# Educational Space and the Issues of Digitalization in the Mining Region

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**Abstract**

The solution of key tasks of the national program of transition to digital economy depends on the efficiency of interaction between the primary components of the national economy, the level of development of information and communication technologies, and the quality of the educational space. The conducted analysis of the mutual influence of production growth in the Republic of Sakha (Yakutia), geographically remote from the industrial centers of Russia, and the educational space accompanying the changes in the social life of society shows the radically changed nature of the formation of human capital in the region. The current inter-territorial and socio-economic asymmetry of digitalization introduces specific limitations, which must be overcome by improving the educational space of the region through the implementation of joint projects using digital technologies.

**Keywords**

Digitalization • Remote region • Educational space • Production indices • Asymmetry

**JEL Classification**

A14 • I31

## 1 Introduction

One of the most important national programs for the further development of Russia is the program of transition to the digital economy and digitalization of the life of every citizen for maximizing the needs of society and individuals. Successful implementation of the key tasks of the national digitalization program undoubtedly depends on the effectiveness of interaction between the components of the digital transformation of enterprises, the educational space, and the population of Russian and its regions. The Moscow School of Management SKOLKOVO notes the importance of ensuring digitalization by improving the quality of the educational space of the country and regions [8], which is currently understood as the space of human socialization. These processes, continuously occurring in the elements and parts of the educational space, determine the pace and efficiency of the digital transformation of society.

Nowadays, the educational space of Russia is at a difficult and critical stage of training personnel capable of ensuring and accelerating the natural civilizational transition to the digital economy, namely as defined by several experts [4, 8, 9], to the production of marketable products based on digital technology. It is pointed out that the pace of digital transition largely depends on the level of regional digital development of the educational space and educational environment and ways and methods of digitalization of education. Noting the generally positive dynamics of digitalization in the regions of Russia [2, 3, 15, 16], experts point to the need to focus on specific and important areas of regional policy, namely improving the efficiency of using available educational resources.

Qualitative and quantitative characteristics of the educational space of particular regions of Russia significantly vary and raise a certain scientific interest in the discussion of the methodological foundations of the ways of digitalization, the development of methodological recommendations on indicators of digitalization, and the practical impact of innovative digital technologies on human capital. The rapid expansion of the digital capabilities of each person in terms of quantitative and qualitative transformation of communication processes and the introduction of artificial intelligence technologies and technologies for operating large databases require the actualization of the properties and characteristics of the regional educational space.

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## 2 Materials and Methods

The transition to a new digital technological mode of the economy is one of the strategic objectives of Russia. Effective solution to this problem is carried out by improving state and municipal administration, developing information infrastructure, and modernization of educational space to ensure staffing for digitalization in the regions. In the works of Russian and foreign researchers [6–8, 11], the process of digitalization is closely connected with the economic parameters and the broader humanitarian values of society. Therefore, issues of assessment, indication, and ranking of the pace of development of the digital economy in Russia and its region are developed and discussed.

It is proposed to analyze the level of digitalization of regions by seven components of the digital life index: transport, finance, trade, health, education, media, and administration [8]. The approach proposed by researchers is justified by the availability of indicators on the use of digital technology in the activities of regional enterprises and organizations. The high relevance of establishing objective indicators of the digitalization of the economy, the pace of transition to new information and communication technologies, and the construction of information infrastructure is reflected in many works [3–6, 9]. These works indicate the possible causes of the current digital divide between the regions and countries.

Digital inequality of Russian regions is explained by significant spatial differentiation of the economy, the presence and development of certain industries in the region, the level of educational space, and other factors united by specific regional characteristics. Accelerating the introduction of new information and communication technologies in business and large industrial companies for expanding digital opportunities and the needs of the population of the regions requires the transformation of the educational space that forms the human capital.

Thus, one of the directions of overcoming the digital divide in the region with specific features is the development and modernization of the educational space to expand the opportunities provided by society and the country. Therefore, this research aims to study and establish the main drivers of the formation and development of the educational process in the Republic of Sakha (Yakutia), which is geographically remote from major industrial centers. Moreover, the research aims to develop proposals to improve the indicators of digitalization in a particular educational space.

The study of organizational and managerial issues in the field of further improvement of the targets of measures aimed at the digitalization of the educational space of the region with specific characteristics (lack of manufacturing enterprises and weak transport infrastructure) was carried out based on the analysis of statistical data on the development of economic indicators for a long period. Statistical data of economic growth are compared with the parameters of formation and changes in the educational space of the Republic of Sakha (Yakutia) in the context of their compliance with the objectives of digitalization.

## 3 Results

Digitalization of the economy is a key tool for the strategic development of Russia and ensuring high competitiveness of industrial products and high quality of population's life. The creation of a digital society involves introducing digital information and communication technologies in all spheres of human activity. Therefore, it relies on the quality of human capital formed in a particular educational space.

Topical issues of mutual influence of digital information and communication technologies and regional educational space are considered and discussed by many experts and specialists [2, 6, 10, 15]. Extensive analysis of the development of digital technology in the regions, opening up new opportunities to improve the economy, education, culture, and personality, shows that the above issues remain controversial and require further study. The works of Kuznetsova and Yumaev [9] and Nikolaev et al. [11] point out that the territorial, social, and geographical diversities make it necessary to identify the internal constraints arising, for example, in the digitalization of industrial companies and enterprises active in remote mining regions. These internal limitations to the effectiveness of the digital transformation are caused by the apparent multi-structure society in the region, providing an innovative systemic nature of the economic transformation.

Continuous improvement of the regional educational space adequate to the rapid technological changes in society is a necessary and sufficient condition for effective interaction between the innovation potential of the industry and the socio-economic development of the region. The validity of this provision is proved by comparing the economic condition and educational space of the Republic of Sakha (Yakutia) over a century of development.

Several objective facts demonstrate the close and organic relationship of the educational space of the region with the level of technical and technological development of industry and agriculture. Until the twentieth century, Yakutia was a distant province of the Russian Empire, practically not participating in the production of the total gross product of the country. In 1917, there were 173 schools and four colleges in Yakutia. At the end of the second decade of the twentieth century, the number of literate people living within the current territory of the republic was no more than 2% of the

total population; the number of literate representatives of the indigenous population of Yakutia did not exceed 1% of the total population [12]. In 1926, the literacy of the republic's population increased by more than 15%. By 1939, almost every eighth person of working age became literate.

In 1930, the opening of the Aldan Mining Technical School in Nezametny settlement (later Aldan) and the Construction and Road Technical Schools in Yakutsk marked a qualitative change in the educational space of the republic. The number of educational institutions increases to 496 schools. Secondary specialized professional institutions (14 technical schools) trained specialists for culture, medicine, education, agriculture and fisheries, river transport, finance, and other sectors of the region's economy. The following qualitative change is marked by the opening of the Pedagogical Institute in Yakutsk in 1934. In 1956, Yakutsk State University was created. The Yakutsk State University trained specialists with higher education to further ensure the growing industrial potential of the Republic of Sakha. These quantitative and qualitative changes in the educational space are marked by an increase in the number of trained specialists with higher and secondary vocational education employed in the national economy. According to statistics, in 1941, there were no more than 4000 specialists. For twenty years (by 1961), the number of specialists with higher and secondary specialized education increased to 30 thousand and amounted to more than 118 thousand people in 1980 [1].

Thus, the extensive development of the republic's economy was provided by the active formation of educational space necessary and sufficient to meet the need for skilled labor, engineering and technical workers of middle and higher levels, and managerial personnel. Statistics from 1940 to 2000 show that the growth of industrial output declines every five years (as a percentage) from multiples to units of one percent exponentially (Fig. 1), in which the argument is the duration of the process at the industrial stage of development. Perhaps, this close relationship between the characteristics of industrial production and the educational space of the region are natural and decisive in the industrial transformation of society.

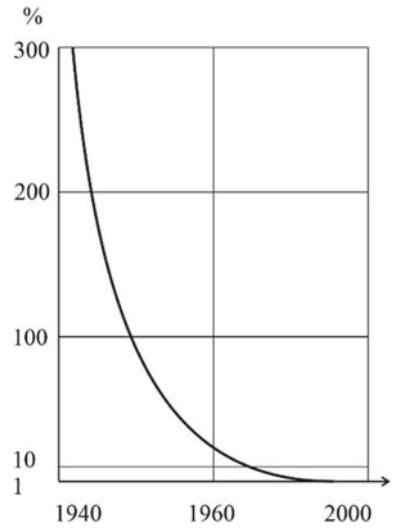


**Fig. 1** Changes in the growth rate of industrial production in the Republic of Sakha (Yakutia) in 1940–2000. *Source* Compiled by the authors [1]

## 4 Discussion

There are significant deviations from the previously realized dependence of the growth of industrial production and the accompanying process of quantitative and qualitative development of the educational space of the Republic of Sakha (Yakutia).

Since 2000, the increase or decrease in industrial production in the Republic of Sakha (Yakutia) is characterized by the index of production in the current year, referred to as a percentage of the previous year. The observed change in production indices for almost 20 years indicates a relatively stable level of the economic health of the region, balanced with the macroeconomic parameters of the Far Eastern Federal District of Russia (Table 1). The main indicators of the results of federal and regional educational institutions, expressed in the number of graduates with higher and secondary specialized education, correspond to this solvency of the region (Table 2).

As given in Tables 1 and 2, the production of industrial products and quantitative performance indicators of educational institutions is in a certain equilibrium state. Based on the analysis of the current economic structure, we can state that the mutual influence of self-developing strata of society in the country with a predominantly raw material economy is expressed by the leading role of mining companies in digitalization.

Currently, the digitalization of regions is generally assessed by a variety of digital technologies used by industrial and agricultural enterprises, medium and small businesses, as well as the involvement and active participation of the population of the region in innovative information and communication systems. The results of expert studies show that the adopted ratings of digitalization do not fully reflect the intensity and quality of the digital transformation of the educational space in the regions. A possible reason for the identified socio-economic asymmetry of digitalization of the regions is hidden in the excessive number of measurable parameters, which makes it challenging to establish the determining driving forces that actively affect the observed process.

**Table 1** Indices of industrial production in the Republic of Sakha (Yakutia) (in % to the previous year)

| Years | 2000 | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Index | 105.4 | 93.4 | 104.2 | 86.4 | 122.8 | 116.1 | 109.0 | 106.2 | 104.9 | 103.8 | 101.9 |

*Source* Compiled by the authors based on [13]

**Table 2** Graduation of specialists by educational institutions of the Republic of Sakha (Yakutia)

| Years | 2000 | 2010 | 2018 |
|---|---|---|---|
| *Higher education* | | | |
| Number, people | 2270 | 6027 | 4056 |
| *Specialized secondary education* | | | |
| Number, people | 2661 | 4769 | 4296 |

*Source* Compiled by the authors based on [14]

Using the Novosibirsk and Tomsk regions with developed IT clusters as an example, Kuznetsova and Yumaev [9] prove the need to train specialists with professional competencies for the implementation and operation of intelligent systems of transport and social services in cities and large settlements. Several works [2, 6, 7, 15] emphasize that enterprises and scientific and technical centers with assets in the regions leading in the technological development of the country are poorly involved in solving the issues of improving the region's educational space.

## 5 Conclusion

The currently observed inter-territorial and socio-economic asymmetry of digitalization in the Republic of Sakha (Yakutia) requires strengthening the creative and socially significant influence of industrial enterprises on the improvement of the region's educational space. The involvement of large mining companies and enterprises can result in mutually beneficial joint educational programs and scientific, technical, and educational centers aimed at the qualitative development of human capital and the qualitative improvement of the region's educational space.

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