

The system of continuous education as a decisive factor of personnel training for the digital economy

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Abstract—In article features of modern system of continuous education for the decision of a problem of effective reproduction of shots for digital economy and maintenance of steady innovative development of the Russian Federation are considered. It is shown that such a system should have an integrated character, which covers all levels and types of education (from preschool to postgraduate, from basic to additional, including formal, non-formal and informal education).

The use of personality-based and competence-based approaches, innovative pedagogical and information technologies makes it possible to ensure the universality and uniqueness of specialist training. A conscious choice of the sphere of knowledge and level of education makes it possible to form individual educational trajectories. General and professional development of students through the network of educational resources, programs, models and mechanisms increases the adaptability of a person in a dynamically changing economy.

Keywords—digital economy, continuing education, professional orientation, human resources potential, online educational technologies.

I. INTRODUCTION: THE NEED FOR CONTINUING EDUCATION FOR THE DIGITAL ECONOMY

Education determines the socio-economic development of the state and society and has a significant impact on all spheres of human life. Acceleration of production development, rapid transition to digitalization of all spheres of life and information society has revealed an acute problem of moral aging of knowledge received by graduates of educational institutions of professional education. Rapid change of forms and methods of fundamental and applied research, constant reduction of terms of introduction of modern scientific discoveries and technical inventions into production require specialists able to build up the potential of knowledge adequately to the changing world. Continuity of education in the era of digital economy is actually becoming a strategic factor in the development of the country.

Improvement of professional competences of a specialist of the XXI century in any field of activity and development of social communication skills are connected with the necessity of constant obtaining and updating of knowledge. Today, the qualification of an employee implies not only a static set of competencies and the ability to perform a uniform job on a daily basis, but also the desire and ability of a specialist to quickly change his

or her functions and move on to the performance of modified or more complex duties [1].

The problem of providing the digital economy with qualified personnel can be solved by creating a mobile system of continuous professional education. Continuing education provides a purposeful process of forming the educational potential of a person obtained in educational institutions and as a result of self-education. Such adult education allows for the improvement of professional competencies of existing specialists and the acquisition of new ones, which contributes to the emergence of new professional opportunities and labor mobility. The acquisition of new knowledge and mastery of modern technologies makes it possible for a practitioner to move to new types and areas of activity, including those that shape and determine the development of the information society and digital economy. The focus of the continuing education system on personal development increases the adaptive capacity of individuals in a dynamically changing economy.

II. ANALYSIS OF EXPERIENCE IN THE APPLICATION OF CONTINUING EDUCATION

The paper [2] describes the contribution of Russian scientists A.P. Vladislavlev, V.A. Gorokhov, A.V. Darinsky, A.L. Zagorsky, L.A. Kohonova, E.I. Ogareva, V.G. Onushkin to the development of the theory of continuous education. Professor A.V. Darinsky introduced the concept of "Continuous education", which he proposed to consider as a system of education, a unified and coordinated in terms of organization and content that allows everyone to develop and improve themselves throughout life in accordance with their aspirations, capabilities and abilities [2]. Many scientists noted the holistic and progressive nature of the development of all aspects of the individual in the context of lifelong learning.

According to the data [2], the Concept of continuing education development was developed in the USSR in 1988 and set the task of rethinking the target functions of the education system and its sectors, traditional ideas about the social essence of education and its relations with other forms of social practice, as well as the place and role of education as a social institution in the life of man and society. This concept, the implementation of which never took place, according to the declared values and breadth of content corresponded to the concept of lifelong learning developed since 1976 and adopted by the

international community, in particular, by the European Union [3].

Continuing professional education and training in the European Union countries covers professional development of specialists, which is carried out mainly at enterprises; the system of "apprenticeship"; professional training of unemployed citizens; adult education; retraining and retraining of specialists. Thus, the priority functions of continuing education are inextricably linked to the labour market.

According to G.D. Sorokoumova's research [4], the most frequently used concepts in the world practice are: continuing education, lifelong education, permanent education, recurrent education, adult education, further education, post-graduate education, remedial education, etc. According to UNESCO, there were a total of about twenty.

The concept of continuing education first appeared in 1968 in UNESCO materials. The Law of the Russian Federation "On Education" of 1992 for the first time established by law a norm on continuous professional development of a worker, employee, specialist in connection with the continuous improvement of educational standards, and the Federal Law № 125-FZ of 22.08.1996 proclaimed the principle of continuity and continuity of the educational process. The Federal Law "On Education in the Russian Federation" (No. 273-FZ of 29.12.2012) enshrines the right to lifelong learning in accordance with the needs of the individual.

The national education system provides an opportunity for continuous education of citizens within the framework of the professional education system. The stages of the existing system allow, if desired, to go from the primary level (primary vocational education) to the postgraduate level. Continuity and progression of upward movement in educational levels is achieved by continuity of educational programs and mandatory confirmation of the appropriate level of qualification of a specialist.

This traditional system of education ensures "lifelong learning". At present, education from the standpoint of personality is regarded as lifelong education - education "through life" [2].

The main part of lifelong learning is continuous professional education. According to the Monitoring of the economics of education, more than 50% of the adult population of the Russian Federation believes that the main purpose of participation in continuing education is the need to improve knowledge and skills in their professional activities, 34.1% see the purpose of education in the possibility of self-development, satisfaction of personal interests, 13.6% noted the need for regular professional development in their work/professional activities [5].

The existing traditions of basic vocational education are conservative and inertial, which does not correspond to the dynamically changing world. As a rule, basic professional education of a specialist is the only basis for the development and improvement of professional knowledge and competences. Professional development is determined by the level and quality of basic education and

the desire for professional development. The lack of systematic professional development and motivation for change limits the opportunities for professional development of specialists, which affects the overall level of the enterprise, industry and economy as a whole.

The issues of lifelong learning are relevant in almost all countries of the world [6]. Thus, for example, Zhang Zhi and Zhang Nan conducted a study of the system of continuous education of physical education teachers [7]. Wang Yijun considers adult education based on distance learning as an element of lifelong learning [8]. According to Global Industry Analysts, the global revenue from the global e-learning market amounted to 52.6 billion dollars in 2010, and the expected revenue is 241 billion by 2022. A number of researchers have analyzed the peculiarities of e-learning practices and online training of leading exporters of higher education [9-10]. The development of educational technologies in the Internet era has brought new opportunities and challenges to the development of lifelong learning, which were explored by Ruobin Liu, Ting Sun and Geping Liu [11]. The authors Yiwen Shen and Zhijian Lu analyzed the situation of IT education in China. Two CompTIA's Tech Career Compass of America and Advanced IT Training System of German were analyzed and recommendations were made to the Chinese IT continuing education industry [12].

III. INTEGRATION OF FORMAL, NON-FORMAL AND INTER-FORMAL LEARNING

Of the three types of educational activities generally recognized in the traditional system of education (formal, non-formal and informal education), the most conservative is formal education, culminating in the issuance of a universally recognized diploma or certificate. The fundamental task of this type of education is to give basic competences and "teach to learn". The formal education system in the country is the basis of the continuous education system of the XXI century.

Self-education in the form of individual cognitive activity, i.e. informal education, is aimed at meeting the needs of personal development and is not always associated with the development of professional competencies.

The needs of today's and tomorrow's economy most appropriate non-formal education, often without the issuance of a document on the level of education. Short-term professional development courses, trainings, additional professional programs and retraining programs are aimed at eliminating the mismatch between the requirements of employers and the qualifications of graduates of educational institutions and practitioners.

System integration of different types of educational programs of formal and non-formal education for different age groups with different knowledge, skills and abilities allows to create a mobile multilevel educational structure. A conscious choice of the sphere of knowledge and level of education makes it possible to form individual educational trajectories of students. Informing and motivating students allows to manage the process of retraining of specialists in accordance with the constantly changing labor market conditions and contribute to the

redistribution of labor resources and their transition from traditional sectors of the economy to developing ones.

Expansion of opportunities of information space and growth of IT-literacy determines the possibilities of creation of local educational systems of continuous education on the basis of leading regional universities to meet the needs of the region's enterprises with the personnel meeting the modern requirements of the digital economy [13-14]. The educational structure of professional education, located in the region and working closely with employers, is able to respond to changes in the needs of the regional labor market and modify its educational and career guidance resources [15-16].

In 2019, the Kurgan Region, as a pilot region, participated in the implementation of the joint project of the Russia - Country of Possibilities platform and the All-Russian People's Front Professionals 2.0. The goal of the project is to provide an opportunity for young people interested in professional growth to demonstrate their knowledge and business skills by performing practice-oriented student work on a real enterprise task (case study).

Internships are a new mechanism of interaction between a student, an educational organization and a future employer. Within the framework of the contest, the coursework and final qualifying works performed by students of educational institutions of secondary professional and higher education are evaluated by the cases of the contest partners in order to identify real business qualities and competences, to support the professional development of active youth. The case study is a practice-oriented task aimed at finding an effective solution to a specific technological, economic, social problem and testing knowledge, analytical skills and business qualities of students. The main criteria for evaluating the work are innovation and practicality of the proposals, the expected effect, the investment attractiveness of the proposal, and the prospect of implementing the results. The most active and trained students will be able to undergo industrial practice or internship, and enterprises will be able to choose the most promising and interested in the work of young specialists for further employment.

In the Kurgan region, the Kurgan State University is the leading higher educational institution providing training for the industrial complex. For many years, the traditional system presented above met the requirements of the labor market and the needs of students. As drawbacks of the existing system of personnel training, we can note the lack of flexibility in the choice of educational trajectory and significant periods of training due to the framework of educational standards.

Insufficient inflow of professionally oriented entrants, who have an idea of the chosen profession and field of activity, have a high pass rate and are able to study at the university, also had a negative impact on the system of professional education of engineers and specialists [17-19]. It became obvious that it was necessary to abandon traditional approaches to the implementation of continuous professional education and transformation of

the training system into a multilevel and multifunctional [20-21].

At the first stage, the elements of the new structure were created and tested. In 2012, a special program "Modern computer automation and control systems" was developed for training and career guidance sessions. Within the framework of acquaintance with the profession there were held practical classes on electronics and microprocessor technology, as well as the basics of programming: "Computer automation on the basis of programmable controllers", "Microcontroller - it's very simple", "Modern automation software", "Technology of programming controllers and microcontrollers". Since 2017, several additional general development programmes have been prepared for schoolchildren, which are annually mastered by schoolchildren.

Since 2015, the Department of Production Process Automation of Kurgan State University, which trains specialists in the field of automation and technical systems management, has held annual open university competition for schoolchildren and students in robotics. Since then, the departments of "Information and Automated Systems Security" and "Automated Systems Software" of KSU have been actively involving future programmers and information security specialists in online Olympiads, contests, various educational projects aimed at forming professional competencies [22-23]. In order to form interest in the field of professional activity and development of professional competences of students since 2017 in the framework of the movement "Young professionals of Russia" (World Skills Russia) in the Kurgan region on the basis of the Kurgan State University held a competition in the competence of "Mechatronics".

An effective mechanism for the training and further professional education of teaching staff in general and vocational education institutions is the implementation of additional education programmes on topics related to robotics, mechatronics and automation, network technologies, information security and the use of information and communication technologies in educational activities. The last of the above programs provides for the use of online learning only [24]. Over the last two academic years, more than 400 teachers have completed professional development programmes. New professional development and retraining programmes for IT professionals using online resources are being prepared for implementation. In the current academic year, additional educational programs for advanced training of employees in the field of information security were implemented for the first time in coordination with employers.

The beginning of the continuous education process is preschool education. Therefore, the starting point in the system should be to work with preschoolers to form their interest in engineering. For this purpose, during the last two years the professional orientation event "Non-boring science" and interactive exhibition "Entertaining robotics" were held with preschool children.

Effective training in the most popular and promising professions requires revision of both the content of education and the set of educational technologies used by

the system of continuous adult education [25]. The response to the growing need to update knowledge, skills (competences) and qualifications and their increasing volume is the active introduction of modern educational technologies, including distance learning technologies, open education and e-learning platforms. Thus, within the framework of the development of the system of continuing adult education, a special place should be given to the formation of information support for the formation of educational trajectories.

Systematization of the accumulated experience and the need to accelerate the transition to new educational models pushed the authors of the article to create and implement the project of online education "Trajectory of success of a professional of the XXI century". The aim of the project is to improve professional and additional education in the field of information security, development and operation of hardware and software of automated systems through the use of modern educational (including online) technologies.

Project objectives:

- creation of an innovative system of multilevel education using educational online technologies in the field of programming, information security, robotics and automation for schoolchildren, students of secondary and higher education institutions, specialists of enterprises and all those wishing to obtain additional education;
- assistance to retraining programs for specialists in accordance with the state program "Digital Economy of the Russian Federation", approved by the Order of the Government of the Russian Federation on 28.07.2017 №1632-r.;
- enhancing the prestige of engineering education, providing vocational guidance to schoolchildren and attracting trained and interested young people to higher education;
- motivation of college and technical college students to continue their education and formation of a real understanding of the digital economy professions.
- One of the basic directions of the development of the digital economy is "Personnel and Education". The main objectives of this area are:
 - creation of key conditions for the training of digital economy personnel;
 - improvement of the education system, which should provide a competent workforce for the digital economy.

The presented project is aimed at increasing the efficiency of training specialists in the field of IT-technologies to meet the needs of the digital economy in highly qualified personnel and includes several levels of education [26]. The directions of implementation of the project implemented on the basis of the online resource correspond to the key milestones of the "Roadmap" of the Program.

The use of online learning can significantly expand the audience of students and leads to the expansion of the list of educational with the use of distance learning technologies in other areas. The positive results of the project, reflected, in particular, in the growth of the passing score of applicants, contribute to the further development of the innovative model of continuous education in the field of IT-technologies from school to graduate.

IV. CONCLUSION: THE APPLICATION AND EXTENSION OF EXPERIENCE THROUGH RE-TRAINING OF TEACHERS

Changes in the social and economic sphere of society, the requirements imposed by the employer on specialists, dictate the need to create a dynamic system of additional professional education, based on the principle of continuous professional development, involvement of leading specialists in the industry, as well as the use of methods of active, contextual learning and distance learning [27].

The development of multi-level and multifunctional education as a system of non-formal education should become a significant factor in the formation of a system of continuing education and the formation of key competencies of the digital economy. This system provides continuity of professional development of the adult population, integrating and developing resources that are outside the "formal" educational space. The system not only creates conditions for the development and improvement of the competences of specialists, but also provides for the improvement of the overall educational level of the adult population, including IT-literacy.

The synergetic effect of interaction between the subsystems of the continuous education system can be strengthened by raising awareness and developing the motivation of citizens to receive education. Methodologically thought-out construction of the system, including elements of information, popularization of scientific knowledge, vocational guidance and training increase the effectiveness of the system as a whole.

The active use of publicly available online resources helps to eliminate social inequalities and gaps between different segments of the population. In addition, international practice shows that in conditions of economic instability, the acquisition of additional qualifications by workers increases their employment opportunities and reduces the threat of unemployment for young professionals without professional experience and people of pre-retirement age.

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