DIGITALIZATION OF PROJECT, TECHNOLOGICAL, AND DESIGN ACTIVITIES IN THE PROCESS OF TRAINING FUTURE TEACHERS OF LABOR EDUCATION AND TECHNOLOGY

DIGITALIZAÇÃO DE PROJETOS E ATIVIDADES TECNOLÓGICAS E DESIGN NO PROCESSO DE FORMAÇÃO DE FUTUROS PROFESSORES DE PROFISSIONAIS DE EDUCAÇÃO E TECNOLOGIA

Nataliia Nahorna
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
tala.nagorna@gmail.com

Nataliia Orlova
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
orlova@gsuite.pnpu.edu.ua

Pavlo Kuzmenko
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
kuzmenko@gsuite.pnpu.edu.ua

Maryna Kondratenko
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
marinakondratenkosp@gmail.com

Oleksandr Sotnychok
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
sanyasotnychok@gmail.com

Mykola Blyzniuk
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
blyzniyk@gmail.com

Valentyna Tsyna
Poltava V. H. Korolenko National Pedagogical University
Poltava, Ukraine
ajut1959@gmail.com

Abstract. The practice of digitizing project-technological and design activities in training future vocational education and technology teachers has gained popularity in recent years. The active transition of all societal processes (communication, professional activities, leisure, etc.) into the digital space has led to an increase in interaction speed within society. Higher education institutions are incorporating this practice into the student learning experience to keep pace with the times. This enables them to prepare graduates who actively employ innovative methods in their professional work. In response to the challenges of the time, higher education institutions are introducing elements of innovation into the training process of future vocational education and technology teachers, thereby creating new principles and teaching methods. The focus of our interest is the exploration of these working principles, the analysis of practices, and the characterization of methods for digitizing project-technological and design activities. Describing the commonalities and differences in approaches to teaching this field defines the subject of our theoretical research. The article aims to provide a retrospective analysis of project-technological and design activities in the process of training future teachers of vocational education and modern technologies in Ukraine and worldwide. Research methodology involves the use of systemic-structural, comparative methods of analysis, information synthesis, and the inductive method of the research.

Keywords: teacher, technology, project activity, design activity, digitalization.

Resumo. A prática de digitalização de atividades de projetos tecnológicos e de design na formação de futuros professores de educação profissional e de tecnologia ganhou popularidade nos últimos anos. A transição ativa de todos os processos sociais (comunicação, atividades profissionais, lazer, etc.) para o espaço digital levou a um aumento na velocidade de interação dentro da sociedade. As instituições de ensino superior estão incorporando essa prática na experiência de aprendizagem dos alunos para acompanhar os tempos. Isso lhes permite preparar graduados que empregam ativamente métodos inovadores em seu trabalho profissional. Em resposta aos desafios da época, as instituições de ensino superior estão a introduzir elementos de inovação no processo de formação dos futuros professores do ensino profissional e das tecnologias, criando assim novos princípios e métodos de ensino. O foco do nosso interesse é a exploração destes princípios de funcionamento, a análise de práticas e a caracterização de métodos de digitalização de atividades de projeto tecnológico e de design. A descrição dos pontos em comum e das diferenças nas abordagens de ensino nesta área define o tema da nossa pesquisa teórica. O artigo tem como objetivo fornecer uma análise retrospectiva das atividades de projeto tecnológico e de design no processo de formação de futuros professores de educação

profissional e tecnologias modernas na Ucrânia e no mundo. A metodologia de pesquisa envolve a utilização de métodos sistêmico-estruturais, comparativos de análise, síntese de informações e método indutivo de pesquisa.

Palavras-chave: professor, tecnologia, atividade de projeto, atividade de design, digitalização.

INTRODUCTION

"Teachers Prepare Future Leaders and Build a Better Future" (Why TEACH, 2023). In contemporary society, there is a direct correlation between teachers' competence level and the education system's effectiveness. This relationship is observed worldwide. It is worth describing not only the national pedagogical heritage but also the experience of prominent educational systems worldwide to summarize the principles of the system of training future teachers of vocational education and technology within the spectrum of digitalization of project technology and design activities.

What does digitization entail? How does it relate to project and technological design activities? And why should future teachers of vocational education and technology master it? Digitization refers to the deliberate infusion of electronic and digital devices, tools, systems, and electronic communication connectivity into the physical world (our daily lives). This integration transforms the virtual into the physical, creating a cyber-physical space. Digitization aims to achieve digital transformation in existing and newly emerging economic sectors, as well as to modernize all areas of human activity, making them more efficient and contemporary (Khlebynska, 2021). We can generalize this and define digitization as the implementation of digital technologies in all aspects of life, ranging from human interaction within society to industrial production, everyday household items we use without much thought, to children's toys, clothing, and more.

As a result, project and technological design activities encompass all forms of modern human activity that begin as creative concepts and culminate in finished products, ensuring the realization of a personalized approach and becoming an essential and justified practice in the context of implementing an educational trajectory for personal development (Orshanskyi, 2010). The goal of education in this field can be defined as a combination of developing competencies necessary for solving everyday challenges and fostering personal growth. The means to achieve this become the tools of object-transforming activities. The concept of "project and technological competence" may signify the outcome of technological education, the result of the development of personal qualities (creative abilities, talents), and the acquisition of experience in project and technological activities. Such skills are developed in students during the study of vocational education and technology.

High-quality educational activities of teachers of vocational education and technology should be based on student-friendly approaches to the process of acquiring these competencies. Among them are the ability to develop and execute projects, technological literacy, communicative skills, and the development of soft social skills (creativity, teamwork, critical thinking, collaboration, etc.).

Researching the interrelation of all digitization components in the context of project and technological design activities of future vocational education and technology teachers is the subject of our research.

LITERATURE REVIEW

Many researchers have dedicated their work to the issue of using information technologies in the educational process (A. Yershov, N. Balyk, V. Andrushchenko, H. Ball, V. Bykov, I. Bulakh, Yu. Valkman, R. Hurevych, A. Hurzhii, M. Zhaldak, Yu. Zhuk, Yu. Mashbyts, O. Spivakovskyi, V. Monakhov, Yu. Ramskyi, M. Smulson, M. Uhrynovych, etc.). There have been conducted studies on the features of activities and communication in the "teacher-student" relationship system using information and communication technologies (T. Habai, A. Brushlynskyi, O. Matiushkin, Yu. Mashbyts, etc.). The issue of informatization in general education schools and higher education (V. Bykov, V. Mykhalevych, M. Zhaldak, B. Hershunskyi, S. Honcharenko, R. Hurevych, Yu. Zhuk, N. Morze, Y. Ryvkind, O. Spivakovskyi, P. Stefanenko, etc.) has also been addressed (Beridze, 2019). Additionally, research by V. Husev, V. Steshenko, V. Madzihon, M. Kortsia, S. Lisova, O. Kobernyk, V. Tytarenko, H. Tereshchuk, D. Tkhorzhevskyi, A. Tsyna, etc., is dedicated to various aspects of vocational teacher training in vocational education (technologies). The fundamentals of design education have been investigated by L. Malynovska, O. Kulikov, S. Kozhukhovska, V. Naumov, N. Konysheva, V. Puzanov, V. Rozin, V. Sydorenko, Ye. Klimov, Ye. Tkachenko, and others (Steshenko, 2021).

RESEARCH AIMS AND METHODS

As we can see, scientific and pedagogical literature has accumulated substantial theoretical and practical material related to project activities. However, research representing the specifics of professional training for future vocational education and technology teachers has yet to be conducted. It also requires deeper study and illumination.

This necessitates a detailed characterization of the foundations, principles, methods, and techniques of teaching future vocational education and technology teachers, as they serve as carriers of accessible methods for teaching students the basic algorithms of project-technological digitization.

This study employs general scientific methods, including analysis and synthesis of information, its formalization, and comparison. Observation methods, literature analysis, etc., are used in the historical context.

RESULTS

Our research begins with an analysis of the experience of professional training for teachers of vocational education and technology by our American colleagues. Several educational institutions are involved to ensure the high-quality preparation of future teachers in this field in the United States. In particular, the Council on Technology Teacher Education (CTTE) (Council on Technology Teacher Education, 2022) plays a significant role. Essentially, it is an international organization founded in 1950 with the support of the International Technology and Engineering Education Association (ITEEA). CTTE operates intending to enhance the educational level of technology teachers and focuses its efforts on:

- Providing necessary resources and enriching the informational component of pedagogical staff training.
- Promoting research in the field of technology.
- Awarding scholarships to prominent researchers.
- Encouraging innovation in the area of professional training for technology and design teachers.

In addition to CTTE, the International organization PATT is also actively involved. It works productively in studying students' attitudes toward technology (Pupil's Attitudes Toward Technology) (PATT, 2022). This structure unites researchers, educators, and students (all participants in the educational process) in technological education. Founded in the Netherlands in 1988, its goal is to support and stimulate research in technology and specialized education.

Another equally renowned organization, MATIO, collaborates with the National Council for Accreditation of Teacher Education (NCATE), which focuses on improving technology teacher education. With the support of these organizations, higher education institutions have excelled in creating fundamental programs for preparing future teachers of vocational education and technology and providing the highest level of professional training in this field. Such universities include California University of PA, Ball State University (Indiana), University of Wisconsin-Stout, Purdue University, the State University of New York at Oswego, Millersville University (Pennsylvania), and others. Let us take a closer look at the specifics of education for future educators studying in the Department of Technology at Ball State University (Indiana). During their first year at the university, students work on creating their own websites and develop portfolios that encompass their views on education and teaching principles, include information about the student's personality and preferences, and incorporate the author's photos (Teacher Education Digital Portfolio, 2022). Throughout the following years of their education, students supplement their portfolios with their own reflections - artefacts demonstrating their understanding of the fundamental principles of education. These artefacts can be projects completed by the student during their studies, videos, photo publications, or other forms of work. Thus, during the learning process, students compile a unique resume for potential employers, showcasing the skills and abilities of future technology specialists. As graduates have worked on building their portfolios throughout their entire course of study at the university, receiving guidance from mentors and support from the institution itself, their portfolios reflect the whole content of their education and the university's policies.

Therefore, the essence of the professional training of future technology teachers in the United States involves the application of the following principles: the study of specific technical and pedagogical disciplines, as well as the active use of interactive methods, all while incorporating modern information technologies, tolerance and multiculturalism.

Strictly speaking, the principle of using the latest technologies in education involves the informatization of education, providing access to high-quality databases, using the capabilities of the global Internet network in order to create projects of various complexity, using flexible technologies of educational activity and its elements for distance activities of students. Parallel to this basic principle in the educational process is the principle of tolerance. This principle involves perceiving the personality and freedoms of another person with respect and dignity. It can also be interpreted as sensitivity to others, to their views on things or social events. The principle of multiculturalism is tangential, very similar but no less important. The principle of multicultural training in American higher education is mandatory in all institutions of higher education. Ensuring compliance with this principle applies to all specialties without exception. However, professionals who plan professional activities with people in a multicultural environment, such as future teachers, study its basics much more deeply. As a matter of fact, it involves educating students to adequately perceive the ideas of values and culture of others. According to this principle, students should be open-minded and benevolent, with respect for the diversity of society. They are recommended to take into account the ethnic, racial and linguistic differences of others, religious, cultural, speech views of others. And also try to be tolerant towards them.

Continuing our analysis of the education systems of the most prosperous countries, where education plays a central role in societal development, we will describe the achievements of the education systems in the countries of Northern Europe. Among them, the Kingdom of Norway holds a prominent place. The high level of achievements in Norway's education system has been recorded in the international PISA program (2021). One of the key objectives of education in the kingdom is to preserve and develop the uniqueness and cultural heritage of Norwegian society. Therefore, the preparation of subject-specific teachers in art, crafts, and design in the Kingdom of Norway is recognized as a matter of national importance.

The Royal Ministry of Education and Research (Norway) divides educational institutions into two categories. The first category consists of higher educational institutions focusing on teaching theoretical disciplines, including arts, humanities, and natural sciences—Bachelor's programs, which last for three years. Master's programs, which require five years of study, and doctoral programs, which require eight years of study, are offered in this category. The second category comprises university colleges that offer a wide range of educational services to prepare bachelor-level education specialists. These institutions provide future educators with the necessary knowledge, particularly in the field of technology.

Now, let us take a closer look at the specifics of preparing future technology teachers at the bachelor's level at the Faculty of Arts and Crafts of Telemark University College (TUC) in the Kingdom of Norway. The main document that guides students throughout their academic journey is the Individual Study Plan. It includes a list of competencies that students acquire over three years. When first-year students sign this document, they receive a development roadmap that tracks the progress of their skills and abilities in the field of technology. It also encompasses the mastery of methods and techniques of professional work. Additionally, each student receives professional guidance from a teacher within the curriculum framework, encouraging future technology teachers to explore their potential and possibilities in their professional activities.

The program's features of methodological training for future technology teachers are organized based on a partner school. It allows students (even before their teaching practice) to utilize the opportunities of the partner school to gain or enhance knowledge and practical skills, experience the school atmosphere, and engage in everyday school life situations. This includes learning to communicate with students and student groups.

Self-assessment plays a significant role in evaluating students' skills and abilities. This form of work enables future technology teachers to form an understanding of the quality of their professional competencies. Overall, self-assessment by students after the first year primarily consists of a written evaluation of their own professional and artistic portfolio. As for self-assessment after the second year, it includes the results of academic work on the speciality's coursework in addition to a written evaluation of their professional portfolio. The final comprehensive assessment after the third year incorporates all previous data, including personal achievements during the teaching practice and completion of creative tasks.

Pedagogical practice is an important part of the educational program for future technology teachers. Pedagogical practice (with a total duration of 14 weeks) according to the curriculum for the training of technology teachers (bachelor's degree level) at Telemark University College begins in the first year of students' studies (fall semester) and includes 1 week of observation in a primary school, followed by 1 week

of adaptation practice (spring semester). The pedagogical practice in the second year of training for future technology teachers (fall semester) consists of 3 weeks of practice, including practical preparation for teaching technology lessons. The pedagogical practice in the second year of studies (spring semester) includes 3 weeks of pedagogical practice, including lesson preparation, assisting a practicing technology teacher, and independent work in technology classes. The plan for the pedagogical practice of future technology teachers in the third year of studies (spring semester) includes 3 weeks of practice, including more independent professional activities in general schools, gymnasiums, public schools, or other educational institutions, including professional practice abroad, in line with the conditions of pedagogical practice.

Therefore, Norway's success in training technology teachers can be attributed to the effectiveness of its educational system organization: the multi-level education, differentiation of learning, the creation of conditions necessary for the successful resolution of personal and professional development tasks for students, the implementation of active teaching methods and forms, and the orientation of educational institutions toward utilizing positive global experience in the training of pedagogical personnel (Zhernokloev, 2014).

Therefore, Norway's success in training technology teachers can be attributed to the effectiveness of its educational system organization: the multi-level education, differentiation of learning, the creation of conditions necessary for the successful resolution of personal and professional development tasks for students, the implementation of active teaching methods and forms, and the orientation of educational institutions toward utilizing positive global experience in the training of pedagogical personnel (Zhernokloev, 2014). Being a teacher in a Scandinavian-type country means being an expert. The teacher acts as a mediator, a way of transferring knowledge. Its main goal is the formation of a positively oriented learning environment. At the same time, the emphasis is not only on achieving the final goal, but also on getting satisfaction from the process of acquiring knowledge. Education here is based on the principles of pedagogical competence, flexibility, and personal development.

The curriculum is formed in such a way as to educate students in the following types of competences: pedagogical and didactic, the ability to self-educate, reflective, and the ability to partner. It is the totality of these competencies that makes it possible to train an effective specialist for the modern market. An important aspect of the curriculum is the use of an activity approach. This term means in-depth practical training of future teachers. It can be achieved thanks to the transformation of theoretical knowledge into practical, inclusion of the future specialist in professional activity long before he receives a diploma of education.

National practices in preparing specialists in the field of technology and vocational education in Ukraine

In Ukraine, the professional training of teachers in vocational education and technology is carried out in private and state higher education institutions and lasts from five to seven years. During this time, the student acquires basic skills and competencies and develops as a future teacher.

We can learn more about the specifics of mastering the qualification category at the National University of Chernihiv Collegium, named after T. H. Shevchenko, "Foundations of Technological Education with Teaching Methodology for the Technological Education Sector". Preparation in this field has its own peculiarities, which relate to the institution's work forms, teaching methods offered by the educational path, consideration of local traditions, and the creation of diverse projects. This includes integrated and social projects. Typical forms of educational and developmental activities for this Higher Education Institution (HEI) include classroom-based work and extracurricular work. Classroom-based work encompasses not only lecture sessions but also practical work. Extracurricular work involves independent learning activities.

The specifics of lecture sessions included in the subject matter of "Foundations of Technological Education with Teaching Methodology for the Technological Education Sector" include students acquiring theoretical information about the content of project-technological work and its practical application. This consists of the study of the history of the project approach in the educational process, the characteristics of different types of projects, and their value in social discourse. It also encompasses guidelines for preparing educational projects and the components of project-technological activity.

While acquiring education at this university, course participants familiarize themselves with artistic (creative) methods of project implementation and the logical principles of organizing project-technological and design activities for young students in "Design and Technology" classes. As for the purpose of studying design and technology in primary school, it primarily involves the following:

- Developing a child's individuality through subject-transforming activities.
- Creating and improving fundamental project-technological competencies needed for meeting life requirements in interaction with society.
- Cultural and national self-expression.

The following tasks are necessary to achieve this goal:

- Fostering students' interest in the subject.
- Providing systematic knowledge about the specifics of both material and non-material production.
- Cultivating in children a sense of beauty and the importance of their native people's traditions in work and decorative-applied arts.
- Gaining experience in creating functional and aesthetically attractive products independently and through collaboration.
- Developing in children skills for the rational use of materials and the safe use of traditional and modern technologies.
- Instilling a work ethic and a desire to improve the process and its outcomes in their life space.

The actual process of delivering lecture material and mastering knowledge directly related to project-technological activities is achieved through the use of the following methods:

- Traditional and innovative methods.
- Information and communication approaches.
- Argumentative and problem-solving strategies.

Practical sessions seamlessly integrate with the strategy of theoretical training. When organizing practical sessions, students develop skills and abilities for project-based activities, including the ability to design and execute projects. This process fosters and reinforces a culture of technological activity, verbal communication methods, and the crystallization of 'soft skills,' such as teamwork, collaboration, creativity, critical thinking, and more. Practical sessions are structured to allow recipients of educational services to undertake projects of a theoretical nature. These projects include those based on data collection and analysis, research projects, and projects that stimulate students' artistic and creative abilities. Students work on these projects either individually or in pairs or groups. The topics of the projects can vary, including: "Ukrainian Folk Toy," "The Role of Amulets in Everyday Life of Ukrainians," "Embroidered Rushnyk. The Ukrainian Tradition," "Ukrainian traditional clothes of different regions," "Textile Doll. From the Past to the Present," "Making Handmade Souvenirs," "Theatrifying a Fairy Tale for a Puppet Theater," "Making Essential Household Items from Scrap Materials," or "How to Create a Fabric Doll by Yourself", etc. (Ohiyenko, 2022). When organizing teacher training, it is important to consider the local component (Ohiyenko, 2022). Another striking example is the revival and popularization of arts and crafts in a particular local region of Ukraine - the Chernihiv region. According to this direction, students carry out specific projects of regional specificity:

- "Folk arts and crafts typical for the region".
- "Modern masters of folk crafts in Chernihiv region".
- "Creating a model of the interior of a peasant house in Chernihiv region", "A special tradition of modern interiors in the specifics of Polissia vytynanka".
- "Pysanka of my region," and many others.

This practice has shown effective results in teaching projects and technological activities. According to it, the teacher develops project topics while adhering to the principle of student-centered learning. These topics consider the student's interests and personal characteristics, the level of acquired knowledge and skills, the work time and deadlines, external factors, and the capabilities of the material and technical base, among other things. Stages of project development and implementation form the structure of project-based technological work. The first stage is organizational and preparatory, followed by the technological stage, and the final stage is concluding (Kobernyk, 2001). An essential condition for successful learning is involving students in all stages of project and technological activities. Special attention should be paid to project evaluation. During this stage, the teacher assesses not only the work done by the students but also their diligence in performing the tasks. Quality, originality, the degree of the product's completion, its aesthetic appearance, the level of creative approach, and the level of independence in execution are also

considered. To evaluate the work of educational service recipients, the teacher must take into account the correctness and rationality of the operations performed, adherence to the algorithm of actions, the arrangement of the components of the workplace, the economy of necessary materials usage, compliance with safety rules, knowledge, and practice of safety techniques. The teacher must also note the atmosphere and communication style within the group, the harmony and cohesion of the team during task execution, the specificity of relationships within the team, and methods of mutual assistance.

Based on the above, assessment and reflection are essential structural parts of project and technological activities. Reflection allows future specialists to analyze their own feelings acquired during the activity. Meanwhile, assessment helps to evaluate the quality of the work performed. The projects that students carry out in the process of acquiring knowledge, skills, and project and technological activity experience have a practical orientation. They contribute to the formation of internally directed motivation and provide students with practical experience. Each functional element prepares future teachers for conducting lessons with students in primary school and helps them prepare for internships or further professional activities. When preparing project topics for students, teachers try to choose topics that are most relevant to the projects students work on in the "Design and Technology" lessons. During practical classes, where students are involved in project and technological activities, the teaching staff applies various methods of educational and upbringing process, including:

- Verbal methods (such as storytelling, conversation, explanation).
- Partial-search method.
- Imagination method.
- Interactive methods.
- Problem-based learning.
- Discussion methods of teaching.
- Analogy method.
- Ideal and focal object method.
- Exercise method, cooperative learning, problem-solving, or creative tasks.
- Technologies for the development of creative and critical thinking, and many others.

Independent work of students begins with an analysis of the Typical Educational Program. During their education, learners identify lesson topics that are best suited for the project and technological work of younger students in the classroom. They select the themes for the projects that students should complete during the lesson and create their own mini-projects. The work concludes by analyzing the developed "Design and Technology" lessons.

To ensure the implementation of the objectives described above in the integrated course "Design and Technology," the activities of future specialists are organized along content lines. These lines demonstrate the logic of a student's personality development and form a complete cycle of a project and technological activities. These components include the "Design Environment," "Technology and Techniques Environment," "Information and Communication Environment," and "Socialization Environment." So, let us take a closer look at each content line.

The "Information and Communication Environment" is responsible for fostering associative, imaginative, and critical thinking, as well as mastering fundamental concepts of partnership interaction, which create a comprehensive understanding of the industrial sector of human activity. This content line also serves as the foundation for unleashing students' creative potential while assimilating educational material in subsequent content lines, structured according to the methods of integrated project and technological activities. The content line called "Design Environment" is directed toward developing analytical, spatial, and creative thinking, and it nurtures teamwork skills. This also includes creating conditions for mastering design elements related to working with ideas and involves the following:

- problem identification;
- idea generation;
- selection of socially and individually significant design project elements;
- creation of basic, unique visual images;
- choice of materials for product creation based on given specifications;
- exploration of materials and techniques for realizing personal ideas;
- formulation of a product manufacturing algorithm.

The "Technology and Techniques Environment" is the following content line. It includes improving the logic of activities and developing thinking algorithms, somatic abilities, coordination of actions with other participants in the process, ability to promptly adjust work according to safety conditions with specific tools and devices, and skills for step-by-step production of products using traditional and innovative technologies suitable for processing various materials.

As for the "Socialization Environment" content line, it is aimed at shaping and enhancing emotional intelligence, reviewing and personally assessing the process and results of individual or collaborative project and technological activities, acquiring skills in presenting the results of educational activities, discussing them within a group, and effectively using the products made. It involves experiencing positive aspects of benevolent behavior, business activities, camaraderie, and household work, as well as creating prerequisites for improving one's own environment. Through this program, students have the opportunity to address real-life challenges, demonstrate interdisciplinary and artistic project technological skills, connect acquired skills with other knowledge, and collaborate with specialists from different fields beyond the school.

The integrated course "Design and Technology" can combine tasks from both the technological and information technology fields. Seventy instructional hours throughout the year are required (equivalent to two instructional hours per week) to establish such complex interdisciplinary connections. Computer technologies and digital devices are applied at various stages of the learning process. They include the documentation phase and assessment, not only during production but also upon its completion. Relevant educational materials revolve around urgent educational topics. In the realm of personal choice, the teacher decides on allocating instructional hours for specific topics and selects objects for project and technological activities, considering the conditions of instruction and pedagogical expediency. Creating a practical and aesthetically pleasing product is mandatory for conducting classes. It can be produced individually, in pairs, or groups, and educational results can be evaluated and presented individually or jointly with a chosen partner/group. Attention is focused here on the expediency of organizing the workspace, internal regulations, workplace safety, and sanitary standards.

When the teacher has the opportunity to engage in professional activities in school, they practice and apply the skills and abilities acquired during their training. Practical lessons in higher educational institutions and independent work come to their aid. During these lessons, students analyzed the Typical Educational Program. These independent works give young teachers pre-prepared lesson plans for "Design and Technology."

DISCUSSION

The analysis of the scientific literature in the field of digitalization of project-technological and design activities during the preparation of future teachers of vocational education and technology allowed us to get a clear general picture of the commonalities and differences in the processes of training professional staff. Through our research, we can identify common and distinctive features in this process and, in the future, create an ideal set of best practices to summarize all the world and national experiences in this area. Thereby, the principles of training future vocational education and technology teachers should be formed, incorporating only the best practices. Testing such a comprehensive scheme can be the subject of our further research.

CONCLUSION

The issue of digitization in project-based, technological, and design activities in preparing future vocational education and technology teachers is relevant in every higher educational institution in Ukraine and worldwide. It unites national, American, and European schools as a top priority concern. The principles that lie in the paradigm of modern domestic higher education are: fundamentalism, variability, humanism of the learning process and humanism of the content of learning, alternative. Fundamentalism can be considered as a set of fundamental principles of transformation and improvement of society, which is based on the traditional foundations of social processes, the need to observe clearly defined prescriptions, established paradigms. Variability, as opposed to fundamentalism, introduces into the educational process the possibility of different ways of achieving the goal, the application of the entire spectrum of pedagogical systems for obtaining quality education. Humanism is determined as a belief in the value and freedom of the future teacher, his independence, humanity. This principle relies on the student as a bearer of reason, critical thinking, compassion for the surrounding society, a person who gives an account to himself that he

is a part of nature and depends on the "health" of the planet. Alternative education involves the possibility of choosing a form of education and an approach to education that will be most appropriate for a particular student. This is about the comfort of the future teacher and an individual approach with a focus on the interests of the student. However, as our research indicates, this is the only aspect that binds them together, as the approaches to addressing this issue differ.

In the United States, significant attention is given to preparing teachers for the job interview stage. The digitization of knowledge, skills, and abilities acquired during education involves showcasing them to potential employers. Essentially, American higher educational institutions support their students not only throughout their academic journey but also at the threshold of their independent professional careers. Such support is not available to students in domestic higher educational institutions, who often struggle with finding employers and crafting resumes independently, often not knowing what information to include.

In Ukraine, preparing future vocational education and technology teachers prioritizes digitizing every educational lesson according to the Typical Educational Program. Thanks to this practical approach to professional activity, young teachers will already possess a complete algorithm of actions for their classes. They can adjust the lesson plan and the student's skills based on the digitalized approximate results of the activity. If a vocational teacher begins a lesson to teach students to create a virtual greeting card for their grandparents and demonstrates the digitally visualized expected result to the students, analyzing their reaction, they can determine that the task is too simple, and students can perform it more effectively. The teacher will have already developed improvement strategies for the lesson that can be applied immediately. Thus, the teacher stimulates students to achieve higher-quality results, develops their skills, and creates an atmosphere of interest and satisfaction with the outcome since the students have surpassed the teacher's expectations.

In Europe, a more advanced method of preparing specialists for future vocational education and technology teachers has been developed. In addition to digitizing their own skills, knowledge, and abilities reflected in projects created during their education, higher educational institutions offer students the opportunity to gain additional practical skills in foreign schools. Each student receives state support for professional training in partner countries, where future vocational education and technology teachers can learn from experienced educators. This approach allows students to demonstrate their abilities and present themselves through digitized products (projects) and borrow exciting and effective interaction methods with students during lessons.

REFERENCES

Beridze, K. S., Horbachenko, S. V. (2019). Features of the selection and use of electronic educational resources within the in the educational process of General Secondary Education Institutions. Report scientific conference of the Institute of Information Technologies and Teaching Aids of the National Academy of Sciences of Ukraine: collection of materials of the scientific conference, 6-11, UDC 378: 044: 001.37.

Council on Technology Teacher Education. Available at: http://ctte.iweb.bsu.edu/

Khlebynska, O. I. (2021). Theoretical approaches to digitalization and digital transformation. II International scientific and practical conference "Business, innovation, management: problems and prospects," https://orcid.org/0000-0002-7977-0483, UDC 330.356.

Kobernyk, O. M. (2001). Project work at the lessons of vocational training. Abor training in educational institutions of Ukraine, 12-14.

Kostyuk, H. S. (1989). Educational process and psychological development of an individual, 608 p.

Kulinka, Yu.S. (2016). Interdisciplinary design-oriented tasks in computer graphics as an effective way to form the design competence of future technology teachers. Herald of Cherkasy University, 6166.

Kulinka, Yu.S. (2021). Interdisciplinary design-oriented tasks in computer graphics as an effective way to form the design competence of future technology teachers. Teacher training for labor training in the context of updating professional and educational standards, 51-77. Available at: https://doi.org/10.31812/123456789/4760

Maslow, A. H. (2009). Motywacja i osobowość. Warszawa, PWN.

National Council for Accreditation of Teacher Education. Available at: http://www.ncate.org

Ohiyenko, D. (2022). The Future Primary School Teachers' Training for the Organization of the Pupils' Project and Technological Work at the "Design and Technologies" Lessons. *NewInception*, 39-46. Available at: https://doi.org/10.5281/zenodo.5761863

Orshanskyi, L. V. (2010). The method of projects in the system of training a modern teacher of vocational education. Collection of scientific works of Uman State Pedagogical University named after Pavel Tychyna, 124-133.

PATT. Available at: http://pupilsattitudestowardstechnology.wordpress.com

Pavlyuk, L. (2018). Handicraft teachers training in Ukraine: history-pedagogical aspect. Scientific Bulletin of the Institute of Vocational and Technical Education, 147-152. https://orcid.org/10.32835/2223-5752.2018.17.147-152.

PISA. Available at: http://pisa.testportal.gov.ua/scho-vyvchaye-pisa/

Ronginska, T. (2008). Kreatywność wieku starszego ważnym czynnikiem zdrowego życia. Aktywność zawodowa pracowników starszych w aspekcie starzejącego się społeczeństwa: ogólnopolska konferencja naukowo-szkoleniowa. Warszawa: CIOPPIP, 63-65.

Sternberg, R. (1996). Successful Intelligence. London.

Steshenko, V. (2004). Theoretical and methodical principles of professional training of the future teacher of labor education in conditions of graduate education. Sloviansk, SDPU.

Steshenko, V. V (2021). Preparation of Vocational Education Teacher in the Context of Updating Professional and Educational Standards: A Collective Monograph, 243 p. ISBN 978-617-7780-43-3, UDC 378.147:37.011.3-051:62/64.

Steshenko, V. V. (2020). Preparation of Vocational Education Teacher in the Context of Updating Professional and Educational Standards: A Collective Monograph. Slovyansk, Vydavnytstvo B. I. Matorina, 2020-2021, 243 p. ISBN 978-617-7780-43-3

Sydorenko, V. K. (2009). What is hidden behind the desire to technologize the vocational education of students. Trudova pidhotovka v zakladakh osvity, 3-7.

Teacher Education Digital Portfolio. Available at: http://portfolio.iweb.bsu.edu/default.html

Why TEACH. Available at: http://teach.gov/why-teach

Zhernokloev, I. V. (2014). Training Of Future Teachers of Technology in The Kingdom of Norway (On The Example Of The Faculty Of Arts And Crafts At Telemark University College Of Notodden). Scientific and methodical journal "Labor training in native school".