

Effect of Media and Non-Media Factors on the Development of Online Education in Russia

Valentina E. Guseva, & Elena N. Fokina

Tyumen Industrial University, Russian Federation

Abstract

The accelerated development of online education is mainly due to advances in information and communication technologies and public life's widespread digitalization. However, the factors in the development of e-learning are rather diverse, and their influence is heterogeneous. To explore the effect of media and non-media factors, the paper analyses Russia's online education market from 2011 to 2019. We hypothesize that it is possible to expand the contribution of the e-learning market to GDP by increasing investments in EdTech and that there is a direct relationship between the level of investment in online education and the internet penetration rate. The hypotheses are tested using statistical and correlation methods. The research results indicate that both the hypotheses were confirmed. There is a direct moderate relationship between the Internet penetration rate in Russia and the volume of investment in the online education market. There is a strong direct relationship between the size of GDP and the volume of investment in the online education market.

Keywords: Online learning, EdTech, internet penetration rate, media factors, investment, academic strategies

Introduction

Online education is a relatively young industry. As far back as 2014, about 20 million students were using the most popular educational media resources, and the volume of investment amounted to 300 million dollars (TAdviser, 2014). The current number of online students worldwide is over 110 million (HSE, 2020b), including 450,000 students from Russia (Borovskaya, 2019). The rapid development of e-learning is driven by advances in information technology (Karo & Petsangri, 2020; Cai & Wang, 2020; Brown & Green, 2019). It has become one of the most promising teaching mechanisms taking e-learning and mobile learning (m-learning) and blended learning formats effectively utilized to deal with particular tasks. The whole industry of e-learning software products for various economic sectors is being created, including the systems for content delivery, organization, and learning management – LMS (Learning Management Systems) – that combine tools for communication, knowledge assessment, and development training courses. All this is a part of the so-called EdTech market, which focuses on enhancing the quality and speed of learning in a digital media environment.

Currently, the issues on the further development of distance learning are widely debated (Akugizibwe & Ahn, 2020; Virkus, Kirinic & Begicevic Redep, 2020; San-Martín et al., 2020). The least ambitious forecasts indicate that such an educational format will

Correspondence to: Valentina E. Guseva, Tyumen Industrial University, 38 Volodarskogo Street, Tyumen, 625000, Russian Federation.

stay within the prerogative of self-study. However, there are assumptions that massive online courses are the prototype of the future education system.

Online education has significantly gained in popularity during the spread of coronavirus in 2020. Most governments worldwide have temporarily closed campus-based educational institutions to contain the spread of the COVID-19 pandemic. UNESCO estimates that more than 1.5 billion learners – over 90% of the world student population – are confined to their homes. Providing alternative learning solutions has become the top priority for every ministry of education (HolonIQ, 2020).

Since educational institutions aim to meet today's students' needs and harness the latest technologies' power, online learning has become a primary academic strategy (Seaman, Allen, & Seaman, 2018). An increasing number of universities are offering flexible educational solutions (Aksenova, 2020). Distance learning is becoming an adequate response to these challenges, reducing costs without changing educational services volume but offering them different formats (Bondarenko & Kolmakov, 2018). For this reason, online learning is among the fastest-growing segments now.

In this regard, the current state of the online education market is becoming increasingly relevant. Using the case study of Russia, we attempt to identify the factors in the media environment that affect online education's infrastructure and examine the possibilities of distance learning following other countries' experience and the prospects for its development in Russia.

Literature Review

There is a wide range of studies on theoretical and applied aspects of distance learning. As Naletova (2015) puts it, traditional educational institutions and traditional teaching methods cannot satisfy the growing globalization-driven demand for education, which explains the use of distance learning and information and communication technologies. There emerges "higher education without borders" that becomes a focal point for new market actors.

According to Gul (2014), opinions about online learning vary significantly: it is perceived as a form of education, which no longer performs the educational function and the function of creating "an educational space, beyond of which education is defective"; online learning is interpreted as education lacking social communication (Yessenbekova et al., 2020); and it has several advantages over the classical education.

Debates about the feasibility and prospects for the development of the e-learning market have resulted in several positive education processes. This refers to the open, accessible, and free educational content for a broad audience due to the growing number of educational multimedia online resources – lesson designing, services for organizing webinars, video classes, the use of scribing technology, etc. (Garces-Voisinat, 2016; Vlasov & Demin, 2017; Vlasov, Juravleva & Shakhnov, 2019). E-learning makes it possible to eliminate geographical, physical, and financial barriers (Tan, Ho, & Pang, 2016). Some researchers (Peng, Ma, & Spector, 2019; Wozniak, 2020; Litau, 2018) reveal a specific online education trend that consists of personalized learning and a cognitive approach. Students are free to study in any place convenient for them; they can also choose the most suitable time, content, and pace of study. The opportunities for universities are expanding, as they gain access to those students who cannot attend in-person classes (Sergeev, Zhigalov, & Balandina, 2016).

Experts from MBA Center (MBA, 2020) claim that the negative factors influencing the development of e-learning embrace the following—an economic downturn due to a sharp drop in consumer demand; an unfavorable sanitary and epidemiological situation caused

by the COVID-19 pandemic, which increased unemployment in several regions of the world; a decrease in entrepreneurial and investment activity; changes like demand in the online education market and a shift in demand towards short-term training courses; and staffing problems in the educational market. Sulimin and Shvedov (2018) arrive at the same conclusions when detecting the e-learning market development problems in the context of digitalization. Despite a comprehensive analysis of barriers and constraints to market development, their work does not provide empirical evidence.

The system of distance learning in Russia is now at the beginning of information. Nevertheless, it exhibits good development prospects in adopting global experience and combining state-of-the-art information technologies with the classical education model's best methods. Tagarov (2018) identifies the following trends facilitating Internet technologies' penetration into the Russian education system. Firstly, the efficiency of budgetary educational institutions is growing. Here, the introduction of EdTech both optimizes the current processes and initiates new ones. Secondly, there appear numerous fee-based online courses and educational services. Thirdly, media resources are providing educational services and advice free of charge.

On the other hand, Kuznetsov (2019) highlights that e-learning does not equate with traditional learning. The digital infrastructure is not flawless, and the share of graduates who complete the distance learning courses is relatively low. E-learning is characterized by a predominant share of adult students (whereas the global trend is towards online technologies spreading to school curricula) and increased cooperation between universities and online platforms (Interfax, 2020).

There is a rigorous scientific debate on how various factors affect the development of the online education industry. Nie et al. (2020) revealed a correlation between e-learning and the growing economic efficiency of education. The authors scrutinized the role of private investment that partially reduced public spending, contributed to the optimization of education management, and led to a pay increase. Meza-Bolaños, Compañ Rosique, and Satorre Cuerda (2019) elaborate on investment in e-learning. Tagarov (2018) identifies the major avenues for developing the online education market and proposes a set of priority measures to expand this segment. According to Tagarov, shadow employment is economically detrimental to the industry.

The literature review allowed us to discover the central factors influencing the online education market, which are the following:

- (i) The growing importance of human capital. A decent education is one of the necessary conditions for potential human realization (Zaborovskaya, 2005). Its share in the global, national net wealth exceeds 60% (Kozlova, 2008). Education capital is, in turn, an essential component in extending the duration of human capital use. The level of education justifies the participation of working-age people in the labor process. The employment rate among people with higher education is over 90%, while for those with a high-school education, this indicator is just over 80% (HSE, n.d.). Continuous development of competencies also boosts work motivation and commitment to the corporate spirit (Halkos & Skouloudis, 2016; Metaxas, 2016);
- (ii) Professional knowledge and skills are being updated at a blistering pace. A comprehensive set of professional competencies is required due to the growing volume of information and data. Varavva (2008) argues that about 5% of theoretical knowledge and 20% of vocational experience in the world are updated every year;
- (iii) Life-long learning stipulated in developed countries' education policies results in the introduction of novel flexible forms of training to provide equal access to high-quality study (Titov, 2014);

- (iv) The transition of developed countries' education systems to the widespread use of information technologies. Many leading universities are guided by the principle of the maximum accessibility of educational media resources (Abdurakhmanova, Bekpulatov&Khudoinazarov, 2018). Information technology is taking the lead in all spheres of life, both individually and socially (Baromychenko, 2017); and
- (v) Demographic factor. The decline in the birth rate and population aging prove the need to create conditions for elderly education. In this context, distance learning enjoys a growing demand (World Bank, n.d.; Uvarov & Frumina, 2019).

Methodology

In the current study, we put forward two hypotheses based on Russia's case and tested using statistical and correlation methods.

H1: The online education market's contribution to GDP can be enhanced by increasing investment in EdTech.

H2: There is a direct relationship between the size of investment in e-learning and the internet penetration rate.

The information base of the study includes statistical data on the structure of the world and Russian online education market (Voloshin, 2020); investments in the Russian online education market in 2014–2019 (EdMarket, n.d.); and the state of the online education market and the digital educational environment (HSE, 2020b). Additional sources of information are Rosstat (2020), market research institute GfK (2018), and international statistics service Statista (2019; 2020).

To assess the relationship between the investment volume in the online education segment and GDP, a correlation coefficient was calculated by the formula (Ishkhanyan & Karpenko, 2016):

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{n \cdot \sigma_x \sigma_y}, \quad (1)$$

Where n denotes the population's volume under study (sample size); \bar{x} , \bar{y} denote average parameter values; σ_x^2 , σ_y^2 denote variances of parameters; σ_x , σ_y denote root-mean-square (standard) deviations of x and y .

Correlation indices were assessed using the Chaddock scale (Ishkhanyan & Karpenko, 2016).

The study does not consider that online education is one of the EdTech market segments (among software, educational platforms, and providers of various solutions that ensure the immersion in learning). We use data on the entire EdTech market.

Results and Discussion

E-learning is becoming increasingly popular every year. Specialists of the IT holding TalentTech explored global trends in online education and forecast the global market growth to 282 billion dollars by 2023 (EdMarket, n.d.). According to Technavio (2020), the online education market is expected to overgrow. During the forecast period, the market will total 320 billion dollars in 2025 (Research and Markets, 2020). Experts from International Education (IE, 2020) share the same opinion.

TalentTech estimates that the online education market in Russia in 2019 amounted to 38.5 billion rubles (EdMarket, n.d.). By 2021, the market is projected to boost to 52.8 billion rubles, and by 2023, the market volume will exceed 60 billion rubles (Statista,

2019). According to Voloshin (2020), who holds a less optimistic view, the volume of Russia's online education market is approximately 21 billion rubles. Table 1 presents a detailed look at the market and its segments in Russia in 2019.

Table1. The education market in Russia, 2019

Segment	Total, billion rubles	Private business, billion rubles	Market share of private business, (%)	E-learning (EdTech), billion rubles	Market share of e-learning, (%)
Preschool education	492	37	7.5	1.0	0.1
High school education	592	18	3.0	0.0	0.0
Supplementary school education	159	159	100.0	3.6	2.4
Secondary vocational education	386	30	7.7	6.8	1.7
Supplementary vocational education	216	5	2.3	1.8	0.8
Higher education	145	66	45.5	1.0	0.6
Other	41	41	100.0	7.0	17.07
Total	2031	356	—	21.2	—

Source: (Voloshin, 2020)

The overall contribution of e-learning to the Russian education market makes up 1.0%, while in the global market, this segment is about 3–10% (Zotova, 2020). Thus, the adoption of new information technologies by the segments of the Russian education market is insufficient.

The sector-based market distribution in Russia differs significantly from the global market (Telecom Daily, 2020): the largest share of e-learning in Russia is observed in supplementary vocational education (45%) and school education (24%), while the latter dominates (38%) the global online education market. It is noteworthy that there is virtually no preschool online education in Russia, whereas globally, this segment accounts for about 9%.

There are a plethora of e-learning management systems. Figure 1 shows the most popular platforms for online courses in Russia. According to Statista (2020), more than 40% of respondents in Russia could not remember what online platforms they used to study online. The most popular e-learning platform among respondents (15%) was an American massive open online course provider Coursera. The ranking also embraced Geekbrains, the National Open University INTUIT, Universarium, Stepik, Open Education, and Netology. According to Interfax (2020), the largest EdTech companies in Russia are online university SkillBox, Skyeng, Mirapolis, iSpring, Netology Group, eQueo, GeekBrains, Netrika, etc.

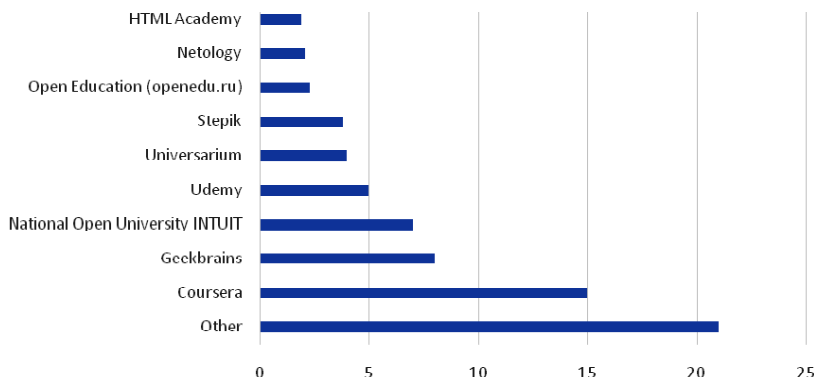


Figure 1. Popular platforms for online courses in Russia, 2019

Source: (Statista, 2020).

Active introduction of cloud solutions coupled with massive investment in educational platforms is driving end-users towards distance learning. During 2011–2019, the volume of investment in the Russian online education market skyrocketed 67.22 times – from 52.9 million to 3.6 billion rubles. Simultaneously, the volume of investment in the global market over the same period grew 18 times. Hence, the growth rate of the Russian online education market exceeds that of the global market. However, it is worth noting that such trends are mainly due to the low base effect since the Russian online education sector’s contribution to GDP was around 0.0032%. Figure 2 presents the dynamics of investment in online education and Russia’s GDP for 2011–2019.

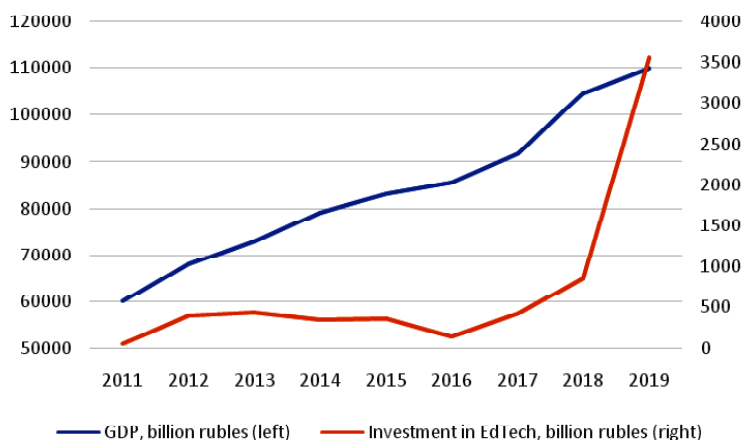


Figure 2. Dynamics of investment in Russia’s online education and GDP, 2011–2019

Source: (Rosstat, 2020).

The correlation coefficient between investment in online education and GDP is 0.703. On the Chaddock scale, this is a strong direct relationship. We construct a linear regression model ($y=10,608x +76240$) that reflects the relationship between these indicators. Let us calculate the forecast factorial participation for Russia’s GDP if there is an annual two-fold increase in investments in e-learning until 2024 from 7.22 billion rubles in 2020 to 151.05 billion rubles in 2024 (Table 2).

Table 2. Factorial participation of investment in online education in Russia’s GDP for 2020–2024

Indicator	2020F	2021F	2022F	2023F	2024F
Investment in online education, billion rubles	7.2	15.4	32.9	70.4	151.1
Factorial participation in GDP (billion rubles)					
<i>chain value</i>	–	86.8	185.3	397.9	854.6
<i>cumulative total (the basis of 2020)</i>	–	86.8	272.1	670.0	1524.6

Thus, in 2024, with an annual increase in the share of investments in online education, GDP will rise by 1,524.6 billion rubles, or 2%, compared to 2020.

The growing penetration of the Internet is among the central factors driving the development of the education market. At the moment, the internet penetration rate in Russia is relatively low (75.5%) in comparison with developed economies, such as the USA (89%) and the EU (80%) (TAdviser, 2014). Despite a substantial increase in the internet penetration rate over the last nine years, Russia comes eighth in the world by the number of Internet

users (TAdviser, 2014). At that, only 3% of the Russian population use the web for distance learning, while in the USA and South Korea, 20% of Internet users take online courses. It was 18% in Sweden and Finland; the number was 17% (HSE, 2020a).

The correlation coefficient between investments in online education and the internet penetration rate in Russia is 0.445. On the Chaddock scale, this is a moderate direct relationship. We develop a linear regression model ($y=43,32x - 2091$) that characterizes these indicators' relationship based on the presented data. Let us calculate the forecast factorial participation in the volume of investments in online education, provided that the internet penetration rate in 2020 increases to 80%, and there is a consecutive annual increase until 2024 by 1% (MOEX, 2019).

Table 3. Factorial participation of the internet penetration rate in the volume of investment in the online education market in Russia for 2020–2014

Indicator	2020F	2021F	2022F	2023F	2024F
Internet penetration rate, %	80	81	82	83	84
Factorial participation in the volume of investment (million rubles)					
<i>chain value</i>	–	43.3	43.3	43.3	43.3
<i>cumulative total (the basis of 2020)</i>	–	43.3	86.6	130.0	173.3

Thus, in 2024, with an annual increase in Russia's internet penetration rate by 1%, online education investments are projected to rise by 173.3 million rubles or 2.4% if compared with 2020.

Conclusion

The development of information and communication technologies and the widespread digitalization of public life could not pass educational activities. The global online education market is increasing, and the education industry is undergoing radical change. Such media platforms as Coursera, Udemy, ÅdX, and The Open University have provided access to educational programs from the world's best universities, scaling up distance education's attractiveness. New development trends have caused e-learning to move to the workplace (Attwell, 2019), blended learning has become omnipresent, and e-learning has successfully adapted to different education levels.

Having analyzed the patterns of the online education market development in Russia, we have managed to establish the role of media and non-media factors. Both hypotheses constructed in the current research have been confirmed. There is a moderate direct relationship between Russia's internet penetration rate and the volume of online education investment. An annual increase in the internet penetration rate by 1% will increase EdTech investment by 2.4%. The results have proved that the volume of investment in e-learning affected the size of GDP. A two-fold increase in investments in the online education market in GDP will lead to GDP growth by 2% from 2020 to 2024.

Despite the considerable improvement in the internet penetration rate, for the further development of online education in Russia in line with the global trends, it is expedient to promote preschool and online school education and enhance the adoption of online technologies in the sphere of higher education.

References

- Abdurakhmanova, U. K., Bekpulatov, Kh. O., & Khudoinazarov, M. Sh. (2018). The role of information technology in improving the quality of education. *Znanstvena Misel*, 7-2(20), 10–12.
- Aksenova, G. N. (2020). Online education development trends in Russia. *E-Scio*, 5(44), 217–225.
- Akugizibwe, E., & Ahn, J. Y. (2020). Perspectives for effective integration of e-learning tools in university mathematics instruction for developing countries. *Education and Information Technologies*, 25, 889–903. <https://doi.org/10.1007/s10639-019-09995-z>
- Attwell, G. (2019). E-learning at the workplace. In: S. McGrath, M. Mulder, J. Papier, & R. Suart (eds.). *Handbook of Vocational Education and Training*. Springer, Cham. https://doi.org/10.1007/978-3-319-49789-1_110-1
- Baromychenko, V. F. (2017). Development of information and communication technologies at the present stage. *Bulletin of Scientific Conferences*, 1-1(17), 24–25.
- Bondarenko, T. G., & Kolmakov, V. V. (2018). Distance education as an active educational technology: Rationale for implementation. *Azimuth of Scientific Research: Pedagogy and Psychology*, 7(3-24), 53–57.
- Borovskaya, I. A. (2019). Modern digital educational environment in the Russian Federation. Retrieved from <https://clck.ru/RHRiE>
- Brown, A., & Green, T. (2019). Issues and trends in instructional technology: Access to mobile technologies, digital content, and online learning opportunities continues as spending on IT remains steady. In: R. Branch, H. Lee, & S. Tseng. (eds.). *Educational Media and Technology, Yearbook*, vol. 42. Springer, Cham. https://doi.org/10.1007/978-3-030-27986-8_1
- Cai, G. Q., & Wang Q. H. (2020). Research on online learning platform based on cloud computing and big data technology. In: J. Shen, Y. C. Chang, Y. S. Su, & H. Ogata. (eds.). *Cognitive cities. IC3 2019. Communications in Computer and Information Science*, vol. 1227. Springer, Singapore. https://doi.org/10.1007/978-981-15-6113-9_41
- EdMarket. (n.d.). Russian online education market research 2020. Retrieved from <https://research.edmarket.ru/>
- Garces-Voisinat, J.-P. (2016). Equality of opportunity in education: A case study of Chile and Norway. *Journal of Eurasian Social Dialogue*, 1(1), 42–49.
- GfK. (2018). Internet penetration in Russia: Results of 2017–2018. Retrieved from https://drussia.ru/wp-content/uploads/2018/01/GfK_Rus_Internet_Penetration_in_Russia_2017-2018.pdf
- Gul, D. V. (2014). Online education in Russia: Barriers and prospects (pp. 100–109). *Jubilee collection of scientific works of lecturers, graduate students, and undergraduates of the sociological faculty of Samara State University*. Samara: Samara University.
- Halkos, G., & Skouloudis, A. (2016). Cultural dimensions and corporate social responsibility: A cross-country analysis. *Journal of Eurasian Social Dialogue*, 1(2), 12–29.
- HolonIQ. (2020). \$3B Global EdTech venture capital for Q1 2020. Retrieved from <https://www.holoniq.com/notes/3b-global-edtech-venture-capital-for-q1-2020/>
- HSE. (n.d.). Higher School of Economics. Unemployment rate by educational level. Retrieved from https://memo.hse.ru/ind_w10_0_02
- HSE. (2020a). Higher School of Economics. Digital economy 2020. Retrieved from <https://issek.hse.ru/digec2020>
- HSE. (2020b). Higher School of Economics. Traditional forms of education do not fit into the online format. Retrieved from <https://ioe.hse.ru/news/341458289.html>
- IE. (2020). International Education. Retrieved from <https://www.ei-ie.org>

- Interfax. (2020). EdTech market in Russia in supplementary vocational and adult education. Retrieved from <https://academia.interfax.ru/ru/analytics/research/4257/>
- Ishkhanyan, M. V., & Karpenko, N. V. (2016). *Econometrics. Part 1. Paired regression*. Moscow: MIIT University.
- Karo, D., & Petsangsri, S. (2020). The effect of online mentoring system through professional learning community with information and communication technology via cloud computing for pre-service teachers in Thailand. *Education and Information Technologies*, August 18. <https://doi.org/10.1007/s10639-020-10304-2>
- Kozlova, T. V. (2008). Human capital as a structural element of national wealth. *Tomsk State University Journal*, 12(68), 374–378.
- Kuznetsov, N. V. (2019). Online education: Key trends and barriers. *E-Management*, 2(1), 19–25. <https://doi.org/10.26425/2658-3445-2019-1-19-25>
- Litau, E. Y. (2018). Cognitive science as a pivot of teaching financial disciplines. *Proceedings of the 31st International Business Information Management Association Conference, IBIMA 2018: Innovation Management and Education Excellence through Vision 2020*, 72–80.
- MBA. (2020). Trends in the business education market. Retrieved from <http://mba.susu.ru/info/news/tendentsii-rynka-biznes-obrazovaniya/>
- Metaxas, T. (2016). Corporate social responsibility in European organizations: A universal idea? *Journal of Eurasian Social Dialogue*, 1(2), 30–40.
- Meza-Bolaños, D., CompañRosique, P., & SatorreCuerda, R. (2019). Analysis of relevant factors to measure the impact of investment in e-learning ecosystems in public universities. In: Á. Rocha, C. Ferrás, & M. Paredes. (eds.). *Information Technology and Systems*. ICITS 2019. Advances in Intelligent Systems and Computing, vol. 918. Springer, Cham. https://doi.org/10.1007/978-3-030-11890-7_73
- MOEX. (2019). Moscow Exchange. Online businesses – the future here and now. Retrieved from <https://place.moex.com/analytics/news/internet-kompanii-budushee-zdesi-seychas>
- Naletova, I. V. (2015). Changes in the education system under the influence of online technologies. *Gaudeamus*, 2(26), 9–13.
- Nie, D., Panfilova, E., Samusenkov, V., & Mikhaylov, A. (2020). E-learning financing models in Russia for sustainable development. *Sustainability*, 12(11), 4412. <https://doi.org/10.3390/su12114412>
- Peng, H., Ma, S., & Spector, J. M. (2019). Personalized adaptive learning: An emerging pedagogical approach enabled by a smart learning environment. In: M. Chang, E. Popescu, Kinshuk, N.-S. Chen, M. Jemni, R. Huang, J. M. Spector, & D. G. Sampson. (eds.). *Foundations and Trends in Smart Learning. Lecture Notes in Educational Technology*. Springer, Singapore. https://doi.org/10.1007/978-981-13-6908-7_24
- Research and Markets. (, 2020). Global Online Education Market - Forecasts from 2020 to 2025. Retrieved from <https://www.researchandmarkets.com/reports/4986759/global-online-education-market-forecasts-from>
- Rosstat. (2020). The Federal State Statistics Service of the RF. Retrieved from <https://rosstat.gov.ru>
- San-Martín, S., Jiménez, N., Rodríguez-Torrico, P., Piñeiro-Ibarra, I. (2020). The determinants of teachers' continuance commitment to e-learning in higher education. *Education and Information Technologies*, 25, 3205–3225. <https://doi.org/10.1007/s10639-020-10117-3>
- Seaman, J. E., Allen, I. E., & Seaman, J. (2018). Grade increase: Tracking distance education in the United States. Babson Survey Research Group. Retrieved from <https://onlinelearningsurvey.com/reports/gradeincrease.pdf>
- Sergeev, A. G., Zhigalov, I. E., Balandina, V. V. (2016). *Introduction to e-learning*. Vladimir: VISU University.

- Statista. (2019). Market volume of online education in Russia in 2016 with a forecast until 2021, by education level. Retrieved from <https://www.statista.com/statistics/1072423/online-education-market-volume-in-russia-by-type/>
- Statista. (2020). Most popular platforms for online courses in Russia in 2019. Retrieved from <https://www.statista.com/statistics/1073587/most-popular-online-course-platforms-russia/>
- Sulimin, V. V., & Shvedov, V. V. (2018). Digital economy and online education: Problems and prospects. *Global Scientific Potential*, 6(87), 40–41.
- TAdviser. (2014). Online education. Global market. Retrieved from <https://www.tadviser.ru/a/235316>
- Tagarov, B. Zh. (2018). Main avenues for the online education market development in Russia. *Creative Economics*, 12(8), 1201–1212. <https://doi.org/10.18334/ce.12.8.39269>
- Tan, S. C., Ho, C. M., & Pang, V. (2016). Education inequality: Become better or worse? *Journal of Eurasian Social Dialogue*, 1(1), 1–5.
- Technavio. (2020). Online Education Market by Type and Geography - Forecast and Analysis 2020-2024. Retrieved from <https://www.technavio.com/report/online-education-market-industry-analysis>
- Telecom Daily. (2020). Forecast: Online education in the Russian Federation will grow to 40 billion rubles. Retrieved from <http://tdaily.ru/news/2020/03/24/prognoz-onlayn-obuchenie-v-rf-vyrastet-do-40-mlrd-rub>
- Titov, B. N. (2014). Evolution and development of theoretical background of the concept of life-long learning. *Professional Education in Russia and Abroad*, 1(13), 10–19.
- Uvarov, A. Yu., & Frumina, I. D. (2019). *Difficulties and prospects of digital transformation of education*. Moscow: HSE Publishing house.
- Varavva, M. Yu. (2008). Stages of formation and development trends of the knowledge economy. *Vestnik of Orenburg State University*, 4(85), 45–51.
- Virkus, S., Kiriniā, V., & Begiēviā Ređep, N. (2020). The role of e-learning and information culture in educational institutions in transforming European education. In: L. Moos, N. Alfireviā, J. Paviēiā, A. Koren, & L. Ēāēija. (eds.). *Educational Leadership, Improvement and Change*. Palgrave Studies on Leadership and Learning in Teacher Education. Palgrave Pivot, Cham. https://doi.org/10.1007/978-3-030-47020-3_9
- Vlasov, A. I., & Demin, A. A. (2017). Visual methods of formalization of knowledge in the conditions of the synchronous technologies of system engineering. In: *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3166094.3166098>
- Vlasov, A. I., Juravleva, L. V., & Shakhnov, V. A. (2019). Visual environment of cognitive graphics for end-to-end engineering project-based education. *Journal of Applied Engineering Science*, 17(1), 99–106. <https://doi.org/10.5937/jaes17-20262>
- Voloshin, D. (2020). Where is the EdTech market heading? Retrieved from <https://vc.ru/u/387242-terra-cognito/92714-kuda-dvizhetsya-rynok-edtech-trendy-2020-ot-dmitriya-voloshina>
- World Bank. (n.d.). In search of a new “Silver Age” in Russia: Factors and consequences of population aging. Retrieved from <http://documents1.worldbank.org/curated/en/820371468190168559/pdf/99487-RUSSIAN-WP-PUBLIC-Box393204B-silver-aging-rus-web.pdf>
- Wozniak, K. (2020). Personalized learning for adults: An emerging andragogy. In: S. Yu, M. Ally, & A. Tsinakos. (eds.). *Emerging technologies and pedagogies in the curriculum. Bridging Human and Machine: Future Education with Intelligence*. Springer, Singapore. https://doi.org/10.1007/978-981-15-0618-5_11

- Yessenbekova, U. M., Turzhan, O. I., Koshanova, K. A., Yegemberdiyev, I. D., & Kutym, B. K. (2020). Role of media in addressing the socialization problems of the younger generation: The case of Kazakhstan. *Media Watch*, 11(2), 348–355. <https://doi.org/10.15655/mw/2020/v11i2/195659>
- Zaborovskaya, O. V. (2005). Human capital and the role of the education system in its formation. *Innovations*, 4(81), 68–72.
- Zotova, E. (2020). EdTech 2020: How education is changing through online services and VR. Retrieved from <https://hightech.fm/2020/01/11/edtech-Russia>

Valentina E. Guseva (PhD., Omsk State Pedagogical University, 2008) is an Assistant Professor in the Department of Business Informatics and Mathematics at Tyumen Industrial University, Tyumen, Russian Federation. Her research interests are in mathematical methods in economics, forecasting processes, statistical methods of information processing, institutional economy, public-private partnership, and sustainability.

Elena N. Fokina (PhD., Tyumen State University, 2002) is an Associate professor of the Department of Business Informatics and Mathematics of the Tyumen Industrial University, Tyumen, Russian Federation. Her scientific interests are in education, mathematical methods of research in the economy, information technology, vocational training, and social networks.