



Economic, Technological, and Social Conditions of Professional Education Development in the Digital Economy

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Abstract

This article is mainly about the study of economic and social factors, which are affecting the development of vocational education. It also determines the pedagogical conditions that provide training for digital workers and specialists. The algorithm is as follows: production of the starting positions, a pilot study, synthesis and implementation of research results. As methods of scientific research, methods of cognition were used that have a theoretical, methodological nature (deduction, analysis, and synthesis, abstraction, generalization, constructivization, axiomatic, genetic); methods operating on real objects (observation, study and other measurements). There is a need for continuous and deeper study of digital pedagogy. EdTech develops the business models, its manageability, changes in production, maintenance of workers, as well as fundamental changes in vocational education. The interconnection of production and pedagogical technologies is carried out based on not only production labor but also digital technologies.

Keywords

Digital economy • Vocational training • Economic • Technological • Social conditions • Digital technology • Production process

JEL Code

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1 Introduction

Digital innovations suggest automation of production and business processes. They go deeper into the management of sociocultural, technological, scientific, and production systems.

The expansion of databases, the development of technological infrastructure leads to the creation of an ever-wider range of digital services.

These changes lead to an increase in the role of experts, their intellectual culture and competence.

Purpose: systematization of factors affecting vocational education, as well as to determine the pedagogical conditions that provide training for workers and specialists for the digital economy.

Theoretical and applied questions on the problem studied in this article are disclosed in the work of Fedorov et al. (Fedorov et al., 2017b).

2 Method

The article uses a multidisciplinary approach, methods, and tools for a variety of scientific fields (economic, social, technical and technological, pedagogical knowledge).

Only comprehensive research can provide an effective study of the socio-economic and technical–technological factors and their impact on vocational training. The main phases are a presentation of the starting positions, a pilot study, the main study, the analysis and implementation of research results. In the first stage, examines the literary sources are determined by the problem, purpose, objectives, research methods.

At the second stage, a pilot study is carried out, in the process of which they receive primary information about vocational education and the factors contributing to its development.

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The research work consists in experimental research, processing of primary information, systematizing the data obtained, conducting additional research, describing the results.

At the third stage, the results of the study obtained by specialists and teachers of professional educational institutions are generalized and substantiated.

The fourth stage is to implement the research results into the practice and theory of vocational education (Lapshova, 2019; Markova et al., 2017, 2019; Vaganova & Lapshova, 2019).

As methods of scientific research, methods of cognition were used that have a theoretical, methodological nature (deduction, analysis, and synthesis, abstraction, generalization, constructivization, axiomatic, genetic); methods operating on real objects (observation, study and other measurements). General scientific research methods complement each other (Markova & Tsyplakova, 2017).

In addition, historical and logical research methods are highlighted. In the study of vocational education, the conducted logical-historical analysis of socio-economic and technical-technological development made it possible to determine:

- Elements in changing the content of vocational education at various stages;
- Components of curricula and programs;
- The ratio of theory and practice in vocational education.

A study of vocational education problems always goes through a systematic approach that will allow deeper and more effective to penetrate the essence of each component of vocational education and its development factors (Ilyashenko et al., 2019). In this theoretical study the authors develop the theoretical models of pedagogical systems.

3 Results

The scientific and technical process, technical and technological innovations implemented in production processes lead to a restructuring in the professional and economic structure of workers. There is a need to train workers and specialists who are able to engage in complex automated labor, work in high-tech production, and carry out business processes (Markova et al., 2019).

The field of intellectual work (complex high-tech equipment, CNC machines, digital technologies in telecommunications and activities related to software development, using information resources) requires the training of workers of a wide profile of professional competence (Markova et al., 2019; Myalkina, 2011).

These processes are carried out in conditions of development of the industry, changes in the investment policy, which requires an increase in the role of skilled labor.

Development of digital industry, public administration, the birth of new forms of human socialization, and their communications determine the introduction of new economic standards, economic and financial independence of professional educational institutions.

The system of economic methods of managing vocational educational institutions makes it possible to plan the activities in the long term, integrate with other social structures and industrial enterprises, and restructure the management systems of vocational educational institutions. In this regard, perhaps more effective use of training facilities, production workshop equipment, teaching laboratories and the use of the production base of the industrial enterprises (Fedorov et al., 2017a; Gruzdeva et al., 2018; Ilyashenko et al., 2018).

Scientific and technological progress determines the leading principles of labor organization based on the division of the production process into individual operations. In the digital economy, the intellectual functions of the worker are transferred to computer technology.

In scientific and technical industries, artificial intelligence technologies, big data analytics, cloud computing, robotics, the production of custom products, and various forms of digital Internet platforms are becoming top priorities. This leads to the creation of new forms of organization and professional education methods and means (Markova et al., 2018).

In a continuously developing socio-economic environment, a system of improving the skills of workers and professionals, as well as teachers of vocational training is required.

The digital economy provides social protection for workers and professionals, which links this problem to the development of educational programs that ensure full employment of the population, occupation training, and retraining of workers and professionals. We are talking about the development of additional vocational educational programs, the introduction of modular training, the organization of employment centers, in-house training.

Effective solution of these problems consists in creation of professional educational institutions, rating system of evaluation, the attraction of students to scientific, educational-professional, and innovative activities.

Increasing competitiveness is ensured by cooperation with other social institutions and industrial enterprises, creation of sectoral training centers, the introduction of e-learning and project management of the educational system.

Inclusion of the production process in the educational process enhances the educational effect of production labor

and the workforce. Thus, a target range of economic, technological, social factors creates conditions for increasing innovation activity. Digital economy, production organization techniques are reflected in the digitalization of educational processes in professional educational institutions (Semarkhanova et al., 2018).

Training of workers and specialists with an appropriate level of qualification and complexity of labor, with a certain degree of automation and informatization, who know the modern requirements of business processes (digital personnel) determine the fulfillment of the following conditions:

- Ensuring the compliance of the innovative activity of vocational training teachers and the professional activity of workers and specialists in the digital economy;
- Interaction of educational and professional production and technical, technological, scientific, and technical conditions (Smirnova et al., 2018).

Further growth of industrial phase of the economy, the introduction of cognitive forms, nanotechnology into production start changes in vocational education. Respectively, will create a new management structure, processing large amounts of information, organization of innovative forms of social partnership of vocational schools with enterprises, government agencies and other social institutions.

Then, the main factors are the following:

- Implementation of the idea of digital pedagogy, which is ensured by the informatization of the educational process, the development of experimental laboratory courses, and the use of various electronic platforms;
- An increase in demand for distance education;
- An increase in alternative and free forms of professional development and retraining of personnel;
- The creation of various vocational and educational networks, where the need for teaching staff is revealed, for a high level of professional skill (Markova & Tsypalakova, 2017; Markova et al., 2017).

These socio-economic factors are associated with the use of digital pedagogy and digital economy platforms.

We are talking about the joint use of resources, staff, implementation of the idea of “visiting professor”, “master class of a leading production specialist”, the implementation of e-learning, recruiting applicants, and the introduction of electronic management schemes.

Thanks to the informatization of educational processes, various ways of providing services, such as the organization of certification tests, the emergence of new educational tests and products are becoming more and more accessible. Such

an organization of professional education not only reduces the cost of educational services, but also to enhance the role of individualized learning (Watts 2020).

Vocational education is based on cooperation, exchange of resources, mutual cooperation, assumes different relationships, the provision of complementary services to enterprises and organizations (Vaganova & Lapshova, 2019).

The main objectives of vocational education are in the adaptation of digitization as a new economic technology. In these conditions and economic laws (laws of production development, the law of value, wages, etc.), professional education is based on the following prerequisites for the digital economy:

- A regulatory framework that creates communication based on digital technology for innovation, improving a comfortable educational environment;
- Competencies that allow teachers to use modern information platforms.

The main objectives of vocational education are:

- Development of new models of educational systems;
- Provision of related information educational technologies, innovative production technologies, and their use in vocational and educational processes;
- Reduction of funds for material and technical resources.

Mutually beneficial relations are expressed in various forms: from vocational training, advanced training to retraining of workers and specialists through the organization of sectoral specialization of vocational educational institutions.

Industry 4.0 requires the need for an increased level of qualifications of the personnel potential of vocational education, which ensures the mastery of digital technologies, additional professional competencies (Watts, 2020).

The digital economy viewed as:

- Development and implementation of project management;
- Development of innovative models of pedagogical systems;
- Creation of new organizational substructures based on the territory of educational institutions and base enterprises;
- Expansion of off-budget activities of professional educational institutions;

Successful organization of relations between economic systems and vocational education allowed to increase the

number of applicants wishing to study at Minin University (Fig. 1).

The introduction of digital technologies has increased the number of e-learning courses designed to ensure self-organization and cognitive activity, learning experience with digital technology in the direction of preparation 44.03.04 vocational training (by industry) (Fig. 2).

In addition, the number of electronic services used for organizing distance learning has increased with the joint activities of teachers and students in a synchronous mode, such as Zoom, Mirapolis, Webinar.ru, Google.Meet, WebEx, Yandex.Telemost (Fig. 3).

University graduates will carry out their professional activities under the conditions of postgraduate support through various electronic services.

4 Conclusion

There is a need for continuous and deeper study of digital pedagogy. EdTech develops the business models, its manageability, changes in production, maintenance of workers, as well as fundamental changes in vocational education. The interconnection of production and pedagogical technologies

Fig. 1 Number of applicants to Minin University. *Source* authors

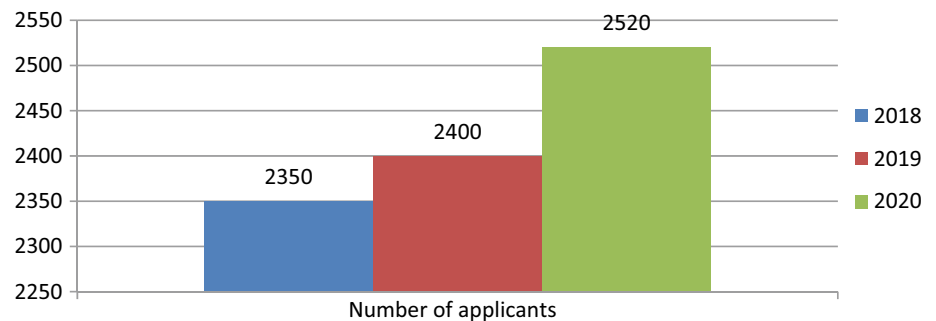


Fig. 2 E-courses 03.04.04 vocational training (by industry). *Source* Authors

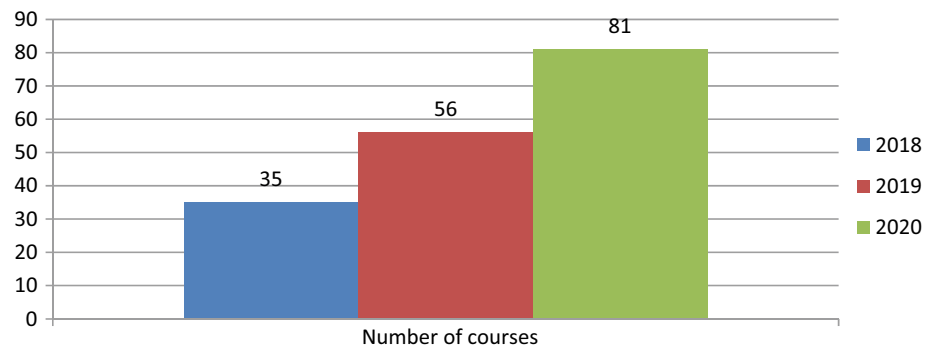
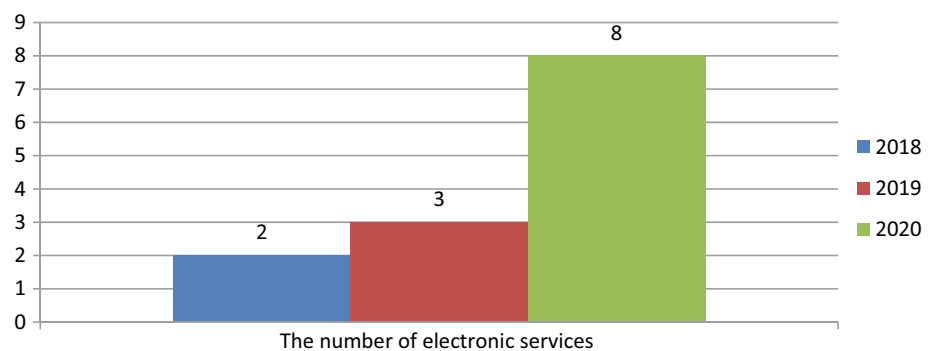


Fig. 3 Distance learning. *Source* Authors



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