

Competencies for the Digital Economy: Possibilities of the Education System of the Republic of Bashkortostan

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ABSTRACT

The speed of scientific and technical progress, changes in information technology and the expansion of opportunities for receiving and applying information make it necessary to create a social model of human behavior in the information society that allows you to adapt and live comfortably in such a society. Improving the education system in this direction will subsequently provide the digital economy with competent personnel. The main issue is to understand the role of certain competencies (and their corresponding knowledge, skills and abilities) of a person in the digital economy. The article gives a review of the education system in the Republic of Bashkortostan in the context of competencies required by the digital economy.

Keywords: *digital economy, information technology, digital economy competencies, information and communications technology, IT-competencies*

1. INTRODUCTION

The current process of fundamental transformation in the society productive forces caused by the increased use of information and knowledge in all spheres and the accelerated updating of information technology, invariably leads to the formation of the so-called information society. The information society is a concept of a post-industrial society, a qualitatively new phase of its development, which most countries of the world entered with the beginning of the information and computer revolution. In such a society, the main products of production are not industrial products, but information and knowledge, and the majority of working people are engaged in their producing, storing, processing and saling.

In the information society:

- The main economic resource is information, and the sector of information and information and communication technologies (IT and the ICT) comes first in the economy's rate of development, a share of capital investments, the number of employees and a share in GDP.
- A developed institutional infrastructure is being formed that ensures the creation of the necessary information resources - primarily education and science.
- Information is the subject of mass consumption - any person's access to any source of information is guaranteed by law and technical capabilities.
- A single integrated information system (environment) is formed.
- Globalization is a characteristic feature. The information society is formed at the global level. And it includes: the world "information economy," the single world information space, the global information infrastructure, the emerging world legislative system.

Most of the economic activity in the information society flows into the digital environment. Electronic (digital)

economy, electronic money, digital financial markets, etc. are formed.

At the same time, the intensive development of ICT and the transition to an information society also have a significant impact on the social sphere, the field of science and education, culture and the way of life of people. ICTs occupy a very large part of human life. Now almost everyone owns various gadgets - a mobile phone, tablet, camera, etc., and many people can't imagine a day without using such scientific and technical devices and technologies [6, 4].

The speed of scientific and technological progress, changes in information technology, the expansion of opportunities for obtaining and applying information make it necessary to create a social model of human behavior in the information society that allows us to adapt and comfortably exist under the conditions of such a society. It seems that the most effective tool in this task can be the education system, which should, on the one hand, accustom a person to the need for constant change (that is, continuous education throughout the life), and, on the other hand, ensure the formation of competencies necessary to live and work in the new digital economy. Improving the education system in this direction will subsequently provide the digital economy with competent personnel. Such a thesis is confirmed by the study [2], which substantiates the theoretical and methodological undeveloped relationship between technological innovations and social initiated changes and the influence on individual competencies in the dynamic sector.

2. BACKGROUND

2.1. The formation of competencies

The main issue is to understand the role of certain competencies (and their corresponding knowledge, skills and abilities) of a person in the digital economy. Analysis of various studies [3, 7, 8, 11, 12] allows you to distinguish four main groups:

1) General or basic competencies, which, as a rule, are laid down at the first stages of the educational process. These are competencies that form the so-called digital literacy or digital competence of the individual – general ICT skills for non-professionals in the field of ICT.

Digital competence refers to the ability of people to confidently, effectively, critically and safely choose and apply ICTs in various spheres of life (information, communication, consumption, technosphere) based on the continuous mastery of competencies (a system of relevant knowledge, skills, motivation and responsibility), as well as their readiness for such activities [8]. Information area includes creation, search, selection, critical assessment of the content; sphere of communication – creation, development, maintenance of relations, identity, reputation, and self- presentation processes; sphere of consumption – use of the Internet for consumer purposes (orders, services, purchases, etc.); technosphere – computer and software skills, technical security. Moreover, such competencies should be formed in all sectors and spheres of human life, even in the creative sector [2]. Thus, digital competence is not only a combination of basic user and professional knowledge and skills in the field of ICT, but also a setting for effective information activities and responsible attitude to it [10].

2) Specialized competencies. This group includes both professional competencies in the field of IT (programming, development and operation of applications, databases and information systems, administration of systems and networks, information security, etc.) and specialized IT-competencies for professionals in the various fields of production, economics and management (computer modeling and design skills, the use of digital assistance services and applications in architecture, design, business, etc.). It will be very difficult in almost any area without IT-competencies in the future.

The peculiarities of these competencies are:

- high dynamics of development linked to the life cycle of the workplace, therefore, the development of specific skills should be carried out in a short time while they are still relevant and taking into account the fact that they will be able to adapt to new conditions and develop;
- the rapid increase in the amount of scientific and technical information related to labour functions and the emergence of innovative ways of working with it, which also requires constant updating of skills;
- the multidisciplinary nature is that the content of competencies can cover several related subject areas, making them more difficult to learn. The university

environment is well suited for the development of such competencies, which is quite productive in terms of interdisciplinary research and development;

- the growing role of international standards, the system of which is formed by the world community, ensuring mobility and competitiveness of skills at the global level.

It is noteworthy that such competencies should be laid down at the stage of school education [4], and it is assumed that they should be further formed within the framework of further non-formal and informal learning, for example, using game educational technologies [1].

3) Additional competencies that are not directly related to the use of professionally-oriented technologies, and are necessary for performing work in the context of new forms of the digital economy. The relevance of such competencies in the development of the digital economy is noted, for example, in the work [2]. These are mainly general cultural competencies, such as:

- effective presentation and communication skills (teamwork, project management, interpersonal skills, cross-culture, ability to understand and interact with a person from a different cultural and knowledge platform, co-creation, etc.);

- personal competencies (responsibility, courtesy, professionalism, positive attitude, work ethic, flexibility, self-learning and self-development) and skills that increase personal resilience (for example, health skills and the ability to cope with stress, skills to quickly adapt to rapidly changing conditions);

- cognitive skills that characterize the ability to learn, attention control, patience, creativity, understanding your emotions and the ability to express them in words, system and project thinking, focus on results and understanding the importance of your work, ability to work in conditions of uncertainty, the ability to understand and/or implement a number of future scenarios, business thinking and entrepreneurial skills.

4) The actual competence of the digital economy, the competence of the future or Future skills (in terms of the union "Young Professionals (WorldSkills Russia)").

The competencies of the future include mobile application development, machine learning and Big Data processing, quantum technologies, solutions based on blockchain technology, and others that are already in demand.

The program "Digital Economy of the Russian Federation," approved by the Government of the Russian Federation at the end of 2017 [7], defines promising digital technologies, the competencies of which will be in demand in the near future at both the Russian and global levels:

- Big Data;
- neurotechnology and artificial intelligence;
- distributed registry system (blockchain);
- quantum technologies;
- new production technologies;
- industrial Internet;
- robotics and sensor components;
- wireless communication technologies;
- virtual and augmented reality technologies.

The transformation of the labor market in accordance with the requirements of the digital economy forms a challenge to the national, including regional, education system in terms of developing the necessary competencies and providing the digital economy of Russia with professional personnel. Let's consider what the answer to this challenge is given by the modern education system on the example of the leading universities of the Republic of Bashkortostan in the main areas of training (Integrated Group of Training Areas (IGTA)) in the field of economics and information technology:

- 02.00.00 Computer and information sciences,
- 09.00.00 Computer science and computing,
- 10.00.00 Information security,
- 38.00.00 Economics and management.

The foundations of basic ICT competencies are laid during secondary school. However, the programs of most Republican schools are rather superficial, and the main way to form these competencies for a student is self-study in a digital environment with the participation of family, relatives and friends.

Fully basic competencies are already formed at the level of secondary professional and higher education (undergraduate, specialty) when studying such disciplines as computer science, work in a package of office applications, management of information resources, the basics of business-presentations, etc. There are similar courses in all educational programs of the training areas under consideration, but there is an imbalance in the amount of hours allocated to technical disciplines and disciplines of an information and communication nature. So, for example, in most programs in the areas of training in the field of information technology, there are practically no disciplines for the development of digital communication and the rules of business and self-presentation, and technical and economic courses have been minimized. In economic areas, the opposite situation – the curricula do not provide for the study of such fundamental disciplines as information search and content

2.2. The formation of additional competencies

The formation of additional competencies necessary to work in the realities of the digital economy is partially provided for by educational standards and higher education programs. These are mainly psychological disciplines, philosophy, system analysis, project management, and professional ethics. Otherwise, the main source of the formation of these competencies is still self-training, additional courses, schools, etc.

Currently there are problems with obtaining knowledge and skills in the digital economy competencies in both the regional and Russian higher education systems. And if competencies in the development of mobile applications, machine learning, artificial intelligence technologies can be obtained by studying in such areas as "Software Engineering" and "Mathematical Support and Administration of Information Systems" at the USATU, competencies in versatile analysis of data that are the basis

evaluation, information security, working with basic computer software. The only direction that is more or less balanced in this context is Business Informatics, in particular, programs implemented at Bashkir State University (BashSU), at Bashkir State Agrarian University (BSAU) and Ufa State Aviation Technical University (USATU).

Specialized competencies for professionals in the field of IT, economics and management are formed mainly at the level of higher education (undergraduate, specialist, master's degree). In general, the programs of republican universities provide opportunities for training pure programmers ("Software Engineering" and "Mathematical Support and Administration of Information Systems" fields of study at USATU, BashSU, at the branch of BashSU in Sterlitamak), specialists in the field of information security ("Information security" field of study at USATU, BashSU, at the branch of BashSU in Sterlitamak), "Information technology security in law enforcement" at USATU and at the branch of BashSU in Sterlitamak), as well as specialists in the field of implementation and operation of information systems and networks ("Informatics and Computer Engineering" at USATU and USPTU, "Applied Informatics" fields of study (BSPU named after Akmulla, USATU, BashSU, a branch of BashSU in Sterlitamak, a branch of BashSU in BirsK, USPTU), "Information Systems and Technologies" at USATU and BSPU named after Akmulla). However, the number of graduated specialists hasn't covered the needs of the IT-market yet.

As for IT-competencies for specialists in the field of economics and management, there is a rather large gap in the republican education. Most educational programs do not include the study of economic software products and systems. Within the framework of economic areas, only MS Office programs and, at best, the 1C family of software products are studied. Business Informatics stands apart here again, where a relatively wide range of software products and economic information systems are studied.

of machine learning and big data analysis, – in the field of "Business informatics" at the USATU (profile "Business analytics") and BashSU (profile "Information business analytics"), then the opportunities for obtaining such competencies as big data processing, blockchain technologies, virtual and augmented reality technologies, the fundamentals of the digital economy in republican higher education haven't presented yet. We can only note the launch of a new master's program "Financial Management in the Digital Economy" in the field of "Finance and Credit" at USATU in 2018. The main way to develop new promising competencies in the digital economy is special courses so far, which are usually implemented with the involvement of companies-employers in this field and also available remotely (online). Of course, the work on updating educational programs by the leading universities of the Republic is underway, but it is not quickly as necessary. Despite the measures taken by the government of the Russian Federation and universities, including regional ones, it is

expected a significant shortage of highly qualified personnel in the field of digital economy in Russia in the next decade.

3. CONCLUSION

The modern labor market is undergoing major changes under the influence of the emerging digital economy requirements. Both the work environment and the set of competencies required to work in a particular profession are changing. Many workplaces are virtualized, the work becomes team-based and distributed, and requires flexible management technologies. If it was enough yesterday to learn a profession once and then, as the tool and

production process are updated, improve skills, as well as have basic communication skills, so today the rapid changes in market requirements and the set of technologies and tools require constant self-learning.

Now it is necessary to be able to quickly adapt to tasks, environment, team, tools and work space, think systemically and critically, work in conditions of uncertainty, have multidisciplinary competencies, be adaptive and flexible to new information and technologies, be creative, be able to create and process complex information, identify and solve real problems of the digital world. It is important to have non-specific skills that are not subject to automation and digitalization.

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