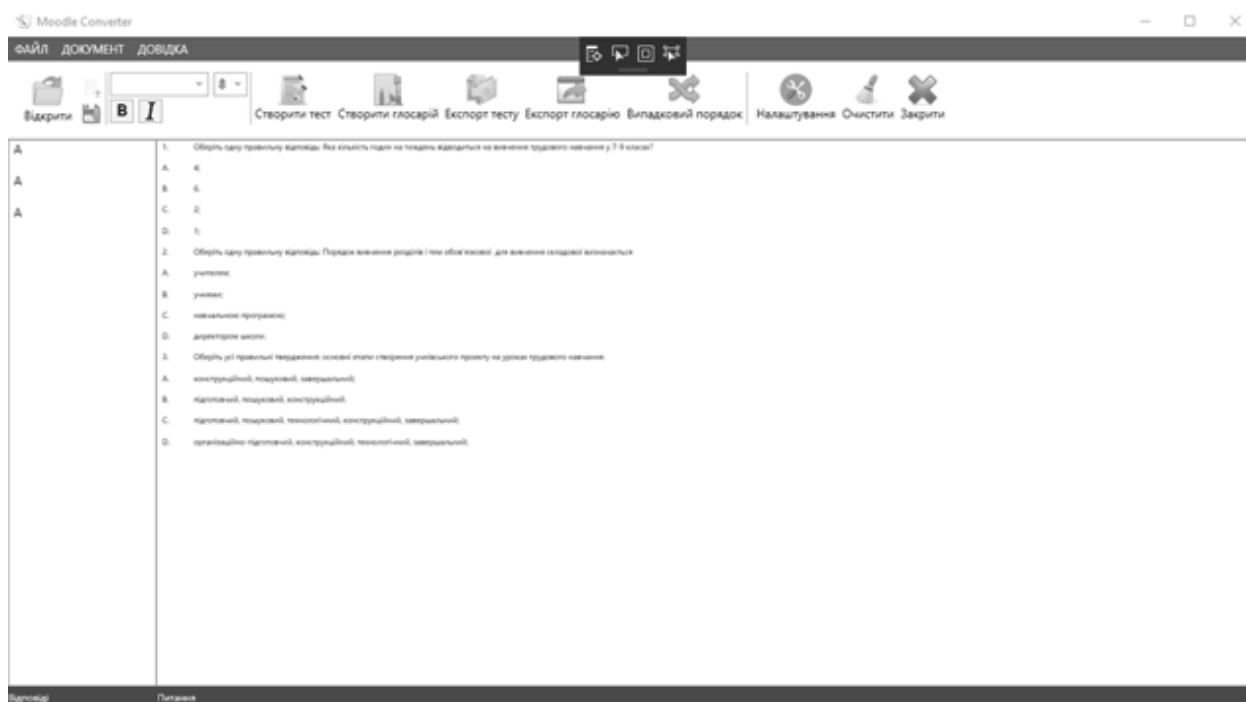
2. Click "Create Glossary", a settings window will appear, in which we select an appropriate definition division. Then click "OK", the file is automatically converted and a window for saving the file appears, select the format \*.xml and save (*Fig. 6*).

3. Open Moodle, move on to the discipline, create a new glossary or select an existing one, in a control panel, select Import records in "Question Bank" and import questions (*Fig. 7*).

To get the test in a text format with Moodle, follow these steps:

1. Export test from Moodle in GIFT format.
2. Open the exported test in the program.

Click "Export test" and select the way to save the text file.



*Fig. 1. Example of placing the test and keys*

To get definitions from a glossary in a text format from Moodle, follow these steps:

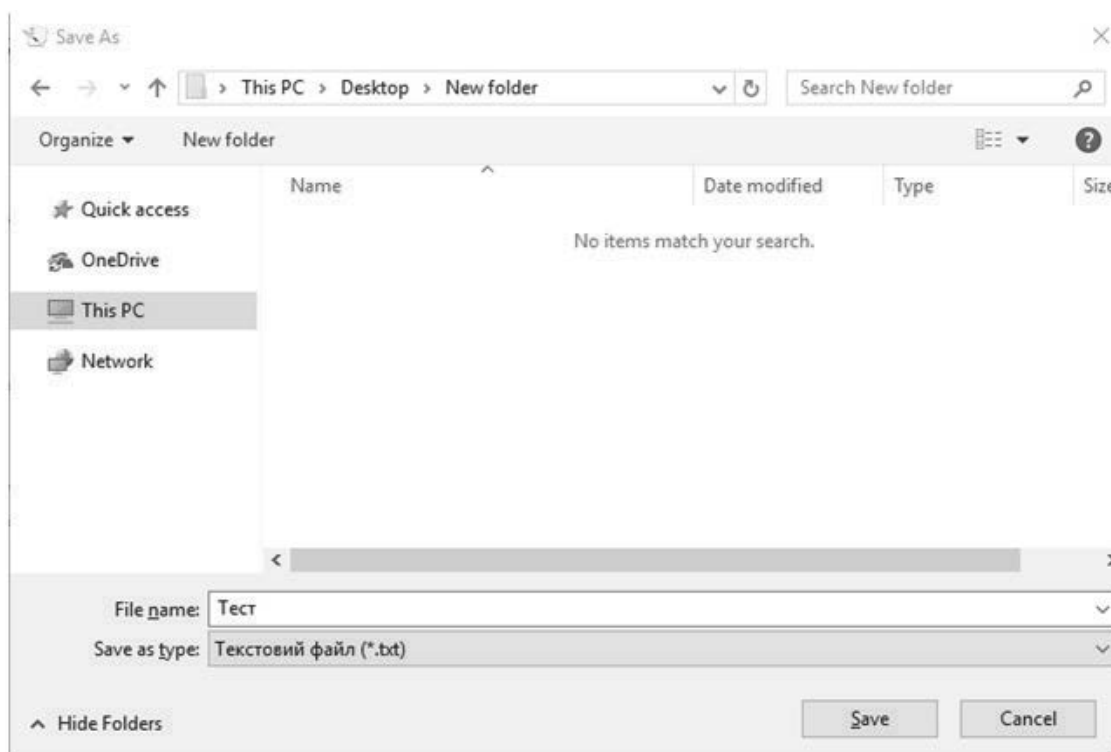
1. Export glossary from Moodle.
2. Open an exported file in the program.
3. Click "Export Glossary" and select the way to save a text file.

To randomly arrange the questions and answers of the test, you must follow the steps:

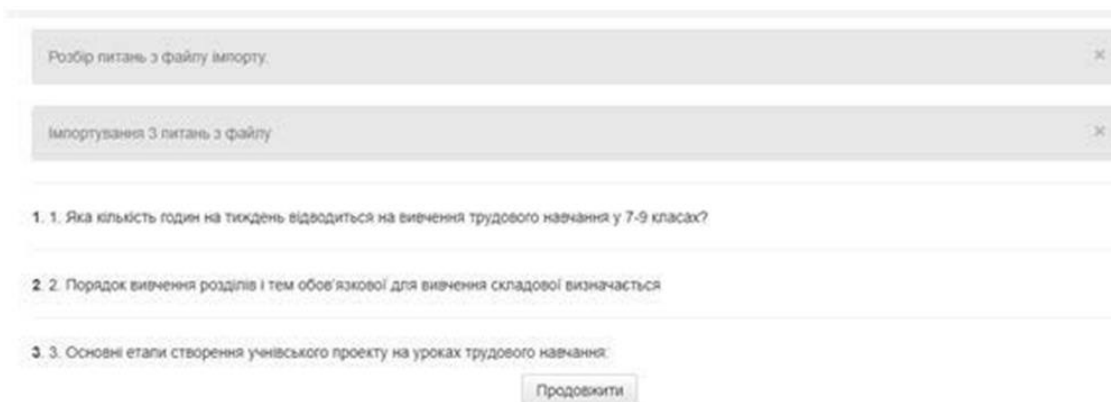
Open a text file with the tests by clicking File Open Document or "Open" on the toolbar. Copy the answers to the appropriate area on the right.

1. Click "Random selection", a settings window will appear, in which we select an appropriate formatting of our file. Then click "OK". We get the result in text fields.

The notion "readiness of the lecturer to use test technologies" is considered as an integrated formation of personality with a systemic organization, a multilevel structure consisting of interconnected motivational, cognitive and operational components, the formation of which will allow the teacher to successfully use test technologies in a professional activity for the organization, management and control of students' educational and cognitive activity (Fihurska, 2011).



*Fig. 2. Test save window*



*Fig. 3. Import of tests*

In order to study the readiness of teachers to use tests in the Moodle system, a questionnaire was conducted, which involved 52 lecturers of Pavlo Tychyna Uman State Pedagogical University. The questions of the questionnaire concerned the role of a test control in an educational process, the functions of testing in an identified level of students' academic achievement, the use of testing in Moodle, the implementation of communication "student – teacher" when working in Moodle and the difficulties, encountered in creating tests in Moodle.

According to the results of the questionnaire, it was found that: 53% of lecturers are ready to use testing in the Moodle system; 35% of lecturers have difficulty in

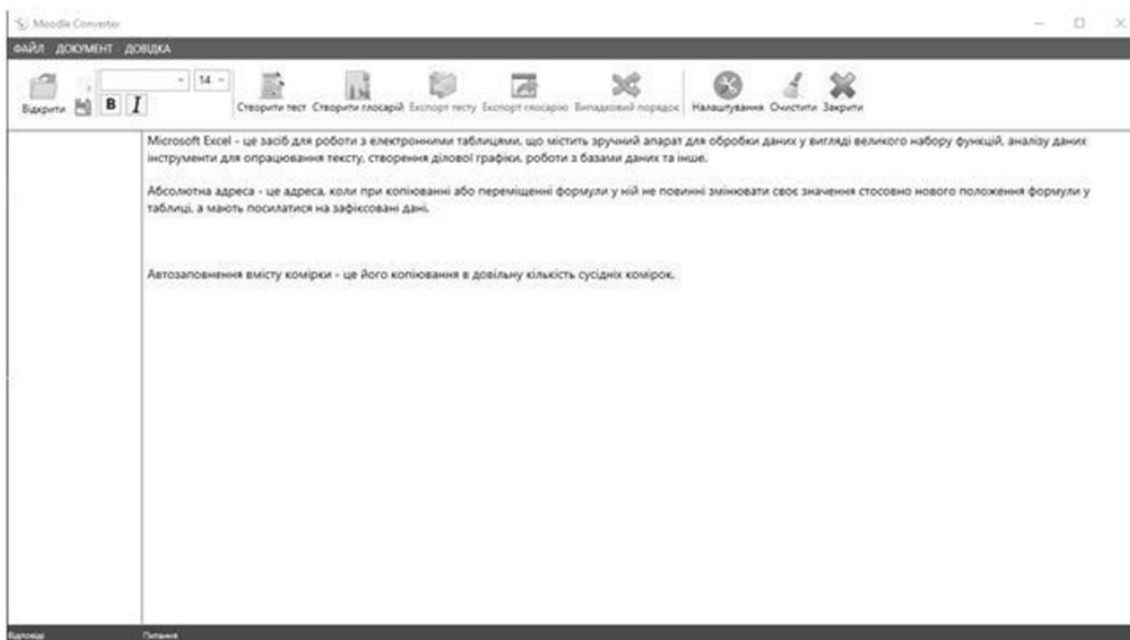
creating appropriate tests; 12% are not ready to use testing in a mentioned system.

After the lecturers were given the opportunity to use an author's program Moodle Converter in their professional activity, a questionnaire was reconducted. The results showed that after using the program, difficulties in creating tests occur in only 15% of lecturers. The number of lecturers, who testified to their readiness to use testing in the Moodle system was 82% (Fig. 8).

There is no doubt that a current trend in the organization of distance learning is the creation of information and educational environment in establishments of education and the conditions for its service support. A developed author's program "Moodle Converter" creates prerequisites for optimizing the process of distance testing in the study of academic disciplines. The versatility of the program is that it provides the ability to convert GIFT and XML files into a text file. Moodle Converter can be used to work with Moodle distance education system version 3.7.2 and earlier. The use of a developed program by teachers contributed to the formation of their readiness to use testing in the Moodle system.



*Fig. 4. Adding tests from the Question Bank*



*Fig. 5. An example of an open glossary*

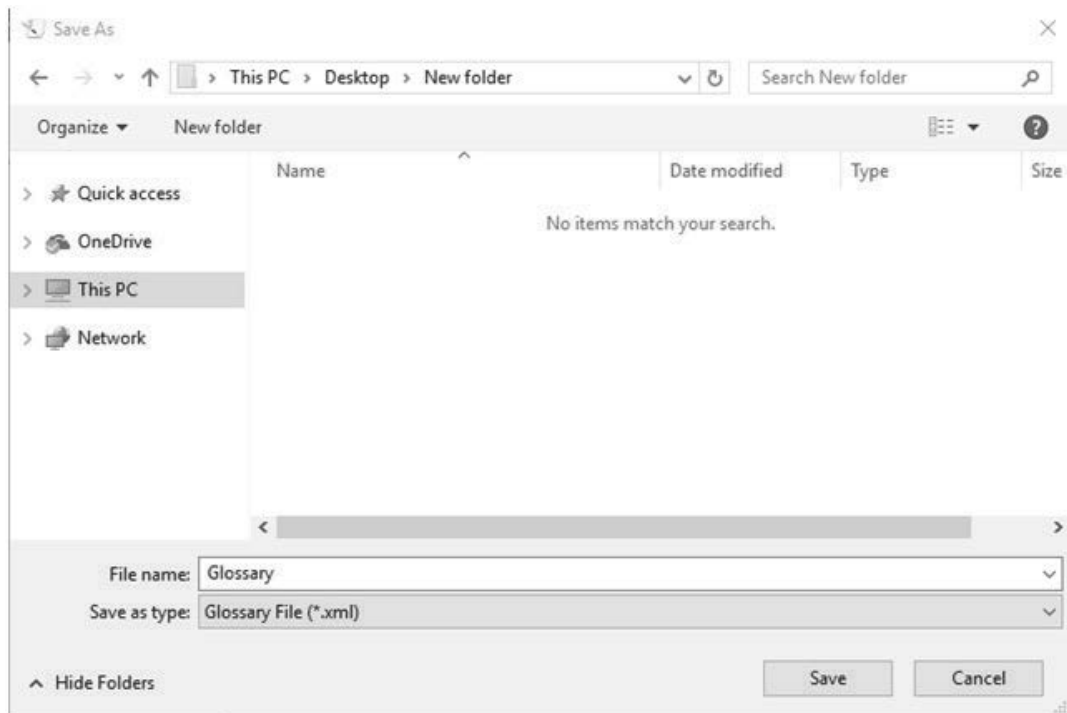


Fig. 6. Glossary save window

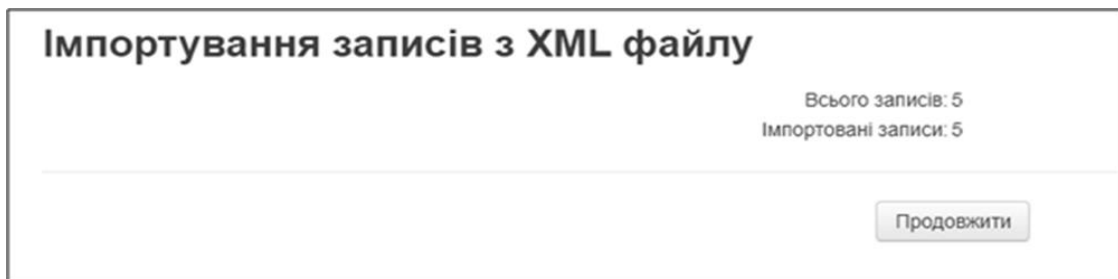


Fig. 7. Records importing from an XML file

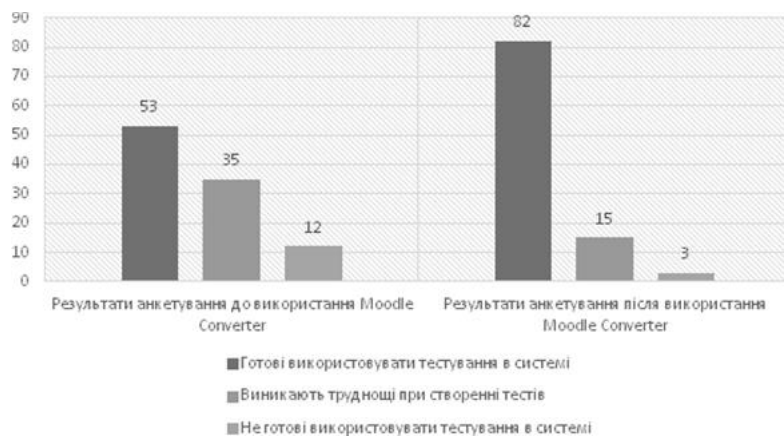




Fig. 8. The readiness of lecturers to use tests in the Moodle system

Further work can be aimed at implementing such functions as the ability to create tests using images, the ability to create tasks "Identify missing words", "Matching".

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### 1.3. METHODOLOGICAL ASPECTS OF DEVELOPING ELECTRONIC TRAINING COURSES FOR THE SYSTEM OF VOCATIONAL EDUCATION

#### МЕТОДИЧНІ АСПЕКТИ РОЗРОБЛЕННЯ ЕЛЕКТРОННИХ НАВЧАЛЬНИХ КУРСІВ ДЛЯ СИСТЕМИ ПРОФЕСІЙНОЇ (ПРОФЕСІЙНО-ТЕХНІЧНОЇ) ОСВІТИ

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*Modern conditions of educational activity have made distance and blended learning more relevant; most of the teaching staff of professional (vocational) education institutions (hereinafter – P(V)E) chose the Google Classroom platform and the Google Meet video conferencing tool to provide training, but there is no single methodology for designing e-learning courses using these digital tools.*

*Results: established the priorities of teachers of P(V)E institutions in choosing digital platforms for conducting blended learning (84.4% of pedagogical workers of P(V)E institutions conducted classes and assigned tasks using the Google Classroom platform, and 74.5% of those interviewed for the organization of video conferences chose Google Meet); the specifics of the methodology for designing e-learning courses for blended learning in the P(V)E system in wartime and post-war times (based on the digital tools of the Google Workspace for Education environment, since they are used by the majority of pedagogical workers of P(V)E institutions); the features of these tools are revealed (easy to use, adaptive, take into account different conditions and technical capabilities of the participants of the educational process, allow taking into account the individual characteristics and educational needs of students); the state of study of the problem in scientific sources was clarified (Ukrainian teachers and scientists distinguished from four to eight stages of designing e-learning courses and determined the different functional content of these stages); the optimal selection of the stages of the methodology of designing e-learning courses for blended learning (ADDIE: Analyzing, Designing, Developing, Implementing, Evaluating) is proposed, expanded and adapted for the needs of blended learning in P(V)E institutions in war and post-war times.*

*The method of designing e-learning courses for blended learning in the P(V)E system in war and post-war times is defined as a set of interconnected methods, forms and means of developing an e-learning course in the Google Workspace for Education environment; has five main stages of ADDIE design, taking into account the pedagogical processes necessary for blended learning in P(V)E institutions in war and post-war times; contributes to the development of a clear algorithm of interaction between teachers and students, the organization and support of pedagogical processes in the e-learning course, taking into account the peculiarities of the learning process and the individual characteristics of students.*

*Сучасні умови провадження освітньої діяльності актуалізували дистанційне та змішане навчання; більшість педагогічних працівників закладів професійної (професійно-технічної) освіти (далі – П(ПТ)О) обрали платформу Google Classroom та інструмент для відеоконференцій Google Meet для забезпечення навчання, однак немає єдиної методики проектування електронних навчальних курсів з використанням цих цифрових інструментів.*

*Встановлено пріоритети педагогів закладів П(ПТ)О у виборі цифрових платформ для проведення змішаного навчання (84,4 % педагогічних працівників закладів П(ПТ)О проводили заняття та надавали завдання з використанням платформи Google Classroom, а 74,5 % опитаних для організації відеоконференцій обрали Google Meet); визначено специфіку методики проектування електронних навчальних курсів для змішаного навчання в системі П(ПТ)О у воєнний та повоєнний час (базування на цифрових інструментах середовища Google Workspace for Education, оскільки ними користуються більшість педагогічних працівників закладів П(ПТ)О); виявлено особливості цих інструментів (легкі в застосуванні, адаптивні, враховують різні умови та технічні можливості учасників освітнього процесу, дають змогу врахувати індивідуальні особливості та навчальні потреби учнів); з'ясовано стан вивченості проблеми в наукових джерелах (українські педагоги і вчені виділяли від чотирьох до восьми етапів проектування електронних навчальних курсів і визначали різне функціональне наповнення цих етапів); запропоновано оптимальний вибір етапів методики проектування електронних навчальних курсів для змішаного навчання (ADDIE: Analysing, Designing, Developing, Implementing, Evaluating), розширених та адаптованих для потреб змішаного навчання в закладах П(ПТ)О у воєнний та повоєнний час.*

*Висновки: методика проектування електронних навчальних курсів для змішаного навчання в системі П(ПТ)О у воєнний та повоєнний час визначається як сукупність взаємопов'язаних методів, форм і засобів розроблення електронного навчального курсу в середовищі Google Workspace for Education; має п'ять основних етапів проектування ADDIE, з урахуванням педагогічних процесів, необхідних для змішаного навчання в закладах П(ПТ)О у воєнний та повоєнний час; сприяє розробленню чіткого алгоритму взаємодії між викладачами й учнями, організації та супроводу педагогічних процесів в електронному навчальному курсі, врахуванню особливостей процесу навчання та індивідуальних особливостей учнів.*

**Ключові слова:** професійна (професійно-технічна) освіта, змішане навчання, електронний навчальний курс, методика проєктування електронних навчальних курсів.

**Keywords:** professional (vocational) education, blended learning, e-learning course, methodology of designing e-learning courses

The modern conditions in which the educational industry of Ukraine is located have actualized new approaches to learning. Mobility and lack of attachment to the place and time of classes have become the main requirements of all branches of education. Quarantine-related restrictions have led to a significant increase in the role of distance and blended learning. In the future, the implementation of the training process in the conditions of martial law made its corrections, training became possible not according to the schedule, but in the presence of the necessary conditions and resources.

In 2022, the Laboratory of Distance Professional Education conducted a survey among pedagogical workers of P(V)E institutions regarding the main forms, means, methods as well as problems of conducting blended education. Thus, according to the results of the survey, 30.7% of teaching staff sent assignments to students through social networks and messengers; 78% of respondents carried out control of educational results during online learning with the help of electronic testing.

51% of pedagogical workers indicated that daily online classes were held and tasks were performed on various platforms; classes were conducted and tasks were performed using the same platform - 50.5% of employees. Google Class room became this platform for the vast majority of teaching staff (84.4%). Also, 74.5% of respondents indicated that Google Meet has become a digital tool for organizing video conferences.

Blended learning is an approach in which the main forms of learning-educational courses, lectures, and practical classes are used in a mixture with others, such as independent work, distance learning, and learning technologies. They are used to satisfy the requirements of the students of education and to convey a larger amount of information. Along with online classes, the use of e-learning courses has become relevant in blended learning for remote interaction with students.

Given the results of the survey, we can talk about the need to create a methodology for designing e-learning courses using Google Classroom and other Google products for education.

Blended learning is an approach to learning that includes the use of online and offline learning materials to achieve educational goals. Within the framework of blended learning, it is possible to use digital tools for audio or video films, educational applications, group discussions, etc. The main goal of blended learning is to expand learning opportunities for students and provide them with an optimal educational environment.

Google has tons of resources that can help you create an eLearning course. One

of the most popular tools is Google Classroom. It is a free platform that allows you to create and organize training courses for students. It allows you to create student accounts and send them homework, tests, and access to manuals and other educational resources. Google Classroom provides the possibility of automatic assessment of homework and a system of messages for exchanging information between students and teachers.

Google has developed other tools to help expand learning opportunities. For example, Google Slides allows you to create presentations, and Google Forms can help you receive and collect information from students. With the help of Google's digital tools for education, you can develop online lectures, video tutorials, spreadsheets, e-mail, social networks, and interactive dialogues for educational purposes. The use of such tools allows the P(V)E institution to provide a convenient and effective learning process for students.

An e-learning course (ELC) is a set of educational and methodological materials and educational services created for the organization of individual and group training using electronic technologies.

Google Classroom is a free digital platform for creating educational courses for P(V)E institutions and users with private Google accounts. In it, you can create e-courses, as well as assign and check tasks. You can develop a e-learning course on the platform; enroll students on it; distribute educational material and tasks among course participants; evaluate these tasks, monitor the progress of tasks; organize students' communication.

This environment works on different devices (phone, tablet, laptop); the software is provided free of charge for use in Ukraine; there are many methodological materials on the use of the software.

The simplest option for distributing roles in Google Classroom is the teacher-student model. The teacher places materials, attaches files, and creates tasks, students get acquainted with information, do homework, and familiarize themselves with the evaluation of completed tasks. In Google Classroom, you can post comments, and return tasks for revision.

Google Classroom also has administrator and curator roles. Supervisors simply monitor students' performance without having access to the course, receiving evaluation results by mail. Administrators can see all courses, participants, and their work, operating on the roles of participants.

Google Classroom, Gmail mail, Google Drive, and Google Docs are combined into a single system that provides free mutual use of text content, videos, and images for the use of interactive learning methods.

Exercises are published in the «Tasks» tab. Knowledge can be tested in several ways: survey, test, Blank Quiz template, and others. Both the grading scale and deadlines can be adjusted to meet the teacher's needs.

Students can view assignments in the feed, in the course calendar, or on the To-Do List page. Tasks have the statuses «assigned», «not submitted», and «completed». An individual task can be assigned to an individual student.

You can create tasks using Google Forms, which are also integrated with Google Classroom. You can create tests with a choice of one or more answers and open-ended tasks, by using pictures and videos. After students have completed the tasks, the teacher automatically receives a notification.

Any method of developing an e-learning course has a certain algorithm, the sequential execution of certain stages. The number of these stages and the processes described in them depends on the chosen technique. However, it is possible to single out the most general, basic stages of the development of e-learning courses: definition of course goals; choosing a platform for conducting the course; creating the structure of the course and its content; saving and downloading materials for the course; creating tests and tasks to test knowledge; introduction of additional resources for students; launch of the course and start of its implementation; processing the results and completing the course.

The most common modern system design method is ADDIE. This is an abbreviation of the first letters of the English names of the main stages of development, there are five of them: Analyzing, Designing an e-learning course, Developing it, Implementing the main processes, and Evaluating the results of the project/course.

The ADDIE system approach was applied by Ukrainian scientists and teachers to the development of e-learning courses (Bykov, Kukharenko, Syrotenko, Rybalko, & Bogachkov, 2008, p. 31-33), and it has the following components:

1. Analysis – educational activity is analyzed and tasks related to its formation are determined following the needs.
2. Design – the sequence (algorithm) of training is determined, and approaches, methods, and goals of the training are chosen and constructed.
3. Development of the designed educational system.
4. Implementation (implementation) - target training.
5. Evaluation, current and final.

Jerold Kemp's teaching design model has seven main stages: 1) analysis (resources, conditions, characteristics of the audience); 2) determination of priorities and standards; 3) determination of development goals and directions; 4) selection of educational content, environment, strategy, scenario; 5) development of e-learning course, tests; 6) development and implementation of course modules; 7) assessment, revision of the course. We can see that this is the same ADDIE method with somewhat detailed stages of developing an e-learning course as a project.

The developers of distance courses at the University of Twente (Enschede, the Netherlands) create educational materials in ten steps, but these steps are also an interpretation of the ADDIE methodology: analysis (identification of needs and goals; analysis of the content of the educational course), design (development, design,



programming of lessons; development of ways of organizing the educational process); development (collection of educational materials; development of an algorithm for their passage), execution (preparation of methodical materials, recommendations, instructions); preparation of educational modules); evaluation of the educational course and improvement of educational materials.

The majority of domestic developers of e-learning courses distinguish a different number of stages in the development of electronic courses (from three to ten), which can be grouped into four main, very general stages, which also contain all components of the ADDIE methodology (Artyushenko, Mozgova, Matyushko, Lytvyn, & Lebedynska, 2020; Bykov, Kukharenko, Syrotenko, Rybalko, & Bogachkov, 2008; Yagupov, Petrenko, Kravets, et al., 2019; Prykhodkina, Tymoshko, Zuieva, Sholokh, Noskova, & Lebid, 2021).

The organizational stage (analysis), during which the materials for the development of the training course are analyzed, their compliance with the requirements, the concept of the e-learning course is developed, its goals are formulated, the final results of the course are determined, the model, methods, training tools are selected, the requirements for content of the course, performers and term of course development, etc.

1. The preparatory stage (design and development), during which a model of the learning process is developed taking into account the curriculum of the course, the structure, scenario, and components of the electronic course, the selection of software and digital tools is carried out to create the structural «framework» of the course and educational content, learning content is selected from existing or created.

2. The main stage (implementation) - with the help of the tools selected in the previous stages, the modules of the e-learning course are directly composed.

3. The final stage (evaluation) – the compliance of the educational materials of the course with the goals and objectives set in the first stage is checked, the identified errors are corrected, and the e-learning course is tested in the educational process.

Separately, it should be noted the detailing of the stages of the development of e-learning courses by the team of authors (Prokopenko, Pidchasov, Moskalenko, Dotsenko & Lebedeva, 2019), who developed eight stages of creating an electronic course and described the content of these stages in a structured manner. The first stage is the analysis of the target audience (the number and key characteristics of the contingent of students). The second stage is the formulation of goals and objectives for students, the purpose and final results of studying the course; the study of motivation, and features of stimulating students to educational activities. The third stage is the determination of conceptual (content) and procedural (types of activity) components of the course, the determination of criteria for selecting educational material for the course, determination of the subject and content of the course modules.

The fourth stage is the creation of the structure of the distance course and the

development of the educational and thematic plan of the course (work program); selection and development of educational content; setting up the virtual learning environment for the course and creating the course structure in this environment; dividing the course into modules and topics that have their defined structure. The fifth stage is the selection of a system of forms of organization of students' activities, types of educational activities, and mechanisms of their implementation for students and tutors/teachers. The sixth stage is working on the content of the course, reviewing and processing the educational materials according to the formed system of requirements. The seventh stage is the development of forms of control of educational activities and the quality of students' knowledge, methods of feedback to students, and organization of reflection. The eighth stage is the evaluation of the pedagogical effectiveness of the created course.

Therefore, the development of e-learning courses is carried out within the ADDIE system approach: analysis, design, development, implementation, and evaluation.

The methodology for designing e-learning courses for blended training in the P(V)E system in war and post-war times is defined as a set of interconnected methods, forms, and means of developing an e-learning course in the Google Workspace for Education environment.

Target audience: managers, methodologists, teachers, masters of industrial training, and other pedagogical workers of P(V)E institutions.

The goal: to increase the level of professional and digital competencies of pedagogical workers of P(V)E institutions by mastering the system of theoretical knowledge and forming practical skills regarding the design of e-learning courses for blended learning and the organization of professional training of students using the Google Workspace for Education environment.

The main task is to acquire the knowledge and skills of pedagogical workers of P(V)E institutions regarding the basic methods of designing, developing, assigning, supporting, and using e-learning courses in blended learning.

The implementation of the methodology is carried out according to the five stages of ADDIE (Analyzing, Designing, Developing, Implementing, Evaluating), detailed for the needs of blended learning in P(V)E institutions in war and post-war times.

Analysis – educational activity is analyzed and tasks related to its formation are determined by needs, the target audience is analyzed (the number and key characteristics of the contingent of students), and the goal of training is determined (intermediate components: analysis of the target group, specialist activities, tasks, predicted learning outcomes; analysis/decomposition of skills; analysis of knowledge on which skills are based; general/special learning tasks; tasks related to the formation of learning activities); goals and tasks for students are formulated regarding the competencies that need to be formed, the purpose and final results of studying the



course; the motivation and features of stimulating students to educational activities are studied. The composition of the course development team is determined. Choice of learning model (rotational, flexible, self-mixing model, or advanced virtual model).

1. Design – the conceptual (content) and procedural (types of activities) components of the course are determined, the criteria for selecting educational material for the course, the subject and content of the course modules are determined; the sequence (algorithm) of training is determined, the approaches, methods and means of training are selected and constructed, the training activity is determined and the training scenario is created (intermediate components: sequence/algorithm of the training content; development of the curriculum project). The choice of a system of forms of organization of students' activities, types of educational activities, and mechanisms of their implementation for students and tutors/teachers. Exploring the capabilities of the Google Workspace for Education system for blended learning. Development of the model and structure of the distance course using Google Classroom.

2. Development of the designed system using the analysis of initial data; creation of the distance course structure and development of the educational and thematic plan of the course (work program); selection and development of educational content; setting up the virtual learning environment for the course and creating the course structure in this environment; dividing the course into modules and topics that have their defined structure; development of training exercises, materials, and tools, setting up the course and testing (intermediate components: lesson plan (program); presentation of the program; training tools; exercises). Development of forms of control of educational activities and the quality of students' knowledge, methods of feedback to students, and organization of reflection. Working with the Google Classroom service: creating an e-learning course in Google Classroom; filling the class with basic structural elements; creating various types of tasks: material, tasks with a test, questions, creation of a topic; attachment of educational materials to the course; their publication settings; customizing the course interface; entering tasks and activities into the course calendar for creating the main types of tasks and methods of responding to them; ways to copy and archive Google Classroom.

Implementation – teaching students using an electronic course (intermediate components: execution plan (algorithm); support protocol; feedback algorithm). Working with the Google Classroom service: inviting students to the course; monitoring and renewal of tasks and events in the course calendar; using Google Meet for video meetings (moderator functions; screen casting; setting camera visual effects; installing class recording extension; class recording technology; getting a link to the recorded session; demonstration of the Jamboard board during the video lesson); using Google Classroom as a learning management system (use of student mode, teacher mode; main tabs «flow», «people», «tasks», means of communication between teachers and students; means of evaluating students). Organization of joint work in distance learning

(using Google Drive, creating folders in it and setting up sharing access, shared access to files, and joint work on them; joint work with Google document, Google sheet, and Google presentation in editing mode.

3. Evaluation. Ongoing student assessment is done for the interim results of each phase. The final assessment of students is carried out after the direct learning process, taking into account feedback (intermediate components: a plan of current assessment; list of necessary actions for current assessment; plan of final assessment; results of final assessment). Working with the Google Classroom service: creating various types of questionnaires and tests in Google Forms; registration, evaluation settings, receiving a link to the ready-made Google form; the processing of results; creating a summary table with test results.

Assessment of pedagogical effectiveness of the created course, reflection for teachers-developers of the course. Results of the technique:

1) understanding by pedagogical workers of the possibilities of using the Google Workspace for Education system for the organization of blended learning in P(V)E institutions;

2) practical skills in the development of an electronic course, interactive interaction, organization, and support of the educational process using the Google Workspace for Education environment;

3) knowledge of the algorithm for creating Google Classroom as a learning management system and interaction between teaching staff and students in P(V)E institutions;

4) knowledge and practical skills in using the tools Google Meet, Google Disk, Jamboard, Google Forms, and other applications of the Google Workspace for Education system for professional training of students in P(V)E institutions in war and post-war times;

5) practical skills of pedagogical workers regarding the evaluation of the developed e-learning course and reflection on the results of its design.

Therefore, the e-learning course is primarily an educational project, this adds specific, purely pedagogical, requirements to the development of the electronic course and requires pedagogical detailing of the five main design stages of ADDIE (Analyzing, Designing, Developing, Implementing, Evaluating) for the needs of blended learning in institutions P(V)E in war and post-war times. The methodology for designing e-learning courses for blended learning in the P(V)E system in war and post-war times is defined as a set of interconnected methods, forms, and means of developing an e-learning course in the Google Workspace for Education environment. This technique makes it possible to develop a clear algorithm of interaction between teachers and students, organization and support of pedagogical processes in an electronic educational course, taking into account the peculiarities of the learning process and individual characteristics of students.

## 1.4. ORGANIZATIONAL AND PEDAGOGICAL CONDITIONS FOR DISTANCE LEARNING OF FUTURE PHARMACY SPECIALISTS

### ОРГАНІЗАЦІЙНО-ПЕДАГОГІЧНІ УМОВИ ДИСТАНЦІЙНОГО НАВЧАННЯ МАЙБУТНІХ ФАХІВЦІВ З ФАРМАЦІЇ

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*The rapid spread of viral diseases worldwide requires a focus on the introduction of distance learning for future Masters of Pharmacy in such disciplines as Microbiology, Virology and Immunology. Hence, it is necessary to determine and substantiate the organizational and pedagogical conditions of distance learning of future Masters of Pharmacy in the period of spread of viral diseases. We are talking about external, internal and technological organizational and pedagogical conditions. The implementation of these conditions involves the creation of information and educational environment as a web resource with electronic audiences in higher medical educational institutions.*

*Results: it has been investigated that the current state of spread of viral diseases determines the search and introduction of new technologies (digital) and forms of training of pharmacists that will contribute to the continuous updating of their knowledge and skills; it has been found that in the conditions of quarantine, distance learning of future specialists of the pharmaceutical industry allows to form professional competencies on the basis of individual training of students of pharmaceutical education.*

*In the period of spread of viral diseases, the effectiveness of distance learning of future Masters of Pharmacy requires the provision of the necessary external, internal and technological organizational and pedagogical conditions. Their implementation makes it possible to: ensure the individualization of education by students online and offline; form practical skills, master professional competencies. Distance learning of future Masters of Pharmacy has a number of obvious advantages over the classroom form of education: the guaranteed fast and remote access to the latest pharmaceutical content is given; educational information and other materials are constantly updated from official sources of pharmaceutical and medical companies; there is an opportunity to get acquainted with the professional experience of pharmaceutical and medical companies, their professional experience, technological features of the production process in accordance with the needs of students; opportunities are open for the organization of independent work of students.*

*Стрімке поширення в усьому світі вірусних захворювань потребує зосередження уваги на запровадження дистанційного навчання майбутніх магістрів фармації із таких дисциплін, як мікробіологія, вірусологія та імунологія. З огляду на це, зумовлюється необхідність визначення та обґрунтування організаційно-педагогічних умов дистанційного навчання майбутніх магістрів фармації в період поширення вірусних захворювань. Йдеться про зовнішні, внутрішні та технологічні організаційно-педагогічні умови. Реалізація цих умов передбачає створення у вищих медичних закладах освіти інформаційно-освітнього навчального середовища як веб-ресурсу з електронними аудиторіями.*

*Досліджено, що нинішній стан поширення вірусних захворювань детермінує пошук і запровадження нових технологій (цифрових) і форм підготовки фармацевтів, що сприятимуть безперервному оновленню їхніх знань та вмій; виявлено, що в умовах карантину дистанційне навчання майбутніх фахівців фармацевтичної галузі дає змогу формувати професійні компетентності на основі індивідуального навчання здобувачів фармацевтичної освіти.*

*Висновки. У період поширення вірусних захворювань ефективність дистанційного навчання майбутніх магістрів фармації потребує забезпечення необхідних для цього зовнішніх, внутрішніх та технологічних організаційно-педагогічних умов. Їх реалізація дає змогу: забезпечити індивідуалізацію навчання здобувачів освіти в режимі online та offline; формувати практичні навички, оволодівати професійними компетентностями. Дистанційне навчання майбутніх магістрів фармації має низку очевидних переваг над аудиторною формою здобуття освіти: надається гарантований швидкий та віддалений доступ до найновішого фармацевтичного контенту; навчальна інформація та інші матеріали безперервно оновлюються з офіційних джерел фармацевтичних та медичних компаній; є можливість ознайомлення із професійним досвідом фармацевтичних і медичних компаній, технологічними особливостями виробничого процесу відповідно до потреб здобувачів освіти; відкриваються можливості для організації самостійної роботи здобувачів освіти.*

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**Ключові слова:** дистанційне навчання, майбутні маістри фармації, організаційно-педагогічні умови, медичні заклади вищої освіти

**Keywords:** distance learning, future Masters of Pharmacy, medical institutions of higher education, organizational and pedagogical conditions.

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One of the important components of the education system of Ukraine is higher pharmaceutical education, because its functionality is aimed at the formation of professional competencies of human resources in the field of country's health care. In turn, the trained highly-competent pharmaceutical workers focus their knowledge and skills on strengthening and maintaining public health. However, the current state of coverage of the population of Ukraine with viral diseases encourages the search for and implementation of new technologies for the training of future Masters of Pharmacy, including distance learning, for the formation of professional competencies. The development of digital technologies in recent years necessitates their introduction into

the educational process of training the pharmaceutical workers. This will ultimately meet current trends, demands and the updated needs of the information society.

Problems of distance medical science and online education of future pharmacists are mentioned in the works of scientists: F. Gizeh, E. Gordienko, J. Gromov, G. Korytari, A. Chirikov, M. Valyashko and others. The issue of digitalization of education is the subject of research by O. Bazelyuk, A. Gurzhiy, L. Kartashova, S. Kravets, V. Kruchek, V. Oliynyk, O. Spirin, N. Stuchynska, O. Piminov and others. The results of research on the development of pharmaceutical education and training of specialists in the pharmaceutical industry are revealed in the works of scientists: K. Amosova, D. Volokh, B. Gromovyk, B. Zimenkovsky, I. Zupanets, Z. Mnushko, T. Kalyniuk, L. Kaidalova, A. Nemchenko, M. Syatin, V. Tolochko, J. Tsekhmister, V. Chernykh, O. Chaly and others. Some issues of the research problem were outlined by the author in the following publications: "Continuous professional training of pharmaceutical industry employees by remote technologies" (Klos, 2019a), "Distance learning of future Masters of Pharmacy: problems and solutions" (Klos, 2019b), "Trends in the training of pharmaceutical professionals: foreign experience" (Klos, 2019c), "Digital learning environment for pharmaceutical professionals: a balance between theory and practice" (Klos, 2019d). The article aims to substantiate and highlight the peculiarities of distance learning of future Masters of Pharmacy in the context of escalating viral diseases.

Results and discussion. The important task in the formation of professional competencies of future Masters of Pharmacy in the medical institution of higher education is to provide the latest knowledge in Microbiology, Virology and Immunology. The importance of these sciences is associated with the anthropogenic impact on the microbiological world, the spread of opportunistic diseases, emergent viral infections. Pharmacists should always be informed about the health status of the population, the types of diseases and pathogens that cause them. This is explained by the fact that pharmacists (quite often, simultaneously with the sale of medicine) have to deal with the selection of their analogues, search for alternative solutions, provide pharmaceutical care to patients. Pharmacists must be able to independently and responsibly determine over-the-counter medicine, especially in times of mass morbidity – epidemics and pandemics. Also, the content of professional training of future Masters of Pharmacy involves taking into account compliance with the norms, regulations and standards of the European Higher Pharmaceutical Education Area. The result of such training will be highly qualified pharmaceutical specialists who, in addition to professional qualities, will have a high level of mobility and competitiveness not only in the national but also in the world labor markets.

The need for such pharmaceutical workers is due to:

- first, clear progressive lines of development of medical and pharmaceutical industries – there are trends in updating industry technologies, tools and devices for professional use;



– secondly, relevant demographic trends, such as: an increase in the number of diseases associated with people's lifestyles; state of ecology; life expectancy; chronic diseases, etc.

Constantly, variable requirements to the professional competencies of specialists in the pharmaceutical industry actualize the introduction of distance learning in the training of future Masters of Pharmacy. After all, during the studies at the medical educational institution, they must acquire a fairly comprehensive system of integrated knowledge and skills in such subjects as Microbiology, Virology and Immunology, which will be used in further professional activities. At the same time, it should be noted that events related to the epidemic spread of influenza, measles, tuberculosis, coronavirus and other diseases determine the need for future Masters trained to provide informational assistance to patients in choosing prophylactic medicine.

Due to the introduction of quarantine, in order to prevent the spread of coronavirus infection in Ukraine, higher educational institutions (HEIs) have introduced distance learning for all students. That is why our study focuses on the features of distance learning of future Masters of Pharmacy. Currently, the process of teaching Microbiology, Virology and Immunology requires the development of innovative learning technologies taking into account the specifics of viral diseases, improving the forms of learning and interaction of teachers and students at a distance mode. The observance of the provisions of the Code of Ethics for Pharmaceutical Workers of Ukraine (2012) is quite important for future Masters of Pharmacy. Among the provisions the main ones are: disease prevention, preservation and promotion of human health. To this end, they must be competent in the pharmaceutical industry, constantly deepen their professional knowledge and skills, provide quality pharmaceutical advice on the issue of possible spread of counterfeit medicine, take an active part in health education.

The professional activity of future Masters of the pharmaceutical industry necessitates the formation of professional knowledge (Microbiology, Virology and Immunology), skills, responsible attitude and medical values. According to the "Standard of Higher Education of Ukraine", the ability of future Masters of Pharmacy to carry out professional practice in the interests of public health safety is updated. They should also be able to work with other health safety professionals. Regarding the concept of professional competence of provisor, I. Koniashyna (2017, p. 208) notes that it is "a personal formation that provides quality professional performance and includes analytical, communicative processes and provides the process of development and self-development of the individual. It consists of experience, theoretical knowledge, practical skills, personal qualities that ensure the effective implementation of professional activities, the ability to solve problems of varying complexity on the basis of existing knowledge and experience.

Based on the above, future Masters of Pharmacy should have continuous access to new content of pharmaceutical education through electronic resources. In addition,

innovative learning technologies aimed at introducing changes in the educational process of medical higher educational institution (MHEI) should be applied, the derivative of which will be a rethinking of attitudes to future professional activities.

The analysis of the process of training pharmacists and the obtained results allow us to believe that the current state of use of digital technologies (DT) in higher medical education needs to be improved. That is why there is a need to use digitalization tools, the properties of which will allow not only to quickly select, analyze, systematize, accumulate and continuously update innovative information as educational material. Future Masters of Pharmacy should have open access to scientific material to be obtained from the latest information sources – this will contribute to the continuity of their professional development, increase the level of professional competencies and provide innovation with theoretical knowledge and practical skills (Radkevych, 2019, pp. 128-139).

This involves determining the organizational and pedagogical conditions of distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy, the content of these subjects. Under the organizational and pedagogical conditions, the author understands a set of factors that provide: regulation, interaction of objects and phenomena of the educational process to achieve this goal; improving interpersonal relationships of participants in the educational process; solving specific didactic tasks; intensification of educational activities of future pharmaceutical specialists, formation of their self-study, motivation and professional interests.

In providing organizational and pedagogical conditions for distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy, it is advisable to take into account the specifics of the educational process of higher educational institution and the essence of the professional activity of pharmacists; as well as the possibility of their implementation as individual components of the education system and the educational process as a whole.

Organizational and pedagogical conditions can be conditionally divided into necessary (mandatory) and sufficient. Under the necessary conditions of distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy we understand the conditions without which the purpose of training can not be achieved; and under sufficient conditions we mean the ones, which are sufficient to obtain positive results. These organizational and pedagogical conditions are divided into three categories – external, internal and technological. External organizational and pedagogical conditions are aimed at creating an innovative learning environment – information and educational environment in order: to form theoretical and practical knowledge of Epidemiology, Morphology and Physiology of pathogens of infectious diseases, the pathogenesis of infectious diseases; providing professional knowledge and practical skills to determine the effectiveness of antimicrobial, antiviral and immunobiological medicine; pharmaceutical competencies in the health care system



(including specific prevention of infectious diseases, promotion of the healthy lifestyle, advice on issues of safety and rational use of medicine and medical devices); competencies in the field of providing pharmaceutical care to the population; organizational, managerial competencies; professional and personal competencies, as well as content optimization, updating the forms and means of organizing the educational process.

Internal organizational and pedagogical conditions are determined by the personal capabilities and abilities of each individual student and are aimed at forming: the ability of the individual to carry out professional practice in the interests of public health safety; motivation to obtain professional knowledge through the inclusion of Masters of Pharmacy in professionally oriented practice; positive attitude to the future profession.

The importance of providing technological organizational and pedagogical conditions, namely: technical and scientific-methodological support (educational and instructional materials) of distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy is updated in accordance with the priorities of the digital society, the introduction of information and digital technologies in the educational process, the use of electronic education management systems.

Thus, the organizational and pedagogical conditions of distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy as a set of tools, methods, actions and technologies are reasoned. They ensure the achievement of effective changes in the training of Masters of Pharmacy in higher educational institution and promote the level increase of formation of their pharmaceutical competences, stimulation of their cognitive activity of future Masters of Pharmacy and increase motivation to study.

According to the author's vision, organizational and pedagogical conditions of distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy will positively contribute to the formation of innovative orientation of educational activities, motivational atmosphere, creative approach to innovation introduction. The unifying factor of all categories of organizational and pedagogical conditions (external, internal, technological) is the development of information and educational environment (IEE) in higher educational institution (HEI), continuous access to which is provided to future Masters of Pharmacy (*Fig. 1*). The structure of IEE as a web resource should have an internal subject (disciplinary) distribution to electronic audiences, where students have access to reliable scientific information about infectious diseases, pathogens that cause them, their specific and nonspecific prevention, treatment methods, as well as online consultations from tutors (*Fig.2*).

CHAPTER 1. THEORETICAL AND METHODOLOGICAL ASPECTS  
OF ORGANIZING THE EDUCATIONAL PROCESS IN  
THE CONDITIONS OF BLENDED AND DISTANCE  
LEARNING



Fig.1. Information and educational environment for distance learning of Microbiology, Virology and Immunology of future Masters of Pharmacy

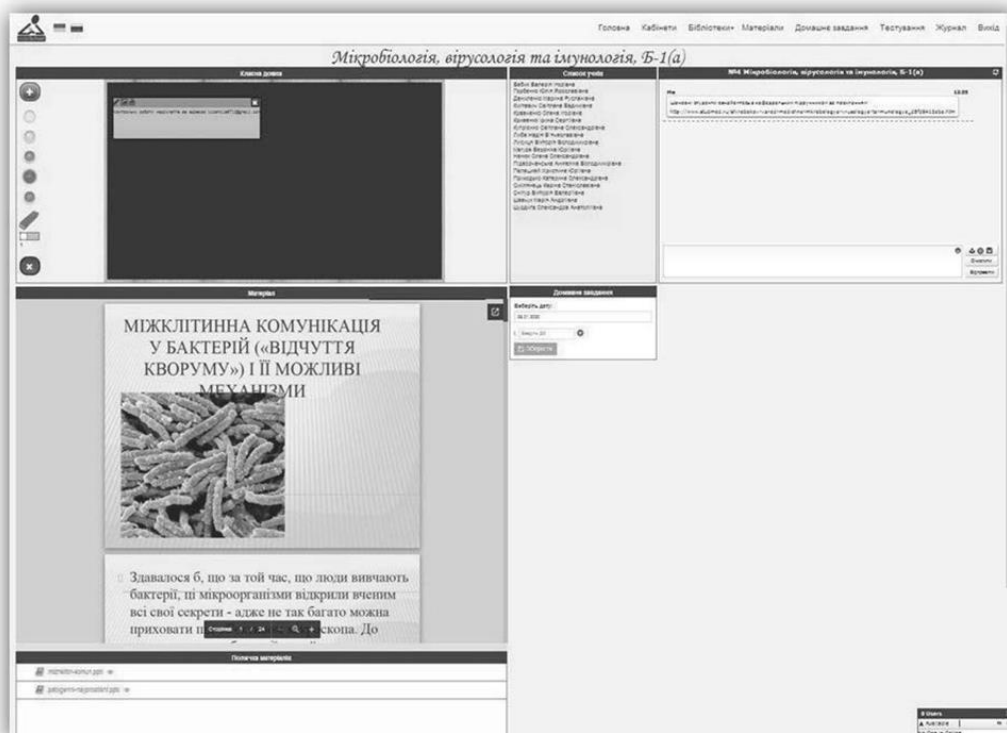


Fig.2. Electronic audience (e-audience) of information and educational environment

Professionally oriented information and educational environment is a space for real interaction of participants in the educational process, where the professional development of everyone is optimized. The mission of IEE is to provide practical and theoretical assistance to future Masters of Pharmacy in acquiring knowledge, developing skills and abilities; to be able and mobile to lifelong learning (Hurzhii, 2019, pp. 22-26).

All IEE components are available on different operating systems; they are intuitively understandable; easily adapt to the hardware and software of different versions of the user (computer, tablet, laptop, etc.) of any configuration, regardless of the year of manufacture, brand and model; interconnected and at the same time independent of each other (each is a separate platform that is connected with a common system) – this facilitates the problem of loading them; dynamic, may be subject to administrative adjustment; have the same type, simple, clear interface that is attractive to users with different levels of readiness to use digital technologies; do not require special user training courses; open and personally oriented in their didactic and organizational content.

In the e-classroom, the teacher downloads teaching materials, communicates with students both online and offline. In turn, each student receives personal input (login and password), according to which he has free access to the e-audience in which the educational process takes place.

The organization of the process of teaching Microbiology, Virology and Immunology of future Masters of Pharmacy in the conditions of IEE depends on: objective factors (means of managing the interaction of objects and phenomena of the educational process, interpersonal relationships of participants in the educational process to perform professionally oriented didactic tasks, revitalization of educational-cognitive activities of future pharmacists, which encourage the use of the activity approach); subjective factors (taking into account the personal qualities of participants in the educational process, the level of their skills of independent work, motivation, professional interests, which encourage the use of personality-oriented approach).

In the period of spread of viral diseases, the effectiveness of distance learning of future Masters of Pharmacy requires the provision of the necessary external, internal and technological organizational and pedagogical conditions. Their implementation makes it possible to: ensure the individualization of education of students online and offline; form practical skills, master professional competencies. Distance learning of future Masters of Pharmacy has a number of obvious advantages over the classroom form of education: the guaranteed fast and remote access to the latest pharmaceutical content is given; educational information and other materials are constantly updated from official sources of pharmaceutical and medical companies; there is an opportunity to get acquainted with the professional experience of pharmaceutical and medical companies, their professional experience, technological features of the production

process in accordance with the needs of students; opportunities are open for the organization of independent work of students.

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## 1.5. ORGANIZATION OF BLENDED LEARNING FOR FUTURE SKILLED WORKERS

### ОРГАНІЗАЦІЯ ЗМІШАНОГО НАВЧАННЯ МАЙБУТНІХ КВАЛІФІКОВАНИХ РОБІТНИКІВ

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*The study relevance of vocational training organization of skilled workers in the conditions of blended learning is determined by the need to quickly adapt the system of vocational (vocational and technical) education to changes in various spheres of public life, in particular, globalization, integration into the European space, digitalization, quarantine restrictions, military operations in Ukraine for the effective implementation of educational tasks.*

*The article analyzes the state and peculiarities of vocational training organization of skilled workers in the conditions of blended learning.*

*It is found that there is a need for state regulation and definition of the blended learning status, unification and efforts coordination of teachers, methodologists, scientists in the field of digitalization of education, creation and use of digital educational tools, digital competence development of teachers and students, dissemination of positive domestic and international pedagogical experience in the use of digital technologies through open specialized electronic platforms. Pedagogical staff are sufficiently motivated to master digital educational tools and technologies for organizing blended learning, are aware of the need to improve the level of digital culture. The most popular forms of professional development in this area are interactive forms that involve subject-subject interaction and partnership. There is a need to update the educational standard, vocational teacher training programs, and the content of teacher training programs; create an appropriate information and educational environment; and promote the practice of holding master classes, trainings, and webinars on the use of digital technologies to improve the digital competence of teachers.*

*Актуальність дослідження організації професійної підготовки кваліфікованих робітників в умовах змішаного навчання визначається необхідністю швидкої адаптації системи професійної (професійно-технічної) освіти до змін, що відбуваються в різних сферах суспільного життя, зокрема до глобалізації,*

*інтеграції в європейський простір, цифровізації, карантинних обмежень, військових дій на території України.*

*Здійснено аналіз стану та особливостей організації професійної підготовки кваліфікованих робітників в умовах змішаного навчання.*

*Висновки: з'ясовано, що є потреба в державному унормуванні та визначенні статусу змішаного навчання, об'єднанні та координації зусиль викладачів, методистів, науковців у сфері цифровізації освіти щодо створення та використання цифрових освітніх інструментів, розвитку цифрової компетентності педагогів та здобувачів освіти, поширення позитивного вітчизняного та міжнародного педагогічного досвіду застосування цифрових технологій через відкриті спеціалізовані електронні платформи. Педагогічні працівники достатньою мірою вмотивовані до оволодіння цифровими освітніми інструментами та технологіями організації змішаного навчання, усвідомлюють необхідність та потребують підвищення рівня цифрової культури. Найбільш затребуваними формами професійного розвитку з цього напрямку є інтерактивні форми, що передбачають суб'єкт-суб'єктну взаємодію та партнерство. Є необхідність в оновленні освітнього стандарту, освітніх програм підготовки педагога професійного навчання, змісту програм підвищення кваліфікації педагогічних працівників; створення відповідного інформаційно-освітнього середовища, поширення практики проведення майстер-класів, тренінгів, вебінарів з питань використання цифрових технологій для підвищення цифрової компетентності педагогічних працівників.*

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**Ключові слова:** *змішане навчання, онлайн навчання, дистанційне навчання, цифрова компетентність, цифровізація освіти*

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**Keywords:** *blended learning, online learning, distance learning, digital competence, digitalization of education*

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In order to effectively implement modern tasks, Ukraine's educational system must quickly and flexibly adapt to changes in various spheres of public life, including globalization, integration into the European space, digitalization, etc. As a form that can meet the subjects' needs of the educational process, blended learning is proposed as a hybrid methodics that combines online learning, traditional and independent learning. It integrates digital technologies into the educational process along with traditional pedagogical practice, provides for the creation and functioning of an educational environment in which the educational process is not limited to direct contacts of its participants, but takes place both in person and remotely. This is not just a combination of direct (on-site) and indirect (through online learning opportunities) forms of interaction between students and teachers, but a process of optimizing the educational process so that it becomes more effective for a generation that cannot imagine its life without digital technologies, and meets the needs of students in terms of varying the pace of learning, complexity and volume of material, format of interaction, etc.

The attention of scientists and educators to blended learning in VET increased in 2020 due to anti-epidemic quarantine measures, but in world educational practice, the introduction of blended learning began in the late twentieth century. At the beginning of

the twenty-first century, pedagogical theorists and practitioners began a discussion on the specifics of this concept (Blended Learning, 2013; Oliver & Trigwell, 2005). Blended learning refers to the combination of traditional forms of education with innovative ones, including online and distance learning; a combination of different learning formats within one classroom, which ensures personalization of learning by giving students the right to choose the conditions and control over the process of mastering the necessary competencies (Blended Learning, 2022). Scholars also offer the following interpretation: "Blended learning is a combination of technology and traditional classroom learning based on a flexible approach that takes advantage of online training and monitoring tasks, which can significantly improve the quality of education" (Tomlinson & Whittaker, 2013). It is noted that online learning involves a purposeful, specially organized process of interaction between students and teachers, with digital technologies and with each other. It is uncritical in space, time, and a particular educational institution and takes place in a specific pedagogical system, the elements of which are the goal, content, means, methods and forms, teacher and student. In blended learning, the cognitive activity part of students takes place in the classroom under the direct supervision of the teacher, and the other part is in independent work with electronic resources individually or in groups (Kuzmenko, 2017).

A study of the scientific and pedagogical literature shows that most scholars agree that blended learning should be understood as a combination of the traditional academic environment and the use of distance learning opportunities (Akhmetov, Shaverskyi, 2007; Zhukovskiy, Haletskiy, 2018; Charity Eyre, 2013). In an open learning environment, participants of the educational process can obtain the necessary knowledge themselves using a variety of information resources (databases and knowledge, multimedia, educational systems, video and audio recordings, electronic libraries, etc. (Bykov, 2008).

Blended learning has been actively introduced in higher education institutions, so nowadays the vast majority of research and other publications on it relate to higher education. However, blended learning in the system of vocational education has its own specifics (Pasichnyk, Yelfimova, Chushak, Shynarovska & Donets, 2021).

Distance learning, which Ukraine urgently introduced in the spring of 2020 due to the pandemic, and blended learning, introduced in the country in response to military operations in 2022, served as an incentive for the accelerated implementation of this practice in VET institutions and its scientific justification. This experience has significantly influenced the level of digital literacy of all subjects of the educational process. Various aspects of the problem of high-quality organization of blended learning and ways to solve it, rethinking traditional models of education in VET institutions are being widely discussed.

Within the framework of the statement stage of the methodical foundations study of future skilled workers vocational training in blended learning, the staff of the



Laboratory of Distance Professional Training of the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine prepared a questionnaire and conducted a pedagogical staff survey of vocational (vocational-technical) education institutions to study the current state of the organization of blended learning. The questions of the questionnaire concerned the experience of vocational training in blended learning, digital tools for organizing online learning, assessment and control of learning out-comes in online learning, difficulties in implementing blended learning in VET institutions, technical support, psychological readiness of students, readiness of the educational institution for blended learning, forms and types of independent work in blended learning, the need to develop digital competence, current trends and forms of digital competence development, methodical support for blended learning, ways to improve professional training in blended learning, etc. The surveys covered 2,935 vocational teachers of different types of vocational (vocational and technical education) institutions (mainly vocational lyceums, higher vocational schools, vocational education centres, including relocated ones) from 24 regions of Ukraine and the city of Kyiv.

More than 96.5% of respondents indicated that they had experience in providing vocational training in blended learning. In particular, 91.7% of teachers indicated that they switched to blended learning due to quarantine restrictions and military operations in Ukraine, and another 4.8% indicated that blended learning was provided for in training programs and plans. To organize online learning, the vast majority of teachers (84.4%) used Google Classroom, 9.5% used Moodle, and 7.4% used My Class. Video conferences were held using a combination of different digital tools: Google Meet (74.5%), Zoom (63.6%), Microsoft Teams (13.9%), Skype (9.6%). The most popular social networks and messengers for online learning were Viber (92.7%) and Telegram (55.1%). In addition, the following were used: Messenger (18.4%), Facebook (14.3%), and Instagram (13.1%). Only 55.6% of respondents answered affirmatively to the question about the availability of the Internet of sufficient quality to organize online learning, 41% do not always have it, and 3.5% do not have it. Computer equipment for online learning is provided to 62.9% of teachers, 27.7% are partially provided, and 9.4% of teachers are not provided. In most cases, a laptop (71.9%) and a smartphone (62.7%) are used. A desktop computer is used by 36.6% of respondents, and a tablet by 6.3%. Technical means of communication are mostly private property of teachers (in 54.2% of cases), partially owned by the educational institution and private property for 22.8% of teachers, and owned by the educational institution in 19.6% of cases.

Among the difficulties and problems of online learning, teachers pointed to poor quality of Internet and/or mobile connection (45.0%), insufficient development of students' ability to learn independently (41.5%), low motivation to learn by students (36.1%), lack or obsolescence of computer hardware and software by students (34.5%), lack of communication with students and colleagues (23.6%), difficulty in organizing task control and assessment (21.9%), rejection of online learning as such by students (18.0%), insufficient level of digital competence of students (15.8%), lack of or



outdated computer hardware and software for online learning by teachers (12.3%), lack of time to prepare classes (10.7%), lack of a standardized online platform for online learning (5.0%), insufficient level of their own digital competence (4.9%), insufficient level of their own methodological competence (1.5%). According to 39.8% of teachers, 50 to 75% of students are psychologically ready for online learning, 27.7% of teachers believe that 25 to 50% of students are ready, and 18.5% of teachers estimate this share to be more than 75%.

Regarding the readiness of the institution for blended learning, the highest scores were given to the readiness of teachers (3.8 points), lower scores were given to methodical support (3.7 points), and the lowest scores were given to technical support (3.2 points). The need to develop digital competence to implement blended learning is confirmed by 34.0% of teachers. The answer "rather yes" was chosen by 34.3% of respondents, "rather no" by 12.8%, 11.4% did not feel such a need, and 7.5% of teachers found it difficult to answer.

As forms of digital competence development, teachers indicated advanced training courses (60.3%), master classes (54.7%), video courses/lessons (54%), webinars (52.2%), trainings (35.2%), seminars (31.4%), and conferences (24.2%). At the same time, they consider master classes, video tutorials, and advanced training courses to be the most effective forms. In terms of digital competence development, electronic resources (the Internet) (92.8%), manuals/guidelines (51.2%), and textbooks (30.8%) were in demand. Monographs, abstracts in conference proceedings, and scientific articles in professional periodicals are of lesser interest.

Educators receive information about digital educational technologies and resources from social networks (62.2%), colleagues (57.1%), through participation in conferences, seminars, webinars, round tables (55.1%), through participation in trainings, courses, master classes (50.4%), specialized websites, and electronic libraries (29.9%). 43.2% of respondents indicated that they were not the authors of methodical support for blended learning. Presentation materials were prepared by 33.3% of educators, tasks for independent work – 31.4%, video materials - 19.6%, methodical recommendations – 10.6% of survey participants. 9.7% of teachers participated in the creation of a platform for distance learning, textbooks, and 7.9% developed e-learning courses.

36.1% of teachers expressed a desire to participate in a training/workshop on the development of e-learning support for blended learning, 45.4% had doubts about this, and 18.5% did not have such a desire. More than half of the respondents (56.5%) indicated that their institution provides organized training in the development of e-learning support for blended learning. 45.0% of teachers have undergone special training organized by scientific, methodical institutions, higher education institutions on the organization of blended learning.

Teachers consider the following to be relevant ways/directions for improving

vocational training in blended learning: ensuring sufficient Internet coverage/mobile Internet for educational institutions and the country (62.3%), providing teachers with the necessary equipment for organizing distance learning (45.5), updating the material and technical base of educational institutions (44.5%), ensuring equal access to resources (44.4%), providing the necessary equipment for training to students who need it (41.0%), development of a unified standard for online learning and relevant guidelines, materials (38.4%), teacher training in organizing online learning and using digital technologies (35.6%), teaching students to work independently and self-educate (32.5%), creation of a unified platform for learning in a group/institution/country with access to learning materials and assessment tools (30.5%), clear and coordinated organization of online learning in the educational institution (29.1%), use of new modern textbooks (26.0%), and establishment of communication between teachers, students, and parents (25.3%).of their professional activities in blended 19.7% of respondents are satisfied with the results learning, 59.8% are rather satisfied, 17.0% are rather dissatisfied, and 2.1% of teachers are dissatisfied.

The results of the survey showed the need for state regulation and determination of the status of blended learning, unification and coordination of teachers` efforts, methodists, and scientists in the field of digitalization of education, creation and use of digital educational tools, development of digital competence of teachers and students, dissemination of positive domestic and international pedagogical experience in the use of digital technologies through open specialized electronic platforms. Teachers are sufficiently motivated to master digital educational tools and technologies for organizing blended learning, are aware of the need to improve the level of digital culture. The most popular forms of professional development in this area are interactive forms that involve subject-subject interaction and partnership. There is a need to update the educational standard, vocational teacher training programs, and the content of teacher training programs; create an appropriate information and educational environment; and promote the practice of holding master classes, trainings, and webinars on the use of digital technologies to improve the digital competence of teachers.

## 1.6. ORGANIZATION OF INDEPENDENT WORK OF FUTURE SKILLED WORKERS IN THE CONDITIONS OF BLENDED LEARNING: METHODOLOGICAL ASPECTS

### *ОРГАНІЗАЦІЯ САМОСТІЙНОЇ РОБОТИ МАЙБУТНІХ КВАЛІФІКОВАНИХ РОБІТНИКІВ В УМОВАХ ЗМІШАНОГО НАВЧАННЯ: МЕТОДИЧНІ АСПЕКТИ*

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*The research is driven by changes in the field of professional education, the implementation of blended learning in professional (vocational-technical) education, the necessity for distance and online learning, preparation of future qualified workers for independent learning and self-organization, which requires the search for new approaches by pedagogical staff in organizing their independent work, and the need to develop a methodology for organizing the independent work of future qualified workers in blended learning conditions.*

*Based on the analysis of scientific literature, normative-legal documents, and empirical data, trends in organizing independent work in institutions of professional (vocational-technical) education have been identified and analyzed; a methodology for organizing the independent work of future qualified workers in blended learning conditions has been developed; its concepts and implementation stages have been defined.*

*The implementation of the developed methodology contributes to the successful performance of educational tasks by learners, mastery of professional knowledge, formation of skills and abilities, development of self-organization skills, work and time planning, self-control, enhancement of the level of digital culture, which prospectively will manifest through increased levels of confidence and independence of the individual, ability to plan one's time, interact in a digital society, be competitive in the labor market, mobile, and professionally grow throughout life.*

*Актуальність дослідження зумовлено змінами у сфері професійної освіти, впровадження змішаного навчання у професійній (професійно-технічній) освіті, необхідністю дистанційного й он-лайн навчання, підготовки майбутніх кваліфікованих робітників до самостійного навчання й самоорганізації, що вимагає пошуку нових підходів до організації педагогічними працівниками їх самостійної роботи, потребою розробки методики організації самостійної роботи майбутніх кваліфікованих робітників в умовах змішаного навчання.*

*На основі аналізу наукової літератури, нормативно-правових документів, емпіричних даних виявлено та проаналізовано тенденції організації самостійної роботи в закладах професійної (професійно-технічної) освіти; розроблено*

*методику організації самостійної роботи майбутніх кваліфікованих робітників в умовах змішаного навчання; визначено її поняття та етапи реалізації.*

*Висновки: реалізація розробленої методики сприяє успішному виконанню здобувачами освіти навчальних завдань, оволодінню професійними знаннями, формуванню умінь й навичок, розвитку навичок самоорганізації, планування роботи й часу, самоконтролю, підвищення рівня цифрової культури, що перспективі виявлятиметься через підвищення рівня впевненості та самостійності особистості, вмінні планувати власний час, взаємодіяти у цифровому суспільстві, бути конкурентоздатним на ринку праці, мобільним, професійно зростати впродовж життя.*

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**Ключові слова:** самостійна робота, змішане навчання, майбутні кваліфіковані робітники, методика організації самостійної роботи в умовах змішаного навчання, професійна (професійно-технічна) освіта

**Keywords:** independent work, blended learning, future qualified workers, methodology of organizing independent work in blended learning conditions, professional (vocational-technical) education.

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In the context of the martial law legal regime in Ukraine, blended learning has become one of the forms that enables institutions of vocational (vocational-technical) education (hereinafter referred to as V(TE)E) to carry out professional training for future skilled workers. The widespread implementation of blended learning in Ukraine took place in 2020, due to COVID-19 quarantine restrictions, and in 2022, in connection with the onset of mass military actions on the territory of Ukraine. Until 2020, according to survey results, only 4.8% of V(TE)E institutions deliberately introduced blended learning into the professional training of future skilled workers, taking into account the curricula and programs. By blended learning of future skilled workers, we mean the effective combination of various forms and methods of learning, digital technologies, and independent work, for their high-quality professional training.

Under the conditions of a pandemic or martial law, the access of education seekers to face-to-face attendance at educational institutions is limited, hence substituting with distance and online learning. In these circumstances, blended learning becomes an alternative form of education, with independent work being the primary means for future skilled workers to master theoretical material. The volume of independent work of future skilled workers in blended learning compared to face-to-face (traditional) education increases, as does the time spent using digital technologies, requiring learners to be technically and psychologically prepared to work independently and self-organize, with a sufficient level of information technology usage.

Thus, under these circumstances, independent work in blended learning is not just a method, means, type, or form of education, but becomes the basis of professional-theoretical training, requiring a review of approaches to its organization, which prompted our study on the methodology of organizing independent work of future skilled workers in blended learning.

Independent educational work in pedagogy is considered as a form of organizing

the educational process, as a method of teaching, a means or type of educational activity and does not have a univocal definition. For instance, S. Honchanenko (1997) defines independent educational work of students as various individual and collective types of activities of learners, conducted within or outside the educational institution, at home, under the guidance of an educational staff member, but without their direct participation. V. Lozova (2008) considers independent educational work as a form of educational activity of learners, performed during classes in the premises of the institution, outside classrooms, at home, under the direct or indirect guidance of an educational staff member, who determines its purpose, tasks, ways, and methods of organization, and serves to develop qualities of independence in the individual.

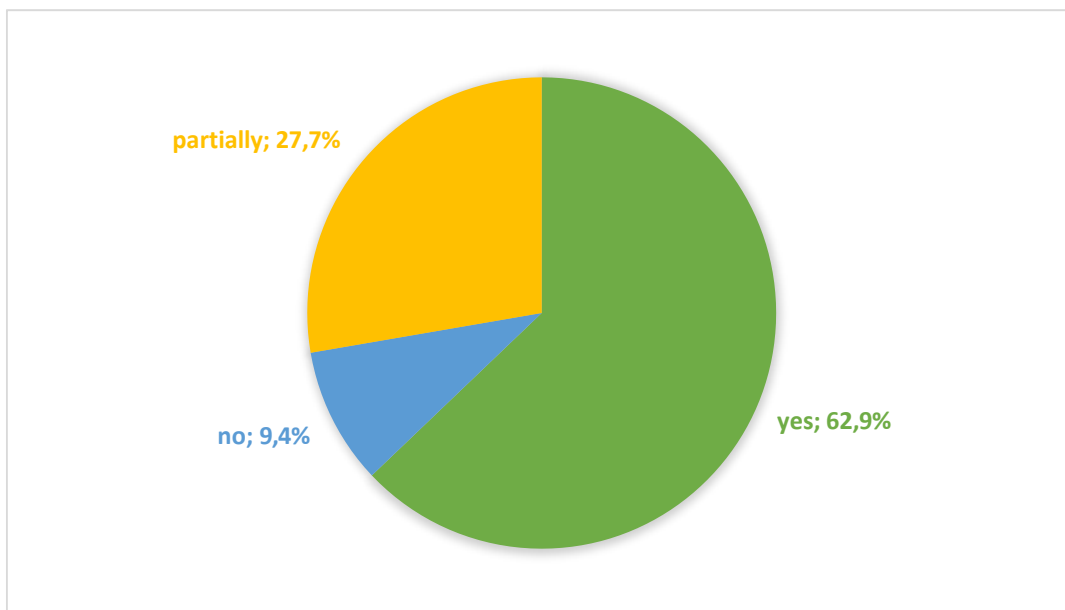
The issue of organizing the independent work of learners is presented in the works of a wide range of domestic scientists and practitioners I. Bekh, V. Bondar, V. Buryak, O. Vashchuk, S. Honcharenko, I. Ziaziun, Yu. Zinkovsky, V. Kozakov, M. Kasyanenko, N. Lukinova, Yu. Malovanoy, P. Oliynyk, V. Palamarchuk, O. Savchenko, P. Pidkasisty, L. Sushchenko, L. Ternavska, M. Shkilya, O. Yaroshenko, and others. The independent work of learners of V(TE)E institutions is highlighted in the works of R. Hurevych, V. Bronnikova, A. Kononenko, P. Luzan, I. Mosya, S. Osypenko, T. Pashchenko, H. Romanova, V. Umanets, V. Yagupov, and others. However, the issue of the methodology of organizing independent work of future skilled workers in blended learning is not sufficiently addressed.

To determine the current state and peculiarities of organizing the independent work of future skilled workers in blended learning, we conducted an online survey of educational staff of V(TE)E institutions. In the survey (2022), 3142 educational staff participated, including teachers (49.8%), masters of industrial training (37.6%), methodologists (4.2%), senior masters (1.8%); directors and deputy directors (1.5%), educators, social pedagogues, psychologists, club leaders, librarians (5.1%).

To summarize the survey results, it should be noted that the technical readiness of educational staff for blended learning, particularly in the aspect of distance or online education, is satisfactory. The majority of educational staff are equipped with technical devices of various generations, which only affects the quality of their interaction, communication, and mobility with learners. The qualitative indicator of the absence of technical equipment for online learning among educational staff amounts to 9.4% (Fig. 1).

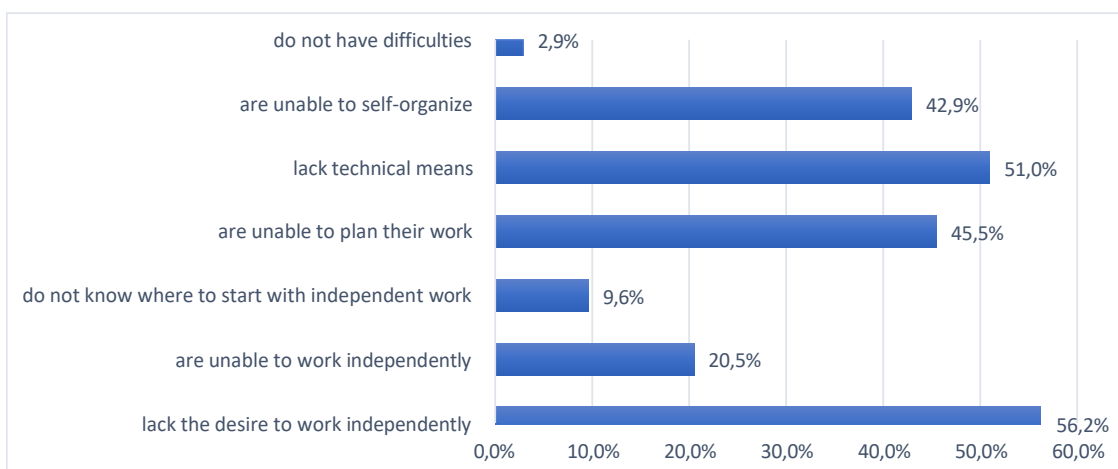
**CURRENT ISSUES IN THE IMPLEMENTATION  
OF BLENDED LEARNING  
IN VOCATIONAL EDUCATION**

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*Fig. 1. Quality indicator of pedagogical staff's provision with technical means for blended learning implementation*

The technical preparedness of learners to participate in online education at an excellent level is 31.1% of learners; 41% are at a good level; satisfactory – 18.4%; and unsatisfactory level constitutes 2.9%. Therefore, the average indicator of the level of technical preparedness of learners to participate in online education is satisfactory. However, pedagogical workers have noted difficulties faced by future skilled workers during the performance of independent tasks, particularly the lack of motivation, desire, and ability to work independently, plan work and time, and self-organize, etc. Only 3% of learners do not experience difficulties while performing independent tasks (Fig. 2).



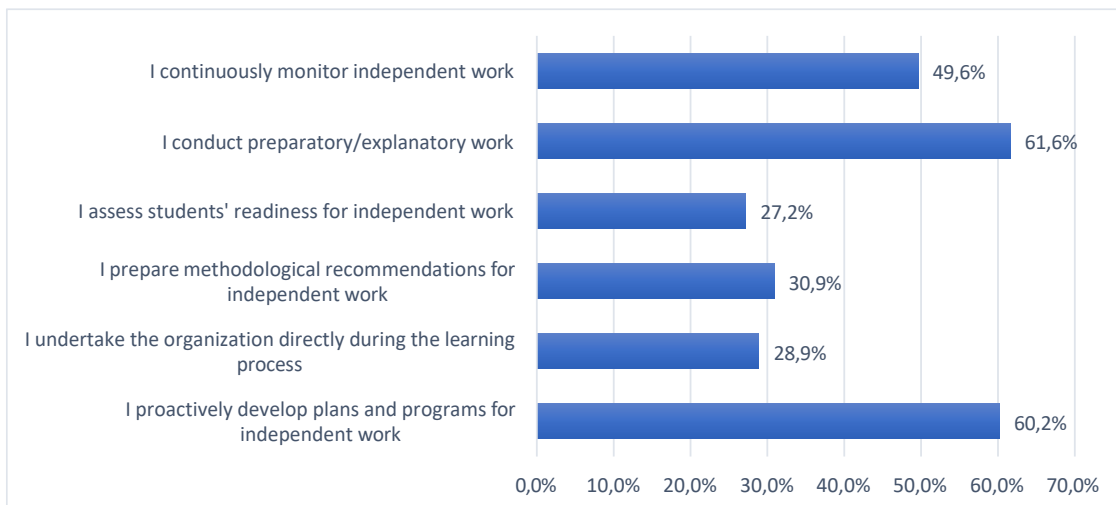
*Fig. 2. Quantitative and qualitative indicators of challenges faced by future*



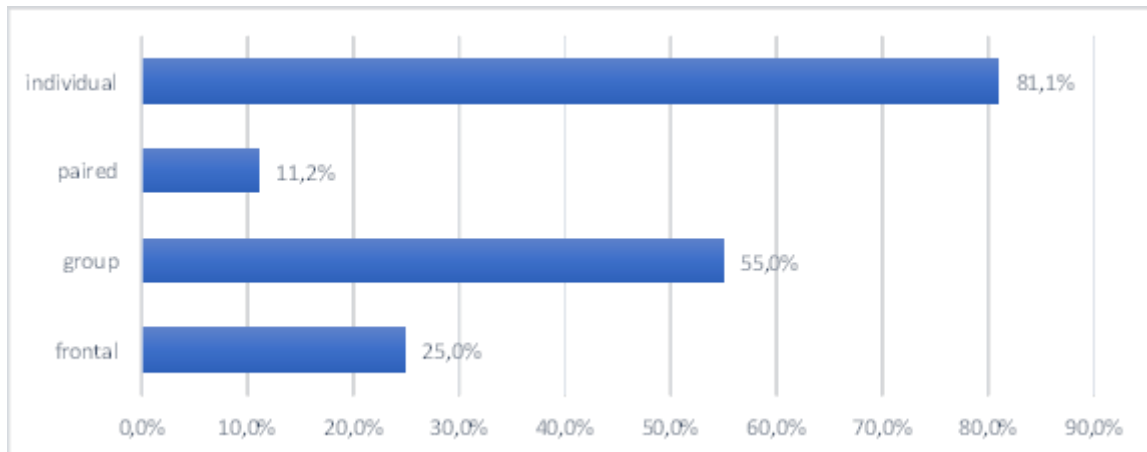
*skilled workers during independent work in blended learning environments*

The analysis of the organization of independent work by pedagogical staff in Vocational Education and Training (VET) institutions for future skilled workers under blended learning conditions revealed that about 30% of educators adopt a holistic approach to organizing independent work. In their educational activities, they utilize various organizational forms, types, and methods of independent work, develop methodological recommendations for learners' independent work, assess their readiness, work on student motivation, and employ project-based and creative tasks.

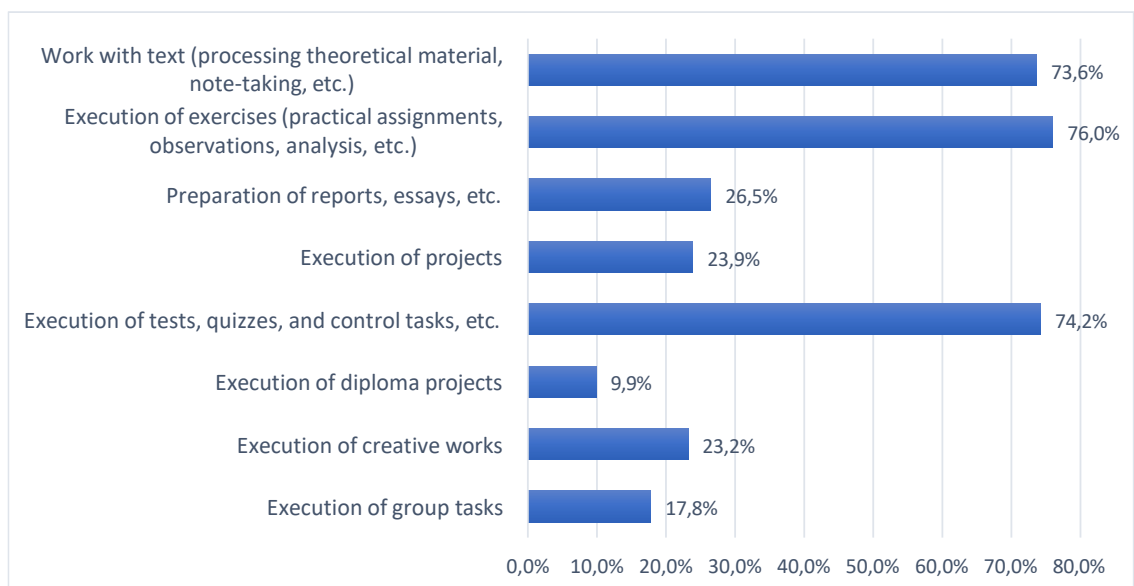
Approximately 50% of pedagogical staff organize independent work conservatively, limiting themselves to monotypic organizational measures, forms, methods, and types of independent work, with insufficient differentiation and variability of tasks, which hinders an individualized learning approach. In 20% of pedagogical staff, a formal attitude towards the organization and execution of independent work by learners is observed, characterized by a situational approach (Figs. 3-5). Overall, there is a lack of a systematic approach to organizing independent work for future skilled workers in blended learning contexts.



*Fig. 3. Quantitative and qualitative indicators of measures for organizing independent work by pedagogical staff for future skilled workers in blended learning environments*



*Fig. 4. Quantitative and qualitative indicators of organizational forms of independent work employed by pedagogical staff in vet institutions in blended learning conditions*



*Fig. 5. Quantitative and Qualitative Indicators of Types of Independent Work Performed by Future Skilled Workers in Blended Learning Conditions*

The above considerations have necessitated the development of a methodology for organizing the independent work of future skilled workers in the context of blended learning. The methodology for organizing the independent work of future skilled workers in the context of blended learning is understood as a set of organizational actions (measures) by educational staff aimed at preparing learners for independent work, diagnosing the formation of independent work skills, developing tasks, methodology of organization, and control of the independent work of future skilled workers in the context of combining face-to-face and distance learning forms using

digital educational tools.

The goal of the methodology for organizing the independent work of future skilled workers in the context of blended learning is to improve the effectiveness of organizing independent work by educational staff, thereby enhancing the quality of vocational education in vocational education and training (VET) institutions in a blended learning environment.

The tasks of the methodology are to enhance the effectiveness of organizing independent work by educational staff, improve the quality of professional training in a blended learning environment, and develop skills in self-organization, planning and managing learning time, self-control in performing independent tasks, and digital literacy for successful self-realization in the information society.

The essence of the methodology lies in the sequential execution of interrelated actions (preparatory, diagnostic, active, control-analytical stages), which enables educators to ensure effective organization and execution of tasks for independent work by future skilled workers.

The content of the methodology is focused on enhancing the quality of professional training in VET institutions under blended learning conditions, developing skills in self-organization, time management, self-control, and digital culture through interaction and partnership between educational staff and learners.

The stages of implementing the methodology for organizing the independent work of future skilled workers in blended learning conditions are as follows:

Preparatory stage, focused on:

- compiling and agreeing on educational-methodological documentation for planning the educational process, analyzing program sections, and determining educational themes, materials for independent tasks;
- defining the purpose, tasks, forms, methods, means, content, and duration of independent tasks;
- preparing necessary material-technical and comprehensive-methodological support for independent tasks.

Diagnostic stage, aimed at determining/checking the technical, psychological, and professional readiness of future skilled workers for independent work in a blended learning environment, specifically:

- technical readiness of future skilled workers for communication, practical implementation (execution) of independent work in an online mode, using digital technologies;
- psychological readiness of future skilled workers for independent learning, task execution, determined by the level of self-organization, motivation, anxiety, etc.;
- professional readiness – determining the basic knowledge, skills, and abilities of future skilled workers necessary for performing assigned independent tasks.

The activity stage involves:

- conducting introductory and ongoing briefings on independent work by

teaching staff;

- activating cognitive and professional motives for the independent learning activities of future skilled workers;
- the sequential completion of independent work tasks by future skilled workers;
- ongoing control, assistance, and correction of errors, adjusting the independent educational activities (work) of learners, their motivation, educational tasks, etc., for successful completion;
- ongoing analysis of the psychological state/readiness, particularly motivation, anxiety, etc.

The control-analytical stage includes:

- assessment by teaching staff of the independent work completed by learners;
- reflection by teaching staff on the conducted independent work;
- considering successes and mistakes in future teaching activities, prospective adjustment of educational tasks of independent works, updating of comprehensive methodological support, etc. The pedagogical and socio-economic effectiveness of the methodology for organizing independent work of future skilled workers in blended learning conditions includes:

- pedagogical effectiveness lies in the fact that the implementation of the developed methodology contributes to the successful completion of educational tasks by learners, mastery of professional knowledge, development of skills and abilities, development of self-organization skills, planning of work and time, self-control, increasing the level of digital culture;

- the social effect is expected, in the short term, to manifest through increased levels of confidence and independence of the individual, ability to work independently, self-organize, plan personal time, interact in a digital society. In the long-term social perspective through competitiveness in the labor market, mobility, professional growth throughout life.

- the economic effect will manifest through an increase in the employment rate of skilled workers.

The organization of independent work of future skilled workers in blended learning conditions requires careful preparation and organization by the teaching staff, formation of a complex of variable tasks of independent works, diagnostics of motivation, self-organization, gradual involvement in independent work, use of approaches of learning 'from simple to complex, etc. The quality of their execution by future skilled workers, the level of mastery of professional knowledge, skills and abilities, digital culture, motivation, ability to work independently and plan personal time depend on the well-chosen forms, methods, types, tasks of independent works. Independent work not only contributes to the formation of professional competence (knowledge, skills, and abilities) but also develops speech activity, thinking, learning new things, skills of self-organization and self-control, the ability to take responsibility, independently solve professional tasks, interact in a digital society, etc. Effectively organized independent work of future skilled workers in blended learning conditions is a guarantee of their professional and personal growth throughout life, mobility, competitiveness in the labor market, etc.

## 1.7. MOOC PLATFORMS AS A MEANS OF ORGANIZING DISTANCE LEARNING

### МООС-ПЛАТФОРМИ ЯК ЗАСІБ ОРГАНІЗАЦІЇ ДИСТАНЦІЙНОГО НАВЧАННЯ

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*Studying in a pandemic was a challenge for education, which was not ready for the mass introduction of online platforms in the system of conventional (formal) learning. However, Massive open online courses or MOOC platforms have become an active learning tool in many countries over the last ten years. Examples of successful online education practices in Ukraine are the Online Platform of Non-Formal Education, the Prometheus platform of open public online courses, and the Educational Era online education studio.*

*An overview of educational online platforms, their content, accessibility and variability. It is established that the MOOC platforms today are an effective means of organizing distance learning, which are able to ensure the formation of an individual learning trajectory for students.*

*The reserves of the global innovative educational environment create opportunities for vocational education institutions to review their capabilities and organize effective distance learning for students through MOOC platforms. The latter contain effective tools (video lectures, test and graphic constructors, web resources, etc.) to ensure the productivity of learning and feedback between teacher and student.*

*Дистанційна освіта в умовах пандемії постала викликом для освіти, яка виявилася не готовою до масового упровадження онлайн-платформ у системі звичного (формального) навчання. Проте МООС платформи за останні десять років вже встигли стати активним засобом навчання у багатьох країнах світу. МООС-платформи – це глобальне інноваційне освітнє середовище. Світовий ринок освітніх послуг пропонує п'ять основних провайдерів МООС: Coursera, edX, Udacity, Khan Academy, Codecademy. Прикладом успішних практик онлайн-освіти в Україні можуть слугувати Онлайн платформа неформальної освіти, платформа масових відкритих онлайн-курсів Prometheus, студія онлайн-освіти «Educational Era».*

*Огляд запропонованих програм, змістової наповненості, доступності та варіативності МООС-платформ підтверджує їх ефективність при організації дистанційного навчання. Резерви глобального інноваційного освітнього середовища МООС-платформ створюють можливості закладам освіти переглянути свої можливості та визначити перспективи їх використання.*

*Ключові слова: дистанційне навчання,  
відкриті освітні ресурси, масові відкриті  
освітні онлайн-курси, MOOC*

*Keywords: distance learning, open  
educational resources, mass open educational  
online courses, MOOC.*

Distance education in a pandemic has become a challenge for education. The world was not ready for such a rapid transition to distance learning. However, a structured online education space has already been developed with the help of MOOC platforms. They became the saving tool for the national education system, which provided the necessary conditions for distance learning of pupils and students.

Fundamental scientific researches of distance learning are presented in scientific researches by O. Borzenko, S. Denysenko, B. Lytovchenko, O. Oliinyk, V. Ustymenko, G. Chornous and others. These authors define distance learning as an organizational innovation and a priority for the development of the modern education system. However, a comprehensive study of the capabilities of MOOC platforms in terms of distance learning in the domestic pedagogical science is not presented enough.

One of the priority areas of the modernization program of secondary and higher schools is recognized as distance learning. In 2000, the Concept of Distance Education Development in Ukraine was adopted, the Ukrainian distance learning system – UDL System and the Ukrainian Center for Distance Education (UCD), centers and laboratories on the basis of higher education institutions were created.

Distance learning is successfully used in higher education, in professional training and retraining, raising and improving the professional level of specialists, for self-education. At the level of vocational education institutions, distance learning is a new thing.

With the development of a global innovative educational environment, distance learning has received favorable conditions for its development, associated with the rapid creation and dissemination of content. Thanks to information technology, the path from the author of information to its consumer has been significantly reduced. Traditional sources of knowledge – books, conferences, magazines, etc. require a significant amount of time for the information to reach the end user. The global innovative educational environment is able to create knowledge in real time. This type of content is called an open educational resource (OER).

With the unlimited spread and availability of technology, OER has significant potential to create a community of users who use, share and constantly supplement open educational resources with information, thereby improving the content of education (Benkler, 2005). This process is two-way: the creation of information-rich content allows you to keep OERs up to date and create new open educational resources (Petrides, Jimes, 2008). The advantage of OER as a source of educational content is that joint temporary working groups (ad-hoc groups), which participate in the regular and meaningful saturation of OER, are more effective than individual authors. In addition, OERs may contain personal recommendations, reflect the values and practical



experience of the authors. At the same time, open educational resources become social and turn into mass open online courses (MOOCs).

Open Internet sources announce that MOOCs provide an opportunity to study with teachers from the world's leading universities – people who have weight in academia, join a multinational student group (in discussion forums) and obtain a document confirming the successful completion of the course. The largest online platforms present videos and evaluate the acquired knowledge. The difference is what courses are offered and who reads them and how (popular online course platforms (MOOC)).

In the countries of the European Union, learning with the help of MOOC-platforms is the leading form of acquiring knowledge, skills and abilities in the distance learning system. MOOCs have gained considerable popularity in the last 5 years: 2014 is considered to be the year when MOOCs changed the world (Na T., 2014). This is due to the rapid increase in the number of students who have taken online courses around the world. According to the report "By The Numbers: MOOCs in 2018", in 2018, 20 million new users registered (By The Numbers: MOOCs in 2018). For comparison: in 2016-2017, this figure reached 23 million people.

The five most popular online courses are: Coursera, edX, Udacity, Khan Academy, Codecademy. Table 1 provides general information on MOOC providers on the number of students / courses and the cost of training. The data presented in *Table 1* and Figure 1 are presented based on the results of the annual reports (2017-2019) of the MOOC platforms on their work.

Table 1

*General characteristics of MOOC providers (according to online platforms)*

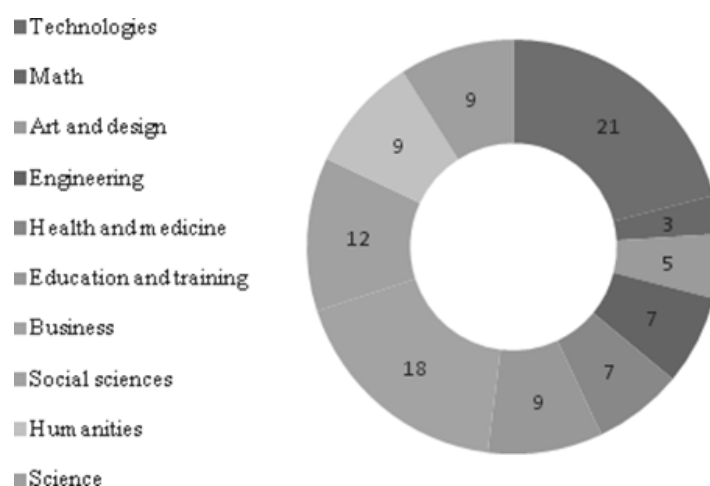
Provider	Number of students, million people*	Number of courses	The cost of the course
Coursera	22	3100	free, certificate \$ 49
edX	< 1	2200	Free, or certificate and study credits – depending on the course and university
Udacity	2	72	Free, for limited access, \$ 150 per month – for extended access,
XueatangX	6,2	1400	Free, for limited access
FutureLearn		1 000	
Khan Academy	1,2	4300	Free
Codecademy	24	556	Free

\* includes all students who have started the course, even if they have never completed it

MOOC providers offer about 630 specializations of 10 different types. The vast majority of them belong to Coursera and edX. In 2018 alone, more than 120 new

specializations were introduced. Regarding the distribution of courses by subject, 40% of them are business and technology (*Fig. 1*).

Examples of successful online education practices in Ukraine include the online platform for non-formal education, the platform for mass open online courses Prometheus, and the online education studio Educational Era.



*Fig. 1. Distribution of MOOCs by subjects (according to online platforms)*

The online platform of non-formal education is implemented with the support of DVV International in Ukraine, the International Center for Non-Formal Education and the Ukrainian Association of Adult Education in order to:

- to promote public awareness of educational programs implemented in Ukraine;
- establishing communication between those wishing to study and educational institutions;
- awareness of the value and development of lifelong learning culture;
- creating conditions for the full realization of the potential of the individual and increase its social, civic activity and responsibility.

The Prometheus mass open online course platform is the first and largest project to introduce blended learning technology for adults in Ukraine. The mission of the platform is to make the best courses from the world's leading teachers, universities and organizations accessible to all. To date, there are 755,120 registered users on the platform, 1 904 013 – course entries, 229 253 – generated certificates and 145 634 users with certificates.

EdEra online education studio became famous in the spring of 2014, when two students of the Faculty of Radiophysics decided to create an online course in physics, inspired by the world's best practices. The desire to introduce a culture of quality educational product in Ukraine has been embodied in online courses, textbooks, special

projects. EdEra is now a bridge between expert authors and users, numbering nearly 9 million. There are 19 online courses on the platform; 11 interactive textbooks filled with theoretical videos and educational texts from online courses; 10 special projects containing dynamic videos, theoretical materials, test examples and a forum to discuss learning.

All courses (60 of them) presented on online platforms are formed in five main areas (Fig. 2).

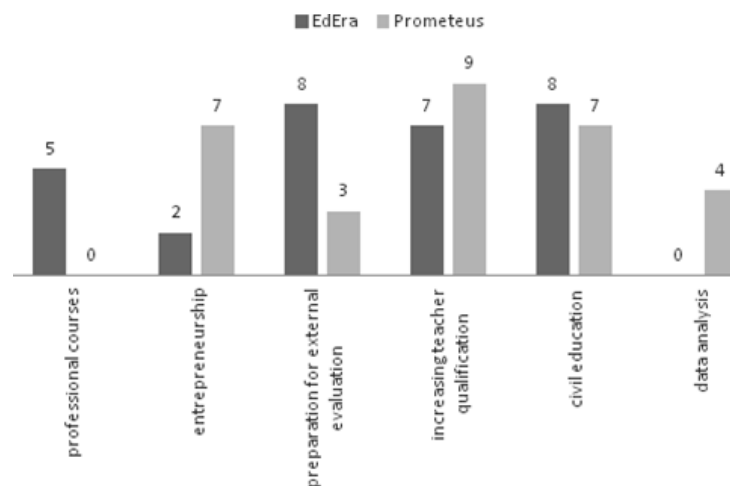


Fig. 2. Distribution of courses of online platforms Prometheus and EdEra

In the XXI Century": creativity, critical thinking, cooperation and communication skills. It is these knowledge and skills that will be needed in the future by both the student and the teacher (Figure 3).

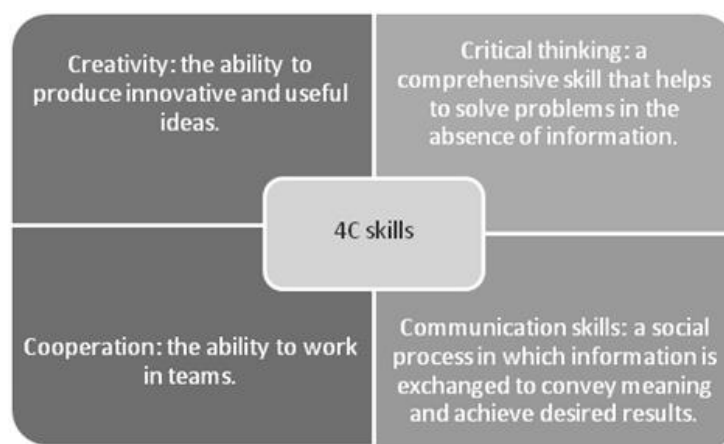


Fig.3. 4C personality skills of the XXI century

Thus, the review of the proposed programs, content, availability and variability of MOOC platforms indicates the possibility of their use in distance learning in

vocational education institutions. Reserves of the global innovative educational environment create opportunities for vocational education institutions to review their capabilities and organize effective distance learning for students through MOOC platforms that contain effective tools (video lectures, test and graphic constructors, web resources, etc.) to ensure learning performance and feedback. language between teacher and student.

Prospects for further research include a review of the features of the use of MOOC platforms in the teaching of special subjects in vocational education institutions.

# CHAPTER 2

**ORGANIZATIONAL AND  
METHODOLOGICAL PRINCIPLES FOR  
THE DEVELOPMENT OF THE DIGITAL  
CULTURE OF PARTICIPANTS IN THE  
EDUCATIONAL PROCESS IN THE  
CONDITIONS OF BLENDED AND  
DISTANCE LEARNING**

## 2.1. ENSURING ORGANIZATIONAL AND PEDAGOGICAL CONDITIONS FOR THE DEVELOPMENT OF THE DIGITAL CULTURE OF PEDAGOGICAL WORKERS

### ЗАБЕЗПЕЧЕННЯ ОРГАНІЗАЦІЙНО-ПЕДАГОГІЧНИХ УМОВ РОЗВИТКУ ЦИФРОВОЇ КУЛЬТУРИ ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ

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*The relevance of the study is associated with the society's need for increasing the rate of vocational (professional) education digitalization and with the lack of methodological and didactic support of this process.*

*Results: the present-day status of vocational education and in particular the status of the teaching staff's digital culture have been analyzed; emphasis has been placed on the intensification of the digitalization trend due to the world pandemic; the key reasons for the low level of digitalization (domination of conservative approaches to the organization of training, complex mechanisms of implementing apprenticeship and work-based learning modes) have been identified; optimal ways of solving the problem (using hybrid learning models, ensuring appropriate infrastructure and equal access to the Internet and digital educational resources, organization of digital skills training for the teaching staff) have been described.*

*A novel set of organizational and pedagogical conditions as a subsystem of developing digital culture among the teaching staff at vocational schools has been justified. It consists of three blocks: the personal and professional block that includes the teaching staff's use of digital resources and their willingness to train themselves to improve the skills of using digital resources and services; the organizational and technical block which presupposes the creation of digital educational environment at vocational schools and organization of the educational process based on blended learning approaches; the content and procedural block that includes e-learning courses available in the Learning Management System (LMS) and the tailor-made course "Digital Technologies in Vocational Education".*

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*Актуальність дослідження зумовлена потребою суспільства в прискоренні темпів цифровізації професійної (професійно-технічної) освіти та відсутністю методологічного й методичного забезпечення даного процесу.*

*Висновки: обґрунтовано власний комплекс організаційно-педагогічних умов, як підсистеми розвитку цифрової культури педагогічних працівників закладів професійної освіти, що складається з трьох блоків (особистісно-професійний блок, що складається з володіння педагогічними працівниками цифровими засобами та готовності до самоосвітньої діяльності з вдосконалення володіння цифровими засобами та сервісами; організаційно-технічний блок, що передбачає*



створення цифрового освітнього середовища ЗПО та організацію освітнього процесу на основі підходів змішаного навчання (*blended-learning*); змістово-процесуальний блок, що містить електронні навчальні курси розміщені у Системі управління навчанням (СУН), та авторський курс «Цифрові технології в професійній освіті».

**Ключові слова:** професійна освіта, цифровізація, цифрове освітнє середовище, педагогічні умови, педагогічні працівники закладів професійної освіти

**Keywords:** vocational education, digitalization, digital educational environment, pedagogical conditions, teaching staff at vocational schools.

The problem of educational process digitalization, among others at vocational schools, has recently gained significance for the social life in Ukraine. The penetration of electronic means in all aspects of life has brought the provision of available educational services to a new level and extensively automated many stages of production and social processes. Teachers were among the first ones to become interested in the potential of using electronic resources at the modern digital stage of technological development. However, major obstacles involving, among others, the lack of methodological and didactic support have become a considerable impediment.

In the analysis of modern vocational education development trends, V. Radkevych (2020) identifies the following: digitalization, technologization and standardization. The above trends are a threefold structure whose elements, regardless of their formal independence, rely on each other and actively react to changes in them.

Above all, vocational education digitalization involves the use of new technological tools and information resources in the education process. It is accompanied by the processes of developing online platforms with learning and didactic materials for teachers and students; SMART complexes of study disciplines; hardware and software to ensure various aspects of training management and communication among education subjects; educational interaction in social networks; simulation of real-life production environment based on the software-supported learning principle; creation of students' digital profiles for recording acquired competences, etc. (Bazeliuk, 2018). Taking this into account, the investigation of organizational and pedagogical conditions of developing digital culture among the teaching staff gains particular significance.

Conceptual foundations of education informatization and digitalization are elaborated in the works of V. Bykov, A. Hurzhii and V. Kovalchuk. A wide range of issues related to the use of modern electronic means in vocational education are described in the works of O. Spirin, A. Kalenskyi and M. Pryhodii. Methodological aspects of remote vocational training are explored in a series of works by L. Petrenko and S. Kravets. The use of e-learning resources and the creation of SMART complexes for vocational education are described in the works of O. Humennyi, A. Kononenko and L. Lypska. The problems and prospects of vocational (professional) education

digitalization were investigated by M. Yershov (2018).

Pedagogical conditions within methodological systems of teachers' professional development were studied by Yu. Babanskyi, A. Verbytskyi, B. Hershunskyi, I. Lerner, I. Pidlasyi, V. Slastonin, etc. General pedagogical aspects of pedagogical conditions were described by S. Batyshchev, R. Hurevich, A. Kolomiets, A. Lytvyn, etc.

Digital transformation of education has become an irreversible process that requires significant changes to all its components. This global process has intensified due to the COVID-19 epidemic, which has catalyzed it. The extraordinary session of the global UNESCO conference dedicated to education in the post-pandemic period (GEM 2020) emphasized that the crisis has brought to life vulnerabilities in the vocational education system. The main problems were found to be low levels of digitalization and outdated educational structure, which made it difficult to implement apprenticeship and work-based learning modes that are key functional elements of the vocational education system (Policy Brief, 2020). The use of hybrid learning models has been proposed as a solution to this problem. However, it has been found that they require not only appropriate infrastructure but also equal access to the Internet and e-learning resources. An important aspect is training the teachers in digital skills, which is directly related to the development of their digital culture. In this context, the Ministry of Education of Ukraine recommended vocational (professional), specialized pre-higher and higher education institutions to adopt a remote learning mode (Verkhovna Rada Ukrainy, 2020).

In 2020, the global COVID-19 epidemic has affected all social processes in the world. Introduced in March 2020, the quarantine measures have also become a great challenge for the system of vocational education in Ukraine. Transition to online learning has caused substantial difficulties in the achievement of the key objectives of vocational (professional) schools (Kukhareenko and Bondarenko, 2020).

In October 2020, the Ministry of Education and Science of Ukraine and EU4Skills presented the results of the audit (Institute of Educational Analytics, 2020) at 1254 specialized pre-higher and vocational schools, in which ensuring equal access to the Internet for students was recognized as a key problem of digital transformation. It was noted that there are 0.4 rooms with Internet access per 1 person.

The findings of studies on remote vocational training (Radkevych and Artiushyna, 2018; Petrenko, another, 2020) from previous years demonstrated that almost half of the teaching staff (49 %) had never used any e-learning elements in their pedagogical activity. It was found that almost one in six surveyed teachers (15.8%) has a negative experience of using e-learning resources, while only one third of the teachers have a positive experience (28.6 % and 6.6 %, respectively). At the same time, only 6.6 % of respondents admitted using them systematically and effectively.

The analysis of the level of willingness to implement remote vocational training among the teaching staff at vocational schools (Kravets, 2016) demonstrates a sufficient level of willingness. However, the motivational and evaluative-reflexive components are the most pronounced, while the level of cognitive and operational-activity

components is moderate. It indicates that there is a need for increasing the level of cognitive and operational-activity components of the willingness to implement remote vocational training among the teaching staff at vocational (professional) schools. The results of this study determine the need for the development of digital culture among the teaching staff at vocational schools based on their expertise and involving a set of professional creative skills, innovative and prognostic thinking, a high level of psychopedagogical culture, and a high level of proficiency in using modern digital technologies. It appears to trigger the development of both the vocational education system in general and the students' life opportunities (Bazeliuk, 2018). At the same time, such development of the vocational teaching staff can only take place in appropriate organizational and pedagogical conditions.

A. Lytvyn (2014, p.63) interprets pedagogical conditions as “a set of constructed opportunities (circumstances) of the content, forms and methods of the integrated educational and didactic process, which ensure the management of the operation and development of the procedural aspect of the education system, influence the training process, and ensure effective control and implementation of this process according to the objectives using the selected forms, methods, techniques, and provisions whose application ensure the achievement of the goal”.

It is worth mentioning S. Kravets' (2018) view that any pedagogical conditions at a modern education institution are part of the information education environment. It means that the organizational support of vocational training must be provided at the background of proper technical support at education institutions, including the availability of computers, computer classrooms, stable Internet connection, etc., and the abovementioned environment must be based on specialized hardware and software with learning management systems (LMS).

The description of the teachers' digital competence proposed by a creative team of scholars led by N. Morze (2019) includes requirements to the structure and levels of digital competence needed for the teaching staff to successfully carry out their activity in digital society. For the purposes of our study, this description is important as a systematized structure of professional and personal qualities required for a digital era teacher. Based on this description, we have formulated the *personal and professional conditions of developing digital culture among the teaching staff at vocational schools* as follows:

- teaching staff's mastering digital resources;
- willingness to engage in self-education and improve the skills of using digital resources and services.

However, the availability of computers and access to the Internet cannot fully ensure the requirements to education digitalization at vocational schools. Above all, digitalization is the creation of digital infrastructures capable of interacting with the user (establishing interactive (in the broad meaning) teacher-student, student-teacher, student-student connection) both at the local and at the global level. Thus, the need to

ensure both the pedagogical conditions and, most importantly, their organizational and technical component comes to the fore.

The digital education environment at vocational schools must be based on the set of digital means (digital infrastructure components) capable of ensuring educational interaction among all its participants.

There are two basic scenarios for the creation of such infrastructure:

- based on cloud services (e.g. Microsoft or Google);
- based on specialized hard- and software with learning management systems (LMS), e.g. LMS Moodle.

The advantages and disadvantages of each of these scenarios deserve separate research, but it is obvious that, from the educational perspective, a teacher with a high level of digital culture will be more effective as the understanding of differences and specific functional features of these infrastructural components will allow teachers to take into account and overcome their disadvantages and to make a better use of their advantages.

Therefore, the creation of digital educational environment at vocational schools is a crucial component of the organizational and technical conditions of developing digital culture among the teaching staff at vocational schools.

Regardless of the selected scenario for the organization of the digital educational environment, the teachers will inevitably face the problem of achieving the objective related to the mastering of respective professional skills by future qualified specialists. This problem is extremely pressing for vocational training as learning fully remotely is either impossible or very difficult for most professions. This problem can be resolved if distance and traditional learning is joined, and remote and face-to-face interaction is combined. This combination has been called blended learning (Bazeliuk et al., 2017), (Kukhareno, 2016). For vocational education, blended learning is a harmonious combination of remote learning (to acquire theoretical knowledge) and students' applied practical activities. Recommendations on the organization of blended learning are set forth in the Recommendations of the Ministry of Education and Science (Recommendations on the Implementation of Blended Learning at Specialized Pre-Higher and Higher Education Institutions, 2020).

Thus, a second component of the organizational and technical conditions for the development of digital culture among the teaching staff at vocational schools is the *organization of the educational process based on blended learning approaches*.

At the same time, the implementation of the proposed blocks of organizational and pedagogical components is impossible without a targeted process of acquiring pedagogical experience in the digital environment and systematic development of the level of one's digital culture. Taking this into account, we have defined the *content and procedural block of conditions* that is an integral component of the development of digital culture among the teaching staff at vocational schools. It is this block that contains the main procedural elements and their content. This block of pedagogical conditions includes e-learning courses available in the Learning Management System,

namely “Critical Thinking Development”, “Digital Communication Culture”; “LMS Moodle for Vocational Education”, and the tailor-made course “Digital Technologies in Vocational Education”. The courses contain up-to-date information on a wide range of digital technologies used in the practical activity of the teaching staff at vocational schools and provide an opportunity to increase the level of one’s digital culture in a systemic and targeted manner. It also helps avoid chaotic acquisition of digital skills detached from the pedagogical process.

The global process of digital transformation has given rise to serious educational challenges, in particular in vocational training. Digital transformation in education is an objective global process significantly accelerated by the world pandemic of COVID-19. Only a teacher with a high level of digital culture is now able to ensure an effective educational process in the new-age digital educational environment. The development of digital culture among the teaching staff at vocational schools will be rapid if respective organizational and pedagogical conditions are in place.

The proposed organizational and pedagogical conditions as a subsystem of the development of digital culture among the teaching staff at vocational schools consists of three blocks that rely on and complement each other.

The personal and professional block includes the teaching staff’s use of digital resources and their willingness to train themselves to improve the skills of using digital resources and services.

The organizational and technical block presupposes the creation of digital educational environment at vocational schools and organization of the educational process based on blended learning approaches.

The content and procedural block includes e-learning courses available in the Learning Management System (LMS) and the tailor-made course “Digital Technologies in Vocational Education”.

In the future, components of the digital environment at vocational schools must be studied and the regulatory background of the teaching staff’s activity at vocational schools must be explored taking into account extensive implementation of digital technologies.

## 2.2. PREREQUISITES FOR THE DEVELOPMENT OF DIGITAL COMPETENCIES OF PARTICIPANTS IN THE EDUCATIONAL PROCESS

### ПЕРЕДУМОВИ РОЗВИТКУ ЦИФРОВИХ КОМПЕТЕНТНОСТЕЙ УЧАСНИКІВ ОСВІТНЬОГО ПРОЦЕСУ

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*The implementation of the European experience in the formation of digital competences in the education system of Ukraine is due to the need for widespread digitalization of processes and phenomena in society and the economy. The realities of the coming years have shown the effectiveness of the online educational process, but new IT in online education has challenged education seekers, teachers, and heads of educational institutions, including professional ones. Online education involves a complete transformation of the educational process and a change in pedagogical approaches and exacerbates the need for mandatory acquisition of digital competences by all participants for its full implementation and ensuring the quality of education. Professional education needs special attention, since the students of education above the basic secondary level are teenagers and young people, and control by parents or guardians is impossible for many reasons. In addition, teachers and masters of industrial training in disciplines that instill professional skills may find it useful to have specific IT skills to implement the educational process.*

*Results: a review of legislative and normative documents was carried out, which regulate the tasks of increasing the level of digital skills of members of society; the prerequisites for the acquisition of digital competences by members of society, including for online learning, were formulated, and measures for their implementation were determined; the framework of digital competences from the experience of EU countries, implemented for citizens of Ukraine and pedagogical workers; a review of online tools for self-assessment of the level of digitalization of educational institutions, digital competences of teachers, was carried out.*

*It was found that, due to their age, vocational education students often have a misunderstanding of their own IT knowledge and skills, which creates difficulties in participating in the educational process; industrial training masters have to study new specific IT skills for teaching professional disciplines; objective assessment of awareness and experience of using IT opportunities, awareness of the need to solve new*



problems in the online environment should become the basis for improving digital competence, which should be carried out permanently throughout life; the prerequisites for the acquisition of digital competences by the participants of the educational process for the successful implementation of mixed learning tasks (legislative, institutional, foreign policy, cognitive, technological, cyber security) are formulated; the measures implemented by the state to increase the digital competence of citizens are characterized.

Імплементация європейського досвіду формування цифрових компетентностей в систему освіти України обумовлена потребою повсюдної цифровізації процесів та явищ у суспільстві та економіці. Реалії найближчих років показали ефективність здійснення освітнього процесу онлайн, проте нові ІТ в онлайн освіті кинули виклики здобувачам освіти, педагогам та керівникам закладів освіти, у тому числі, професійної. Онлайн навчання передбачає повну трансформацію освітнього процесу та зміну педагогічних підходів і загострює необхідність обов'язкового набуття цифрових компетентностей усіма учасниками заради його повноцінного здійснення та забезпечення якості освіти. Особливої уваги потребує професійна освіта, оскільки здобувачами освіти рівнів вище базової середньої є підлітки та молодь і контроль з боку батьків або опікунів неможливі вийти з багатьох причин. Крім того, викладачам та майстрам виробничого навчання з дисциплін, які прищеплюють професійні навички, можуть статися у нагоді специфічні ІТ навички для здійснення навчального процесу.

Здійснено огляд законодавчих та нормативних документів, які регламентують задачі зростання рівня цифрових навичок членів суспільства; сформульовано передумови для набуття цифрових компетентностей членами суспільства, у тому числі для онлайн навчання, та визначено заходи з їх реалізації; розглянуто рамки цифрових компетентностей з досвіду країн ЄС, імплементовані для громадян України і педагогічних працівників у тому числі; здійснено огляд онлайн засобів для самооцінювання рівня цифровізації закладів освіти, цифрових компетентностей педагогів за потреби.

Висновки: з'ясовано, що здобувачам професійної освіти з причини їх віку нерідко притаманне помилкове розуміння власних знань та вмінь з ІТ, що породжує труднощі участі у освітньому процесі; майстрам виробничого навчання доводиться опановувати нові специфічні ІТ навички для викладання фахових дисциплін; об'єктивне оцінювання обізнаності та досвіду використання можливостей ІТ, усвідомлення необхідності вирішувати нові задачі в онлайн середовищі має стати підґрунтям для удосконалення цифрової компетентності, що має здійснюватися перманентно протягом усього життя; сформульовано передумови набуття учасниками освітнього процесу цифрових компетентностей для успішної реалізації завдань змішаного навчання (законотворчі, інституційні, зовнішньополітичні, когнітивні, технологічні, кібербезпекові); охарактеризовано заходи, здійснені державою для підвищення цифрової компетентності громадян.

**Ключові слова:** цифрові компетентності, цифрові навички, онлайн навчання, освітній процес, передумови набуття цифрових компетентностей.

**Keywords:** digital competences, digital skills, online learning, educational process, prerequisites for acquiring digital competences.

In recent years, distance and blended learning has become widespread in the world and in Ukraine as forms of implementing the educational process during the pandemic and other disasters. IT tools for distance and blended learning have challenged traditional pedagogical approaches and teaching methods at all levels of education. They also outlined the urgent tasks of acquiring modern digital competencies for all participants in the educational process: students, teachers, and educational institution administrators. Vocational education requires special attention since students above basic secondary levels are teenagers and young people, and supervision by parents or guardians is impossible for many reasons. Additionally, teachers and vocational training instructors in disciplines that instill professional skills may need specific IT skills to implement the educational process.

The article reviews legislative and regulatory documents that regulate the tasks of increasing the level of digital skills of society members; formulates prerequisites for acquiring digital competencies by members of society, including for online learning, and identifies measures taken by the state for their implementation; examines the digital competency frameworks based on EU countries' experience and their implementation for Ukrainian citizens and pedagogical workers; provides an overview of online tools for self-assessment of the digitalization level of educational institutions (particularly vocational ones) and, if needed, digital competencies of teachers and citizens; defines directions for further research.

For a long time, the acquisition of digital competencies was considered only in the context of changing the educational process, revising educational programs and technical improvement of educational institutions. Through the widespread digitalization of entire spheres of business, society and everyday life, it became clear that the acquisition of such competencies is necessary at any age, at least for the purpose of its own integration into the public space. This aspect of these problems was first noted by D. Hanna and E. Brynjolfsson. Ukrainian researchers did not pay enough attention to this issue for a long time the publications were mainly of a review nature. Recently, there has been a growing interest in the issue of digital competencies and skills, highlighting the challenges of the time and the risks of social isolation for people who do not sufficiently possess new IT skills. In particular, researchers (A. Vasylyk, A. Kushnir) have identified the qualities and knowledge required in the professional activities of HR managers, as well as the components that are necessary for anyone in the era of digitalization. The text describes the characteristics that define information and digital inequality in the environment of network communications in the work of L. Horodenko. The system of remote control of experiments (SRCE), which serves as the basis for remote laboratory work in the exact sciences, is discussed in the work of H. Lutsenko. The research and solutions to the problems of information security and ways to protect children from negative information influences are addressed in the work of O. Radziievska. In the research of O. Humennyi, the assessment of digital literacy for future skilled workers is based on an approach that evaluates indicators of information, computer, communication, technological, and media competencies, each of which is

assessed in three aspects: cognitive, technical, and ethical. The scope of the researchers' studies also includes examining the experience of digitalization of educational processes in EU countries. The article by A. Solomakha explores Austria's experience in reforming education and the establishment of a new digital school “Schule 4.0. – jetzt wird’s digital.” It has been established that a mandatory component of the professional competence of modern educators in Austria, including foreign language teachers, is digital competence. The study (V. Kovalchuk, V. Soroka) analyzed the role of digital competence in the professional activities of industrial training masters and highlighted the main aspects that digital competence should provide in the educational process. The levels of development of digital competence were identified: technical, social, informational and epistemological.

At the time of the pandemic and Ukraine's rapid transition to online learning, there are a number of issues that have not been developed or partially resolved in the context of the development of digital competencies of citizens in society:

- systems and descriptions of digital competence (digital competence framework) and requirements for the levels of digital skills and digital competences of different categories of workers;
- unified requirements for digital competences in the education system;
- requirements for digital competence in professional standards;
- unified approaches to defining digital competences in professional standards and unified requirements for educational programmes for the development of information and digital competence of specialists in various professions;
- indicator systems for monitoring the state of development of digital skills and digital competences;
- coordination of actions at the level of executive authorities and local self-government bodies to implement state policy in the field of digital skills and digital competences development;
- legal regulation of the development of digital competences;
- digital competence certification systems.

The experience of EU countries and other countries around the world demonstrates the high effectiveness of implementing and executing state programs and decisions regarding the acquisition of digital competencies by citizens. However, during their implementation in each country, including Ukraine, problems arise.

In the resolution of the Cabinet of Ministers of Ukraine dated March 3, 2021, No. 167-r “On the Approval of the Concept for the Development of Digital Competencies and the Approval of the Action Plan for Its Implementation,” the necessity of ensuring society's readiness to master key combinations of knowledge, skills, abilities, ways of thinking, views, and other personal qualities in the field of information and communication technologies and digital technologies (digital competence) is emphasized.

The importance of acquiring digital competencies and competencies by citizens of the country is witnessed by their consideration in regulatory and legislative documents and the coverage of the problems of their acquisition of educational processes of all educational levels, namely:

- in the Law of Ukraine “On Education” information and communication competence is recognized as one of the key, necessary for every modern individual for successful life and career growth;

- in the State Strategy for Regional Development for 2021-2027, approved by the Decree of the Cabinet of Ministers of Ukraine of August 5, 2020 No. 695 (Cabinet of Ministers of Ukraine, 2020a), among other national challenges that hinder the development of regions and the state as a whole, recognizes the low level of digitalization of regions and digital awareness;

- In the State Standard of Basic Secondary Education, approved by the Resolution of the Cabinet of Ministers of Ukraine on September 30, 2020, No. 898 “On Certain Issues of State Standards of Complete General Secondary Education” (Cabinet of Ministers of Ukraine, 2020b), information and communication competence is defined as the confident, critical, and responsible use of digital technologies for personal development and communication; the ability to safely apply information and communication tools in learning and other life situations while adhering to the principles of academic integrity.

- in the Concept for the Development of the Digital Economy and Society of Ukraine for 2018-2020, approved by the resolution of the Cabinet of Ministers of Ukraine on January 17, 2018, No. 67 (Cabinet of Ministers of Ukraine, 2018), one of the priority tasks on the path to the accelerated development of the digital economy is identified as the creation and implementation of a national program for training in general and professional digital competencies and knowledge.

The provided list indicates that the tasks of acquiring digital competencies are extremely relevant for every citizen (regardless of age or profession) and for society as a whole. Addressing these tasks requires solving a whole range of issues and problems within the country, regions, and specific sectors, particularly in the education system.

Acquiring digital competencies is a relevant task not only for participants in blended learning. It concerns every citizen, regardless of age, gender, or social status. Awareness of this fact and the willingness to acquire new IT skills for professional and everyday needs is part of a person's socialization. Blended learning has become a part of everyday life for every family; moreover, online meetings for professional activities and addressing a wide range of issues have become a common daily reality.

Let us formulate the prerequisites for acquiring digital competencies among members of society based on the aforementioned points, and state what has currently been done in society (Table 1).

*Table 1*

Prerequisites for the acquisition of digital competences by members of society and measures taken by the state to ensure them

The importance of digital competences is also highlighted by current global practices. In particular, on 22 May 2018, the European Parliament and the Council of

<b>Prerequisites</b>	<b>Measures taken</b>
Legislative prerequisites (assume the activities of the highest state authorities regarding the issuance of legislative acts and the creation of legal norms)	The establishment and activity of the Committee of Digital Transformation of the Verkhovna Rada of Ukraine since August 29, 2019.
Institutional prerequisites (imply the existence of a set of fundamental political, social, legal and economic rules in society that define the framework of human behaviour and form the basis for the implementation of certain activities)	The establishment and active work of the Ministry of Digital Transformation of Ukraine, appointment of deputy ministers for digital development in all ministries of Ukraine.
Foreign policy prerequisites (include the existence of experience in the world of implementing certain measures and the availability of documents that are acceptable for implementation in the Ukrainian society)	The activities of the EU support program “EU4Digital: support of the digital economy and society in the Eastern Partnership”, development of the Strategy (“road map”) of Ukraine's integration into the Single Digital Market of the European Union in close cooperation with representatives of the relevant structural units of the European Commission”.
Cognitive prerequisites (imply the presence of framework regulatory documents, according to which every citizen is able to acquire knowledge and skills personally for their own needs).	In 2021, the Ministry of Digital Transformation of Ukraine presented the Digital Competence Framework for Citizens of Ukraine (DigCompUA for Citizens 2.1).
Technological prerequisites (imply the availability of technical means, application software, and access to the Internet)	The availability of technical means (computer equipment and personal gadgets) and applications, as well as the widespread access to the Internet for all citizens, particularly for participants in the educational process.
Cybersecurity prerequisites (imply the presence of capabilities to manage real and potential cyber threats and dangers during online training)	Decree of the President No. 447/2021 dated August 26, 2021, on the approval of the decision of the National Security and Defence Council of Ukraine dated May 14, 2021, “On the Cybersecurity Strategy of Ukraine.”

the European Union adopted the Framework for an updated key competences for lifelong learning. This regulatory document recognizes digital competence as one of the eight key competences for the full life and work of EU citizens. Digital competence for



learning, working and participating in society implies confident, critical and responsible use and interaction with digital technologies. The term encompasses a range of related concepts, including information and media literacy, communication and collaboration, digital content creation (including programming), security (including digital privacy and cybersecurity), as well as problem-solving and lifelong learning. In 2021, the Ministry of Digital Transformation of Ukraine presented the Digital Competence Framework for Ukrainian Citizens (DigCompUA for Citizens 2.1). This document was adapted by Ukrainian experts based on the results of research conducted as part of the international Erasmus+ project “Digital Competence Framework for Ukrainian Teachers and Other Citizens” (dComFra). It is based on recommendations in the field of digital competences from European and international institutions and the European conceptual and reference model of digital competences for citizens DigComp 2.1: The Digital Competence Framework for Citizens and. After translation and adaptation, the draft of this Framework was discussed and improved in the expert environment of the Digital Skills Committee of the Ukrainian National Digital Coalition “Digital Transformation Coalition”. For this purpose, representatives of the Expert Advisory Committee on Digital Technologies under the Ministry of Education and Science of Ukraine and experts from the EU4 Digital Facility's eSkills network in Ukraine were involved. This Framework was adapted to the national, cultural, educational and economic peculiarities of Ukraine, taking into account the current challenges and realities.

The Digital Competence Framework for Ukrainian Citizens can be considered as the basis for the development of digital competences. It defines the scope of knowledge, skills and practical abilities that citizens need to be competitive in the Ukrainian and international labour markets and to consciously and competently use modern digital technologies.

In particular, in this document, each citizen will find the following areas of digital competence:

- basics of computer literacy;
- information literacy and the ability to work with data;
- communication and interaction in the digital society, security in the digital environment;
- digital content creation;
- problem-solving in the digital environment; and higher education and lifelong learning.

Moreover, the document contains names and descriptors of competences related to each of these areas. Each of them includes a description of the relevant knowledge, skills and abilities.

People without a basic education in IT can assess their level of digital competence. For this purpose, the document provides relevant descriptions of levels A1, A2, B1, B2, C1, C2.

In its current version, the Framework comprises 4 dimensions, 6 domains, 30 competences and 6 levels of digital competence.



The practical application of the Framework includes:

- amendments to professional standards and job requirements;
- integration into testing, surveys, certification, attestation, etc;
- creation of programmes for different forms of education, educational resources, for acquiring new knowledge and improving the level of digital competences;
- development of a professional, more detailed framework of digital competences for specialists of professional groups in various sectors of the economy, agriculture, civil servants, teachers and educators, healthcare professionals, entrepreneurs, etc.

In addition, local public authorities can use it to make managerial decisions and plan practical measures to increase the level of digital literacy of the population of certain regions, cities, and territorial communities.

At the end of 2021, three new Digital Competence Frameworks were launched on the Diia.Digital Education portal:

- 1) Digital Competence Framework for Entrepreneurs.
- 2) Digital Competence Framework for civil servants.
- 3) Conceptual and Reference Framework for Digital Competences of Teachers and Academic Staff.

The last one is the result of fruitful cooperation between the project consortium and other working groups at the Ministry of Education and Science of Ukraine. Five areas of competence have been identified: Digital Literacy, Professional Engagement, Digital Educational and Scientific Resources, Educational Activities, and Digital Competence of Education Learners, which describe 22 competences and 5 levels of proficiency in each of them. The Digital Competence Framework for Pedagogical and Academic Staff is intended to be used in the future to create educational standards, develop educational programmes by educational service providers (those who train future teachers and those who improve their qualifications), as well as for self-education of pedagogical and academic staff.

Since the digitalization of the economy, education, and all areas of life involves significantly greater penetration of new technologies compared to previous stages of technological progress and is all-encompassing, acquiring digital competencies cannot be reduced solely to the educational process or equated with obtaining an additional qualification. Furthermore, an individual's digital competencies require constant updating (both in everyday life and professionally), and all members of society should possess these competencies to some extent.

Online learning has set new challenges for all participants in the educational process, including the acquisition of digital competencies. And this is where the illusion of their own skills and capabilities arises. At the same time, students consider their main advantages the ability to work with gadgets, applications, search for information and create their own content. In addition to the above, teachers and managers of institutions consider their digital skills to include the ability to create documents and teaching

materials in disciplines using modern software and cloud services, and to create a learning environment for online learning for students. For the purpose of their objective assessment, the EU and many countries have in recent years approved and implemented the so-called digital competence frameworks for citizens, which apply to every citizen and to certain professional groups (for Ukraine, the above are listed).

The acquisition of digital competences envisaged by the Digital Competence Framework for Ukrainian Citizens is relevant for all participants in the educational process without exception. The successful implementation of blended learning depends on the relevant digital competences of the teacher. Educators should strive to acquire the digital competences envisaged by the Digital Competence Framework for Teachers and Researchers.

The Ministry of Digital Transformation of Ukraine, in cooperation with the Ministry of Education and Science of Ukraine, has launched a national digital literacy test on the Diia.Digital Education portal. At <https://osvita.diia.gov.ua/>, the portal offers a choice of online digital literacy tests: “Digital Literacy 1.0 for Citizens”, “Digital Literacy 2.0 for Citizens”, “Digital Literacy for Civil Servants”, “Digital Literacy for Teachers”, “Digital Literacy for Healthcare Workers” and

“ICDL Ukrainian Digital Citizen”. It allows anyone, including teachers, to assess their own level of digital literacy and further improve their digital skills as needed. Based on the results of the online test, you can receive an official certificate that can be attached to your CV when looking for a job. This test was created by experts of the Academy of Digital Development on the basis of the professional competence framework in accordance with the order of the Ministry of Education and Science of Ukraine No. 38 of 15 January 2019 and assesses 21 professional digital competences grouped into 5 areas: teacher in a digital society; professional development; use and analysis of digital resources; teaching and assessment of students; development of students' digital competence.

The effectiveness of the introduction of innovative digital technologies in the educational process for an educational institution can be assessed using the online self-assessment tool SELFIE, which was developed under the auspices of the European Training Foundation for vocational education and training institutions. This free online tool is available in Ukrainian at <https://schools-go-digital.jrc.ec.europa.eu/> and is recommended for use by general secondary and vocational education and training institutions by the Ministry of Education and Science of Ukraine. It does not measure or compare the knowledge or skills of users, nor does it evaluate or compare educational institutions among themselves. It is used only for self-analysis of the state of digitalisation and the effectiveness of digital technologies in a particular educational institution and is intended for managers of educational institutions, as it allows them to assess how they use digital technologies for innovative and more effective learning, taking into account the opinions of teachers, students and institutional managers. The questions for managers focus on strategies and practices related to the use of digital technologies at the level of the educational institution. The questions for teachers cover

teaching practices, and the questions for learners cover their experiences and learning practices related to the use of digital technologies. Educational institutions can customise the tool, if necessary, by adding their own questions that meet their context and needs. As of 3 June 2021, ninety-six schools and vocational education institutions have completed the piloting of the SELFIE tool, which helped them assess the effectiveness of digitalisation and the state of digitalisation of their institutions. More than 20,000 participants took part in the piloting of SELFIE in Ukraine: 17,303 students; 2,996 teachers; 546 heads of educational institutions.

Determining the formation of the components of a person's digital competence is one of the main problems facing scientists today. To solve this urgent problem, the development of European scientists is useful: the programme for diagnosing the formation of human digital competence 'The digital competence wheel' (hereinafter referred to as DCW). This programme was launched in 2017, and its developers from the Centre for Digital Dannele aim to provide an overview of which digital knowledge and skills are more relevant today, as well as ways of digital learning through understanding the formation of digital competence. The digital model of the programme is theoretically based on a large EU research project, DIGCOMP. You can create your own digital competence wheel on the Digital Competence website at <https://digital-competence.eu/>. The elements of the wheel are: health, storage, search, critical evaluation, active participation, collaboration, data protection, etc.

The task of acquiring digital competences by members of society throughout their lives has become obvious and relevant. The prerequisites formulated in the article relate to the measures taken by the state to improve the digital competence of citizens. The direction of further research should be to study the subjective prerequisites for the acquisition of digital competencies, that is, those related to the cognitive knowledge and personal motivations generated by the needs of society and circumstances. To this end, the author believes that it is necessary to popularise the Digital Competence Framework. For pedagogical staff and management of educational institutions, it is necessary to introduce mechanisms for familiarising themselves with the standards of digital competence within the framework of professional activities and self-assessment of their level of proficiency using the online tools discussed in the article.

## 2.3. USING DISTANCE LEARNING COURSES FOR THE PROFESSIONAL GROWTH OF TEACHERS OF GENERAL EDUCATION DISCIPLINES

### ВИКОРИСТАННЯ ДИСТАНЦІЙНИХ КУРСІВ ДЛЯ ПРОФЕСІЙНОГО ЗРОСТАННЯ ВИКЛАДАЧІВ ЗАГАЛЬНООСВІТНІХ ДИСЦИПЛІН

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*The development of professional pedagogical skills in teachers of general education disciplines throughout their lifetime is a key condition for preparing competitive specialists in all fields of activity. For a competent educator, continual self-improvement, self-development, and the development of their abilities through self-education and distance professional development courses are vital. This article highlights the potentials of distance courses for the development of pedagogical mastery in teachers of general education disciplines.*

*Results. Professional development is a process of paramount importance, through which the growth of an educator as a professional is achieved. In today's fast-paced life, with constant time constraints, the development of pedagogical skills in teachers of general education disciplines at vocational education institutions is effectively accomplished through distance education. The peculiarities of learning using distance educational technologies are highlighted, and their advantages and disadvantages are analyzed. A specialized distance course for enhancing the professional mastery of educators, "Development of Pedagogical Skills in Teachers of General Education Disciplines at Vocational Education Institutions," has been characterized. This course includes five educational modules designed to improve all aspects of the pedagogical skills of teachers in these institutions.*

*The organization of the distance course "Development of Pedagogical Skills in Teachers of General Education Disciplines at Vocational Education Institutions" is aimed at providing informational and methodological support to educators in their continuous professional education and is highly relevant today.*

*Розвиток професійної педагогічної майстерності викладачів загальноосвітніх дисциплін протягом усього життя є головною умовою підготовки конкурентоспроможних фахівців для всіх сфер діяльності. Компетентному педагогові важливе постійне самовдосконалення, саморозвиток, розвиток своїх здібностей засобами самоосвіти, дистанційних курсів підвищення кваліфікації тощо. У статті висвітлено можливості дистанційних курсів для розвитку педагогічної майстерності викладачів загальноосвітніх дисциплін.*

*Професійний розвиток є процесом пріоритетного значення, завдяки якому досягається зростання педагога як професіонала. У нинішніх умовах високого*

темпу життя, постійної нестачі часу розвиток педагогічної майстерності викладача загальноосвітніх дисциплін закладу професійної освіти ефективно здійснюється засобами дистанційної освіти. Виділено особливості навчання з використанням дистанційних освітніх технологій, проаналізовано його переваги і недоліки. Охарактеризовано розроблений дистанційний спецкурс удосконалення професійної майстерності педагогів «Розвиток педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти», який включає п'ять навчальних модулів, що розраховані на підвищення рівня всіх складових педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти.

*Висновки.* Організація дистанційного спецкурсу «Розвиток педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти» спрямована на інформаційно-методичну підтримку педагогів в процесі їх безперервної професійної освіти і є актуальною на сьогоднішній день.

**Ключові слова:** педагогічна майстерність; професійна освіта; загальноосвітня підготовка; дистанційний спецкурс; викладач.

**Keywords:** pedagogical mastery; professional education; general education training; distance special course; teacher.

In the current stage of development of Ukrainian society, overcoming the consequences of the pandemic and the state of war, the country needs professionals who can quickly adapt to the surrounding environment, acquire necessary knowledge, and apply it in practice. Thus, the development of pedagogical skills of educators, as a leading factor determining the quality of training such specialists of any profile, is the most important pedagogical problem. The internal subjective aspect of pedagogical skill includes knowledge, skills, abilities, value orientations and priorities, general and professional culture, professionally important personality qualities, attitudes towards pedagogical activity, pedagogical abilities, character traits adequate to the demands of the profession, manifestations of temperament, and peculiarities of mental processes. All these require constant improvement, which is why the study of ways and means of developing pedagogical skills of educators remains a relevant issue today.

The problem of a teacher's pedagogical skills, its formation, and improvement is widely developed in pedagogy and psychology, with research results reflected in the works of scholars such as E. Barbina, A. Hrytsenko, I. Ziaziun, V. Kovalchuk, O. Krasnytska, P. Luzan, N. Ostroverkhova, O. Otych, V. Palamarchuk, M. Paltysh, V. Semychenko, S. Sysoieva, N. Telichko, and others.

The theme of distance education, the introduction of distance courses for the development of professional competence of educators, and the improvement of pedagogical skills are discussed by scientists such as O. Bazeliuk, N. Bendere, V. Bykov, A. Hurzhii, L. Kartashova, V. Gravit, N. Klokart, V. Kukharenko, V. Lapinsky, N. Morze, Y. Novikov, A. Nurzhinska, V. Oliynyk, V. Osadchy, L. Petrenko, S. Sysoieva, O. Spirin, P. Stefanenko, and others.

Despite the relevance of discussing the problem of pedagogical skills, the study



of psycho-pedagogical literature allows identifying a complexity in its research, such as defining the very concept of "pedagogical skill." The results of the analysis of modern studies (I. Ziaziun (2000), V. Kovalchuk (2011), P. Luzan (2010), O. Otych (2014), N. Telichko (2014), L. Filatova (2021), and others), dedicated to aspects of developing teachers' pedagogical skills, enabled the "formulation of own views on the interpretation of the essence of the concept in such an edition: "Pedagogical skill of a teacher in general educational disciplines of a vocational education institution" – is an integrative complex quality of a personality, based on perfect professional-pedagogical competence, ensures a high level of self-organization of pedagogical activity through the synthesis of knowledge, experience, values, and qualities of a teacher and manifests itself in the creative solution of professionally oriented tasks of mastering the system of knowledge in general educational training for the development of key competencies of future qualified workers" (Kabysh, 2021).

The proficiency of a vocational education teacher is characterized by professional appropriateness, individual-creative nature, and optimality in choosing tools. Thus, pedagogical mastery is a high level of professional activity of a teacher. Its external indicators include: a high level of performance, the quality of the teacher's work; purposeful, adequate actions to pedagogical situations; achievement of results in education, upbringing, and development of a student's personality.

In any profession, competent, educated specialists have always been valued. Professionalism often depends not only on the level of education and work experience but also on an individual's desire to fill gaps in knowledge and skills, often a necessary factor for career advancement. For a competent teacher, continual self-improvement, self-education, and development of abilities are essential. Professional development is a process of priority importance, through which a teacher's growth as a professional is achieved. The greatest impact on a teacher's development comes from continuous education, which operates unceasingly and is aimed not only at acquiring knowledge and skills but also at nurturing character, behavioral culture, aspirations, and achievements. Professional development courses are the best solution for modern scholars and educators. In the process of professional development of pedagogical workers (retraining and increasing professional level), it is essential to integrate new knowledge into the structure of the listeners' professional experience and to influence not only at the informative but also at the personal level. Currently, "the system of professional development is less inert and capable of responding to rapid socio-economic and technical-technological conditions. It mostly has a direct two-way connection with practice, allowing for a quicker educational result, and the learning contingent is capable of critically evaluating proposed innovations, directly participating in their testing, development, and implementation" (Oliynyk, 2003). In today's fast-paced life and constant lack of time, the development of pedagogical mastery of a vocational education institution's general education discipline teachers is effectively achieved through distance education methods.

Distance courses open new opportunities for teacher qualification improvement,



as with proper organization, they successfully implement the principles of continuity and connection with professional-pedagogical practice. Distance learning makes it much easier to provide qualified teaching staff, and the course participants themselves learn without interruption from professional activities, having the opportunity to simultaneously apply the acquired knowledge practically. A significant factor of continuity in distance professional development is the ability to choose the time by the participants themselves. Modern distance learning technologies not only convey professionally necessary information to the course participants but also organize the practical part of the educational work, conduct objective control of material assimilation and its creative interpretation results through online testing, and exchange experiences and defend pedagogical projects in webinar formats.

An urgent task in the context of integrating the activities of professional development courses and pedagogical self-education of teachers is the development and implementation of distance learning to develop pedagogical mastery of general education discipline teachers in vocational education institutions. Distance learning is very convenient and effective, opening up broad prospects for teacher qualification improvement. Studying in a modern distance course implies the possibility of feedback, constant contact with the teacher in communication. Distance courses are an excellent opportunity for qualification improvement for teachers who also want to master distance learning technologies to then apply them in their work. By studying remotely, a teacher better understands the peculiarities of this form of learning compared to traditional ones.

One of the primary objectives of distance courses is to encourage the purposeful enhancement of the qualification levels of pedagogical staff, their personal and professional-career growth, and to increase the effectiveness of pedagogical work. Foremost, this refers to the author's distance special course "Development of Pedagogical Skills in Teachers of General Education Disciplines in Vocational Education Institutions", the aim of which is to support pedagogical staff of vocational education institutions, particularly during the inter-course qualification enhancement period, in deepening and systematizing knowledge about the essence and peculiarities of professional mastery in teachers of general education disciplines; professional and personal self-improvement, enhancing the effectiveness of pedagogical activity, developing pedagogical skills, and a creative approach to the task.

Mastering the aforementioned distance course aids in the improvement of studying and implementing modern, innovative approaches to the organization of the development of pedagogical skills in teachers of general education disciplines. The use of distance educational technologies is increasingly playing a significant role in modernizing the entire domestic education system. Analysis of domestic theory and practice of e-learning using distance educational technologies (Vovk et al., 2019; Bazelyuk et al., 2018) allowed for the identification of its features. Some of them can be considered advantages:

- Technological nature – modern software and technical means enable enhancing

the efficiency of education through visualization of information, active interaction of the learner with the educational system, voluminous electronic libraries, etc.;

- Openness and accessibility of learning – obtaining education is independent of material conditions and place of residence, which facilitates continuous education, using an individual study schedule;
- Documentation of the entire learning process - the learner can save the course of study, electronic correspondence with the teacher, which can be referred to later as needed; and the teacher can provide timely professional support;
- Individualization of the learning process – e-learning allows the learner to determine the pace of learning, offers the possibility to return several times to certain topics, receive consultation from the teacher, discuss issues on the forum, access Internet resources, etc., which promotes the development of self-education skills, increasing interest in learning;
- Massiveness – the possibility of creating a unified educational environment that will enable teaching a larger number of people.
- Disadvantages of e-learning include:
- Lack of direct contact between the teacher and the learner, complicating administration requirements, motivating listeners;
- High labor intensity for the teacher in developing courses;
- Lack of methodological materials concerning the preparation and conducting of e-learning.

The development of the remote course for enhancing the professional skills of educators was based on the implementation of principles of individualization and a student-centered approach, taking into account the requests, interests, and needs of educators. The program, founded on these principles, ensures individual focus and the integrity of the entire educational process.

The program's structure includes five educational modules aimed at improving all components of pedagogical proficiency for teachers of general education subjects in vocational education institutions. The modular organization of the remote course is necessitated by the fact that a module represents a certain volume of educational information required for any professional activity and contains several modular units. These can supplement and expand the module's content depending on the requirements of a specific activity (Kovalenko, 2004).

Researchers (Yeremyeyeva, 2011; Kovalenko, 2004; Sysoieva et al., 2001; Sydorenko, 2013) highlight the following advantages of modular organization in the learning process: segmentation of information into complete parts or modules with independent significance; elimination of superfluous material for this type of work; maximum individualization of learning progress. The selected modules for enhancing professional mastery are complementary and interdependent: the goals and tasks of the process (own route) for improving professional skills, as understood and accepted by

educators, can be achieved through the use of forms and means proposed by the program, which in turn ensure continuity and reflection of the educational process itself.

The developed remote special course "Development of Pedagogical Mastery for Teachers of General Educational Disciplines in Vocational Education Institutions" meets the following conceptual, methodological, and didactic requirements:

- Conceptual requirements: "alignment with the goals and objectives of the educational program; relevance and scientific substantiation of content; orientation towards a competence-based approach" (Bazelyuk et al., 2018);
- Methodological and didactic requirements: completeness of content disclosure; optimal content volume of all structural elements; clarity, conciseness, accessibility, and unambiguity in explaining educational material; diversity in presenting educational materials, encompassing all necessary components of the educational process (information acquisition, practical sessions, assessment of learning achievements); presence of interactivity, expanding the scope of independent educational work through active learning forms; optimal, efficient, and varied forms and methods of self-assessment and assessment of learners' achievements; conformity to modern forms and methods of organizing the learning process with the application of electronic learning and distance education technologies; logical and sequential organization of students' educational activities; availability of methodical materials and information for independent work of course participants; alignment with age and psychological characteristics of learners; creation of positive motivation for learning; use of modern, relevant sources to form content, absence of factual errors, and unethical components.

The distance course represents a system for interactive interaction among participants of the educational process. It is an educational resource (website) containing a series of pages/sections, essential components of the distance learning system within a particular course, closely interconnected.

In the process of developing the distance special course "Development of Pedagogical Mastery for Teachers of General Educational Disciplines in Vocational Education Institutions," recommendations from scholars (Vovk et al., 2019; Bazelyuk et al., 2018) were taken into account regarding its structure (Fig. 1).

I. Організаційний блок	<ul style="list-style-type: none"> <li>• вступ (відео, текст),</li> <li>• місце знайомства членів навчальної групи (форум, соціальна мережа),</li> <li>• інструкція з використання програмного забезпечення, що використовується в курсі,</li> <li>• посібник з вивчення курсу, програма курсу,</li> <li>• мережвий етикет (правила поведінки в Інтернеті),</li> <li>• анкети вхідні (вихідні) тощо.</li> </ul>
II. Теорія.	<ul style="list-style-type: none"> <li>• навчальна інформація може представлятися у різному вигляді: текст із графікою, відеолекції у записі, вебінари, відкриті ресурси інтернету на тему курсу.</li> </ul>
III. Практикуми	<ul style="list-style-type: none"> <li>• семінари, завдання, реферати, есе, кейси</li> </ul>
IV. Контроль:	<ul style="list-style-type: none"> <li>• тести, підсумкове оцінювання, портфоліо, самоконтроль та взаємоконтроль.</li> </ul>
V. Педагогічне спілкування:	<ul style="list-style-type: none"> <li>• наявність спеціального місця, наприклад, форуму для консультацій слухачів з викладачем та спілкування між слухачами.</li> </ul>

*Fig. 1. Structure of the Distance Learning Course "Development of Pedagogical Mastery in Teachers of General Education Disciplines in Professional Education Institutions" (Figure in Ukrainian)*

The main educational content (divided into modules) includes:

- Core theoretical materials of the course (printed texts, audio and video materials, presentations) with self-assessment materials (tests and interactive tasks);
- Materials for practical and laboratory work (assignments, electronic simulators);
- A list of additional electronic informational resources (files with supplementary materials, glossaries, links to articles, electronic versions of books and educational manuals in electronic library systems, accessible from the IP addresses of the educational institution and on the Internet).
- Materials for seminar sessions, ongoing monitoring, and interim assessment (educational tasks, assessment resource pool).
- Materials for reflection (initial and final surveys, participant questionnaires).

The course modules can encompass a diverse array of materials depending on the objectives being addressed. The main characteristics of the developed online course "Development of Pedagogical Skills for Teachers of General Education Disciplines in Vocational Education Institutions" include: at the beginning of each lesson, the goals, tasks, expected outcomes, and a brief annotation of the text are defined; the course structure is modular, allowing participants to clearly comprehend their progression from module to module, and to choose any module at their discretion or at the discretion of the lead educator, depending on their level of education; the selection and structuring of

the material is in line with the concept of education; for the elaboration and explanation of main concepts, hypertext links are used; for explaining terms and foreign words, pop-up lines are utilized; the clarity, conciseness, and logic of the material presentation.

The distance learning special course employs technologies of collaborative creative activity, project method, training, problem role-playing games, case method, solving pedagogical situations and tasks, various forms of control both automated and open types, etc. Diverse activities, creative tasks, carefully selected links to reliable Internet resources, and interactive forms of communication with each other and with the teacher contribute to enhancing the effectiveness of the learning process. The principles of organizing the distance special course for improving professional skills of educators align with training, as such education is aimed at solving practical tasks in a current professional context and is directly related to future application situations. For the development of training sessions of the special course, materials from training manuals (Kalashnikova, 2008; Sysoieva & Bondareva, 2007) were used and adapted for the development of pedagogical skills of teachers of general education disciplines, and training programs, auxiliary training exercises, etc., were developed.

The most effective for the training method of the distance special course in the development of pedagogical skills is the use of a combination of gaming techniques. According to many researchers, the use of game methods in training is extremely productive. In the first stage of group work, games are useful as a means of overcoming stiffness and tension among participants, as a condition for painless removal of "psychological defense". Often, games become a tool for diagnostics and self-diagnosis, allowing non-intrusively and easily to identify communication difficulties and serious psychological problems. Through games, the learning process is intensified, new behavioral skills are reinforced, verbal and non-verbal communicative abilities are trained, creative initiatives and human potentials are revealed. For reproducing the results of the development of pedagogical skills of teachers of general education disciplines in vocational education institutions, participants of the distance special course developed projects of their own professional self-development. After completing the distance special course "Development of Pedagogical Skills for Teachers of General Education Disciplines in Vocational Education Institutions," the main recommendation was to guide participants towards creating their own "Portfolio", which scholars consider as "a tool for realizing one's own educational goals" (Sysoieva et al., 2001). The portfolio allows for the consideration of results achieved by the learner in various activities (educational, social, communicative, etc.) and is an important element of a practice-oriented, activity-based approach to education, enabling the assessment of the level of development of pedagogical skills of teachers of general education disciplines.

The proposed portfolio of the participant of the special course for the improvement of professional skills of educators includes a cumulative folder with: the most successful training exercises that are appropriate for use in working with students of vocational education institutions; materials that will contribute to the development of

pedagogical skills in professional activities; the program of professional growth of a teacher of general education disciplines. It is advisable to include in the portfolio a project of one's own professional self-development.

The orientation of the distance learning course is practical in nature. A notable feature is that the lessons allow for more intensive feedback between group members compared to everyday communication. Additionally, each group member can actively experiment with different communication styles, learn and practice entirely new communicative skills and abilities, previously unfamiliar to them, while feeling psychologically comfortable and protected.

Practical lessons of the distance course are developed considering recommendations for organizing such sessions (Kalashnikova, 2008; Sysoeva & Bondareva, 2007). The assessment of practical skills is carried out using practical tasks in the distance course, aimed at consolidating learned material and developing certain professional skills and abilities. Under the guidance and control of the instructor, participants perform specific tasks, exercises, simulate professional activity situations, and solve complex educational-professional problems.

The tasks of the practical part are focused on applying theoretical knowledge in solving various situational tasks, using algorithms in problem-solving, applying specialized knowledge in unconventional situations, conducting research, and presenting obtained results. At the end of each practical lesson, there are recommendations for organizing reflection on the content of the lesson. Reflection should not be episodic; reflective operations are carried out throughout all practical lessons.

Feedback is a key element in the gradual process of developing pedagogical skills among teachers during a distance learning specialty course. Providing continuous feedback is an important means of enhancing learning effectiveness. It includes providing information about aspects of understanding and productivity and can be given by practicing specialists, colleagues, or listeners. Effective feedback helps distance course participants reflect on their learning and learning strategies to make adjustments and achieve more progress in learning. Scholar V. Kukhareno identifies the main function of feedback as "receiving information about the educational activities of students in order to design and develop a detailed system of educational actions that would ensure effective achievement of educational goals" (Kukhareno, 2001).

Various forms of feedback, such as comments, questions, and discussions often provided during learning, motivate for success. Feedback can be provided to listeners in a distance course at all stages of the course, immediately after its completion, and even several months after it ends. Feedback in the form of reviews allows for continuous improvement of the educational course, making constructive changes to the educational process based on the wishes of the listeners, and making the online course more interesting, useful, and motivating for learners.

As a result of studying the course, listeners must:

- Know: the features of pedagogical activity, the essence of pedagogical



skill, its components, their manifestation in solving professional tasks considering modern requirements; methods of studying the main components of pedagogical skill; the essence, types, and methods of reflection, its possibilities in developing pedagogical skill; requirements for a modern teacher, the essence, stages, methods, and peculiarities of the teacher's creative self-development;

- Be able to: identify promising directions, tasks, and methods of developing components of pedagogical skill, develop a self-education program; solve pedagogical tasks, determining methods that reflect modern requirements for components of pedagogical skill; analyze and evaluate components of pedagogical skill, their manifestation in situations of interaction between subjects of the educational environment; analyze and reflect on their actions when solving professional tasks;

- Possess methods: self-education, self-upbringing; analysis, evaluation, and forecasting of pedagogical phenomena, situations; diagnostics of components of pedagogical skill, methods of analysis and reflection of their actions during solving professional tasks.

The analysis of studies on the development of pedagogical skills of educational workers (N. Benderec (2013), V. Yeremyeyeva (2011), I. Ziaziun (2000), N. Klokar (2010), V. Kovalchuk (2011), P. Luzan (2010), O. Otych (2014), V. Sydorenko (2013), N. Telychko (2014), V. Tesliuk (2010), H. Fedyuk (2020), L. Filatova (2021), L. Shovkun (2010) and others) formed the basis for developing the structure of methodological support for implementing the distance course program for improving the professional skills of teachers "Development of Pedagogical Skills of Teachers of General Education Disciplines in Vocational Education Institutions," the educational-thematic plan of which is presented in Table 1.

*Table 1*

Навчально-тематичний план дистанційного спецкурсу «Розвиток педагогічної майстерності викладачів загальноосвітніх дисциплін закладів професійної освіти»

No.	Topic	Total Hours	Lectures	Practicals
1	2	3	4	5
1	Introduction. Key Concepts of the Course	2	2	
	<b>Content Module 1. Theoretical Foundations of Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions</b>	<b>12</b>	<b>6</b>	<b>6</b>
2	Topic 1. Pedagogical Activity and its Specific Features. The Concept of Pedagogical Expertise.	4	2	2

3	Topic 2. Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions in the Context of Continuous Education.	4	2	2
4	Topic 3. Professional Development and Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions.	4	2	2
	<b>Content Module 2. Mastery of Pedagogical Interaction of General Education Subject Teachers in Vocational Education Institutions</b>	<b>16</b>	<b>6</b>	<b>10</b>
5	Topic 4. Fundamentals of Pedagogical Expertise and Technique of General Education Subject Teachers in Vocational Education Institutions.	6	2	4
6	Topic 5. Improving the Pedagogical Technique of General Education Subject Teachers in Vocational Education Institutions.	6	2	4
7	Topic 6. Pedagogical Conflict and its Resolution Tactics.	4	2	2
	<b>Content Module 3. Pedagogical Creativity as the Basis of Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions.</b>	<b>12</b>	<b>6</b>	<b>6</b>
8	Topic 7. The Role of Pedagogical Skills in the Activities of General Education Subject Teachers in Vocational Education Institutions.	4	2	2
9	Topic 8. Pedagogical Expertise and Culture of General Education Subject Teachers in Vocational Education Institutions.	4	2	2
10.	Topic 9. Pedagogical Creativity as a Factor in the Formation and Development of the Personality of General Education Subject Teachers in Vocational Education Institutions.	4	2	2
	<b>Content Module 4. Technologies, Forms, and Methods for Developing Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions</b>	<b>14</b>	<b>6</b>	<b>8</b>
11.	Topic 10. Development of Pedagogical Expertise of General Education Subject Teachers.	4	2	2
12.	Topic 11. Technologies for Developing Pedagogical Expertise of General Education Subject Teachers.	4	2	2

1 3.	Topic 12. Pedagogical Coaching – A Technology for Developing Pedagogical Expertise of General Education Subject Teachers.	6	2	4
	<b>Content Module 5. Creative Self-Development of General Education Subject Teachers in Vocational Education Institutions</b>	<b>12</b>	<b>6</b>	<b>6</b>
1 4.	Topic 13. Self-Education and Self-Cultivation as Factors in the Self-Development of Pedagogical Expertise of General Education Subject Teachers in Vocational Education Institutions.	4	2	2
1 5.	Topic 14. Developing a Program for Professional Self-Improvement and Development of Pedagogical Expertise of Teachers.	4	2	2
1 6.	Topic 15. Reflection as a Universal Internal Mechanism for Developing Pedagogical Expertise of Teachers.	4	2	2
1 7	Final Session: Defense of Projects on Personal Professional Self-Development of the Teacher.	4	-	4
	<b>Total</b>	<b>72</b>	<b>32</b>	<b>40</b>

The educational and methodological support of the program includes a list of study guides and other teaching materials that are available to the participants and ensure sufficient quality of preparation according to the program content. The methodological support for the development of pedagogical skills in teachers of general education subjects also includes multimedia presentations, methodological recommendations, instructions, and digital educational resources.

The educational and methodological support for the independent work of the participants in the distance course "Development of Pedagogical Skills in Teachers of General Education Subjects in Vocational Education Institutions" during the implementation of each section includes various types of practice-oriented activities:

- Business and role-playing games (on the content of different pedagogical situations);
- Trainings (related to the development, presentation, and implementation of pedagogical decisions made in the context of implementing educational standards);
- Development of programs, projects (working programs, lesson models, diagnostic tools, etc.);
- Working with literature;
- Working with internet resources (searching for information on a given topic, working with regulatory and legal information, etc.);
- Working with a glossary on the studied topic;
- Systematization of methodological materials;

- Studying and mastering educational technologies;
- Writing reflective works (self-analysis, questionnaires, etc.).

The conditions for positive effectiveness of independent work include active, emotionally colored participation of the participants in practical classes (such forms as discussion, round table, presentation of presentations, meetings of problem groups, etc. are envisaged).

The distance course program "Development of Pedagogical Skills in Teachers of General Education Subjects in Vocational Education Institutions" provides for various forms of control. Ongoing control: responses to problem questions in the process of lectures, practical classes; performance of practice-oriented tasks on the topic of the course; case studies; analysis of normative legal documents of different levels; analysis of typical pedagogical situations; defense of individual and complex project developments; defense of educational products developed in practical classes and independently (multimedia presentations, programs, plans, models, etc.); presentation of reflective works (self-analysis, essays, etc.). Final control according to the results of the distance course program: presentation of the results of practical tasks, portfolio; defense of the developed project. The mentioned forms of control in the process of implementing this program provide for the provision of participants with methodological recommendations (instructions) for the preparation of reporting materials and their presentation.

Distance mastering of the special course "Development of Pedagogical Skills in Teachers of General Education Subjects in Vocational Education Institutions" takes place via the Internet by:

- Developing a personal website on the CMS platform. The website is filled with educational content of a professional nature that contributes to the development of pedagogical skills in teachers of general education subjects in vocational education institutions;
- Placing information in the environment of the methodological association of teachers of general education subjects;
- Undergoing a course on the website of the Scientific and Methodological Center for Higher and Professional Pre-Higher Education in the professional development section;
- Disseminating best practices of comprehensive methodological support of the educational process by a professional methodological association of employees of professional pre-higher education institutions.

Conclusion. The organization of the distance special course "Development of Pedagogical Skills in Teachers of General Education Subjects in Vocational Education Institutions" is aimed at informational and methodological support of educators in the process of their continuous professional education. The combination of professionally-oriented and motivationally substantiated preparation with the development of professionally significant qualities provided by the program optimizes the possibilities of interpersonal interaction. The process of developing the pedagogical skills of

educators moves to a completely new qualitative level, ensuring the self-realization of the creative (professional) potential of the teacher on the path to the peaks of professionalism and productivity of professional activity. The implementation of the special course meets the didactic requirements for the educational process in the conditions of an activity-based approach and resonates with the experience of the learner.

Further scientific research is associated with the development of a methodology for purposeful development of pedagogical skills in teachers of general education subjects.

## 2.4. IMPROVING DIGITAL COMPETENCE IN THE TRAINING OF MASTERS OF INDUSTRIAL TRAINING

### УДОСКОНАЛЕННЯ ЦИФРОВОЇ КОМПЕТЕНТНОСТІ ПРИ ПІДГОТОВЦІ МАЙСТРІВ ВИРОБНИЧОГО НАВЧАННЯ

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*The use of modern digital technologies is a prerequisite for the development of more effective approaches to learning and the improvement of teaching methods, which saves time and faster to achieve this goal. The high educational potential of modern digital technologies and the pace of their development, development and modernization of software determine the requirement for the improvement of training of masters of industrial training. In these circumstances, it is important for graduates of pre-professional higher education to have the knowledge, skills and experience to solve educational tasks, above all, digital tools.*

*Results: the role of digital competence in the professional activity of masters of industrial training is analyzed in the article and the main aspects that digital competence in the general understanding in the educational process should provide. The levels of development of digital competence are distinguished: technical, social, informational and epistemological. In order to determine the levels of digital competence of future masters of industrial training, a study was conducted among the students of the final groups of the Professional-pedagogical specialty college of Hlukhiv NPU named after O. Dovzhenko with further analysis and presentation of the obtained results. In the experiment study, a technique was used to establish digital competence levels based on the respondents' frequency of use of various digital technologies. The obtained results reveal some problems in the formation and development of levels of digital competence in the preparation of future masters of industrial training. Namely, it has been demonstrated that the four levels of digital competence under study are not equally developed and need further adjustment. Thus, the social level was dominant in a large number of study participants. The analysis of each level separately revealed some patterns in their formation during the educational process and during the ordinary daily operations of the respondents.*

*Frequent use of a variety of digital technologies is an important overall indicator of the development of digital competence, provided that procedural knowledge is transferred, which is supported by the purposeful use of digital devices. According to the results of the experimental research, some differences in the levels of development of digital*



competence were revealed in the respondents. Thus, in 47% of respondents there is a developed social level, in 24% of respondents – the technical level, and in 17% – the information level. The smallest number of respondents (12%) has an epistemological level of digital competence.

Використання сучасних цифрових технологій є необхідною умовою розвитку ефективніших підходів до навчання та вдосконалення методики викладання, що дозволяє заощадити час і швидше досягти поставленої мети. Високий навчальний потенціал сучасних цифрових технологій та темпи їх розвитку, розробка і модернізація програмних засобів зумовлюють вимогу щодо удосконалення підготовки майстрів виробничого навчання. За таких умов випускникам закладів передфахової вищої освіти важливо володіти знаннями, уміннями та досвідом для розв'язання освітніх завдань, перш за все, засобами цифрових технологій. У статті проаналізовано роль цифрової компетентності у професійній діяльності майстрів виробничого навчання та виділено основні аспекти, які повинна забезпечувати цифрова компетентність у загальному розумінні в освітньому процесі. Виокремлено рівні розвитку цифрової компетентності: технічний, соціальний, інформаційний та епістемологічний. Для визначення рівнів цифрової компетентності майбутніх майстрів виробничого навчання було проведено дослідження серед студентів випускних груп Професійно-педагогічного фахового коледжу Глухівського НПУ ім. О. Довженка з подальшим аналізом і презентацією отриманих результатів. В експериментальному дослідженні використовувалась методика, яка дозволяє встановити рівні цифрової компетентності на основі визначення частоти використання різноманітних цифрових технологій респондентами. Отримані результати дозволяють виявити деякі проблеми у формуванні та розвитку рівнів цифрової компетентності при підготовці майбутніх майстрів виробничого навчання. А саме було продемонстровано, що досліджувані чотири рівні цифрової компетентності мають не однаковий розвиток і потребують подальшого корегування. Так соціальний рівень виявився панівним у значної кількості учасників дослідження. Аналіз кожного рівня окремо дав можливість виявити деякі закономірності у їх формуванні під час освітнього процесу і під час звичайних повсякденних операцій респондентів.

**Ключові слова:** майстри виробничого навчання, рівні розвитку, цифрова компетентність, цифровізація, цифрові технології

**Keywords:** masters of industrial training, levels of development, digital competence, digitization, digital technology.

The concept of digital competence arose simultaneously with the development of digital technologies that determine the constant emergence of new activities in society. Therefore, the relevance of its development is constantly growing. Today, most European researches studies focus more on identifying access to and consumption of digital resources than on the developing of digital competence. Using and managing basic digital tools or online platforms is only the first step to "advanced" digital skills to work. The development of digital competence should be seen as a continuation of the development of instrumental skills to more productive, communicative, critical and

strategic (Henseruk, 2019).

Although the using of computers, mobile devices and the Internet is constantly growing in all segments of the population, this does not certainly mean that they develop skills that can be useful in various aspects of the activity. Studies have shown that great amounts of digital devices contribute to the development of digital skills only at the operational level. Higher cognitive ability to critical search and selection of information is not the result of greater consumption. Users can simply stay on the same level and use only certain programs and services. Therefore, increased usage of digital technologies can not be considered as a key indicator of digital competence (van Deursen, 2010).

Examining this model of key competences which is approved by the European Parliament and the Council of the European Union, digital competence is included in it. According to this document, "digital competence is the confident, critical and responsible use and interaction with digital technologies for learning, professional activities (work) and participation in society" (ANNEX to the Proposal for a Council Recommendation on Key Competences for Lifelong Learning, 2018).

Ukraine has set out to create a digital state (or state in a smartphone). This is recognized as the need to form the digital economy and society, and digital technologies are seen as one of the key elements of such development.

One of the priorities of this developed is the digitalization of educational, which involves, above all, the intensification of the learning process, the implementation of ideas of adaptive and developmental learning, improving forms and methods of organizing the educational process, creating an education system focused on modern digital technologies (Bykov, 2019).

The priority tasks for the development of vocational education in the context of digitalization should include not only the resource content of the educational environment with modern digital teaching forms, but also the preparation of teachers for their effective use. Taking into consideration the high educational potential of modern digital technologies and the pace of their development, due to the continuous development and modification of software, the education of such professionals needs constant improvement today. Under such conditions, it is very important for the master of industrial training to determine the level of his knowledge, skills and experience that he needs to perform educational tasks using digital technologies. This lets, in its turn, outline the individual educational trajectory to increase their own digital competence of professionals.

Sources. The theoretical analysis of the researched problem was carried out on the basis of scientific works of native and foreign researchers. Modern trends of the development of the informative society are considered in the studies of V. Bykov, M. Leshchenko, N. Morse, L. Finally, Fr. Spirina et al. I. Gavrysh, R. Gurevych, I. Vorotnikova, O. Dubaseniuk, K. Durai-Navakova, O. Kovalenko, V. Kovalchuk, L. Kondrashova, M. Kulakova, O. Romanovsky, L. Romanyshyna, L. Khomych, J. Tsekhmister and others studied the conceptual principles of professional training of

specialists.

Interpretation of the essence of the concepts "digital competence", "digital technologies", definition of their structure, features are found in many works of our native scientists. In the researches of N. Soroko, O. Spirina the issues of digital literacy and information and communication competence of a person are scientifically substantiated.

Our native and foreign scientists worked on the problem of introduction of digital technologies in educational process: V. Bykov, M. Byrka, I. Vorotnikova, A. Ershov, M. Zhaldak, V. Kovalchuk, V. Kukharenko, V. Lapinsky, M. Leshchenko, P. Matyushko, V. Monakhov, N. Morse, I. Novik, A. Poplavsky, V. Rozumovsky, O. Spivakovsky, O. Spirin and others.

Foreign researchers: J. Anderson, S. Brookfield, M. Fengchun, P. Normak, H. P?ldoja, M. Simonson, O. Abramova, I. Zakharova, E. Polat, B. Yarmakhov pointed out the importance of implementing computer technologies in modern education, the possibility of using distance learning, various network technologies and Web-services, features of implementation of modern models of computer and e-learning.

The results of researches by these scientists show that only a competent in digital technologies specialist who is ready to use them can organize a productive educational environment. Namely, such effective professional activity is possible with a combination of modern digital and pedagogical technologies.

The digital society dictates its requirements for professional training. The graduate must not only acquire the skills needed to enter a more technological and competitive labor market, but also constantly improve these skills and acquire new ones, learning throughout life. To do this, he must be well-versed in the vast information space, be able to find solutions independently (Nasution et al., 2018).

It is the digital competence of the graduate that can ensure his ability to self-education and professional development in the context of digitalization.

The concept of digital competence appeared in 2013 for the first time and after a significant update it describes 21 learning outcomes in 5 areas:

- 1) information and information literacy, content management;
- 2) communication, cooperation and participation in public life;
- 3) creation of digital content;
- 4) data security and protection;
- 5) solving tasks (Kovalchuk and Sheludko, 2019).

The definition of digital competence in 2018 in the European Framework of Key Competences outlines these five areas, while maintaining the basic format of knowledge, skills and abilities.

Digital competence involves the ability to use digital technologies to support creativity, active citizenship and social integration, collaboration with other people to achieve personal, social or commercial goals (Havrilova and Topolnyk, 2017).

However, today this definition must be flexible enough to be relevant in today's

and future society first of all. This is primarily due to the large number of social media resources and the emergence of technologies such as artificial intellect, robotics, virtual and augmented reality.

A necessary condition for the preparation of a graduate capable of using digital technologies in professional activities there, are qualified teachers who are motivated to work, self-improvement and productive use of digital technologies in the educational process.

The modern learning process involves the use of computer information environment as a universal tool in the acquisition of knowledge and professional skills (Kovalchuk and Fedotenko, 2018).

Most modern teachers find it very convenient to use digital technologies in their professional activities, but this does not mean that all teachers and graduates of educational establishments are well possessed in them and can use them in their professional activities. As digital technologies have been becoming a part of our daily lives and are embedded in the educational space, it is crucial that our educational community is competent and is willing to use them. In this sense, digital competence means the confident and critical use of the full range of digital technologies for information, communication and basic problem solving in all aspects of life (Lynch, 2019).

It is easy to assume that most people use digital technologies comfortably, but unfortunately this is not true. In fact, the Pew Research Center conducted a study that assessed respondents who were divided into five sections based on their readiness to use digital technology: "unprepared", "traditional students", "forced", "cautious clickers" and "digitally ready". According to their estimates, most people doubt their readiness when it comes to using digital tools, and only 17% are fully prepared to use them (Horrihan, 2016).

Our study was conducted on the basis of the Professional and Pedagogical Professional College of Hlukhiv National Pedagogical University named after Oleksander Dovzhenko among 68 respondents (future masters of industrial training).

As a tool to study the levels of development of digital competence of future masters of industrial training, we used electronic tests. They were developed based on the Digital Competency Profiler (EILab) proposed by the University of Ontario's Institute of Technology (EILab) (Digital Competency Profiler, 2018). The test aims to understand how and at what level graduates of the Vocational College will be able to use a variety of digital technologies, including mobile technologies, both in everyday life and in future professional activities. At the end of the survey, a graph of the profile of the distribution of levels of digital competence was created for each respondent. This profile helps to identify gaps in the development of digital competence that can be removed through appropriate advice, further education or experience.

The main advantage of choosing this approach is that the indicators for measuring the levels of development of digital competence are formulated on the basis of an analysis of the objective needs of modern society. At the time of the research, this

methodology is considered the most appropriate and practice-oriented.

Based on the work of foreign researchers, digital competence can also be seen as a set of theoretical and practical knowledge, skills and values that can be easily identified and used in a particular situation. And the ability to use digital technologies productively implies the development of four levels of digital competence as a prerequisite for the effective use of digital technologies, or their use for certain purposes (Ally, 2019).

To use effectively the opportunities of the educational digital space, the digital competence of masters of industrial training should include the development of the following levels:

1. The technical level contains a set of practical knowledge, usually obtained on the basis of experience with digital devices. These skills constitute the knowledge from which the user will choose, using specific criteria derived from the analysis of the situation needed to select and use digital technologies.

2. The social level includes a set of practical knowledge, usually formed on the basis of communication experience and based on caring for the needs of others, for the development and use of strategies for reflection and interaction with others on the Internet.

3. The information level is a set of theoretical and practical knowledge developed by analyzing the results of various data collection experiments in order to select usable methods for the identification, selection, organization and interpretation of information.

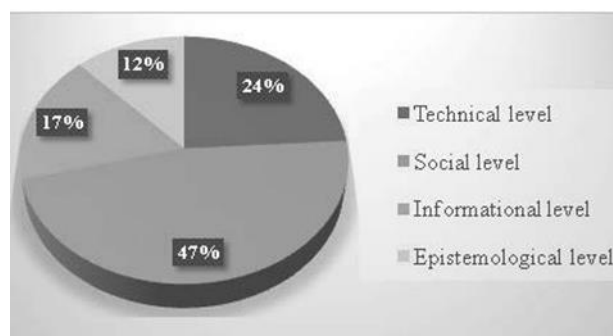
4. The epistemological level is a set of theoretical and practical knowledge in a particular discipline or in a particular field, which is usually developed through formal research and experience. These data are used, with the help of certain methods, for the efficient and effective use of industry-specific digital tools. This knowledge, translated into operating systems or schemas, is needed to formulate information processing tasks with digital tools (such as spreadsheets, databases, photo or music editing systems, any other information processing software, including programming languages and authoring systems), to identify and solve problems or to perform professional tasks (Desjardins, 2017).

These levels are represented in the questionnaire by indicators consisting of 16 activities divided into categories (four for each level), each of which has two measures: frequency and confidence in use, which are conceptualized as "twins", synergistic indicators of digital competence.

Frequency of use is considered an important general indicator of digital competence, provided that procedural knowledge is transferred, which is supported by the purposeful use of digital devices (ie practice leads to the acquisition of abilities). Confidence in use, self-esteem, taking into account a person's ability to choose and perform certain actions directly related to self-efficacy, which is considered an important parameter of un necessarily acquired abilities, but rather a person's desire to

engage in new activities, positively solve problems and to expand already acquired abilities.

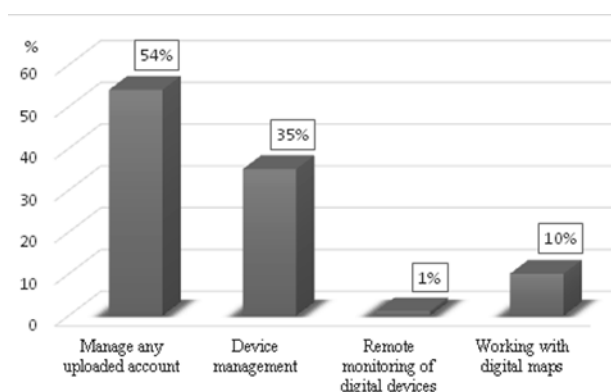
The results of the study (*Fig. 1*) show differences in the levels of digital competence of future masters of industrial training. The analysis of the obtained data showed that almost half of the respondents (47%) have developed a social level of digital competence. 24% of respondents have a technical level, and 17% have an information level. The smallest number of respondents (12%) has an epistemological level of digital competence development.



*Fig. 1. The general distribution of respondents by levels of digital competence*

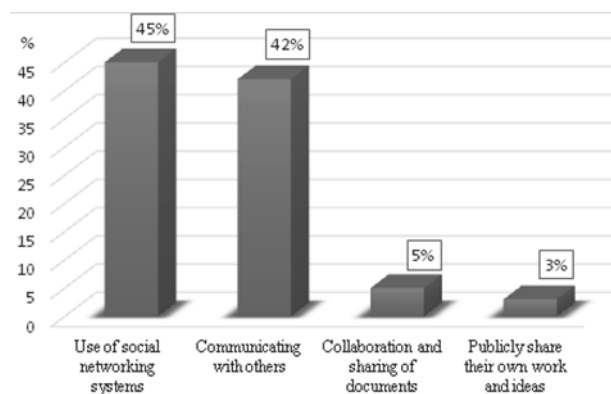
If we analyze each block separately, we can identify the following patterns. At the technical level, the capabilities and willingness to work with digital devices differ significantly (*Fig. 2*). Most often, in their activities, respondents (54%) said that they manage various their own accounts (e-mail, bank, telephone, video chat, television, etc.). This is due to the fact that today all social networking services, bank accounts and even utilities have accounts where is a large number of settings for ease of use or security. Other respondents – 35% most often manage digital devices (multimedia equipment, home entertainment systems, smart devices, etc.). Almost none of the respondents (1%) use remote monitoring of digital devices yet, probably due to the fact that such devices have not yet become widespread among the majority of the population. To find a way and navigate in space (working with digital maps Map Quest, Google Maps and their devices Navitel, Garmin) 10% of respondents most often use digital technology.





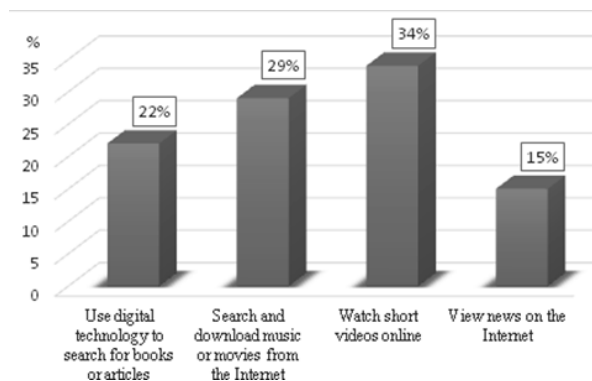
*Fig. 2. Distribution of respondents at the technical level of development of digital competence by the most frequent use of indicators*

At the social level (*Fig. 3*) they received the following distribution of the most common indicators: 45% of students often use social networking systems (Facebook, Instagram, Google+, LinkedIn, Twitter, etc.), 42% – use digital technologies to communicate with others via text messages, e-mail or applications (chats, SMS, Skype, Viber, Facetime, etc.), 5% – use digital tools for commonwork and share documents (Google Drive, Dropbox, etc.) and 3% often share their own work and ideas in public blogs, photo sharing, etc.).



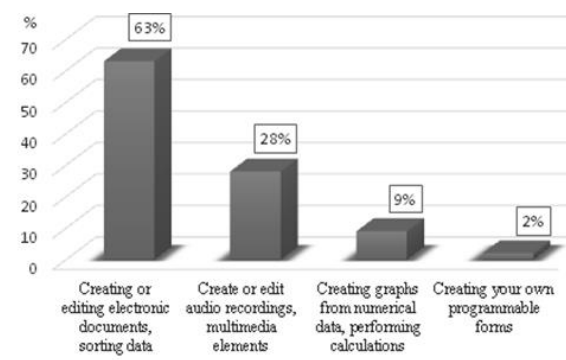
*Fig. 3. Distribution of respondents at the social level of digital competence development according to the most frequent use of indicators*

The information level of digital competence development (*Fig. 4*) is represented by the following distribution: 22% – use digital technologies to search and download books or articles (text or audio). 29% of respondents in the first place search and download music or movies from the Internet. The largest percentage of all respondents (34%) belongs to watching short videos on the Internet (YouTube, etc.). And only 15% of students most often watch the news on the Internet.



*Fig. 4. Distribution of respondents at the information level of digital competence according to the most frequent use of indicators*

At the epistemological level (Fig. 5), a larger number of respondents (63%) use the ability to create or edit electronic documents (text processing, presentations, spreadsheets), data sorting. This is easily explained by the fact that respondents (graduate students) often use these technologies in education (preparation and defense of works, presentation of materials, etc.). The second place – 28% of respondents who use the ability to create or edit audio recordings (podcasts, voice memos), multimedia elements (photos, movies, slide shows). This is due to the fact that today everyone has pages on social networks, and the placement of photos or videos there is a quite spread fact. 9% of respondents often use the capabilities of digital technology to calculate and create graphs from numerical data. This group of respondents mainly includes students who have high academic results, i.e. those who conduct research with calculations and presentation of results in the form of graphs or charts. The smallest number of respondents (2%) use digital technologies to create their own programmable forms to automate certain processes (macros, scripts, robotics, use of any programming languages, etc.). Such a small percentage is explained not due to the great need for this category, because today most of the necessary technologies that can automate processes can be found ready-made. But some respondents do it because they are interested in it or it is a hobby for them.



*Fig. 5. Distribution of respondents at the epistemological level of digital competence by the most frequent use of indicators*

Digital competence at each level can develop differently and in different aspects of everyday life. Using the Internet to communicate, search, download and create new content, to solve technical problems, to make purchases and payments – all these are different opportunities and, accordingly, different resources are needed to implement them. Each of the described levels can be both general (in many areas of activity) and partial (in some areas). Therefore, in such research, it is important to study carefully each level and areas in which it can receive specific development and implementation.

Educators need to give recommendations to students to improve their overall level of digital competence. This will allow them to master the necessary knowledge, improve their skills and be successful professionals in modern society.

Digital competence means the confident and critical use of the full range of digital technologies for information, communication and basic problem solving in all aspects of life. Frequent use of a variety of digital technologies is an important overall indicator of digital competence under the circumstances to give procedural knowledge which is supported by the purposeful using of digital devices.

According to the results of experimental research, respondents had some differences in the levels of development of digital competence. Thus, 47% of respondents showed a developed social level, 24% of respondents showed the technical level, and 17% of them showed the information level. The smallest number of respondents (12%) has an epistemological level of digital competence.

For more productive future professional activity of the master of industrial training it is necessary to try to equalize all described levels in a certain range. This will allow professionals to use equally a variety of digital technologies. To achieve a more uniform use of digital technologies in the educational process, each future specialist must personally strive for the development, exchange of experience, the maximum implementation of modern technological advances in educational activities. Raising awareness of innovations, gaining experience in using new digital technologies and tools, involving students in the practical application of digital technologies in the educational process, sharing experiences with colleagues will increase the personal level of digital competence of each future teacher.

The increasing interest of professionals in current trends and innovations in technology can help create a comfortable digital environment in educational institutions, as well as acquaintance of teachers with the possibilities of digital technologies that will improve their professional activities (Yachyna and Fernandez, 2018).

In the field of education, it is necessary to adopt standards and programs for the development of digital literacy of teachers, one of the most important directions of which it should be the development of critical thinking, as well as expanding knowledge and skills of modern digital technologies in education.

In the future it is planned to develop a model for the formation of digital competence of future masters of industrial training of motor transport profile. The results of the study will be taken into account in the further training of masters of industrial training.

## 2.5. DEVELOPING PROFESSIONAL COMPETENCE OF FUTURE MASTERS OF INDUSTRIAL TRAINING

### РОЗВИТОК ФАХОВОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ МАЙСТРІВ ВИРОБНИЧОГО НАВЧАННЯ

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*The relevance of constant professional development for teaching staff in professional (vocational) education schools (P(V)E schools) is conditional upon the innovative changes in education, the modernization of educational and industrial technologies and the elaboration of effective models and mechanisms of training highly qualified personnel. The professional development of masters of vocational training is correlated with the development of their professional competency, integrating the so-called systematic build-up of new knowledge and experience.*

*Methods include a theoretical analysis of scientific works, a study of practical experience, systematization, generalization and a pedagogical experiment.*

*Results. The results of the survey of teaching staff (including masters of vocational training) regarding the final level of professional motives confirm the following: a high level – 29%, a sufficient level – 56%, an average level – 15%. The results of these specialists' self-assessment of their readiness for professional development are as follows: a high level – 48%, a sufficient level – 47%, an average level – 5%. The paper proves that there appears to be a need to discover some optimal technologies for developing professional competency in masters of vocational training, given the conditions for elaborating modern models of teacher education. An algorithm for designing the technology for developing professional competency in masters of vocational training from P(V)E schools includes a scientific aspect (defining and adhering to targets, objectives, methodological and other principles of professional education), a procedural aspect (modelling the content, forms and methods for developing professional competency) and a result-oriented aspect (identifying the level of professional competency in masters of vocational training based on appropriate methods and self-analysis).*

*The paper presents the technology for developing professional competency in masters of vocational training from P(V)E schools as a psycho-pedagogical process organized according to an appropriate algorithm, whose implementation should result in the professional development of masters of vocational training.*

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*Актуальність безперервного професійного розвитку сучасних педагогічних працівників ЗП(ПТ)О зумовлюється інноваційними змінами в освітній галузі, модернізацією педагогічних та виробничих технологій, створенням ефективних*

моделей і механізмів підготовки висококваліфікованих кадрів. Професійний розвиток сучасного майстра виробничого навчання співвідноситься з розвитком його професійної компетентності, інтегруючи системне “нарощування” нових знань і досвіду.

Результати опитування педагогічних працівників (у т.ч. і майстрів виробничого навчання) щодо сформованості професійних мотивів засвідчують: високий рівень – 29%, достатній – 56%, середній – 15%; за підсумками самооцінювання майстрами виробничого навчання готовності до реалізації функції “професійний розвиток”: високий рівень – 48%, достатній – 47%, середній – 5%. З’ясовано, що в умовах створення сучасних моделей педагогічної освіти виникає необхідність пошуку оптимальних технологій розвитку професійної компетентності майстрів виробничого навчання. Алгоритм проектування технології розвитку професійної компетентності майстрів виробничого навчання ЗП(ПТ)О включає: науковий (визначення та дотримання цільових орієнтирів, завдань, методологічних засад, принципів професійної освіти), процесуальний (моделювання змісту, форм та методів розвитку професійної компетентності) та результативний (проведення діагностики рівня сформованості професійної компетентності майстрів виробничого навчання на основі відповідних методик та самоаналізу) аспекти.

Висновки: технологію розвитку професійної компетентності майстрів виробничого навчання ЗП(ПТ)О представлено як організований за відповідним алгоритмом психолого-педагогічний процес, реалізація якого гарантує досягнення результату – професійного розвитку особистості майстра виробничого навчання.

**Ключові слова:** професійний розвиток, професійна компетентність, майстер виробничого навчання, технологія розвитку професійної компетентності майстрів виробничого навчання

**Keywords:** professional development, professional competency, master of vocational training, technology for developing professional competency in masters of vocational training.

Modern reforms in the national education, including professional (vocational) education (P(V)E), are accompanied by innovative changes aimed at the modernization, a systematic introduction of modern educational and industrial technologies into the educational process and the creation of effective models and mechanisms for training highly qualified personnel. Given this, it becomes essential to develop professional competency in modern teachers and masters of vocational training, who should be able to solve significant educational problems. The Law of Ukraine “On Education” (Art. 54, Clause 2, 2017) states that teaching staff must continuously improve their professional and general cultural level and pedagogical skills. The National Strategy for the Development of Education in Ukraine until 2021 (2013) refers to training a new generation of teaching staff, raising the level of education, pedagogical skills, the professional culture of teaching staff (Legislation of Ukraine, 2013). The Concept of Teacher Education Development (2018) envisages an improvement in the system of teacher education to establish a training base for teaching staff of a new generation, create conditions for involving the best practitioners of other professions in educational



activities and ensure the establishment and development of modern alternative models on constant professional and personal development, which will become a critical condition for implementing the state policy into reforms in all divisions of education (Legislation of Ukraine, 2019). The analysis of legislative acts proves the relevance of professional growth for masters of vocational training. After all, it involves the development of their professional competency for solving not only educational tasks. It is also essential for the development of the country's economy and the personal growth of various specialists.

Such scholars as A. Hurzhii, V. Kremen, L. Lukianova, N. Nychkalo, V. Radkevych and O. Shcherbak theorize about the conceptual views on the development of the personality of teachers or masters of vocational training in the system of continuing professional education. They think that "continuing education is a process of personal, social and professional development of the individual throughout his or her life, which aims to improve the quality of life of both the individual and society" (Lukianova, 2017, pp. 4). There has been much speculation about the issues of training masters of vocational training and developing their professional competency (Yu. Belikova, T. Gerliand; L. Komisarova, H. Omelchenko, Z. Turianytsia, O. Yurtaieva et al.). They believe that there are different ways to solve the issue of adjusting the professional competency of masters of vocational training to modern needs of the national professional education. In this context, one should pay specific attention to developing cultural attitudes in masters of vocational training especially regarding professional and pedagogical culture, as well as the culture of personal and professional development, shaped while studying in P(V)E schools and under the influence of external factors, including the trends in the labour market. Such researchers as M. Artiushyna, S. Kravets, P. Luzan and H. Romanov study theoretical principles for building the content of education and introducing innovative educational technologies. The concept of educational technology is understood as a system of the educational process and specially organized educational activities aimed at the development, education, learning and character building of the individual.

Thus, current conditions for reforms in the P(V)E system substantiate the importance of constant professional development of teaching staff. It causes the search for some optimal ways to develop professional competency in masters of vocational training in the context of using and improving the existing effective educational technologies and justifying new and multifunctional methods corresponding to the content of modern models of teacher education.

In the context of economics and sociology, professional development correlates with the development of performance potential or staff development through searching for the ways to improve the activities of educational institutions and increase the value of teaching staff. From the standpoint of psychology, professional development involves psychological changes related to changes in the mind and behaviour of the individual, the emergence of new motives and interests, the acquisition of new mental capacities. In pedagogy, professional development of the individual occurs when



solving professionally important tasks (cognitive, communicative and moral). At this particular time, teachers acquire a basic set of necessary business skills and moral qualities related to their profession. The analysis of professional self-development of masters of vocational training involves comparing the results of educational activities with those criteria, envisaged by the requirements of education policy, economic development and personal aspirations for self-realization. The Concept of Implementation of the State Policy in the Field of Professional (Vocational) Education “Modern Professional (Vocational) Education” until 2027 highlights the importance of motivation towards cultivating professional development of teaching staff by involving highly qualified experts in production and the service sector in the educational process (Legislation of Ukraine, 2019). Indeed, the active professional development of masters of vocational training encompasses conscious personal needs and their professional motives in professional growth and lifelong learning. The results of the survey of employees from P(V)E schools prove the sufficient level of their motivation towards professional development. Fifty-six per cent out of 36 respondents feel sufficiently motivated towards professional development. The remaining 29% and 15%, respectively, are at high and average levels of motivation towards professional development.

A self-analysis of the professional development of masters of vocational training needs to answer the following questions: “Can I develop the personality of the pupils, make them more responsible for their professional future and development?”; “Can I engage in creative activities in P(V)E schools of different types?”; “Can I work in a new environment, adapt to changes and respond to modern and promising processes of social and economic development of society promptly?”. Answering these and other questions, every master of vocational training is reconsidering his or her role in professional activities and is searching some ways to improve his or her professional skills, professional competency and enrich his or her culture (Kravets, 2019, pp. 317). In 2019, the employees of the Laboratory of Distant Professional Training at the Institute of VET of the NAES of Ukraine, within the framework of working on the professional standard for the profession “Master of Vocational Training”, surveyed the masters of vocational training from Ukrainian P(V)E schools about the importance of employment functions and their readiness for their performance. Consequently, the masters of vocational training from 18 Ukrainian Oblasts completed e-questionnaires on self-assessment of their readiness for professional development, which correlates with the development of professional competency. The analysis of these e-questionnaires shows the following results: 48% out of 1056 respondents think they are at a high level of readiness for professional development. The remaining 47% and 5% are at sufficient and average levels. It must be acknowledged that nobody indicated a low level of such readiness.

In the context of designing a new model of professional education, teaching staff are the primary agents of change, as well as active participants in its development and

approval. Given this, educational activities of masters of vocational training in P(V)E schools exceed the implementation of syllabi for relevant subjects and become multifunctional. It refers to an active participation of masters of vocational training in the implementation of strategic objectives of the educational sector; the ability to design the content of training for future skilled workers; the provision of inter-branch communication; the management of educational projects; the elaboration of integrated models for professional training which combine traditional methods and modern educational technologies (Rad keyvych, Luzan and Kravets, 2017, pp. 265). Therefore, the development levels of professional competency reflect the professional-pedagogical development of masters of vocational training. However, professional competency is not a permanent category. It implies the so-called systematic build-up of new knowledge and experience through self-study, formal and non-formal education, internships, lifelong learning through higher education (master's and doctoral degrees), certification within the framework of participation in Ukrainian and international projects; cooperation and interaction between pupils, parents, teaching staff, school leaders, management structures in education, employers, higher education institutions, academic institutions and other public organizations. Given this, every master of vocational training should be aware of his or her mission in these constructive changes. Besides, a systematic boost of his or her readiness to implement educational and industrial innovations will transform the demands of the labour market during vocational training of future skilled workers through expanding professional skills and abilities of masters of vocational training. It necessitates an active search for different forms, methods and technologies to develop professional competency following the needs of masters of vocational training, pupils, educational institutions, cultural characteristics and economic problems.

The analysis of scientific works and encyclopedias shows that it is necessary to follow a specific algorithm for achieving expected results to solve relevant tasks in the field and increase the productivity of workers. The concept of technology integrates the set of goals, content and information about the sequence of individual operations in the production process, methods and means of achieving expected results. In the education system, this concept is implemented at the level of solving strategic tasks for the education system (educational technology). It also reflects the tactics of implementing educational technologies in the educational process under certain conditions (pedagogical technology) and models the way of developing specific educational material (concept) within the relevant academic subject, topic, issue (teaching technology) (Sorokvashyn, 2018, pp. 99). In the context of the educational process, the mission of masters of vocational training implies implementing technologies at all levels. However, it is vital to justify the appropriate technology, whose essence, purpose and content correlate with the innovative trends in professional education, to improve their educational activities and enhance their professional competency. The technology for developing professional competency in masters of vocational training is inextricably linked with educational activities. Also, it incorporates the principles of systematic,

cultural, humanistic, competency-based, subject-oriented, personality-oriented, developmental and prognostic approaches, continuation principles and combines theory, productive activity and lifelong learning. It refers to the *scientific aspect* of the technology, with defining its purpose and objectives.

Therefore, this technology aims to develop professional competency in masters of vocational training through using a personal potential, resources of the educational environment and opportunities for social partnership for constant professional development, self-improvement and productivity in the field of professional education. The objectives of this technology are as follows: to boost motivation of masters of vocational training towards self-development; to create relevant conditions for developing professional competency in masters of vocational training; to discover the practical ways, forms, methods and tools for it; to ensure constant professional development of masters of vocational training so that they can engage in educational (intellectual, creative) activities, “aimed at education and development of the individual, his or her cultural, civic and / or professional competencies” (Legislation of Ukraine, 2017).

*The procedural aspect* of this technology implies a specific algorithm for its implementation in the educational environment, production and the service sector. This stage involves the mobilization of all personal, instrumental and methodological tools for developing professional competency in masters of vocational training. Given the innovative progress of production, technological changes and growing demands of the labour market, the technology for developing professional competency in masters of vocational training should integrate the psychopedagogical aspect of interaction between teaching staff and pupils while implementing a standardized content of professional training, exceed the educational environment, employ resources of a public-private partnership and capacities of dual education to study the current trends in production and the service sector. Besides, this technology should be advanced, open to rethinking and adjust to the new requirements and priority areas in the country’s development (Kravets et al., pp. 11).

The results of the survey of employers regarding the possibilities and frequency of using specific forms for enhancing professional skills of employees indicate that the most common ones are advanced training (in service training (87%), internships in production (57%); retraining (in educational institutions (79%), in production (65%) (The Institute of Professional Qualifications, 2019).

The development of professional competency in masters of vocational training cannot be limited by advanced training scheduled in advance. In the context of the introverted (closed) pedagogical system, it should be an active process and involve studying some positive practices of teaching staff (mentors); participating in the work of methodological commissions, mentoring schools, novice masters of vocational training; exchanging experience, mutual visits and assistance; holding methodological seminars, workshops, scientific and practical events. The potential of the extroverted (open)

pedagogical system focuses on the complex integration of the educational process with organizational and technological processes in production under the established social partnership between educational institutions and enterprises. Besides, it serves as an essential resource for developing professional competency in masters of vocational training. It refers to “removing” the technology for developing professional competency in masters of vocational training from the introverted (closed) pedagogical system and expanding forms of professional development by using resources of the extroverted (open) pedagogical system. The technology for developing professional competency in masters of vocational training combines optimal resources of introverted and extraverted pedagogical systems for gaining formal and non-formal experience and constant professional development of both teaching staff and pupils.

*The result-oriented aspect* of this technology involves identifying the final level of professional competency in masters of vocational training and conducting self-analysis on a reflexive basis. Reflective processes regarding well-developed or underdeveloped professional competency rely on the ability of masters of vocational training to regulate professional activities and realize the goals, objectives and functions of the educational process. At the same time, one rethinks his or her experience, professional successes or failures and manages individual psychological processes to continue professional development.

Therefore, the technology for developing professional competency in masters of vocational training from P(V)E schools is an organized psycho-pedagogical process incorporating scientific approaches and principles. One can implement it based on innovative forms, methods, means of training and self-study. This technology guarantees the professional development of masters of vocational training. The algorithm for designing this technology includes scientific, procedural and result-oriented stages. They involve defining and adhering to the targets, objectives, methodological and other principles of professional education; modelling the content, forms and methods for developing professional competency in masters of vocational training; identifying the level of professional competency in masters of vocational training based on self-analysis and methods adapted in pedagogy and psychology. The content of this technology should be advanced, open to rethinking and adjust to the new requirements and priority areas in the country’s development, including the integration of the national education into European educational space.

## 2.6. DEVELOPING VALUES AND ETHICAL PRINCIPLES IN THE CONTEXT OF DIGITAL COMMUNICATION OF PARTICIPANTS IN THE EDUCATIONAL PROCESS

### **РОЗВИТОК ЦІННІСНИХ ЗАСАД ТА ЕТИЧНИХ ПРИНЦИПІВ В УМОВАХ ЦИФРОВОЇ КОМУНІКАЦІЇ УЧАСНИКІВ ОСВІТНЬОГО ПРОЦЕСУ**

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*The need to highlight the issues of forming and developing value-based principles of interaction among participants in the educational process of vocational education institutions is determined by society's requirements for the moral and ethical standards of social communication and the implementation of modern education under blended learning conditions using digital technologies and internet platforms.*

*Modern requirements and means of implementing value-based principles and ethical standards that reflect the personal and civic positions of participants in the educational process under blended learning conditions for future qualified workers in vocational education institutions are highlighted and summarized.*

*Key competencies that need to be formed and developed in the vocational education system for the preparation of qualified workers in various specialties are identified; value-based principles reflecting personal and civic characteristics in the activities of future specialists are highlighted and substantiated. The essence of the concepts of value orientations, pedagogical ethics, ethical standards of participants in the educational process, digital etiquette, and the main ethical principles of participants in the educational process are revealed; conditions for the development of the value-based and activity aspects of personality, requirements for the implementation of modern strategies of social progress, and rules for ethical and effective interaction of participants in the educational process in cyberspace are disclosed.*

*Актуальність: визначається необхідністю висвітлення проблематики формування і розвитку ціннісних засад взаємодії учасників освітнього процесу закладів професійної (професійно-технічної) освіти, що визначається вимогами суспільства до морально-етичних принципів соціальної комунікації та реалізації сучасної освіти в умовах змішаного навчання із застосуванням цифрових технологій та інтернет платформ.*

*Виділено та узагальнено сучасні вимоги та засоби реалізації ціннісних засад та етичних принципів, що відображають особистісні та громадянські позиції учасників освітнього процесу в умовах змішаного навчання майбутніх кваліфікованих робітників у закладах професійної (професійно-технічної) освіти.*



*Висновки: визначено ключові компетентності, що мають формуватися та розвиватися в системі професійної освіти при підготовці кваліфікованих робітників різних спеціальностей, виділено й обґрунтовано ціннісні засади, що відображають особистісні та громадянські характеристики в діяльності майбутніх фахівців. Розкрито сутність понять: ціннісні орієнтації, педагогічна етика, етичні принципи учасників освітнього процесу, цифровий етикет та визначені основні етичні принципи учасників освітнього процесу; розкрито умови розвитку ціннісного та діяльнісного аспектів особистості, вимоги до реалізації сучасних стратегій суспільного прогресу, а також правила етичної та ефективної взаємодії учасників освітнього процесу в кіберпросторі.*

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**Ключові слова:** педагогічні цінності, педагогічна етика, етичні принципи учасників освітнього процесу, змішане навчання, цифровий етикет.

**Keywords:** pedagogical values, pedagogical ethics, ethical standards of participants in the educational process, blended learning, digital etiquette.

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Each stage of societal development establishes its specific requirements for socio-psychological interaction within the education system, particularly in the system of professional training for future workers. These requirements focus on the formation of socially-personal competencies (commonly referred to as soft skills) necessary for each specialty, as well as basic abilities aimed at helping qualified professionals solve complex problems in a rapidly changing world.

The Law of Ukraine "On Education" states that "the purpose of education is the comprehensive development of a person as an individual and the highest value of society, their talents, intellectual, creative, and physical abilities, the formation of values and competencies necessary for successful self-realization, the education of responsible citizens capable of making conscious social choices, directing their activities for the benefit of other people and society, enriching the intellectual, economic, creative, and cultural potential of the Ukrainian people on this basis, increasing the educational level of citizens to ensure the sustainable development of Ukraine and its European choice" (Про освіту. Закон України, 2017). According to the defined purpose, the approved Standards of Professional Education for 2023 highlight common key competencies for different specialties, including communicative competence, personal, social, and learning competences, civic and legal competence, environmental competence, and others (Затверджені стандарти професійної освіти 2023). These abilities are aimed at forming important personal and civic value orientations, which are realized in a person's activities, interpersonal relationships, civic manifestations, form environmental awareness, and motivate self-education, self-development, self-determination, and goal-setting.

The issue of effective interaction among participants in the educational process is a classical paradigm of scientific research from the inception of education to the present time. The value foundations of participants in the educational process and the moral and ethical principles of interaction in the educational field have been studied from various scientific perspectives by Socrates, A. Walton, M. Heidegger, G. Hegel,



J.-F. Herbart, W. Humboldt, W. Dilthey, A. Diesterweg, J. Dewey, É. Durkheim, I. Kant, J.-A. Comenius, J. Korczak, A. Makarenko, M. Montessori, V. Sukhomlinsky, J. Searle, P. Freire, R. Steiner, K. Jaspers, and other world classics. Axiological approaches to personality formation in the educational process are revealed in contemporary Ukrainian studies by V. Andrushchenko, I. Bekh, T. Hrabovska, I. Zyazyun, I. Isayev, K. Korsak, V. Kremen, D. Leontiev, O. Okseniuk, N. Rozov, N. Svetlova, I. Stepanenko, O. Sukhomlynska, O. Tepla, S. Khrypko, H. Yatsenko, and others.

The value foundations of state policy in the field of education and the principles of activity of participants in the educational process are defined in the Laws of Ukraine "On Education" (2017), "On Higher Education" (2014), "On Professional (Vocational-Technical) Education" (1998), "On Professional Pre Higher Education" (2019) and other legislative acts of our state, as well as in international documents such as the Bucharest Declaration of Ethical Values and Principles of Higher Education in Europe (2004), the Pedagogical Constitution of Europe (2013), the Recommendations of the Council of Europe "Ethical Behavior of Participants in the Educational Process" (2015), and others.

During the research, theoretical materials were processed, allowing the essence of terms such as value orientations, core pedagogical values, and ethics to be determined. This theoretical basis enabled the identification of the applied tasks of pedagogical ethics in modern conditions, as well as the ethical principles that all participants in the educational process must adhere to. An analysis of the main principles of netiquette and digital etiquette allowed the expansion of the definition of requirements for the ethics of interaction among participants in the educational process in the conditions of blended learning, which combines the most effective forms and methods of face-to-face and online education.

According to the interpretation provided in the Ukrainian Pedagogical Dictionary by Honcharenko S. U., "value orientations are a selective, relatively stable system of directing the interests and needs of an individual, focused on a certain aspect of social values. Value orientations are formed in the process of an individual's social development, their participation in working life. The upbringing of a person can be considered as the management of the formation or change of their value orientations" (Гончаренко С. У., 1997).

Undoubtedly, education should purposefully influence the process of forming personal values and value orientations of the younger generation through the application of various teaching and upbringing methods, through the specifics of interaction with peers and teachers, through the influence of the corporate culture of the educational institution, etc.

Teachers and their system of value-content orientations play a special role in forming the value foundations of education seekers. The moral and ethical qualities of teachers, their image, and behavior significantly influence the formation of behavioral

models and worldviews of students, acting as a regulator of interpersonal relationships both within the student collective and beyond. The Pedagogical Constitution of Europe identifies the main pedagogical values as "tolerance, democracy, peace-loving, environmental safety, human rights and solidarity, mercy and conscience, responsibility" (Педагогічна Конституція Європи, 2013). The mentioned requirements of the European document once again orient towards the idea that the spiritual values of education seekers should be consolidated in their consciousness meaningfully, through the influence of teachers' guidance and personal example, as opposed to the transmission of subject knowledge from various academic disciplines (Ціннісні орієнтири сучасної української школи, 2019, с.2).

The concept of value is usually interpreted as things, events, facts, etc., important to an individual (Heidegger Martin (1996) et al.). The concept of "value" can also be considered as a certain useful object for meeting needs (Maslow A. (1999) et al.); as the goal of human aspirations (Шрейдер Ю., 1999 et al.); as established obligatory norms (О. Краєва, 1995; Л. Орбан-Лембрик, 2003 et al.) etc.

In the Philosophical Encyclopedic Dictionary, it is noted that values are usually divided into lower and higher values. Lower, or material values, satisfy the biological needs of humanity, while higher values are spiritual. A feature of spiritual values is their internal, conscious potential. Spiritual values can be religious, moral, aesthetic, political, legal, as well as individual, collective, and universal. Universal or common human values are considered those that are shared by different peoples, cultures, etc. (Філософський енциклопедичний словник, 2002).

Historical experience of human development proves that progressive civilizational changes directly depend not only on global influences and challenges but primarily on the human factor, characterized by the conscious adherence of people to spiritual values as personal behavioral regulators. In this context, relying on practical experience and the opinions of scholars who have studied the impact of value orientations on social development, it can be stated that youth is one of the first social groups to respond to changes occurring in society. The nature and direction of such responses directly depend on the moral and ethical principles and values that have been consciously formed in the educational process of the younger generation or on random influences, which in such cases cause unpredictability and unconsciousness in behavior (Nguyen T. T., Deci E. L., 2016).

In this context, in order for the idea of education based on spiritual values not to be nullified or marked as an unnecessary formality, it is necessary to adhere to the requirements defined in the content of the "Value Orientations of the Modern Ukrainian School," according to which "all participants in the educational process, regardless of age, knowledge, experience, or social status, should feel the need to critically evaluate themselves and self-improve" (Ціннісні орієнтири сучасної української школи, 2019, р.2).

Considering the importance of the educational component in the formation and development of the personality, it is important to determine the goals, tasks, forms, and

methods of forming the value foundations of the younger generation in the Ukrainian education system. In this context, the value of education for the moral and spiritual development of each person should be determined by the substantial direction of the education system towards spiritual universal values and orientations. Considering that education, as defined in the Law of Ukraine "On Education," is the basis of the intellectual, spiritual, physical, and cultural development of the individual, its successful socialization, economic well-being, and the guarantee of the development of a society united by common values and culture, and the state (Про освіту. Закон України, 2017), it is appropriate to consider education as one of the most important life values of humanity.

At the same time, fulfilling its historically defined tasks of developing the personality and preparing it for conscious active activity, the education system, along with subject knowledge, should be oriented towards the formation of spiritual values and ideals that are essential and demanded in society.

In a complex, dynamic, and unpredictable time of contemporary realities, the process of educational development of a person must form an innovative component of their personality, psychological readiness for change, and a desire to independently influence changes. Such tasks require the ability to evaluate being and events that occur, the degree of their compliance with universal spiritual values, societal needs and interests, and their relevance to one's own goals and needs.

The issues of the formation and development of a person's value and moral orientations are studied by ethics. The essence of the concept of ethics (Lat. *ethica*, from Greek *ἠθικός* – custom, character) in the electronic Encyclopedia of Modern Ukraine is defined as "a system of moral norms and values inherent in a particular community, social, professional, or other group of people." It is noted that ethics focuses on the issues of the essence and practical manifestations of morality, examines the features of moral norms and values, determines the moral aspects of human consciousness, activities, and communication (Енциклопедія Сучасної України). Accordingly, pedagogical ethics can be interpreted as the science of the regularities of the formation and development of moral norms, requirements, values, and principles determined by the specifics of educational activity and realized in the relationships between the teacher and students, their parents, the administration of the educational institution, stakeholders, as well as in the relationships of the teaching staff, primarily determined by the personal qualities of the participants in the educational process.

According to Melnychuk L. B., the theoretical and applied tasks of pedagogical ethics in modern conditions can be defined as the formation of a humanistic orientation of pedagogical activity, the orientation of the teacher's personality towards the moral education of students; identification of factors that contribute to the increase of the moral level of the teacher and students or, conversely, hinder this process; investigation of the connection between the moral experience of students and their parents; solving problems of moral motivation of pedagogical activity, its moral, material stimulation,

and public recognition (Melnychuk L. B., 2021). The comprehensive implementation of the outlined tasks of pedagogical ethics, in our opinion, will promote the moral education of students, the development of humanistic values of the pedagogical community, and have a positive impact on other participants in the educational process.

The recommendations of the Council of Europe "Ethical Behavior of Participants in the Educational Process" define 14 ethical principles that all participants in the educational process must adhere to, including: integrity; honesty; sincerity; openness; respect for others; reliability; responsibility; benevolence; democratic and morally-ethical management in the educational field; ensuring the quality of education; self-development and improvement of the education system; adherence to the principles of institutional autonomy; international cooperation (Document on "The ethical behavior of all actors in education", February, 2015).

In the context of the widespread use of digital information and communication technologies in education, new requirements for the interaction of participants in the educational process in cyberspace arise. During the pandemic and severe restrictions caused by the brutal war of aggression in Ukraine, there was a need to organize the educational process in a remote and/or mixed format using the internet and computer technologies. The practice of implementing internet interaction led to the definition of new norms regulating such activities based on the moral and ethical norms and principles of live communication.

The requirements for effective communication in cyberspace are determined by a set of rules, guidelines, and principles (Crystal, D., 2004). The rules of communication in the internet space are designated by various terms in scientific literature, such as netiquette, network, or digital etiquette. The term netiquette is formed by combining the bases of two English words "network" (netiquette – net) and "etiquette" (etiquette) and is used to denote the requirements for communication in chats and other internet forums (Chandler, D., 2011).

The rules of netiquette, like most modern behavioral norms, have been formed based on practical experience to ensure the most favorable conditions for interaction among various network users. These norms are usually not reflected in legislative acts and do not entail any sanctions other than public disapproval. The general rules of netiquette were defined by Virginia Shea in a work titled "Netiquette" in 1994, yet they remain relevant even after 30 years. Among the important principles of netiquette, Virginia Shea identifies the following requirements: always be polite; use appropriate symbols to indicate emotions; do not break the law; always reference original sources; respond appropriately to the topic or task; respect others' time and needs; write correctly; do not send anonymous letters and messages; help others when needed; avoid conflicts and do not provoke others. According to Virginia Shea, the basis of netiquette is simplicity, good manners, and business politeness (Shea, V., 1994).

In the context of internet communication, only the most constructive and useful moral and ethical norms are established. Among the most general moral principles, the principle of humanism and humanity can be included, which is embodied in the

requirements to be polite, tactful, correct, courteous, modest, and precise; the principle of appropriateness of actions, which necessitates behaving constructively, simply, and conveniently for oneself and others; the principle of maximum attention and respect for the uniqueness and traditions of different peoples and social communities, which is extremely important in a multicultural society and free internet communication (Андрійченко, Ж., Близнюк, Т., & Майстренко, О., 2021).

The widespread use of blended learning technologies in professional education has made it possible to determine that the main requirement for ensuring the effectiveness of the educational process in a digital environment is adherence to ethical norms both during educational sessions and in extracurricular activities. The experience of organizing the educational process in a blended format has revealed issues related to violations of certain ethical norms of business communication by participants in the educational process, which is important to focus on to eliminate them. This primarily concerns the ethics of email communication; the ethics of communication on social networks; the ethics of communication during video conferences; the image of educational process participants during online connections. It is proposed to focus more specifically on each of these positions.

Nowadays, electronic correspondence is one of the traditional forms of interaction between teachers and students. At the same time, when using email, some participants in the educational process make certain mistakes that violate the ethics of business communication. This includes, in particular, illiteracy, the mismatch of the form and content of the written to the requirements of business correspondence, and the anonymity of letters and messages.

An important resource for the interaction of educational process participants in blended learning conditions has become social networks, which have recently been actively integrated into the educational process and provide (given the availability of electricity and the internet) accessibility, speed, and the possibility of interactive interaction. At the same time, during communication on social networks, violations of moral and ethical norms are sometimes noted, which can only be corrected by the establishment of clear interaction rules by the institution administration or the teacher in the specified format, which must be obligatory for all participants in the communication processes.

In the conditions of blended learning, it is widely practiced to conduct classes in the format of video conferences. The main problem is to make students work with their cameras on, which is necessary to maintain discipline among the learners and ensure better interaction during the class. Working with the camera off is allowed only in exceptional situations related to technical difficulties, or if the audience of the session exceeds 100 participants. An important ethical aspect in the digital educational environment is the image of the participants in the educational process. In this context, generally accepted ethical norms of official communication should apply. Participation in classes in the format of video conferences implies adherence to business dress code

by all participants and proper preparation of the workplace, which are mandatory and obvious requirements for organizing the educational process.

Familiarizing participants of the educational process with the rules of business etiquette during online communications improves the quality of classes and, therefore, the quality of education. Students must know the basic rules: registering under their own names, turning on the camera, turning the microphone on and off, paying attention to the background, etc. Before starting work in an online format, the teacher must discuss with the learners all organizational issues of interaction on the internet, which may arise. This concerns possible delays, the need to disconnect during the class, forms of feedback, discussions of educational material, and asking questions.

The norms of behavior when organizing the virtual learning process should be the same as in everyday life. Every participant in the educational process should adhere to the culture of communication, avoid rudeness, and prevent conflict situations. The atmosphere in the classes should be tolerant and democratic, contributing to the disclosure of the educational and creative potential of the learners. It is an indisputable fact that the teacher's behavior significantly impacts the quality of material assimilation by the learners and their self-realization, shapes the image of the teaching staff, and is the basis of the corporate culture of the educational institution. Pedagogical ethics determine the prestige of teaching work, its social perception, and the effectiveness of professional development. Adherence to ethical norms by all participants in the educational process is a necessary condition for the effective progress of the training of future professionals.

As a result of studying the issue of defining the value foundations and ethical principles of interaction between participants in the educational process in the conditions of blended learning for future skilled workers in vocational education institutions, key competencies that should be formed and developed in the system of vocational education for the training of skilled workers in various specialties have been identified. The value foundations reflecting the personal and civic positions in the activities of future specialists have been outlined and substantiated. The main ethical principles of the participants in the educational process and the conditions for the development of the value and activity aspects of personality, the rules of ethical and effective interaction of participants in the educational process in cyberspace have been revealed. The conducted scientific research leads to the conclusion that values are important defining qualities of human essence, the main lever for the implementation of social interaction, and the basis of the meaning of human existence. Considering that the educational process should be directed not only at achieving academic success of the learners but also at the development of the spiritual and practical-oriented aspects of the personality (Артемченко А. Б., 2018), for the harmonious development of future skilled workers, it is necessary that collective interaction of all participants in the educational process is implemented in tolerant, sincere communication, based on such important moral and ethical components as respect, equality, justice, multiculturalism, democracy, empathy, integrity, responsibility, trust, patriotism, etc. (Ціннісні орієнтири сучасної



української школи, 2019, с.4). In the conditions of socio-economic challenges and disruptions caused by Russian aggressive aggression, the formation and development of moral and ethical values of future skilled workers in vocational education institutions are one of the important directions for creating a cultural basis for the revival and progressive development of the Ukrainian nation and the civil society of our state.

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## 2.7. ELECTRONIC SELF-ASSESSMENT SYSTEMS AS A TOOL FOR ENSURING THE QUALITY OF EDUCATION

### **ЕЛЕКТРОННІ СИСТЕМИ САМООЦІНЮВАННЯ ЯК ІНСТРУМЕНТ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ОСВІТИ**

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*The importance of implementing electronic systems for self-assessment of teachers' professional activities has been described. It has been emphasized that modern educational reforms require objective and transparent evaluation mechanisms. The implementation of such systems is shown to improve the quality of the educational process. The necessity of developing digital and analytical competencies among teachers for effective use of these systems is highlighted.*

*Results of the study indicate that the implementation of electronic systems for self-assessment of teachers' professional activities within the context of educational reforms is a positive step. It has been found that these systems enhance the objectivity, transparency, and effectiveness of assessments while developing key competencies among teachers: informational and digital, evaluative-analytical, innovative, and reflective. The importance of continuous learning for adapting to technological changes is noted. It was found that teachers actively use digital tools, such as online learning, video conferencing, Google Forms, and Padlet. Although artificial intelligence is being implemented slowly, it holds great potential for personalizing learning.*

*The study emphasizes the importance of electronic self-assessment systems for improving the quality of education. The development of key teacher competencies – informational and digital, evaluative-analytical, innovative, and reflective – is crucial for the effective use of these systems. These competencies enable objective assessment of learning outcomes, adaptation of educational strategies, and enhancement of evaluation transparency, all of which positively influence the quality of the educational process. Continuous teacher learning ensures their ability to adapt to technological changes and introduce new approaches to teaching. Electronic systems stimulate*

*reflection and professional development, enhancing teachers' expertise and creating a modern, interactive educational environment that meets the demands of the digital era.*

*Описано важливість впровадження електронних систем самооцінювання професійної діяльності педагогічних працівників. Наголошено, що сучасні освітні реформи потребують об'єктивних та прозорих механізмів оцінювання. Визначено, що впровадження таких систем дає змогу підвищити якість освітнього процесу. Підкреслено необхідність розвитку цифрових та аналітичних компетентностей педагогів для ефективного використання цих систем.*

*Результати дослідження свідчать, що впровадження електронних систем самооцінювання професійної діяльності педагогів у контексті освітніх реформ є позитивним кроком. Встановлено, що ці системи підвищують об'єктивність, прозорість та ефективність оцінювання, розвиваючи ключові компетентності педагогів: інформаційно-цифрову, оцінювально-аналітичну, інноваційну та рефлексивну. Зазначено важливість безперервного навчання для адаптації до технологічних змін. Виявлено, що педагоги активно використовують цифрові інструменти, такі як онлайн-навчання, відеоконференції, Google Forms та Padlet. Штучний інтелект, хоча впроваджується повільно, має великий потенціал для персоналізації навчання*

*Висновки. Дослідження підкреслює важливість електронних систем самооцінювання для покращення якості освіти. Розвиток ключових компетентностей педагогів – інформаційно-цифрової, оцінювально-аналітичної, інноваційної та рефлексивної – є вирішальним для ефективного використання цих систем. Ці компетентності дозволяють об'єктивно оцінювати результати навчання, адаптувати освітні стратегії та підвищувати прозорість оцінювання, що позитивно впливає на якість освітнього процесу. Безперервне навчання педагогів забезпечує їхню здатність адаптуватися до технологічних змін і впроваджувати нові підходи у викладанні. Електронні системи стимулюють рефлексію та професійне вдосконалення, що підвищує майстерність педагогів і створює сучасне, інтерактивне освітнє середовище, відповідне вимогам цифрової ери.*

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**Ключові слова:** інформаційно-цифрова компетентність, оцінювально-аналітична компетентність, інноваційна компетентність, рефлексивна компетентність, безперервне навчання, якість освіти

**Keywords:** informational and digital competence; evaluative-analytical competence; innovative competence; reflective competence; continuous learning; quality of education.

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Electronic self-assessment systems for the professional activities of educational workers are becoming increasingly significant within the framework of contemporary educational reforms. Such systems provide the means to achieve objectivity, transparency, and efficiency in self-assessment, playing a crucial role in improving the quality of education. These systems encompass a wide range of indicators, from student performance to the professional development of teachers, making them a valuable tool for educators' professional growth. The implementation of these systems requires significant resources, time, finances, and personnel training. However, investments in

these systems are justified by the improvement of the educational process quality and the enhancement of professional standards for teaching activities, creating a fair assessment environment where every teacher has the opportunity to demonstrate their contribution to the development of education.

It is essential to emphasize the need for objective and transparent assessment of teaching activities in the context of educational system development. Electronic systems minimize the impact of subjective factors and biases, making self-assessment more fair and objective. This also highlights the necessity for the development of new competencies in educators, such as digital literacy, analytical skills, and communication abilities, which are essential for the effective use of electronic systems.

The relevance of this research lies in promoting the implementation of electronic systems for the assessment and self-assessment of teachers' professional activities, particularly in identifying the key competencies teachers need for their effective use. The research results aim to enhance education quality by providing teachers with valuable information for analyzing and improving their professional performance. This is achieved through the development of professional development programs that help teachers cultivate the competencies required for working with these electronic systems.

One study that confirms the importance of teachers' competencies in using electronic self-assessment systems is the work of S. Ivanov (2017). In his article, he notes that educators who possess the skills to work with electronic systems can not only improve the assessment of students' achievements but also ensure a more objective and transparent assessment process. This research highlights that inadequate teacher preparation in this area can become a significant barrier to the implementation of innovative technologies in education. The scientific inquiry conducted demonstrates that competent teachers can more effectively integrate electronic self-assessment systems of professional performance into the educational process. The author notes that the ability to use such systems enhances the interaction between students and teachers and provides the possibility of real-time feedback. This research indicates that the development of teachers' competencies is a key aspect of the successful application of digital technologies in education.

Regarding the use of self-assessment tools for teachers' digital competencies, especially in the context of martial law and quarantine restrictions, O. Ovcharuk (2023) focused her attention on this matter. She emphasized the relevance of self-assessment as a means for teachers to become aware of their competencies and learning needs, which is particularly important during the rapid transition to distance learning. She identified digital competence as a set of knowledge, skills, and abilities that enable the effective application of digital technologies in the educational process. The researcher reviews various approaches to this concept in both domestic and foreign scientific literature, stressing the need for the unification and standardization of requirements for teachers' digital competencies.

The process of preparing future teachers for the use of digital technologies in the learning process is highlighted by Z. Lakomchak (2015). She explores the key competencies that educators must acquire for the effective use of digital tools and resources. The author describes various stages of preparation, covering both theoretical and practical aspects, and emphasizes the importance of continuous professional development and self-education. Special attention is given to the consideration of modern educational technologies and electronic platforms that can be used in the learning process. Continuing this topic, O. Stoika (2023) examined contemporary methods and approaches to teacher preparation in the context of education digitalization. The author analyzes the need for integrating digital technologies into the process of teacher training and proposes various strategies for effective learning. In particular, she emphasizes the importance of developing digital literacy, adapting educational programs to the latest technologies, and implementing interactive teaching methods. Additionally, examples of the successful implementation of digital technologies in educational institutions and their impact on the quality of teacher preparation are discussed.

Focusing on the aspect of self-assessment of teachers' professional activities, it is important to highlight the article "Electronic Tools for Internal Control and Evaluation of Education Quality," which examines the features of electronic tools such as Moodle, Google Classroom, ExamSoft, and Turnitin. Each of these tools is described from the perspective of the functions and capabilities they offer for controlling and assessing education quality. It has been established that their use contributes to enhancing the efficiency and productivity of the educational process and ensures convenient and accurate internal quality control of education (Radkevych, 2023). In this context, the review of reflective competence is essential. In the article "Reflective Competence as a Component of a Future Specialist's Professional Characteristics," V. Raskalinos (2011) argues that reflective competence is key for modern professionals, as it enables them to adapt to change, engage in continuous learning and development, make effective decisions, and take responsibility for the results of their professional activities. The author describes the structure of reflective competence and methods for its development in future professionals, emphasizing the importance of this competence for higher education. At the same time, there is a shortage of scientific studies analyzing teachers' competencies in the context of working with electronic assessment systems, particularly in terms of self-assessment of teachers' professional activities.

Self-assessment of teachers' professional activities using electronic systems is aimed at achieving important pedagogical goals that contribute to improving education quality and teachers' professional development. One of the main goals is to ensure objectivity in assessment, which helps teachers better understand their strengths and weaknesses. Electronic systems enable the collection and analysis of data on professional activities in real-time, making it possible to respond promptly to the information received and adapt teaching methods accordingly. The self-assessment process encourages teachers to engage in self-reflection and self-improvement, which is

critically important for continuous professional development. On the basis of electronic educational systems, a platform is created for systematically updating professional knowledge and skills. This, in turn, enhances the effectiveness of the educational process as teachers become more purposeful in performing their work. It also allows teachers to better plan their professional development by setting specific goals and strategies to achieve them. Electronic systems can serve as tools for tracking progress in implementing these plans, providing opportunities for regular updates and adjustments, which contribute to more effective and meaningful professional growth. Thus, self-assessment of professional activities using electronic systems becomes a central element in maintaining a dynamic and productive pedagogical environment. The data obtained from electronic systems provide teachers with an evidence base for reflecting on their teaching methods, which can lead to more thoughtful implementation of changes in educational practice. This, in turn, promotes higher educational standards and the development of professional competencies that are important for the modern educational field. Additionally, electronic systems for self-assessment of professional activities can include tools for tracking and analyzing trends in teaching activities at the institutional level. This allows school administrations to evaluate the overall effectiveness of educational programs and make informed decisions regarding resource needs, planning professional development courses for teachers. The use of these systems enables the creation of a more dynamic and adaptive educational environment aimed at the continuous improvement of learning quality and addressing contemporary educational needs.

Considering that electronic systems for evaluating the professional activities of teaching staff play a key role in modern secondary education institutions, they contribute to the effective assessment and analysis of teachers' work. These systems encompass various components that facilitate feedback collection through questionnaires and surveys. This ensures objective evaluation of employees' professional activities by colleagues and supervisors. For instance, tasks and tests as elements of self-assessment help determine the level of knowledge and skills in specific areas of professional activity, which serves as a foundation for planning teachers' training and professional development. Self-assessment enables educators to independently analyze their achievements and identify areas for improvement, fostering their self-awareness and motivation. The analytical capabilities of these systems provide detailed reports on the performance of teaching staff, helping to identify strengths and weaknesses both at the individual and organizational levels. Finally, electronic self-assessment systems for professional activities contribute to the development of targeted development programs for teachers, supporting their professional growth and adaptation to changing conditions in the educational process.

A survey among educational staff was conducted using the Google Forms system, with 941 respondents participating. This number of respondents is significant, as it significantly exceeds the minimum required sample size to achieve



representativeness. The total number of teaching staff in 2021 was 434,755, and to obtain valid survey results with a confidence level of 95% and a margin of error of 5%, a minimum of 384 respondents needed to be involved. Thus, the inclusion of 941 respondents is more than sufficient to ensure reliability and reflect general trends among teaching staff. Formula (1) allows for a high probability of analyzing and interpreting the data obtained from the survey, contributing to the formation of well-founded conclusions and recommendations for the further development of the educational field.

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{(N-1) \cdot E^2 + Z^2 \cdot p \cdot (1-p)}$$

Where:

- $n$  – the sample size required for analysis.
- $N$  – the total population size (in your case, the total number of teaching staff).
- $Z$  – the Z-score corresponding to the chosen confidence level (for example, 1.96 for 95%).
- $p$  – the assumed proportion of responses, usually taken as 0.5, as this provides the maximum sample size.
- $E$  – the margin of error (for example, 0.05 or 5%).

Let us consider the competencies that play a key role in the self-assessment of the professional activities of teaching staff. Specifically, teachers' information and digital competence is critical in the context of applying electronic self-assessment systems for professional activities in general secondary education institutions. This competence encompasses not only knowledge and skills related to electronic systems but also ensures the ability to effectively use digital technologies in professional activities (Barlit, 2022). Mastery of this competence enables teachers to adapt to the dynamic educational environment, where digital technologies are increasingly utilized. It is essential to note that the ability to navigate the information space, search for, critically evaluate, and use information in professional activities is a significant component of information and digital competence. This pertains not only to acquiring new knowledge and information but also to the ability to filter out irrelevant data, which is crucial when applying electronic self-assessment systems. The ability to effectively use available digital resources and create new ones as needed is vital for improving the quality of the educational process. It promotes the integration of innovative approaches in teaching and opens new possibilities for individualizing the educational process and adapting it to the specific needs of students. The application of digital technologies in the educational process is not merely a convenience but a necessity in the modern educational environment. Teachers who possess information and digital competence can effectively use electronic self-assessment systems and integrate digital tools into the teaching process, thereby enhancing the quality of education and fostering the development of students' critical thinking (Timotheou et al., 2023).

The understanding of information and digital competence in contemporary scientific thought covers a broad spectrum of skills and knowledge necessary for successful integration into the information society. Researchers offer various

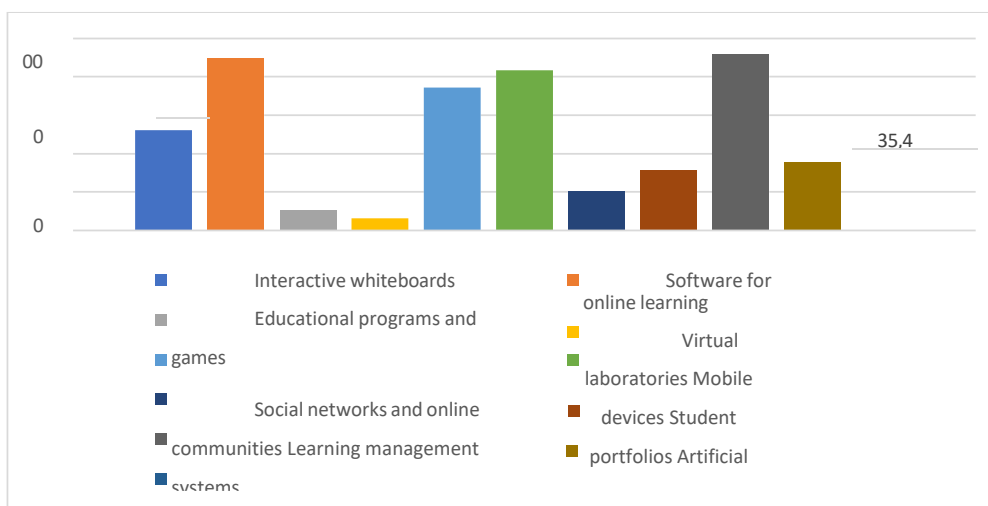


interpretations of this competence, highlighting its key aspects. For example, L. Potapyuk and I. Potapyuk (2019) define information and digital competence as the critical use of information and communication technologies in various spheres of life, including professional activities, personal communication, and public space. They emphasize components such as information and media literacy, programming, algorithmic thinking, and database skills, as well as internet safety and ethical aspects of working with information, which are essential for ensuring secure and responsible use of digital technologies. O. Sakhno (2020) focuses on the use of information and communication technologies in professional activities. According to his definition, information and digital competence includes the collection, processing, transmission, and storage of information, the automation of information-methodological support processes, and the evaluation of electronic resources. Additionally, the researcher emphasizes the organization of interaction through interactive means, which is crucial for digital education, as well as the application of digital technologies in teaching, considering the specifics of the subject area. O. Barlit, V. Mogilevska, and O. Sibil (2022) view information and digital competence as a multifunctional skill that not only contributes to the successful organization of the educational process but also enables teachers to effectively adapt to changes in the educational environment. They underline the universality of this competence, making it important not only for professional activities but also for other spheres that require the effective use of digital tools.

O. Tryfonova (2018) pays special attention to the process of finding, systematizing, and evaluating information using digital tools and filters. She emphasizes the possibility of creating information databases from various sources and assessing competency levels in different areas. Information and digital competence as a set of knowledge, skills, abilities, and personal qualities that enable individuals to work effectively with information from various sources is examined by Sinienko K. (2021). An important component is the use of various media, which accelerates adaptation to the challenges and demands of a high-tech society. O. Polyakova (2022) focuses on the ability of individuals to navigate the information space and work effectively with information according to their own needs and the demands of the modern world. It is essential to understand how these needs evolve with the rapid development of technology. A. Chudesa (2020) concentrates on the technical aspects of information and digital competence, highlighting the ability to configure software, work with multimedia tools, and use resources to create educational materials. The researcher also emphasizes the importance of mastering basic technologies and website development skills. Analyzing various approaches to defining information and digital competence, it can be concluded that most researchers focus on the importance of digital knowledge and skills for modern individuals. However, key differences lie in some researchers emphasizing the professional sphere, while others focus on general media literacy or technical skills. Summarizing these approaches, information and digital competence can be interpreted as a set of skills, knowledge, and abilities that enable individuals to work

effectively with information technologies in various professional fields, critically evaluate information, and use it to achieve their professional and personal goals.

The results of assessing the level of teachers' information and digital competence (Figure 1) revealed that most of them use various digital tools to enhance the educational process. In particular, software for online learning, which includes tools for organizing distance learning and interaction, is used by 89.6% of respondents. This indicates a positive trend in the acceptance of distance learning technologies. Video conferencing, which allows for online lessons and meetings, is even more popular, with a rate of 91.7%. Additionally, a high percentage of teachers use social networks and online communities (74.4%) and mobile devices (83.3%) for educational purposes, indicating a trend toward integrating everyday digital experiences into the educational process. Interactive whiteboards, used by 52.1% of respondents, contribute to increasing interactivity and student engagement in learning. However, less common tools, such as virtual laboratories (6.3%) and educational programs and games (10.4%), despite their potential to provide more engaging and practical learning experiences, are used far less frequently. This indicates the need for further support and development of these technologies. Learning management systems (20.8%) and student e-portfolios (31.3%), as reported by respondents, can serve as important tools for tracking educational achievements and managing learning content. Artificial intelligence, although used by 35.4% of teachers, still holds significant potential for expansion, given its ability to personalize learning and adapt materials to students' individual needs. These data illustrate the wide range of digital tools used in education and highlight the importance of continuous development of information and digital competence among teaching staff.



*Figure 1. Which digital learning technologies do you use in the educational process?  
(data in percentages)*

In the context of using electronic self-assessment systems, the evaluative and analytical competence of educators in secondary education institutions enables teachers

not only to analyze and interpret data on students' learning outcomes but also to effectively apply this information to improve the educational process. The importance of evaluative and analytical competence increases in light of the necessity to adapt teaching methods to students' individual needs and to enhance the overall quality of educational services (Bykov et al., 2020). It should be noted that the ability to critically assess information obtained from electronic self-assessment systems requires teachers to develop critical thinking skills and the ability to work with data analytically. This not only contributes to improving the quality of education through the individualization of the educational process but also prepares students for effective interaction with an information-rich world. The ability to assess students' learning outcomes is fundamental to pedagogical activity. Electronic self-assessment systems offer a wide range of tools for measuring and analyzing various aspects of students' achievements, from academic knowledge to social and emotional skills. These systems allow teachers to make timely adjustments to the educational process based on objective data. The ability to analyze students' learning outcomes encompasses not only the interpretation of quantitative data but also the qualitative analysis of students' responses, reflections, and projects. This includes the use of analytical tools to identify trends, problem areas, and successes in learning, which enables teachers to develop targeted strategies for each student's development.

Given this, the ability to perform self-assessment and peer assessment of learning outcomes becomes crucial. Thus, electronic self-assessment systems can foster the development of students' self-analysis, self-criticism, and responsibility for their own learning. Peer assessment, on the other hand, supports the development of communication skills and collaboration, forming the basis for effective group work and mutual assistance among students (McMillan & Hearn, 2008). Understanding evaluative and analytical competence by various researchers underscores its importance for effective pedagogical activity. For example, S. Pokrova (2022) defines it as a key component that encompasses solving pedagogical tasks and making decisions, whether standard or creative. According to her, this competence is based on the teacher's ability to assess situations in a timely manner, analyze decision options, and choose the best one. The structure of this competence includes skills that enable teachers to successfully solve professional tasks in pedagogical activity.

Another approach is presented by a group of authors led by O. Shkvir (2023). They argue that a teacher's evaluative and analytical competence involves the adequate assessment of learning outcomes and the ability to conduct both self-assessment and peer assessment. This process requires the integration of theoretical knowledge and practical skills acquired during classes. Participation in scientific-practical events, according to the authors, is an important element, as it contributes to the development of skills in analyzing and assessing learning outcomes. Evaluative and analytical competence is viewed as a means for the effective use of electronic systems to analyze students' academic achievements. This competence presupposes the presence of critical

thinking and analytical abilities, which are necessary for working with large amounts of data, as well as the ability to adapt the educational process to the modern educational needs of society. This competence forms the foundation of pedagogical activity, helping teachers to effectively apply various assessment methods, which enables them to make the educational process more transparent and systematic. Teachers should be able to summarize their own experience and adequately present it (Onopriienko, 2021).

V. Yatsenko (2023) adds the ability to appropriately apply assessment criteria for students in secondary education institutions to the understanding of evaluative and analytical competence. This skill is fundamental to educational practice, as it helps teachers adequately assess students' academic achievements and foster their development. G. Chaus and I. Romanets (2023) emphasize the systematic nature of assessment, which allows tracking students' progress and identifying their individual needs. Moreover, these authors highlight the importance of self-assessment and peer assessment as mechanisms that develop students' responsibility for their own learning. Thus, an analysis of interpretations indicates that evaluative and analytical competence encompasses a wide range of knowledge, skills, and abilities necessary for the effective evaluation, analysis, and adaptation of the educational process to contemporary demands. According to the author, evaluative and analytical competence is the foundation of pedagogical activity, as it enables teachers not only to adequately assess students' outcomes but also to critically analyze the educational process and ensure its continuous modernization.

Based on the results of a survey of educational staff regarding the presence of evaluative and analytical competence in the use of digital tools in the educational process (Figure 2), one can observe a distribution of preferences for their application in assessing learning outcomes. Among the most popular tools, Google Forms stands out with a 77.1% share, indicating its widespread use and recognition in educational institutions. Other platforms, such as Padlet and Kahoot!, are also significantly used, with respective rates of 35.4% and 31.3%. Meanwhile, Quizizz is used less actively, with a share of only 14.6%. An important aspect is that 14.6% of responses (corresponding to 137 teachers from the total number of respondents) indicated that these educators do not use digital tools to assess learning outcomes. This may point to barriers or limitations existing in educational institutions or among individual teachers regarding the adaptation to new technologies. Such information can serve as the basis for further research on the reasons for the inaccessibility or unacceptability of digital tools and the development of measures to increase the level of integration of digital technologies into the educational process.

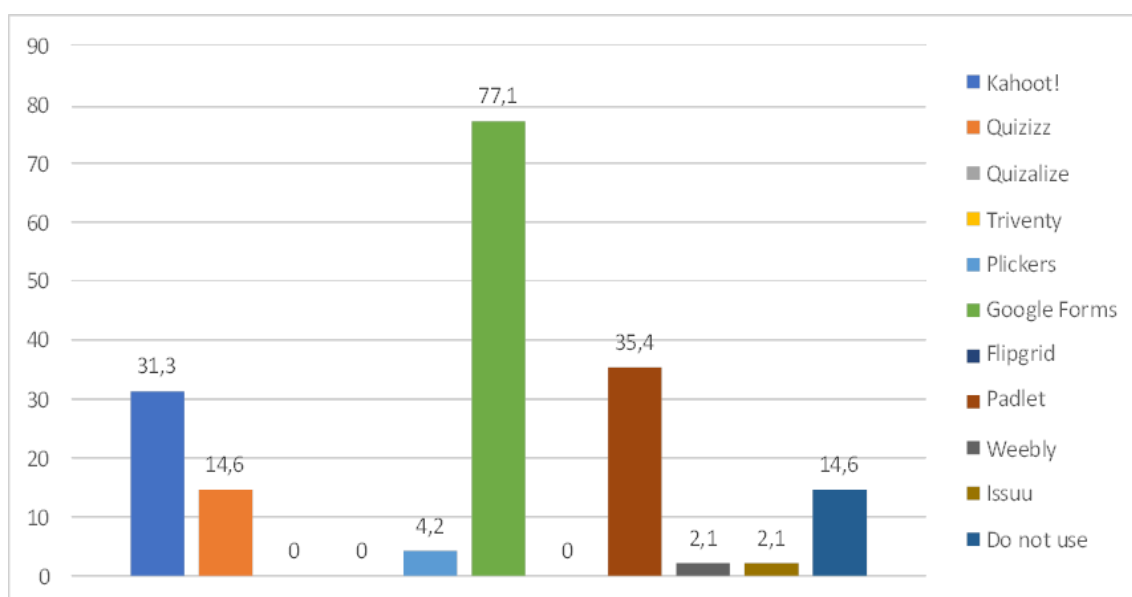


Figure 2. What digital tools for assessing students' learning outcomes do you use?  
(data in percentages)

One of the key roles in the modern educational process, especially in the context of integrating electronic self-assessment systems, is played by the innovative competence of teachers. Its primary advantage lies in the ability of educators to adapt and implement the latest technologies and methodologies, which enhances the efficiency of the educational process (Vashchenko, 2022). The use of digital tools not only simplifies the self-assessment procedure but also stimulates the development of an innovative culture among educators. Teachers who possess this competence can critically analyze educational content and effectively integrate scientific knowledge into their work. This contributes not only to the development of students' critical thinking but also improves the quality of the educational process, making learning more interactive and efficient. Innovativeness in the professional activities of educators is a crucial aspect that requires continuous development and self-improvement. The application of innovations not only modernizes the educational process but also enables teachers to stay at the forefront of educational trends. The integration of electronic self-assessment systems serves as an example of such innovations, enhancing the effectiveness and transparency of student achievement evaluation (Nykytuk, 2018). The ability to apply various approaches to problem-solving in pedagogical activity is an essential component of innovative competence. This encompasses not only the use of traditional teaching methods but also the integration of digital technologies and interactive methodologies. Such an approach expands opportunities for educators, creating a more flexible and adaptive learning environment for students. The use of electronic self-assessment systems and the integration of innovations into the educational process enable educators to improve the effectiveness of learning and foster the development of their own professional competence. Thus, innovative competence

becomes the foundation for creating flexible and adaptive educational programs capable of meeting the needs of the modern educational environment.

The issue of understanding innovative competence increasingly draws the attention of scholars, who attempt to define its key elements and impact on professional activity. In the modern world, innovative competence extends beyond merely technical skills, encompassing a significant set of abilities, knowledge, and personal qualities that shape the capacity for innovative thinking and professional activity. Researchers offer their own perspectives on this competence, revealing the multifaceted nature of its interpretations and opportunities for further exploration. V. Radkevych (2020) defines innovative competence as a key component that enables educators to successfully adapt the educational process to the new demands of the labor market and technological changes. According to her, this competence includes the ability to implement new methods and technologies into pedagogical practice, which contributes to the quality of professional training for students. The author emphasizes the importance of seeking original approaches that allow educators to create innovative educational products. Innovative competence is viewed as a component of general professional-pedagogical competence, emphasizing the creative and continuous nature of innovative activity (Konovalchuk, 2011). The researcher notes that innovative competence is driven by the societal significance of innovation and is aimed at developing the personal and professional potential of educators, focusing on the importance of developing the ability to create new solutions and propose original approaches. This understanding is complemented by the view that innovative competence also includes the ability to find new elements in already stable conditions of the educational process and to offer radically new solutions to existing problems. This approach indicates not only a readiness for change but also the ability to deeply analyze existing processes and seek ways to improve them (Vientseva & Karapetrova, 2022). O. Yevdokymova and N. Aleksiyenko (2017) emphasize that innovative competence is crucial for the effective fulfillment of professional duties and encompasses a readiness for constant innovations. They highlight its significance as a mechanism for cultural and intellectual exchange, which helps professionals not only to acquire new knowledge but also to effectively transmit it to others. This interpretation focuses on the role of competence as a tool for professional and personal development in a rapidly changing world.

As a systemic formation, innovative competence encompasses all aspects of innovative activity, from goals and objectives to methods and outcomes (Dziubenko, 2020). It is not isolated from the personality of the teacher, as its development is connected to a conscious approach to finding new educational solutions. M. Radchenko (2017) views innovative competence as the ability of an individual to adapt to changes and implement innovations, emphasizing such characteristics as creativity, improvisation, and continuous learning. His definition highlights the importance of receptivity to new ideas and active intellectual activity, which promotes individual self-actualization and professional growth.

A group of researchers, including S. Shevchuk, A. Yermolenko, and V. Kulishov



(2020), consider innovative competence as the ability to implement changes at the system level. They emphasize methodological and informational literacy, which is essential for evaluating and implementing innovations. This definition underscores the importance not only of personal skills but also of the organizational conditions that foster the development of the innovative potential of educational institutions. Based on an analysis of the interpretations of this concept, it can be concluded that innovative competence is a complex category that includes both personal and professional components. It encompasses the ability to implement new approaches in professional activity, integrate the latest knowledge and skills, and be ready for continuous learning and adaptation to the rapidly changing conditions of the educational process.

According to the survey results (see Fig. 3), the level of application of modern innovative technologies in the educational process, particularly artificial intelligence, was determined. Respondents were divided into two groups: 47.1% were positive and 52.8% were negative. This indicates that while almost half of the respondents support the integration of artificial intelligence in education, a similar proportion expresses concerns or skepticism regarding this technology. Such a division indicates the need for a deeper investigation of the issues causing concern and the development of strategies to increase the acceptance and application of artificial intelligence in educational institutions. It is important to note that artificial intelligence already demonstrates significant potential in addressing educational challenges, as mentioned in the article "Artificial Intelligence in Solving Educational Problems" (Olena Skrynnyk et al., 2022), which provides examples of successful technology integration to improve learning outcomes and optimize educational processes. This also requires proper teacher preparation to reduce fears and uncertainties about the impact of artificial intelligence on the quality and safety of learning.

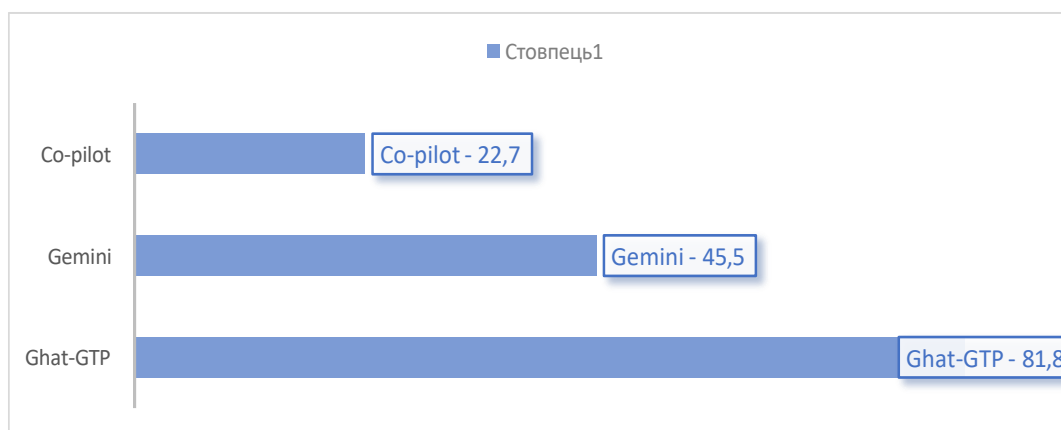


Figure 3. Application of modern innovative technologies in the educational process, including artificial intelligence. (data in percentages)

In the self-assessment of the professional activities of educational workers, the presence of reflective competence plays a significant role. It encompasses the ability to contemplate one's own practice, analyze successes and shortcomings, which contributes

to identifying areas for further professional growth. This process not only promotes self-improvement but also ensures the high quality of the educational process. Reflective practice involves not only individual self-analysis but also the application of feedback from electronic self-assessment systems. These systems provide objective data on the effectiveness of professional activities, allowing for a more accurate self-identification in the field of professional development (Zhelanova, 2020). It is important to understand how the collected information can be utilized for the correction and improvement of one's own teaching practice. Moreover, reflective competence facilitates educators' ability to monitor their activities and determine individual professional needs. This includes the analysis of their own skills, knowledge, as well as emotional and psychological states in the context of professional activities. Such an approach enables educators to be more adaptable to changes in the educational environment and respond to them adequately.

For the effective application of reflective competence, educators require access to high-quality digital tools for self-assessment and analysis, which can be integrated into electronic systems. These tools take into account not only quantitative but also qualitative indicators, allowing for a deeper analysis of teaching activities. Reflective competence is one of the key characteristics of an individual's effective adaptation and development in professional and personal environments. Research conducted by scholars highlights the multifaceted nature of this concept, emphasizing its various aspects. For instance, O. Savchenko (2016) defines the reflective competence of a teacher as the ability to self-analyze, self-regulate, and self-improve, which helps them solve intellectual problems. It encompasses a set of reflective abilities that enable the application of personal resources to resolve internal conflicts through reflection and analysis of one's actions. This definition focuses on internal organization and the conscious resolution of personal contradictions, which are the main aspects of reflective activity.

O. Malykhin and O. Herasymova (2015) draw attention to the role of reflective competence in the context of the professional training of future teachers. They consider it an integral part of professional competence that contributes to personal and professional development during the learning process. It is emphasized that reflection assists in forecasting, planning, and implementing professional activities, directing individuals toward self-realization in socially significant activities. This underscores the importance of reflection in the educational process and its direct interaction with teaching practice. Reflective competence is viewed as a fundamental ability for understanding and critically reflecting on one's own thoughts, feelings, and actions in a professional context. Particular attention is given to introspection – the ability to reconsider one's actions and thoughts, which fosters personal development (Zhelanova, 2020). S. Lytvynenko and V. Yamnytskyi (2014) expand the definition of reflective competence by including creativity and the ability to interact productively in complex situations. They emphasize the importance of reflection for developing creative abilities, which contributes to the harmonious resolution of personal and professional tasks. The

authors also highlight the role of reflection in the educational process at all its stages, making it a central competence for any specialist.

O. Homoniuk, O. Onyshko, and V. Raiko (2019) view reflective competence through the lens of rethinking personal and professional experience, which stimulates the formation of new professional standards. Their approach emphasizes the significance of reflection in professional development, particularly through the actualization of new performance benchmarks, which ensures the growth and improvement of educators. L. Kyashko (2019) underscores the role of reflective competence in professional activities, defining it as the ability to critically rethink thought stereotypes and create new content. The author emphasizes that this competence contributes not only to professionalism but also to personal growth, making it an integral part of professional development. From the analysis of these approaches, it can be concluded that reflective competence encompasses not only the ability to self-analyze but also the development of creative thinking, the ability to overcome stereotypes, and the pursuit of personal and professional growth. It fosters the formation of new approaches to problem-solving and ensures harmonious development in the professional environment.

To maintain a high level of professional competence among educational workers in a dynamically changing world, the ability to engage in life-long learning is crucial. This is particularly relevant in the context of mastering new electronic self-assessment systems, which serve as a tool for improving the educational process and enhancing the quality of education. This competence not only encourages teachers to self-improve but also stimulates their active participation in professional communities, sharing knowledge and experience (Lenkova & Tretyak, 2021; Radkevych & Radkevych, 2021). It should be noted that electronic self-assessment systems enable educators to analyze their own activities, determine the conditions and resources for professional development. This contributes to objective self-assessment and planning of an individual learning trajectory, which is necessary for effective professional growth in the context of constantly evolving educational demands and standards.

The support of a high level of professional competence requires educators not only to have a deep understanding of current trends in the educational sphere but also the ability to adapt to new technologies. Electronic self-assessment systems are an important tool for achieving this goal, as they provide access to relevant digital educational resources, teaching methods, and forms of assessment. It should be noted that the ability to collaborate with other teachers on the principles of partnership and support is critically important for their professional development. Mentoring, supervision, and participation in professional communities allow for knowledge exchange, the development of joint projects, and the implementation of innovative approaches in the educational process. This not only improves the quality of education but also fosters the development of the professional community as a strong support network.

The issue of understanding lifelong learning as a competency encompasses a wide range of aspects of educational development and personal growth. Modern scholars offer various definitions of this concept, focusing on the key characteristics of the continuous education process. Understanding lifelong learning as a competency largely depends on the context of societal, economic, and cultural development, as well as the individual's personal aspirations for self-improvement. For example, O. Markozova (2016) defines lifelong learning as a process that involves systematic and continuous acquisition of knowledge, skills, and competencies at all stages of life. Her approach emphasizes the active participation of individuals in various educational activities aimed at enhancing educational levels and professional training. This process helps individuals remain competitive in the labor market by maintaining the relevance of their knowledge and skills in the context of technological changes. The main goal of this approach is to support the intellectual development of the individual, enabling adaptation to the challenges of modern society.

Lifelong learning encompasses both formal and informal education, emphasizing the importance of continuous self-improvement and the acquisition of new knowledge outside traditional educational institutions. Her approach highlights that learning is not limited to formal education but also requires continuous development in social and professional life. In this context, lifelong learning becomes an important tool for self-realization and the development of critical thinking (Radkevych & Radkevych, 2021). The ability to engage in lifelong learning is considered a key competency, which is formed at the early stages of education and is complex in nature, encompassing content-based, motivational, and procedural components that contribute to the development of learning skills. The content-based component relates to cultural and general educational skills, the motivational component focuses on the significance of knowledge, and the procedural component concerns the organization of learning activities (Kodliuk & Kobryn, 2021). Analyzing these definitions, one can argue that the ability to engage in lifelong learning is a multifaceted competency that involves not only acquiring new knowledge but also developing skills in self-organization, motivation for learning, and the ability to adapt to changes.

Such a competency forms the foundation for continuous professional and personal growth, contributing to social integration and economic development.

The identification of informational-digital, evaluative-analytical, innovative, reflective competencies, and lifelong learning as key parameters for electronic self-assessment systems of professional activity for teachers in general secondary education institutions is determined by modern trends in education and the demands of the teaching profession. These competencies reflect the ability of educators to adapt to rapid changes in the technological and informational environment, effectively analyze and assess students' educational achievements, implement innovative approaches in the educational process, and develop their professional mastery through constant self-reflection and improvement. Unlike other competencies, such as linguistic-communicative, subject-methodological, psychological, emotional-ethical, and others,

the selected competencies ensure a comprehensive approach to self-assessment of professional activity, emphasizing the importance of integrating digital technologies, analytical thinking, innovation, and self-development in the professional activities of modern educators. These competencies correspond to the needs of the modern educational process, which demands that teachers possess not only deep knowledge in their field but also the ability to quickly adapt to changes, implement new technologies in teaching and education, and develop critical thinking and self-education skills.

Thus, the competencies of teaching staff in the field of electronic self-assessment systems for professional activity not only contribute to teachers' professional development but also enhance the overall quality of education. The ability to adapt to new technologies, develop innovative teaching methods, and use electronic resources for self-assessment is fundamental to ensuring high-quality education.

In the context of modern education, the application of electronic self-assessment systems for teachers' professional activities requires the identification and thorough analysis of key competencies. One of the most important is digital competence, which defines the ability of teachers in general secondary education institutions to effectively use digital tools for collecting, processing, and analyzing information. The significance of this competence is determined by the fact that teachers must not only be able to work with technologies but also critically assess the reliability of information. This enables them to quickly adapt to constantly changing technological conditions, thus contributing to the improvement of the quality of the educational process, which is a key factor in enhancing teachers' professional mastery.

The application of evaluative-analytical competence enables teachers to accurately determine the level of students' knowledge acquisition, which serves as a foundation for individual adaptation of educational strategies. As a result, teachers can conduct a thorough analysis of the obtained outcomes and develop more effective teaching strategies that promote higher learning outcomes. This competence is particularly important in the context of evaluating teachers' professional activities, as it enhances the precision and objectivity of the self-assessment process. The innovative competence of teachers plays a crucial role in modern educational practice. It involves the ability to implement new ideas, technologies, and methods in the educational process. This competence allows teachers not only to adapt to new conditions but also to actively shape new approaches to teaching, which stimulates students' interest in the educational process. Such an approach fosters the development of creative potential in both teachers and students, which in turn positively impacts the effectiveness of the educational process and improves its outcomes.

Reflective competence plays a critical role in ensuring the continuous professional development of teachers. It defines the ability of educators to self-assess and analyze their professional activities, which aids in understanding their strengths and weaknesses. Reflection enables teachers to continuously improve their teaching approaches, making adjustments to the educational process to enhance its quality. This

competence allows educators to effectively adapt their methods to new challenges and maintain a high level of pedagogical expertise.

Particular attention should be paid to the competence of lifelong learning, which is an essential component of teachers' professional development. This competence encompasses an openness to continuously acquiring new knowledge and skills, regardless of age or professional experience. In the context of rapid technological changes and the development of modern education, the ability to engage in lifelong learning ensures that teachers remain competitive and maintain a high level of professionalism in the long term. Through this competence, teachers can quickly adapt to new demands and develop their skills to provide high-quality education to learners.

Thus, the implementation of electronic self-assessment systems for teachers' professional activities requires the development of several key competencies, including digital, evaluative-analytical, innovative, reflective, and lifelong learning competencies. These competencies are essential for ensuring the high quality of the educational process, enhancing teachers' professional mastery, and adapting to modern educational challenges. In view of the above, these competencies form the foundation for the effective adaptation and application of electronic self-assessment systems in the educational process, ensuring a high level of professionalism and innovation in teachers' professional activities.



## AFTERWORD

The completion of this monograph symbolizes not only the achievement of an important stage in the study of the digitalization of the educational process but also opens new horizons for discussion, improvement, and implementation of the presented ideas for blended learning. In today's world, where digital technologies are relentlessly changing the structure of society, education emerges as one of the most crucial areas that must adapt to these transformations. The monograph reflects the efforts of the scientific community in addressing the complex yet promising tasks of implementing blended learning to ensure the quality and competitiveness of vocational education.

Researchers focused on analyzing a wide range of issues related to the implementation of blended learning based on innovative digital technologies, which include organizing the educational process in an information environment, developing digital competence among educators, implementing distance and blended learning forms, and creating electronic learning courses. The work takes into account the need to adapt European experience to the realities of the Ukrainian education system, which is of strategic importance in the context of integration into the global educational space. Theoretical and methodological approaches that ensure quality education despite the challenges of crisis situations are also thoroughly examined.

The materials of the monograph are aimed not only at describing existing problems but also at finding solutions that can enhance the effectiveness of the educational process. Developing a clear structure of organizational and pedagogical conditions for the digitalization of education, which includes regulatory, technical, personnel, and methodological components, is essential. This structure allows for the creation of a reliable foundation for the implementation of innovative technologies, adapting them to the needs of both educators and learners.

Moreover, the monograph contains practical recommendations that will contribute to the development of digital culture among participants in the educational process, particularly educators. This issue is critically important in the context of integrating modern technologies into the educational process, as teachers are the main drivers of change. Understanding the importance of their preparation for working in a digital environment became one of the central motives for creating this study. At the same time, the work emphasizes the significance of collaboration between educators, technical specialists, and educational institution administrators to create a harmonious and effective educational environment.

It should also be noted that the monograph does not limit itself to analyzing the current state of digitalization in education. It offers a vision of the future, where digital technologies are used not only to ensure the accessibility of education but also to individualize and improve its quality. Attention is paid to creating conditions for

blended learning, which effectively combines theoretical knowledge and practical skills necessary for the successful performance of professional duties.

Thus, the conducted scientific research demonstrates the prospects of blended learning in pedagogical practice. Its popularization is facilitated by various factors, namely: improving the quality of education, meeting the demand for educational services, accessibility, economic efficiency, and the possibility of optimizing the traditional format. The main conditions for activating and optimizing its implementation are: increasing the level of computer equipment among participants in the educational process, expanding quality Internet access geographically, enhancing pedagogical competence, improving the criteria for the quality of educational services, and increasing the efficiency of the educational process. The further direction of research will be the justification of practical recommendations for the development of blended learning. In this regard, it is advisable to:

- Strengthen the practice of involving successful practicing educators in scientific and practical events to study and disseminate positive pedagogical experience in organizing vocational training under blended learning conditions, using modern digital technologies in the practice of educational institutions;

- Update the content of professional development programs for educators in vocational (vocational-technical) and pre-tertiary education institutions in terms of mastering modern digital technologies;

- Develop methodological and digital competencies to create the necessary organizational and pedagogical conditions for ensuring the quality of vocational training under blended learning conditions;

- Expand cooperation between vocational (vocational-technical) and pre-tertiary education institutions with regional methodological services on digitalization of education;

- Improve the regulatory and legal framework for blended learning;

- Participate in the implementation of international research projects;

- Introduce effective mechanisms for organizing industrial training and internships for vocational (vocational-technical) education students in accordance with production requirements and professional standards, using digital educational tools and resources;

- Create educational resources and digital platforms with support for interactive and multimedia content for free use by vocational education participants to create a digital learning environment (multimedia classrooms, STEM research centers, inclusive classrooms, blended learning classrooms), etc.

The monograph is addressed to a wide range of readers: educators, researchers, education managers, master's and doctoral students interested in the digitalization of the educational process. It will also be useful for representatives of state education management bodies responsible for developing and implementing policies in the field of vocational training. The presented results and conclusions can serve as a basis for further scientific research and innovative projects aimed at modernizing education.

We believe that this monograph will be a source of inspiration for new research, ideas, and discussions aimed at developing education that meets the demands of the digital age. The presented materials emphasize that only through joint efforts can a high level of training for future specialists, who will be competitive in the labor market, be ensured.

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## **CURRENT ISSUES IN THE IMPLEMENTATION OF BLENDED LEARNING IN VOCATIONAL EDUCATION**

*Monograph*

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*Актуальні питання впровадження змішаного навчання у професійній освіті: монографія*

The monograph presents the experience of implementation of blended learning in vocational education, highlights the national context of the development of blended learning in Ukraine, characterizes the peculiarities of training teachers of vocational education institutions for the organization of blended learning.

The publication is addressed to representatives of legislative and executive authorities, public and professional organizations, managers and pedagogical staff of vocational (vocational-technical), professional higher and higher education institutions, methodologists of scientific (educational) and methodological centers (offices) of vocational education, researchers, postgraduate students, doctoral students and all those who study and organizes blended learning.

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