INTRODUCTION OF INNOVATIVE TECHNOLOGIES IN VOCATIONAL EDUCATION UNDER THE CONDITIONS OF INFORMATIZATION OF SOCIETY: PROBLEMS AND PROSPECTS

INTRODUÇÃO DE TECNOLOGIAS INOVADORAS NA EDUCAÇÃO PROFISSIONAL NAS CONDIÇÕES DE INFORMATIZAÇÃO DA SOCIEDADE: PROBLEMAS E PERSPECTIVAS

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ABSTRACT

The use of modern innovative technologies in vocational education is an important challenge of today through the prism of technological development. The aim of the article is to analyze the introduction of innovative technologies in vocational education under the conditions of informatization of society, to determine the problems and prospects of this process. The article is written through the prism of using comparative analysis, predictive method, modeling method. The empirical study involved 170 teachers from 28 to 74 years old and the corresponding difference in professional experience from 1 to 35 years. The results demonstrated the effectiveness and prevalence of the use of information technology in professional education. Based on the materials worked out, it was proved that only 2.28% of teachers had never used information technology in their work. The most widespread in the use of appropriate computer technology and software, electronic platforms, and online courses. As a result of the analytical material, the general problems that may arise in their use in professional education are highlighted. First of all, we are talking about the insufficient level of training of teachers, trainers, etc. lack of necessary facilities, lack of means to assess the effectiveness, low salaries of teachers. The conclusions also summarize the importance of addressing continuing education as an innovative educational technology that allows you to take into account the dynamics of digital technology in the training of specialists.

Keywords: Vocational education. Information technology. Innovation. Prospects.

RESUMO

A utilização de modernas tecnologias inovadoras na educação profissional é um importante desafio da atualidade sob o prisma do desenvolvimento tecnológico. O objetivo do artigo é analisar a introdução de tecnologias inovadoras na educação profissional nas condições de informatização da sociedade, para determinar os problemas e as perspectivas desse processo. O artigo é escrito através do prisma do uso de análise comparativa, método preditivo, método de modelagem. O estudo empírico envolveu 170 professores de 28 a 74 anos e a correspondente diferença de experiência profissional de 1 a 35 anos. Os resultados demonstraram a efetividade e prevalência do uso da tecnologia da informação na educação profissional. Com base nos materiais elaborados, constatou-se que apenas 2,28% dos professores nunca utilizaram a informática em seu trabalho. O mais difundido no uso de tecnologia e software de informática apropriados, plataformas eletrônicas e cursos online. Como resultado do material analítico, destacam-se os problemas gerais que podem surgir em seu uso na educação profissional. Em primeiro lugar, estamos a falar do nível insuficiente de formação de professores, formadores, etc. falta de instalações necessárias, falta de meios para avaliar a eficácia, baixos salários dos professores. As conclusões também resumem a importância de abordar a educação continuada como uma tecnologia educacional inovadora que permite levar em consideração a dinâmica da tecnologia digital na formação de especialistas.

Palavras-chave: Educação profissional. Tecnologia da informação. Inovação. Perspectivas.

Introduction

The modern development of digital technologies indicates the need for further transformation of all spheres of activity, including vocational education. One of the important signs of the information society is the penetration of digitalization in all areas of activity, so the problem of using the achievements of this process in the sphere of education is extremely relevant. The COVID-19 pandemic has demonstrated that the use of innovative technologies and their integration into distance learning has become quite a probable phenomenon. At the same time, the further development of such direction will require further reflection, because the level of development of digital technologies is constantly growing, they are changing, transforming in turn the established forms of the educational process organization. It is important to study also from the point of view of globalization challenges, in particular, the need for security when working with modern information tools, the formation of new paradigms of training and self-training of teachers and co-educators, the transformation of teaching methods and their goals and means. In addition, an important task of modern pedagogical science is not just to identify the main problems, but also to characterize the main ways of solving them through the prism of prediction.

Consequently, the purpose of the article is to analyze the introduction of innovative technologies in vocational education under the conditions of informatization of society, to determine the problems and prospects of this process.

Literature Review

The problem of innovative transformation of vocational education has been studied by many modern scholars. In particular, TSEKHMISTER (2022) highlighted the key factors caused by COVID-19 and military events in Ukraine that affect the digital transformation of vocational education. The researchers believe that the main factors for the development of innovative vocational education are primarily

the improvement of the technical base, professional development of employees (development of information competence), and increasing the motivational level of teachers. Researchers LI and PILZ (2021) characterized the key aspects of the development of the process of organizing international cooperation and mobility in vocational education based on a thorough analysis of modern pedagogical literature. BILLETT (2020) identified the main prospects for improving the material base of vocational education based on an exhaustive analysis of the implementation of modern educational practices in the field of vocational education in European countries such as Finland, Norway, Denmark, and Australia. DEIßINGER (2015) characterized the peculiarities of teaching in Germany, explored the main strengths and weaknesses of the innovative dual model of teaching. At the same time, CHAGOVETS et al. (2020) studied the peculiarities of motivation development in future teachers and educators. GREGORY et al. (2020) characterized the importance of modern information technologies in education through the prism of analyzing the key features of the use of artificial intelligence and network data. TOEPPER (2022) investigated the importance of discussion technologies in the professional education of a personality-oriented model. At the same time, MALANIUK (2020) studied the problem of using innovative technologies in vocational education. The researcher believes that "educational technology" is represented in pedagogy by such hierarchical levels as: general didactic - technology plays the role of a holistic process; subject - technology is a methodology of a particular educational discipline; modular - solving a specific educational problem. At the same time, the researcher emphasizes that each innovative technology must meet the following criteria: systematic, effective, innovative, conceptual, manageable, and reproducible. KUCIRKOVA and LITTLETON (2015) describe the main aspects of the use of digital educational centers and distance courses in the modern system of continuing education. TAIT (2017) identified the main transformations in the education sector caused by the Covid-19 pandemic, with special attention paid to the integration of modern digital resources into education. The peculiarities of using modern information resources are highlighted in the study by NURHAKIM and SUNHAJI

(2022). A similar issue was studied by TAMBINI and MOORE (2018), who described the capabilities of such platforms and resources as Google, Facebook, and Apple. At the same time, TSEKHMISTER (2022) studied the problem of the formation of the education of the future, in which digital competence, the ability to understand modern educational information resources, plays a key role.

Nevertheless, given the constant transformation of education in general and in view of current global challenges (the Russian-Ukrainian war), the urgent task of modern pedagogical science is not only to identify the main educational problems, but also prospects, models, and ways to solve them.

Research Methodology

Design

Experimental verification of the features of implementation and use of innovative technologies in the system of professional education in the conditions of informatization was implemented through the prism of several stages of research - theoretical, experimental, and generalized. At the first stage, theoretical problems of implementing innovative methods and technologies in vocational education were identified and characterized. At the second stage (experimental) a research experiment was conducted in order to determine the main problems and prospects for further development of innovative technologies in professional education. First, the attitudes of modern teachers to the use of innovative technologies were determined, and later the main problems and readiness of teachers of professional education for further application of innovative methods and technologies in the conditions of total informatization and digitalization of society were experimentally determined. Statistica software was used to process the results. At the third stage, a generalization of the results was realized, the results were compared to other researchers, and further prospects and ways of using innovative technologies in vocational education were determined.

Participants

As part of solving the main tasks aimed at identifying the problems and prospects for the use of innovative technologies in vocational education, a pilot questionnaire survey of teachers at Ukrainian vocational schools was organized. A total of 170 teachers participated in the experiment. All of them were of different age from 28 to 74 years old and had different pedagogical experience (from 1 to 35 years) and, accordingly, different experience of using innovative teaching methods and technologies. Before undergoing an anonymous experiment, all participants in the study provided their consent for the right to participate and the possibility of using their responses in further analysis. Note that their participation was based on the principles of anonymity, free of charge, and the right to choose whether or not to participate in the experiment.

Instruments

In order to characterize the main problems and prospects for the use of innovative technologies in vocational education, a survey of teachers of professional institutions in Ukraine was organized based on modern Internet resources. In particular, it was based on Google-forms. The same survey was also uploaded to the Telegram chat-bot. The results were processed using Excel.

Data collection

The material was collected from 02.09.2022 to 20.12.2022, that is, almost the entire first semester 2022-2023 academic year. In order to determine the effectiveness of the use of information technology, the main prospects, the problems in the way of their implementation were applied formed, and compiled by the authors of the survey, which had closed questions. The survey included an assessment (10-point scale) on the following factors: the frequency of use of innovative methods, their effectiveness, identifying strengths and weaknesses, the impact on the organization of training, the overall role in the implementation of educational services.

Analysis of data

The article is formed through the prism of using a comparative analysis of the problems and opportunities for further implementation of innovative technologies in the system of professional education. At the same time, the problem of further development of innovative professional education is characterized with the help of the prognostic method of research, the main recommendations for effective use of information technologies are highlighted. With the help of modeling the main ways of future development of innovative ways of organizing the educational process in the field of professional education have been identified.

Ethical criteria

The experiment was carried out in accordance with the principles of academic ethics of doing research through the prism of respect for all participants. There was no discrimination based on gender or age. Involvement in the experiment took place based on voluntary consent (respondents gave consent to participate the day before), without extraneous processing of the collected materials.
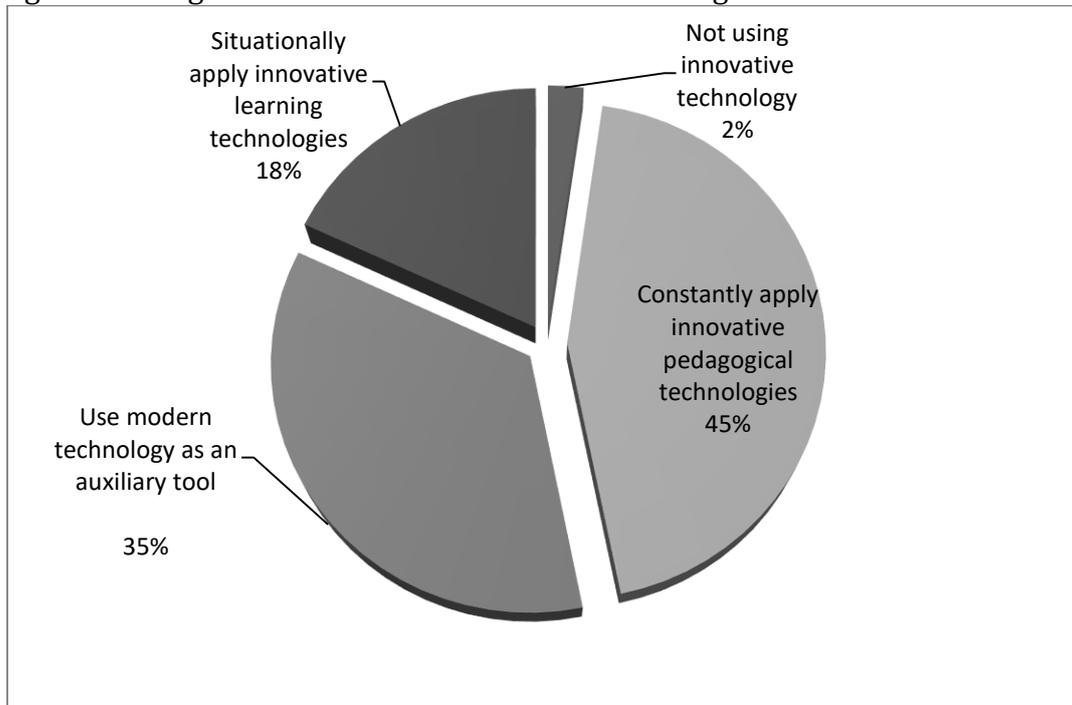
Results

The use of innovative technologies in vocational education is an important component of the modern educational process, especially considering the informatization of social relations. Information technologies provide not only an increase in training efficiency but also allow for the improvement of new approaches to professional training that meet the requirements of the current state of the labor market.

One of the most common innovative technologies in vocational education is the use of computer technology and software. Students can use computers to access various online resources, complete tasks and projects, and communicate with instructors and other students. In addition, specific programs can help students learn specific subjects, perform complex calculations, and other tasks. An offshoot

of this aspect is the use of electronic platforms and online courses (KUCIRKOVA and LITTLETON, 2015). This vector allows recipients to quickly access quality learning materials from anywhere they need them (SCHUMACHER and IFENTHALER, 2021). In addition, such platforms have interactive potential, containing special tests and tasks to check the degree of mastery of the material. An additional important aspect is the use of video information and audio materials, virtual and augmented reality. The latter may be necessary to help students learn complex material and solve practical problems in real-time. In view of this, for example, professional education applicants will be able to interact virtually with pieces of equipment, explore models of the organization of various processes, and work together with artificial intelligence systems and works. A separate important aspect is the integration of interactive games into the educational process (KAMILOVNA and BAURJANOVNA, 2021). Games provide recreation and entertainment but become an effective tool to increase the interest and motivation of applicants in learning materials, allow the development of creative thinking, logical skills, and creativity (ZHU, 2012). These technologies create immersive environments in which students can practice various skills and solve real-life problems. Through the survey, it was found that only 4 teachers (2.28%) do not use information technology in their activities - teachers with more than 36 years of teaching experience. At the same time, 44.45% constantly apply innovative pedagogical technologies, such as the use of video and audio materials, graphic images, computer games, artificial intelligence, and virtual reality technologies. 35.07% of teachers use these technologies as auxiliary tools through the prism of the traditional model of education: primarily for the purpose of visualization of objects of study during classes. At the same time, 18,02% of teachers noted that they use innovative technologies situationally and because of the modern requirements of updating the content of education (See Figure 1).

Figure 1 – Diagram of the use of innovative technologies in vocational education

Authors' development

According to the results of the survey, it was found that 97.8% of teachers consider it necessary to apply innovative technologies and teaching methods in pedagogical work, only 2.2% do not see any content in it. In the survey, teachers were also asked to assess the technical equipment of the workplace. Among the respondents 24% responded that they use a desktop computer during the organization of distance learning, at the same time 62% use laptops, 14% use a tablet or smartphone for classes. At the same time, most teachers noted that vocational schools do not have enough modern gadgets to conduct digital classes. 67% of teachers said that they have the Internet at the workplace during classes. This figure is explained by the fact that due to the blackout schedules in force in Ukraine, not all teachers were able to adapt to the changes.

Almost all teachers commented that they use multimedia technology, video materials, digital graphics, interactive whiteboards, etc. However, 87% of respondents indicated that improving digital competency was important to them. In particular, 68% indicated that, despite the long use of digital technology, still need

to improve their skills in the application of innovative technologies in professional activities. Consequently, we believe that modern teachers of professional educational institutions in Ukraine are aware of the need for digital competence, understand that the formation of an informatized population entails new requirements for the readiness to use innovation, requires mastery of a wide range of innovative techniques and methods of teaching, knowledge of new means of improving the quality of teaching, orientation in basic educational digital resources, etc.

Separately, we should consider the main reasons that make it difficult for teachers to use innovative technologies in professional activity. In particular, 28% of teachers noted insufficient personal preparedness for the use of information and digital technologies in professional activity. At the same time, 52% of teachers noted a lack of adequate digital equipment of vocational education institutions in Ukraine. Dissatisfaction with existing software resources was noted by 24% of the respondents.

Consequently, given the results, the introduction of innovative technologies in vocational education may face certain challenges and problems, because these processes will require transformations in the functioning of already existing pedagogical methods and processes. We can identify several common problems that may arise when integrating them into vocational education:

1. Insufficient training of teachers, trainers, etc. For effective implementation of new technologies in the sphere of professional education, it is important to emphasize the training of teachers and trainers who will work with applicants and will teach them the basics of the profession. If teachers do not know exactly how to effectively establish the use of these technologies in the educational process, it may be the reason for rather low efficiency in the use of innovative technologies and lack of global transformation in the educational process (RAJAB, 2018).

2. There is a lack of necessary facilities and equipment. To use innovative technologies, there is a need for constant access to the necessary tools, software, and

equipment. If there is limited or no access to these resources for vocational schools, the implementation of new technologies can be difficult or impossible.

3. Lack of means to assess effectiveness. In order to understand how effectively innovative technologies are used in vocational education, it is necessary to have tools to assess their impact on the learning process and performance. If these tools are not available, it is difficult to determine how effectively new technologies are used, which may halt further relevant innovations.

4. Non-competitive pay for teachers of professional educational institutions. This, in turn, negatively affects their motivation for the process of implementing innovative educational in the training system.

At the same time, other problems in the development of innovative vocational education are:

5. Low activity of vocational education institutions in the introduction and implementation of various programs, cooperation projects. In many European countries, the vocational education system actively cooperates with universities, research institutes, and stakeholders that promote the implementation of innovative teaching methods.

6. Modern vocational education curricula are not entirely effective in implementing lifelong learning. The concept of lifelong learning was formed not long ago at all. For this reason, a thorough understanding of this technology in vocational education has not yet occurred. This constitutes a weighty problem that researchers have only just begun to address (MCINROY, 2019).

7. Another significant problem is the state of undeveloped and imperfect instruments of public-private communication and cooperation in technical education. For this reason, it affects the emergence of insufficient interest of third-party private partner institutions in the system of innovative improvement of the technical infrastructure of vocational institutions.

Discussion

The study demonstrated that along with a certain degree of didactic competencies, an important aspect of pedagogical work in vocational education has become a sufficient rooster of teachers' pedagogical skills based on a perfect command of teaching skills and techniques of directing theoretical knowledge into a practical-professional field of activity. Many contemporary scholars agree with this statement (IVANYTSKY, 2019; SAPIŃSKI and CIUPKA, 2021). At the same time, according to SANETRA and MAŁODOBRY (2022), teachers during on-the-job education should not only attract the attention of applicants but also direct energy to self-development, work independently on the development of professionally significant qualities of system thinking, reflexivity abilities, technological culture, readiness for professional-personal development and self-improvement, self-organization and self-actualization, personal, social and special competence. In fact, such teachers will be able to teach competitive workers, specialists of their profile in the labor market (LI and PILZ, 2021). Researchers TSANKOV and DAMYANOV (2019) consider the competitiveness of workers as an important indicator of the quality of vocational training, the ability to fully disclose professional and personal standards in the daily conditions of their duties.

Today, the needs of advanced development of vocational education are noted (IVANYTSKY, 2019). Such a vector will prepare and teach qualified specialists for a competitive labor market (SAPIŃSKI and CIUPKA, 2021). Thus, ideally, new specialists should quickly adapt to the work environment, master their specialty and be oriented in related fields of activity, be ready for permanent professional self-improvement, social and professional mobility.

Fulfilling such a challenge draws attention first and foremost to raising the standards of teaching. Overcoming this challenge is multidimensional since the importance of education is determined by a set of indicators that determine various aspects of educational work. First of all, we are talking about improving the content of education and learning technologies, material and technical support, human

resources, etc. At the same time, under the conditions of wide implementation of digitalization, the issue of creating the necessary educational environment becomes relevant (LEÓN CARRASCOSA, 2017). Thus, the issue of forming appropriate conditions to determine the qualitative changes in the educational process becomes particularly relevant. In this regard, a certain problem arises. On the one hand, anticipatory development is necessary because a specialist who has completed training must have a sufficient level of professional competence to perform his or her duties (TSEKHMISTER, 2022). The challenge for educators is to actively apply this approach. However, digital technologies are developing very dynamically, so it is very difficult to build an appropriate training trajectory. A likely innovation that could solve this dilemma could be an active recourse to lifelong learning. Continuous learning based on integral competencies and the search for self-improvement can be reliable ways to solve the problem of too dynamic a technology development. Continuous self-education will, therefore, become an effective mechanism and prospect for the development of vocational education as a whole.

Individual researchers have drawn attention to this point. In particular, DEMIRAY (2017) considered continuing education as a worthy response to the challenge of the continuous evolution of digital education. The acquisition of appropriate digital competencies is an important element of such development. The experience of European countries indicates the effectiveness of such a system. The introduction of additional emphasis in this aspect defines the following nature of vocational education in the near future.

Conclusions

Thus, the introduction of innovative technologies into the system of professional education in the context of the informatization of society has both its own problems and prospects for further development. Innovative technologies allow creating immersive environments in which students can practice various skills and solve problems in real life. As the research has shown, modern teachers of

professional educational institutions in Ukraine understand the need for digital competencies. Modern paradigms of digitalization application in education in the general form new requirements for the ability to apply innovation, the need to master a wide range of innovative techniques and teaching methods, etc. According to the survey, the challenges to the implementation of innovative technologies in vocational education can be an insufficient level of training of teachers, trainers, etc., the lack of necessary facilities, lack of tools to assess the effectiveness of innovation, low salaries of teachers.

An important perspective on the development of vocational education is the use of opportunities for continuous learning. It is a matter of fact that modern digitalization processes and the introduction of the latest technologies are extremely dynamic phenomena, so it is difficult to use advanced training for objective reasons. So, addressing the possibilities of lifelong learning is an important element in determining the perspective of vocational education.

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