

5.2. Professional development of vocational teachers in the context of society digitalization

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Modern civilizational transformations, driven by numerous historical, political, social, and economic challenges, are significantly changing social progress. Globalization processes and the digitalization of all spheres of human existence actualize the need to find optimal ways to improve the quality of various aspects of society, including vocational (vocational and technical) education (hereinafter – V(VT)E). The key tasks of this educational level are to form the intellectual and professional potential of the national economy by training future skilled workers to solve the problems of sustainable development of Ukraine, which are reflected in national strategies (Bazyl et al., 2019). Teachers of vocational education institutions who are motivated to develop themselves professionally in the digital age and have developed digital skills can successfully accomplish such tasks.

In this context, we note that the content of the «Concept for the Development of Digital Competencies» adopted by the Cabinet of Ministers of Ukraine in 2021 draws attention to the lack of, firstly, clear mechanisms for legal regulation of the development of digital competencies, including those of teachers in educational institutions, and, secondly, a system of indicators for monitoring the state of digital skills development of vocational education students and a clear system for certifying the level of digital competence of teachers, as well as the lack of a digital competence framework and common approaches to determining the level of formation of this quality of specialists in various professions (Cabinet of Ministers of Ukraine, 2021).

The key tasks of implementing the Concept for the Development of Digital Competencies include:

- defining and adopting unified requirements for the level of students' digital skills and teachers' digital competencies, including by formalizing them in occupational standards;

- ensuring coordination of actions at the level of executive authorities on the development of digital skills and digital competencies;

- creating indicators for monitoring the state of digital skills development of vocational education students and digital competencies of vocational teachers.

To successfully solve the existing problems of digitalization of the Ukrainian educational space, it is important to focus on ensuring the continuous (uninterrupted) development of digital competencies of specialists in various fields, and, above all, teachers of vocational (vocational and technical) education institutions, through formal, non-formal and informal education. In view of this, the development of training, retraining, and professional development programs for teachers of general and special educational disciplines should be brought in line with the digital competence framework recognized in the European space, taking into account the specifics of their professional activities. Currently, we already have isolated attempts to develop both unified requirements for the levels of teachers' mastery of digital competencies and modular courses, namely: «Information Technologies for Organizing the Educational Process in Vocational Education Institutions», «Modern Digital Educational Technologies», «Fundamentals of Data Visualization. Infographics», «Information Protection and Intellectual Property», etc., focused on the development of digital skills of teaching staff of educational institutions.

In the course of our study, we found that vocational teachers with a high level of digital competence are able not only to comprehend the essential characteristics of digitalization on their own, but also to achieve understanding of its key features by their students, which is related to the change of culture that is integrated into all areas of professional activity, as well as the transformation of interpersonal interaction between the subjects of educational and production processes. Among the advantages of the digital transformation of Ukrainian society, future skilled workers in various production sectors point to the following effects: minimization of time resources; decentralization of production; increased efficiency and productivity; quick real-time decision-making; increased environmental friendliness; production of sustainable products; reduction of material and human resources for the manufacture of products, improvement of their quality and quick response to changing market conditions; diversification of production in a growing number

of industries. However, along with its progressive features, digitalization can also lead to serious civilizational challenges for which neither education, society, nor business is yet adequately prepared. In this context, here is K. Markevych's prognostic opinion that the consequence of progressive automation and the use of robotics will be a disruption of the labor market with characteristic signs of unemployment and income inequality; security problems and privacy violations; deepening social exclusion; erasure of ethical boundaries (inability to control artificial intelligence in the future); decline in cultural development, etc. (Markevych, 2021).

Supporting the opinion of modern researchers in the field of digital and professional didactics, we assume that the teacher's lack of «trust» in digital technologies, the difficulty of their implementation, and the lack of skills in the effective use of electronic learning resources can lead to an increase in the digital «gap» between vocational teachers and future skilled workers. Therefore, it is natural to conduct research to prevent (minimize) the negative consequences of the vocational education digitalization.

One of such researches was the study of vocational teachers' readiness of general and special disciplines to develop and use e-learning resources in professional and pedagogical activities. In 2022-2023, researchers at the Institute of Vocational Education of the National Academy of Educational Sciences of Ukraine conducted a number of empirical studies. Their results revealed the attitude of vocational (vocational and technical) education teachers to the idea of education digitalization, the introduction of digital competence levels, in particular, the readiness of teachers to use digital technologies in educational practice. Based on the analysis and synthesis of the results obtained, it was found that the majority of teachers (over 72%) who teach general professional and special disciplines need additional training in the use of digital technologies in the educational process of vocational (vocational and technical) education institutions. The survey also found that 66% of teachers are dissatisfied with the «combination» of digital technologies with traditional approaches to rationing the time of the educational process in educational institutions. The main difficulties of introducing digital technologies

in the educational process of future specialists professional training in various specialties are mostly associated with the lack of universal methods of their use. In particular, in the course of the research, it was found that 63% of the surveyed teachers of vocational (vocational and technical) education institutions are inclined to this opinion.

According to teachers, the main problems that arise when using digital technologies in the system of vocational education include: firstly, the dehumanization of educational and social group relations between the subjects of the educational process (52%); secondly, the deepening crisis of the intellectual culture of vocational education students, in particular the ability to define the goals of cognitive activity, plan it, perform cognitive operations in different ways, and engage in self-education (44%); thirdly, a decrease in the ability of teachers of general and special educational disciplines to engage in creative professional and pedagogical activities (36%); fourthly, an increase in pragmatism, individualism and even egoism of vocational education students (27%).

However, despite this, the results of empirical research have shown that 86% of the surveyed vocational teachers still recognize the prospects of using digital technologies in teaching disciplines, and 54% emphasize the need and their own readiness to change traditional forms and methods of teaching in preparing future skilled workers for professional activities in the context of digitalization.

Thus, there is every reason to assert that the «digital divide», which reflects the inequality of subjects of educational processes in vocational (vocational and technical) education institutions in access to digital technologies, exists and is a serious challenge. The limited access of vocational teachers and vocational education students to digital resources undoubtedly hinders the professional development of teachers, causing them to «lag behind» the pace of society's digitalization, and sometimes the level of digital competence of vocational education students.

An effective way to overcome the «digital gap» is to intensify the digital competence development of educational subjects at all levels of professional

formation and growth. Such intensification can take place in two ways: firstly, *by improving the effectiveness of teachers' professional training* through formal (long- and short-term training courses, modular programs, participation in webinars, seminars, etc.) and informal (attending public events, master classes, participating in teaching competitions, Planet-IT, etc.), and non-formal (self-education) education based on the optimal use of its hidden reserves; the second is *a special organization of the educational process*, which allows achieving the highest results with minimal effort and time.

Both methods are undoubtedly historically proven and justified. However, they differ in their essential characteristics and methodological approaches. Given the subject matter, let us dwell in more detail on the first of these methods of intensifying the digital competence development of the educational process subjects. Among the «hidden reserves» we can single out the professional formation and professional development of the teacher's personality, which we consider to be integral components of the professional activity of teachers in vocational (vocational and technical) education institutions.

In the conditions of the society's digitalization, these processes are crucial for the quality and integrity of the cultural nature of the teacher's personality, which, on the one hand, ensures his/her spiritual growth, self-realization and self-affirmation as a person, aimed at creating his/her material well-being and moral satisfaction. On the other hand, it contributes to the acquisition of a high level of mastery of the special knowledge, skills and abilities that prove the teacher's ability to perform functional duties and master new types of professional activities. In the digital era, one of the newest kinds of teachers' activities in both general and special disciplines is the creative use of information technology in professional and pedagogical activities. It is worth noting that in most information technology (IT) curricula, developed on the basis of a simplified concept of understanding creativity, digital activity is interpreted only as a set of actions to operationally solve technological problems (i.e., performing technical operations). The peculiarities of human perception of IT and the relationship between communicators through

digital means are usually missing from educational programs, as well as productivity assessment, which is surprising in the current era marked by the development of artificial intelligence. If the trend of digitalization is to develop its potential as an important contribution to the well-being of society, the digital transformation of education must become a rigorous, interdisciplinary, and socially responsible activity of all actors in the educational process.

«Digitalization in education», says academician R. Hurevych, «is aimed at ensuring the continuity of learning, as well as its individualization through the use of advanced technologies for the assimilation of large amounts of data, virtualization, virtual and augmented reality, cloud computing, mobile technologies, etc. High-quality use of digital technologies in education, engaging future professionals in independent research, including finding, critically comprehending and selecting the necessary information, etc. contributes to the formation of 21st century competencies, including ICT competency. In view of this, the digitalized educational process in vocational (vocational and technical) education institutions should be based on a new branch of pedagogical science – digital didactics, which is a scientific discipline about the organization of learning in a digital educational environment. At the same time, the subject of digital didactics is human activity, not the effect of digital learning tools» (Hurevych, 2022). The success of a vocational teacher's activity directly depends on the level of his or her digital competence, and the attitude and motivation to develop digital culture depend on his or her individual and personal characteristics.

In this case, it should be noted that the formation of the personality of a vocational teacher, as well as of a vocational education student, involves not only the external influence of social environment and upbringing factors, but also self-activity, self-organization, and self-education. In our opinion, the personality of a teacher cannot be the result of only a direct layering of external influences. The teacher's personality harmoniously combines his or her own image of «I» – concepts (i.e., the phenomenon that a person creates from himself or herself, asserting

his or her own strategy of being and destiny), which is formed under the influence of internal and external factors.

For a long time, domestic and foreign philosophers and sociologists, psychologists and educators have focused on the problems of personal development, the formation of a socially justified and at the same time independent life trajectory (G. Ball, A. Camus, L. Karamushka, S. Covey, A. Maslow, E. Pomytkin, V. Rybalka, C. Rogers, J.-P. Sartre, etc.). Following the conceptual statements of scientists, contemporary researchers are unanimous in their opinion that each person, as a personality, can realize the functions assigned to him or her only if he or she independently finds their own meaning of civilizational existence and continuously improves themselves, changing their attitude to the world and to themselves.

Thus, there is an objective need to generalize the theoretical foundations of preparing a person to reproduce the realities of the world in oneself, to a kind of «dialogue» with oneself, one's own consciousness and worldview, in particular, the readiness of vocational teachers for integrative professional reflection: firstly, the focus on mastering digital technologies; secondly, the mechanisms and results of reflection on knowledge, skills and abilities in the field of IT; thirdly, the process and results of mastering the latest achievements of psychology and pedagogy, which take into account the current state of society's digitalization in general and vocational education in particular.

The theoretical provisions of the professional development of vocational teachers are based on generally accepted theories of personal development of an individual. The subject of our attention is the conceptual framework for the professional development of the personality of such a specialist in the context of society's digitalization. According to the results of our theoretical analysis and generalization, the nature of the theoretical foundations of this process is expressed through the disclosure of the features and circumstances of the personal developmental functions in the educational process, in particular, the clarification

of the target, content and procedural characteristics of this process in the system of vocational (vocational and technical) education.

The development of theoretical foundations for the professional development of vocational teacher in the context of digitalization involved the following tasks:

- to substantiate the reasons that actualize the problem of developing digital competence in the context of the vocational teacher's professional development;

- to determine the philosophical and methodological foundations of the professional development of teaching staff of vocational (vocational and technical) education institutions;

- to carry out psychological and pedagogical substantiation of the theory of vocational teachers' professional development in the digital age.

Based on the results of the first of these tasks, we summarize that the personal development of teachers plays a key role in the process of quality learning in a digital educational environment. The digitalization of society, including vocational education, is becoming increasingly sophisticated and complex, especially with the introduction of artificial intelligence (AI). Many mobile applications and new technologies make our lives much easier and have the potential to be effective and beneficial for education and business. All of this is important, but there are at least two dangers: dehumanization and loss of privacy, which are related to data security and «manageability». But it's important to remember that the problem is not the technology itself, but how people use it in their own lives (Scott, 2021).

Digitalization has significantly transformed modern education, changing traditional teaching methods and providing new opportunities for access to knowledge on a global scale. Thanks to the introduction of e-learning and digital classrooms, the educational process in vocational (vocational and technical) education institutions has become more flexible, interactive and accessible. It is worth noting that the transition from traditional methods to digital learning involves the use of interactive platforms, multimedia materials, and online courses, which expands opportunities for self-study and distance education. Digital tools, such as educational applications, virtual laboratories, and e-textbooks, have become an integral part of the

educational process. Thus, digitalization promotes equal access to education, regardless of geographic location or economic status. It has made significant changes to the structure of social relations and the cultural landscape, shaping new ways of communication and interaction; it has affected almost all aspects of our lives, from personal communication to global socio-cultural processes, and provided people with new tools for communication and interaction, from social networks to instant messengers. These tools facilitate the rapid exchange of information and opinions, and allow for long-distance communication. However, they also raise questions about the quality of interpersonal relationships in a digitized society.

In this context, the definition of the philosophical and methodological foundations of the professional development of vocational teachers reflects the process of dialectical transition from one stage of human development to another, as a moment of mutual transformation of opposite and at the same time interconnected moments of development (Great Explanatory Dictionary, p. 1384). This term refers to the emergence of the «new» through the destruction of the «old» based on the constant changeability of the structures and systems of the material world. «Formation», philosophers say, «is the transformation of the possible into the actual» (Philosophical Encyclopaedic Dictionary, p. 496). The digitalization of the educational environment, transforming information into accessible and relevant information for the modern fast-changing world, leads to the transformation of the worldview of a vocational teacher and reveals new horizons for his or her professional development and self-realization. This trend is a key element in preparing future specialists of the «new generation» for the challenges of the future. Thus, the specific epistemological meaning of the concept of «professional formation» reproduces the ability of an individual to fully reveal the formation mechanism of new personality qualities, including professional ones, in genetic connection with his previous personal states as a student, novice teacher, young specialist, specialist as a particular movement between the past and the future, the ideal and the real, being and non-being. In view of this, the professional

development of the vocational teacher in the context of the society's digitalization is positioned as:

1) the development of professional qualities that it did not have and that meet the essential requirements of the profession at the stage of society's digitalization;

2) psychological and pedagogical phenomenon that reflects the situation of objective and real development, in which professional qualities have already begun to exist, but mastery of information technologies and professional and pedagogical activities have not yet acquired a complete form;

3) movement towards resolving contradictions between existing reflective ideas, ways of thinking, knowledge, skills and abilities of professional and pedagogical activity and lack of experience in implementing knowledge of IT technologies in practice, between past experience of personal development (acquisition of knowledge, pedagogical techniques, skills and abilities in a particular field) and future development of pedagogical skills, professional culture; between two stages of self-consciousness: «I am a student» who masters the teaching occupation and professional education, and «I am a teacher».

From the standpoint of psychological and pedagogical substantiation of the professional development theory of vocational teachers in the digital age, we consider professional development as a certain stage of development of future teachers' consciousness (the previous stage is the stage characterizing the student's idea of self-realization in the conditions of an informatized educational space, and the next stage is the stage when the student realizes themselves as a teacher who effectively uses the acquired knowledge and skills in developing e-learning resources and implementing IT in the training of future skilled workers). Thus, a person becomes a specialist when they not only imagine, but already think of themselves as a highly qualified competitive specialist. After all, a future teacher can imagine themselves as a vocational teacher on the basis of a mental action that forms a mental image of their own «I», which, in reality, has never taken place. In contrast, to think of oneself as a competent specialist means to understand oneself (to distinguish oneself, to identify oneself) as a specialist with a high level of professional qualities,

including digital competence, who reproduces professional excellence in his or her work.

The theory of professional development of vocational teachers in the digital era reflects the unity of teachers` professional training and special training at the level of mastering technological laws, principles and methods of professional development of a personality. It should be noted that knowledge limited to one type of professional and pedagogical activity hinders the teacher`s professional development in general education or special disciplines. Awareness of various fields of professional activity, including IT technologies, indicates a high level of professionalism of a vocational teacher. It is crucial to focus his pedagogical thinking on the mechanisms of professional consciousness development, i.e. the sphere of personality that brings a teacher of general or special disciplines (translator of knowledge, skills and abilities) beyond the narrow scope of knowledge of his subject to the level of a specialist who educates and opens up opportunities for students of vocational (vocational and technical) education for their further individual and personal development and self-improvement.

In modern educational practice, two interrelated processes are quite specifically distinguished: mastering the occupation (learning) as the acquisition of knowledge, skills and abilities; professional formation, which involves the reflection of this knowledge, skills and abilities, as well as the reflection of life and professional experience at the level of self-knowledge and self-improvement, professional adaptation, identification, and pedagogical creativity. These processes are not necessarily separated by time limits, such as the stages of education. Under optimal conditions, the professional development of a future specialist`s personality can take place simultaneously with professional training. However, unlike vocational training, which is carried out according to standard programs and unified curricula, professional development is a highly individualized process that requires the creation of certain conditions, the use of appropriate methods, and personality-oriented pedagogical technologies.

The professional development of vocational teacher in the digital society is a process of such a level of subjectivity when imitation of models (stereotypes) becomes secondary. Its significant result, among other components, is the awareness of one's own professional handwriting, style, type and methods of professional and pedagogical behaviour and activities, in particular in the development of e-learning resources and the use of IT. A vocational teacher is finally formed when he/she makes a clear and unambiguous decision on his/her own. The professional development of future teachers in the digital era, unlike the traditional educational process of professional training, which is limited by a certain time frame, does not and cannot have a clearly defined and pre-planned beginning or end. It can start at any stage of professional training and even in the pre-professional period, and end when a person, after receiving special training, feels and shows himself as a specialist or when a person has lost the desire to improve his pedagogical excellence.

The concept of «professionalism» means the ability to competently perform paid functional duties acquired in the course of educational and practical activities; the level of a specialist's skill and professional development of a specialist's personality. The main thing in the development of professionalism is not the amount of information learned, but the ability to use it creatively, to find it, assimilate it and use it for practical activities. It is traditionally believed that, in addition to theoretical knowledge, the professionalism of a vocational teacher includes a set of practical skills. This includes the skills of implementing the provisions of psychology, didactics, educational theory and teaching methods of the relevant field of vocational education in practice, as well as skills of social behaviour in a team, communication with applicants, organizational skills, self-development skills, etc. There is a belief that all this comes to a teacher over the years, that professionalism grows with experience. In our opinion, a person can work in a position for decades and still not become a specialist. Combining theoretical knowledge with skills and abilities is the basis for gaining experience and building professionalism. A criterion for the development of professionalism is the ability to creatively use the acquired knowledge, skills, and abilities, to improve one's skills, in particular

in the development of e-learning resources and the implementation of IT (Encyclopaedia of Education, 2021).

The concept of «pedagogical professionalism» reflects the essential properties and interrelationships of all aspects, including the leading categories of didactics, in particular, its category of knowledge. The latter is a generic category in relation to the various types that are distinguished within it (everyday, theoretical, partially scientific, philosophical, educational). In the context of digitalization, everyday knowledge, as a rule, does not imply or require a distinction between a gnostic image and an object. It is reduced to the statement of pedagogical phenomena and the correlation between them. It is contradictory and inconsistent in the sense that it can coexist with statements that exclude each other. We associate the scientific knowledge acquired by vocational teachers focused on the study of the regularities of the professional training process of future skilled workers in the context of the educational environment digitalization with the theoretical form of reflection, characterized by structuredness and multiple mediation. Any knowledge, as a gnostic image, acquires the status of scientific knowledge if it is included in a complex mediated system of justifications. It is believed that IT knowledge is opposed to products of fantasy, dreams, opinions, and belief. Each of these consciousness components is characterized by a specific cognitive attitude. In the process of digitalization, knowledge can be not just any cognitive images, but only those correlated with a certain subject diversity. But this correlation alone is not enough. It is necessary that they be approved as knowledge, as images corresponding to an object, so that they have a certain cognitive value. Consciousness is constituted by different kinds of knowledge. On the one hand, these are gnostic images of objectively existing phenomena, processes, and states, and on the other hand, expectations, intentions, values, ideals, and norms, which, compared to knowledge of a «certain kind», seem to be not knowledge at all. This knowledge is the product of the subject's reflection on themselves, their attitude to the outside world and professional activities. In this regard, IT knowledge is associated with the vision of a certain communicative perspective (if I recognize myself as someone who knows

something when communicating with others, then I recognize that I am ready to convince the Internet interlocutor of this knowledge and to defend (protect) this knowledge). IT knowledge is something that can be subject to intersubjective verification. It can be verified and falsified.

In didactics, the term «knowledge» characterizes one of the most important goals of education. It defines and indicates the means of pedagogical influence, reveals the content and inner side of the pedagogical process; it means the material in which the pedagogical idea is embodied. In order for the knowledge possessed by one person to influence the consciousness of another person and become accessible to him or her, externalization is necessary. Within the framework of pedagogical analysis, it is important to determine in what forms this externalization can take place. The main ones are objectification, modelling, and manifestation of the text, which characterize the professional position and the level of professional and pedagogical thinking. In characterizing the learning process, the following expressions are often used: «transfer knowledge», «equip with knowledge», «communicate knowledge», «reproduce knowledge», etc. However, IT knowledge does not reflect the specifics of the product that is transferred and received: knowledge cannot be transferred like a thing. It can only be assimilated as a result of the subject's own cognitive activity to whom it is transferred. In this case, it is even less about adequate perception and understanding, about the process of realization and assimilation of this knowledge.

A striking example of the digitalization of vocational education is the use of SMART technologies, which we consider not just a supplement but a necessary component of effective learning. In view of this, training a vocational teacher to use SMART technologies is a priority area of their professional development (Nesterenko, 2023). SMART technologies are a set of tools and methods that combine the use of computer and information and communication technologies to improve the educational process (Haleem et al., 2022).

SMART technologies include:

- interactive whiteboards and projectors, which allows you to show multimedia presentations, videos, and other educational materials; teachers and students can interact with the image directly on the board or screen (Why You Should Use a Smart Interactive Whiteboard, 2021);

- tablets and laptops, are widely used to access online resources, curricula, and e-textbooks (Bando et al., 2017);

- interactive exercises and tasks are aimed at consolidating the material studied by students in a playful way (Sjöberg & Brooks, 2022);

- online platforms and resources provide access to a large number of educational materials and tools for organizing the educational process (Criado & Gil-Garcia, 2019).

It is important to note, however, that SMART technologies are not a substitute for a teacher. Their role is to complement traditional teaching methods and make it more effective. In order to successfully use SMART technologies in teaching, a teacher needs to: have knowledge and skills in working with computers and information and communication technologies; be able to develop and conduct interactive lessons using SMART technologies.

It has been proven that the use of SMART technologies in professional and pedagogical activities has a number of advantages. Firstly, it increases the motivation and interest of students: interactive classes and presentations using multimedia have made learning more interesting and attractive (Pryhodii, 2019); games and simulations allow students to better understand complex concepts and apply knowledge in practice (Freitas, 2006). Secondly, improving the efficiency of knowledge and skills acquisition: SMART technologies allow visualization of information, which makes it easier to perceive and memorize (Zaichuk et al., 2024); interactive exercises and tasks help students better consolidate the material they have learned (Vorotnykova & Zakhar, 2020). The third is the formation of competencies necessary for successful professional activity: SMART technologies allow students to develop skills such as critical thinking, communication, collaboration, problem solving, and information literacy

(Siu-cheung, 2014). The fourth is the individualization of learning: SMART technologies allow the educational process to be adapted to the needs and capabilities of each student (Mhlongo et al., 2023), which allows students with different levels of preparation to successfully learn and develop. The fifth is saving time and resources: SMART technologies allow automating some routine tasks, which frees up teacher's time for more creative work (Javaid et al., 2023); the use of online resources and platforms can reduce the cost of educational materials (Kryvorot & Pryhodii, 2020).

The choice of SMART technologies for use in the educational process should be correlated with a number of negative factors (Katuk et al., 2023):

- high cost (SMART boards, tablets, laptops, and other equipment can be very expensive, making certain aspects of learning inaccessible to educational institutions);
- technical problems (equipment may break down, Internet connection may be interrupted, which can interfere with the educational process, and not all educational institutions have access to high-speed Internet, which can make it difficult to use online resources);
- insufficient training of teachers (not all teachers have the necessary knowledge and skills to work with SMART technologies, which can reduce the effectiveness of their use);
- distracting students with digital devices (SMART technologies can distract from learning if used incorrectly; it is important to follow pedagogical principles when using SMART technologies);
- risk of plagiarism (students can easily find ready-made presentations and other materials on the Internet; it is important to teach them to collect information and create their own work);
- vision and health problems (prolonged exposure to the screen can negatively affect the eyesight and general health of students; it is important to take breaks when working with digital devices and follow safety and sanitary standards).

It is important to note that the benefits of using SMART technologies outweigh the disadvantages. If used thoughtfully, SMART technologies can make

the vocational training of future skilled workers more effective and interesting for all students.

We will analyse the use of SMART technologies in three main aspects of a teacher's professional activity, namely, the organization and conduct of the educational process, methodological and research work. When organizing the educational process, teachers most often use SMART technologies to conduct interactive classes to optimize the potential for various types of interaction:

- a student with technology;
- between students by means of technology;
- between the teacher and students by means of technology.

One of the main advantages of an interactive class is that lecture materials are replaced by content that is delivered through a variety of tools that promote interaction. A class using SMART tools can include text with sound and animated images, which requires group work, feedback, and discussion in the group. Then students receive assignments and continue to communicate while completing projects and homework. In addition to the assignments, they receive tools for collaboration and communication that stimulate creativity, innovation, and critical thinking. Group discussions can be held in separate video conferencing «rooms», and discussion resources can be used online without much cost or effort (Kucher et al., 2022).

SMART technologies enable individual vocational students and academic groups to demonstrate their work in the form of slide presentations, infographics, or videos. Depending on the assignment, the teacher can evaluate the presentations and highlight relevant aspects for group discussion. Vocational education students can review and comment on each other's work. These interactive, time-saving features exponentially increase learning and peer learning opportunities. At the same time, the use of SMART technologies is transforming the landscape of vocational education and training, providing teachers with a variety of tools to improve their methodological work.

Free access to the content of online resources, simulations, and modular courses makes it possible to supplement didactic material, expand the content of traditional

textbooks, and enrich lesson plans. Today, many industry associations and software companies offer professionally oriented digital learning materials that can be used when planning and developing class notes. The widespread use of SMART technologies contributes to the implementation of a differentiated approach to the training of future skilled workers within one classroom group. The combination of traditional classroom training with online learning modules allows vocational students to study at their own pace and, if necessary, repeatedly return to the study of topics or individual issues of training classes.

Using online platforms for creating and administering tests, assessing practical skills, and self-reflection exercises allows you to provide instant feedback and create personalized learning paths.

Modern technologies make it possible to organize a new type of online assessment. Students can accumulate their own work in electronic form (E-portfolio), demonstrating their progress and development of practical skills. This provides a more holistic and continuous assessment process, which is taken into account by the teacher when creating teaching materials. The use of augmented reality in methodological developments can overlay digital information on physical objects, helping in the design, training, and practical activities of students.

Thus, SMART technologies are revolutionizing research and development. This area is undergoing significant transformations driven by the development of digital technologies. These advances are streamlining processes, accelerating innovation, and facilitating global collaboration.

Modern data management tools allow educational researchers to efficiently collect, store, analyze, and interpret educational and experimental data, revealing hidden patterns and relationships. Cloud platforms provide secure and scalable solutions for storing large amounts of data, allowing researchers to access and collaborate on data from anywhere in the world.

Artificial intelligence and machine learning algorithms can automate tedious tasks such as data analysis, literature review, and experiment design, thus freeing up researchers for more creative pursuits. At the same time, online platforms such

as video conferencing and project management software allow researchers, regardless of geographical boundaries, to seamlessly collaborate, share data, and work on projects in real time. The emergence of open scientific platforms allows researchers to share data, protocols, and results more openly, accelerating scientific progress and facilitating the implementation of research results.

Therefore, the professional development of teachers in vocational (vocational and technical) education institutions in the context of the society's digitalization is crucial to provide them with the necessary skills and knowledge to effectively integrate innovative technologies into their practice.

So, providing teachers of vocational (vocational and technical) education institutions with the necessary skills and knowledge to effectively integrate innovative technologies into their own pedagogical practice is crucial for their professional development in the context of the society's digitalization. This includes training in the use of digital tools and resources, the inclusion of digital literacy in the curriculum, and constant familiarization with the latest trends and developments in educational technology. Important aspects of the professional development of vocational teachers in the digital age include: learning to use digital tools and resources (SMART technologies) in the educational process; mastering learning management systems and educational content; and using educational platforms and applications for online collaboration.

The use of artificial intelligence, virtual and augmented reality is a promising area for training vocational teachers in the context of the digital transformation of education.

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