

DOI: 10.7596/taksad.v8i3.2240

Citation: Sofronova, N. V., Romanenko, Y. A., Belchusov, A. A., & Ignatieva, E. A. (2019). Public Organizations in the Development of Informatization of Education: A Case Study from Russia. *Journal of History Culture and Art Research*, 8(3), 46-59. doi:<http://dx.doi.org/10.7596/taksad.v8i3.2240>

**Public Organizations in the Development of Informatization of Education:
A Case Study from Russia**

**Nataliya V. Sofronova¹, Yuriy A. Romanenko²,
Anatoly A. Belchusov³, Emilia A. Ignatieva⁴**

Abstract

The paper addresses the identified gap existing in the contemporary scholarship by providing a case study of a public organization's involvement in addressing pressing issues in the field of informatization of education. First of all, on the basis of the literature review conducted by us, we identify a total of three key areas of informatization of education: (1) intensive development of digital information technology in education; (2) scientific understanding and forecasting of informatization of education; (3) introduction of achievements made in science and technology into the practice of the educational process. Within the case, we briefly outline the key steps in the development of informatization of education in the Soviet Union and the Russian Federation. Then we gradually review the key activities conducted by the Academy of Informatization of Education in different regions, additionally focusing on its leading regional branch. A detailed review allows us to develop a clear understanding of the main direction of informatization of education in Russia, as well as the role played by a public organization in these processes. Also, we emphasize the role of entrepreneurial activities of public organizations to sustain themselves, as well as the need to apply for grant support. Within the three key directions of informatization of education outlined above on the basis of the literature review conducted by us, we also review social projects conducted by public organizations in Russia, particularly those which received financial support from the largest Russian Presidential Grants Fund. Such an analysis allows us (a) to trace federal priorities in providing financial support for public organizations working in the field of informatization of education, as well as (b) to analyze a regional dispersion of the projects supported, including their variety and scope. The research conducted clearly shows that public organizations mainly cover only two key directions, but they almost completely ignore the third demanding direction – “scientific understanding and forecasting of processes in informatization of education.”

Keywords: Public organization, Informatization of education, Professional education, Distance competitions for schoolchildren, Conferences for teachers.

¹ Doctor of Pedagogical Sciences, Professor, Professor of the Department of Informatics and ICT, I. Yakovlev Chuvash State Pedagogical University, Cheboksary, Russia. E-mail: n_sofr@mail.ru

² Doctor of Technical Sciences, Professor, Senior Researcher, Military Academy of Strategic Rocket Troops named after Peter the Great (Branch), Serpukhov, Russia. E-mail: romanenko-55@inbox.ru

³ Candidate of Technical Sciences, Associate Professor, Head of the Department of Informatics and ICT, I. Yakovlev Chuvash State Pedagogical University. E-mail: belchusov@mail.ru

⁴ Candidate of Psychological Sciences, Associate Professor, Associate Professor of the Department of Informatics and ICT, I. Yakovlev Chuvash State Pedagogical University, Cheboksary, Russia. E-mail: iehmiliya@yandex.ru

Introduction

Nowadays, scientific and technical progress is associated with the active introduction of information and communication technology (ICT) tools in all spheres of human activity. One of the key areas for ICT dissemination is informatization of education, and this question is also widely covered in the scholarly literature. On the basis of the literature review conducted by us, we distinguish a total of three interrelated directions of informatization of education (Wallace, 2009; Callum & Jeffrey, 2013; Arkorful & Abaidoo, 2015; Bhattacharjee & Deb, 2016; Sampson et al., 2016; Vega-Hernández, Patino-Alonso, & Galindo-Villardón, 2018; Harerimana & Mtshali, 2019; Asongu, Orim, & Nting, 2019; Scherer & Siddiq, 2019; Robert, 2019): (1) intensive development of digital information technology in education; (2) scientific understanding and forecasting of informatization of education; (3) introduction of achievements made in science and technology into the practice of the educational process.

These three directions are addressed in various government plans and programs aimed at introducing and accelerating the "digital education" agenda (OECD, 2015a; OECD, 2015b; Williamson, 2016; Conrads et al., 2017). Also, educational organizations themselves are often perceived as the main accelerators of innovative development, including in the processes of informatization and digitalization (Shengquan & Li, 2006; Zaslavsky, 2016; Aiqun, 2018). However, the role of public organizations in informatization of education is almost neglected in the scholarly literature. Public organizations are superficially mentioned from time to time in the published research (Collis & Jung, 2002; Chanyagorn & Kungwannarongkun, 2011; Iniesta-Bonillo, Sánchez-Fernández, & Schlesinger, 2013; Vergel de Dios, 2016), but there is no comprehensive overview of the role played by them in informatization of education. However, social science scholars clearly indicate the greatest role of non-governmental organizations in social change and innovative development (Doh & Teegen, 2003; Ngo & O’Cass, 2013; Islam, 2014; Harfitt, 2016).

Thus, this research is aimed at addressing the gap existing in the literature on informatization of education and presents a case study of a public organization from Russia. In particular, we focus on the Academy of Informatization of Education, which is the leading and oldest interregional organization in the considered field in the whole post-Soviet space. While “unpacking” our case, we briefly outline the key steps in the development of informatization of education in the Soviet Union and the Russian Federation. Then we gradually review the key activities conducted by the Academy of Informatization of Education in different regions, additionally focusing on its leading regional branch, the Chuvash Regional Department of the Academy of Informatization of Education (Cheboksary, Russia). Such a detailed review allows one to develop a clear understanding of the main direction of informatization of education in Russia, as well as the role played by a public organization in these processes.

More than that, the authors emphasize the role of entrepreneurial activities of public organizations to sustain themselves, as well as the need to apply for grant support. Within the three key directions of informatization of education outlined above on the basis of the literature review conducted by us, we

also review social projects conducted by public organizations in Russia, particularly those which received financial support from the largest Russian Presidential Grants Fund. Such an analysis allows us (a) to trace federal priorities in providing financial support for public organizations working in the field of informatization of education, as well as (b) to analyze a regional dispersion of the projects supported, including their variety and scope.

Consequently, the presented analysis contributes to the scholarship by providing a case study of a public organization's contribution to the development of informatization of education in Russia and thus addressing the existing gap in the literature on this topic. The results of our research can be also used by other public organizations working in Russia and abroad, especially when applying for grant support and drafting their development strategies.

Academy of Informatization of Education

The beginning of the process of informatization in education can be attributed to the middle of the last century when there were even no personal computers yet. University students studied programming on the basis of large and medium-sized computers. At the same time, the first programming circles for schoolchildren appeared in the Soviet Union and abroad. A group of scientists under the leadership of Academician Andrei P. Ershov were at the origins of the School of Informatics in the Soviet Union (Monakov, 2012). In 1985, including the discipline "Informatics" into the list of compulsory school subjects established the foundation of informatization in education in the USSR and later in Russia. If we apply the terminology of synergy, then the year of 1985 can be called a bifurcation point.

Abroad, by that time, there was already the experience of using computers in training, which is covered extensively by foreign researchers, such as Graves (1968), Moriguti (1985), Ragsdale (1991), Riedling (1986), Taylor (1987), etc. But the Russian scientists were looking for their own ways. A variety of theories, textbooks, work programs, a wide variety of school computer equipment and methodological approaches to its use appeared, especially ones developed by Andreev (2013), Vagramenko and Rusakov (2017), Grigoriev, Grinshkun, and Koloshein (2012), Guzhvenko and Tumakov (2012), Danilchuk (2002), Kuznetsov (2014), Monakhov (2012), etc.

Gradually, this chaos turned into a scientific concept set in the federal state educational standards of general education (primary, basic, and complete ones). Requirements for the results of vocational and inclusive education were strictly regulated in Russia (Zamyatin, 2012; Fedorov and Tretyakova, 2016). But there were still a lot of people left behind, who were educated in the "pre-computer" era. To have a full and productive life in the information society, knowledge in the field of computer technology was necessary for them. To solve the problems of informatization of education, public associations came to aid Russian state educational institutions. One of them is the interregional public organization "Academy of Informatization of Education."

Established in 1996, the Academy of Informatization of Education (AIE) unites scientists and specialists from universities, scientific institutions, educational institutions, and educational authorities in Moscow and the Moscow Region, as well as in St. Petersburg, Yekaterinburg, Perm, Rostov-on-Don, Penza, Tula, Cheboksary, and other cities and regions of the Russian Federation (20 branches in total) (AIE, n.d.).

In the AIE departments, cutting-edge research conducted on the actual topics within the framework of the federal program of informatization of education and regional programs. Particularly, in accordance with the Orders of the Ministry of Education of the Russian Federation in 2002–2004 (Ministry of Education of Russia, n.d.), a number of projects in the interests of providing information for youth policy were carried out. For instance, the All-Russian Student Portal was created for the Department of Youth Policy (StudPortal, n.d.). Currently, the Russian Portal of Informatization of Education, created and maintained by the Academy, is functioning. Also, a number of seminars in the framework of scientific readings (conference) “Actual Problems of the Implementation of E-Learning and Distance Learning Technologies” are regularly held (AIE, 2019a), and the Academic Attestation Council for assigning a degree of Doctor of Philosophy (Ph.D.) is working in the Academy of Informatization of Education (AIE, 2019b). According to the Special Decision of the Ministry of Education and Science of the Russian Federation, members of the AIE are included in the composition of experts in the selection of applications and the evaluation of the results of education informatization projects.

The AIE annually holds events of a nationwide scale (conferences, symposia), due to which the work experience and the results of developments in the field of informatization of education extend to the entire education system of Russia. The Academy of Informatization of Education also conducts the following activities (AIE, n.d.): (1) research in the field of scientific and pedagogical problems of informatization of education; (2) Information service of education; (3) examination of software, technical and technological projects, software and hardware for informatization of education; (4) organization and holding of international and All-Russian scientific conferences, seminars, symposia on the problem of developing the program-methodical base for ensuring the informatization of education.

Since the Academy of Informatization of Education is an interregional public organization, it has a number of branches in different regions of Russia. One of the leading branches is the Public Organization of Additional Professional Education “Chuvash Regional Department of the Academy of Informatization of Education” (hereinafter referred to as the Chuvash Organization). From the very first days (since 2005), activities of the Chuvash Organization have been focused on enhancing students’ educational interests in the field of Informatics and ICT, as well as devoting a lot of effort for providing opportunities for professional growth of Informatics teachers. For instance, the Chuvash Organization regularly holds contests in Computer Science, programming tournaments, the International Scientific and Practical Conference “Internet technologies in education”, and other events (Sofronova, 2015).

Since 2005, the Chuvash Organization has been holding the “Infoznayka” competition in Informatics. The Ministry of Education and Youth Policy of Chuvashia has been supporting the “Infoznayka” competition since 2007. Also, the competition was included as one of the events in the Republican target program *“Development of a Unified Educational Information Environment in the Chuvash Republic for 2011-2020”*, which was adopted by the resolution of the Cabinet of Ministers of the Chuvash Republic on September 25, 2008 N 293 (Cabinet of Ministers, 2008). Since 2013, the competition has gained an international status. Such countries as Kazakhstan, Moldova, South Korea, Ukraine, Latvia, and others take part in the competition on a regular basis. Its main goal is to stimulate students' cognitive interest of students of general education institutions in the field of Informatics and ICT, as well as to find and support the most gifted and motivated children in the field of ICT. To get a larger audience and provide a remote form for participation in the competition, a special website was created, which can be accessed via the following link: <<http://www.infoznaika.ru>> (Belchusov, 2013).

It is very important for organizations to engage in social entrepreneurship so they can become more sustainable. In accordance with the license to carry out educational activities, the organization provides opportunities for the professional development of teachers via a number of programs in additional professional education. These programs are posted on the website <www.moodle.infoznaika.ru>. All program developers are the members of the organization and ordinary teachers, which ensures providing advanced knowledge and skills. Revenues collected from educational services are transferred to support other organizations' activities.

During the time of obtaining the educational license by the organization (November 2015), more than two hundred teachers were trained in various advanced training programs. Let's name some of these courses: (1) Psychological and Pedagogical Foundations of Organization Inclusive Education in Schools; (2) Solving Non-Standard Computer Science Problems; (3) Teacher's Web Portfolio; (4) Foundation in Visual Programming in C ++ Builder Environment; (5) Scientific and Methodological Support of the Educational Process; (6) Methods of Teaching Computer Science; (7) Fundamentals of Web-Design and Site Building in UCOZ; (8) Informatization of Educational Process management; (9) computer graphics and animation in computer science lessons; (10) robotics at school; (11) information technology in education. Teachers who have successfully completed the training receive a Certificate of Professional Development (Issued under the State License).

Another method that is important and effective in summarizing pedagogical experience is the “Methodical Piggy Bank.” There is also a specially developed website available (<<http://teacher.infoznaika.ru>>), with the help of which the Russian-speaking teachers from almost all post-Soviet countries archive their methodological materials, such as presentations, notes of lessons, etc. The “Methodical Piggy Bank” provides the following features: (1) free publication of teaching materials on school informatics, informatization of education, information technologies, methods of teaching informatics in an elementary school, etc.; (2) evaluation of works already loaded by other participants and receiving reviews and assessments of their own works; (3) obtaining a certificate of publication with a unique QR code representing a link to information about the published material. To date, in two years, 271 papers have been published and 192 papers are under review on the site.

One of the latest innovations in the activities of the organization is the educational video journal “Infroznayka-Media” about research and methodological developments of Russian and foreign teachers in the field of distance learning, teaching Computer Science, and other subjects. The main goal of creating the video journal was to give an opportunity to visually tell in articles about new methods and pedagogical developments with the help of video inserts of the educational channel “Infroznayka-TV”; to ensure the wide distribution of the articles of scientists and our fellow teachers, other authors, using all modern digital communication channels (YouTube, social networks); to maintain constant feedback between readers and authors.

Grant Support for Informatization of Education

Financial support for social activities conducted by public associations is provided through funds. Since April 3, 2017, the Presidential Grants Fund has been a sole operator of the grants of the President of the Russian Federation for the development of civil society, combining several grant operators: Union of Women of Russia, Russian Union of Rectors, National Health League, Union of Pensioners of Russia, National Charitable Foundation, etc. (President of Russia, n.d.). We would like to list some projects supported by the Presidential Grants Fund in the field of informatization of education in 2018 (Table 1).

Table 1. Grant receivers in the field of informatization of education, All-Russian Grant Program in 2018, Presidential Grants Fund, direction “Support for Projects in the Field of Science, Education, and Enlightenment”

№	Project name	Organization	Grant, RUB
1.	Distance Learning Technologies for School Children With Disabilities	Autonomous Non-Profit Organization – “Center for Research, Educational and Consulting solutions UNIVERSUM”, Udmurtia	1,541,657.00
2.	Unlimited Opportunities in the “IT-Planeta” Student Information Technology Competition	Autonomous Non-Profit Organization “Center for development of information technologies IT-Planeta”, Krasnodar Region	1,641,024.00
3.	Digital Entrepreneurs – for Russia!	Foundation “National Center for Monitoring Technological Modernization and Scientific and Technological Development”, Moscow	1,728,975.00
4.	Professionals of the Future for the Digital Economy	Association “Siberian Methodological Agency for Territorial Development CONCEPT”, Novosibirsk Region	1,146,565.40
5.	Holding the 2019 Moscow Programming Contest	Non-profit partnership “Fiztekh-Soyuz for the support and development of MIPT”, Moscow Region	2,976,532.00

6.	“Children of the Digital Era” – Engineers of the XXI century	Association “Board of Trustees of the Municipal Budgetary Educational Institution Lyceum №87 named after L. I. Novikova,” Nizhny Novgorod	1,393,829.45
7.	“Virtual first class” for Children with Disabilities	Belovo City Organization of the All-Russian Public Organization “All-Russian Society of Disabled People”, Kemerovo Region	364,615.39
8.	Virtual Reality in Education	Autonomous non-profit educational organization “Private School ‘Medina’”, Karachay-Cherkess Republic	470,321.00
9.	Video Making for Yourself	Regional Public Organization “Council of Veterans of the Federal State Budgetary Educational Institution of Higher Education “National Research Mordovian State University named after N. P. Ogarev””, Republic of Mordovia	220,453.00
10.	Developing Creative and Artistic Video Classes for Children of Preschool and Primary School Age, As Well As Children with Disabilities	Charitable Non-Commercial Partnership “Assistance to Participants of the Charitable Activity ‘WIND OF CHANGE’”, Ivanovo Region	760,672.00
11.	IT-School “The Growth Point”	Chuvash Republican Public Organization “Association of Participants of the Federal Program for the Training of Managerial Personnel for the Branches of the National Economy of the Russian Federation ‘Development’”, Chuvash Republic	496,540.00
12.	Special Multimedia Interactive Educational Project “The Main Law of the Country: 25 years of the Constitution of Russia”	Regional Organization “The Youth Organization ‘Prospect Mira’”, Moscow	21,546,314.00
13.	School for Teachers in Robotics	Organization of Additional Education - Private Educational Institution "Center of additional education SNEYL”	1,220,746.40
14.	Computer Literacy for People with Limited Mobility	Abzelilovskaya District Organization of the Bashkir Republican Organization of the All-Russian Public Organization “All-Russian Society of Disabled People”, Republic of Bashkortostan	563,051.90
15.	Digital Education of Teachers	Private Educational Institution of Additional Professional Education “Scientific and Educational Center for Social and Economic Technologies”, Tyumen Region	318,879.20
16.	“InIT” Computer Courses of Web-Developers for People with Disabilities	Regional Public Organization of the Disabled People in the Republic of Tatarstan “Integration”, the Republic of Tatarstan	859,680.00

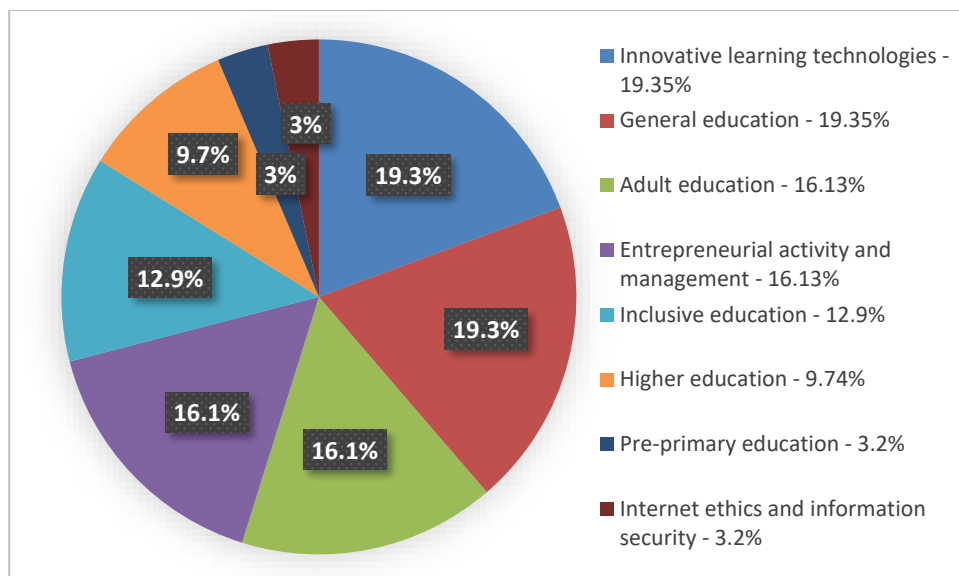
17.	Network Competence “The Power of Argument”	Autonomous Non-Profit Organization of Additional Professional Education “Open Education”, Moscow	1,455,600.00
18.	Workshop on Drones	Public Organization of Veterans (pensioners) of Labor, War and Hostilities, Armed Forces and Law Enforcement Agencies of the Municipality “Yamalsky District,” Yamal-Nenets Autonomous Region	205,000.00
19.	Build the Future with Lego	Autonomous Non-Profit Organization of Additional Education “Planet of the Childhood,” Chelyabinsk Region	247,495.00
20.	Leaders of the Digital Economy	Association of the Internet of Things - Market Participants, Moscow	2,994,208.00
21.	Program on Counteracting Cyberbullying and Hate Speech in the Internet “Agra.net”	Chelyabinsk Regional Youth Public Organization “Institute for Social Innovation of the Youth PROMOTION”, Chelyabinsk Region	328,936.34
22.	Regional Center for Digital Competencies in Minors “Kodika”	Oryol Regional Public Organization for Social Support of the Population “Red Bridge,” Oryol Region	1,617,272.13
23.	Network Gamified Training Platform “Allotrop”	Autonomous Non-Profit Organization “Electronic Education for Nanoindustry,” Moscow	4,045,192.01
24.	Learn to Learn: Using Computer Training to Compensate for Functional Literacy Deficiencies	Autonomous Non-Profit Organization “Innovation Center ‘Technologies of Modern Education’”, St. Petersburg	1,307,928.00
25.	Training in Digitalization of the Main Management Processes of Management Representatives in the Field of Education and Culture of Regions of the Russian Federation	Non-Profit Partnership “Directors Club for Science and Innovations”, Moscow	8,610,640.90
26.	Social Project “Electronic veteran” for Training Computer Literacy to the Citizens of Older Generation	Mozhginskaya City Public Organization of Veterans (pensioners) of War, Labor, Armed Forces and Law Enforcement Agencies, the Udmurt Republic	421,799.93
27.	Socialization of Children and the Youth in the Network of School-University Interaction	Non-Profit Partnership “Board of Trustees of the Municipal Educational Institution of Primary Secondary School No. 95 of Chelyabinsk”, Chelyabinsk	490,185.60

28.	Project in the Field of Media Education and Education for Children and Adolescents “Cultural Code”	Saratov Regional Public Organization named after V. Mikoshi to Support Film Production and Television, Saratov Region	904,409.20
29.	Children's Scientific and Educational Career Guidance Course in Digital Astronomy “Star Future”	Foundation for Education Support “NOOSPHERE,” Moscow	1,364,266.40
30.	School of IT Partnership: The Big Game	Autonomous Non-Profit Organization “Center for Project Solutions of Community Schools”, Altai Region	480,000.00
31.	Interactive Environment: Creating Interactive Online Training Courses for Teachers in the Field of Civic Education of Young people	Private Institution of Additional Education “Federal Scientific and Methodological Center in the Field of Psychology and Pedagogy of Tolerance”, Moscow	1,379,830.00

Source: (President of Russia, n.d.).

First of all, we would like to note that a group of projects in the field of informatization of education accounted for 7.7% of all projects in the direction “Support for Projects in the Field of Science, Education, and Enlightenment,” which is a pretty large percent taking into account all other demanding challenges in this sphere.

Second, we note a good representation of the supported projects in the regions of Russia. Let’s review the key components supported by the Presidential Grants Fund in the field of informatization of education in 2018. The full percentage ration is presented in Figure 1, but we would like to note the largest components: (1) 6 projects on innovative learning technologies (19.35%); (2) 6 projects on general education (19.35%); (3) 5 projects on entrepreneurial activity and management (16.13%); (4) 5 projects on adult education (16.13%); and (5) 4 projects on inclusive education (12.9%).



Source: (President of Russia, n.d.).

Figure 1. Key directions of social projects in the field of informatization of education supported by the Presidential Grants Fund

A number of projects appear to us very important and quite unique. Such projects as “Virtual Reality in Education”, “Workshop on Drones”, “Building the Future with Lego”, and others can be considered as those projects that we conventionally attribute to the intensive development of digital information technologies in education. Among many projects in the field of “Implementing Science and Technology Achievements in the Practice of the Educational Process”, we would like to highlight the most topical projects, namely the following: “Video Making for Yourself” (for pensioners), “Developing Creative and Artistic Video Classes for Children of Preschool and Primary School Age, As Well As Children With Disabilities”, the special multimedia interactive educational project “The Main Law of the Country: 25 years of the Constitution of Russia,” the program on counteracting cyberbullying and hate speech in the Internet “Agra.net”, and the regional center for digital competencies in minors “Kodika.”

Consequently, of the above areas of informatization of education, the Presidential Grants Fund mostly supports the following two areas: (1) intensive development of digital information technology in education; (2) implementation of science and technology achievements in the practice of the educational process. The direction “scientific understanding and forecasting of processes in informatization of education” is not represented in the projects. Although, as considered above, the scientific potential of public associations is quite high in this issue.

Conclusion

Summing up, we note that public organizations have great potential in terms of solving social problems, particularly in the development of informatization of education, and make a feasible contribution to all areas of informatization of education that we have identified earlier. One of the

most vivid examples of a public organization's involvement in solving educational problems in Russia is the Academy of Informatization of Education based in Moscow. It conducts a number of diverse activities, which have both a policy impact, real implication on the ground, and attract the best scholars, thinkers, and activists to facilitate innovation and change in the field of informatization of education in Russia. More than that, our analysis of the leading public organization's projects in the field of informatization of education clearly shows that there is a large enough percentage of them being supported among all others, they have a vivid diversity and aim to address the whole range of challenges. However, it is also clear that public organizations mainly cover only two key directions (intensive development of digital information technology in education and implementation of science and technology achievements in the practice of the educational process), but they almost completely ignore the third demanding direction – "scientific understanding and forecasting of processes in informatization of education." Thus, it is highly recommended to devote more attention to this direction in order to have more efficient results of public organization's involvement aimed at addressing pressing challenges of informatization of education in Russia.

References

- AIE, Academy of Informatization of Education. (n.d.). *Website of the Academy of Informatization of Education*. Retrieved from <http://www.acinform.ru>
- AIE. (2019a). *A list of scientific conferences*. Retrieved from <http://www.acinform.ru/confer.htm>
- AIE. (2019b). *Academic Attestation Council*. Retrieved from <http://www.acinform.ru/phd.htm>
- Aiqun, Z. (2018). An IT capability approach to informatization construction of higher education institutions. *Procedia Computer Science*, 131, 683-690.
- Andreev, A. A. (2013). *Internet technologies and learning models in the Internet environment*. Moscow, Russia: MIPK.
- Arkorful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology and Distance Learning*, 12(1), 29-42.
- Asongu, S. A., Orim, S. M. I., & Nting, R. T. (2019). Inequality, information technology and inclusive education in sub-Saharan Africa. *Technological Forecasting and Social Change*, 146, 380-389.
- Belchusov, A. A. (2013). Formation of universal educational actions when a student passes the stages of a distance competition. *European Social Science Journal*, 10-2(37), 113-118.

- Bhattacharjee, B., & Deb, K. (2016). Role of ICT in 21st century's teachers' education *International Journal of Education and Information Studies*, 6(1), 1-6.
- Cabinet of Ministers. (2008). *Resolution of the Cabinet of Ministers of the Chuvash Republic on September 25, 2008 No 293*. Cheboksary, Russia: Government of the Chuvash Republic.
- Callum, K. M., & Jeffrey, L. (2013). The influence of students' ICT skills and their adoption of mobile learning. *Australasian Journal of Educational Technology*, 29(3), 303-331.
- Chanyagorn, P., & Kungwannarongkun, B. (2011). ICT readiness assessment model for public and private organizations in developing country. *International Journal of Information and Education Technology*, 1(2), 99-106.
- Collis, B., & Jung, I. (2002). Uses of information and communication technologies in teacher education. In B. Robinson & C. Latchem (Eds.), *Teacher education through open and distance learning* (vol. 3) (pp. 171-192). London, UK: Routledge.
- Conrads, J., Rasmussen, M., Winters, N., Geniet, N., & Langer, L. (2017). *Digital education policies in Europe and beyond*. Retrieved from http://publications.jrc.ec.europa.eu/repository/bitstream/JRC109311/jrc109311_digedupol_2017-12_final.pdf.
- Danilchuk, Ye. V. (2002). *Theory and practice of forming the information culture of the future teacher*. Moscow and Volgograd, Russia: Peremena.
- Doh, J. P., & Teegen, H. (2003). *Globalization and NGOs: transforming business, government, and society*. Westport, Conn.: Praeger.
- Fedorov, V. A., & Tretyakova, N. V. (2016). The development of vocational pedagogical education in Russia (organizational and pedagogical aspect). *International Journal of Environmental and Science Education*, 11(17), 9803-9818.
- Graves, W. H. (1986). Personal computing and liberal education: a higher-education case study. *Education and Computing*, 2(3), 215-222.
- Grigoriev, S. G., Grinshkun, V. V., & Koloshein, A. P. (2012). *Methodology of the use of electronic educational resources in the educational process of a university: a study guide*. Voronezh, Russia: Publishing House "Scientific Book."
- Guzhvenko, E. I., Tumakov, N. N. (2016). The study of the capabilities of information technology in the field of humanities in military universities. *Scientific notes of the IEM of the RAE*, 4(60), 69-72.

- Harerimana, A., & Mtshali, N. G. (2019). Types of ICT applications used and the skills' level of nursing students in higher education: A cross-sectional survey. *International Journal of Africa Nursing Sciences*, 11, Art. No. 100163, 1-15.
- Harfitt, G. (2018). The role of the community in teacher preparation: Exploring a different pathway to becoming a teacher. *Frontiers in Education*, 3.
- Iniesta-Bonillo, M., Sánchez-Fernández, R., & Schlesinger, W. (2013). Investigating factors that influence on ICT usage in higher education: A descriptive analysis. *International Review on Public and Nonprofit Marketing*, 10(2), 163-174.
- Islam, M. R. (2014). Non-Governmental Organizations' Role for Social Capital and Community Empowerment in Community Development: Experience from Bangladesh. *Asian Social Work and Policy Review*, 8(3), 261-274.
- Kuznetsov, A. A. (2014). Fundamentals of the general theory and methods of teaching computer science. Moscow, Russia: Bean – Laboratory of Knowledge.
- Ministry of Education of Russia. (n.d.). *Database on all official documents*. Retrieved from <https://www.minobrnauki.gov.ru/documents/>
- Monakhov, V. M. (2012). Informatization of teaching and methodological support of the holistic process of forming competences and technological monitoring of their quality management. *Vestnik MGGU named after M. A. Sholokhov. Pedagogy and Psychology*, 4, 46-59.
- Moriguti, S. (1985). Editorial: computers and development. *Education and Computing*, 1(3), 143-144.
- Ngo, L. V., & O' Cass, A. (2013). Innovation and business success: The mediating role of customer participation. *Journal of Business Research*, 66(8), 1134-1142.
- OECD. (2015a). *Implications of digital technology for education policy and practice*. Retrieved from <https://www.oecd-ilibrary.org/docserver/9789264239555-11-en.pdf?expires=1567769835&id=id&accname=guest&checksum=5F58C9B3DC249F09D96473D662D69B26>
- OECD. (2015b). *Students, computers and learning: making the connection*. Retrieved from <http://dx.doi.org/10.1787/9789264239555-en>
- President of Russia. (n.d.). *Presidential Grants Fund*. Available from: <https://президентскиегранты.рф>
- Ragsdale, R. G. (1991). Effective computing in education: teachers, tools and training. *Education and Computing*, 7(3-4), 157-166.
- Riedling, E. (1986). Educational software review. *Education and Computing*, 2(1-2), 81-85.
- Robert I. V. (2019). On the development of the conceptual apparatus of informatization of education. *Pedagogical Computer Science*, 1. Available from: http://pedinf.ru/content_1.19.htm

- Sampson, D., Ifenthaler, D., Spector, J.M., & Isaías, P. (Eds.). (2016). *Digital technologies: Sustainable innovations for improving teaching and learning*. Berlin, Germany: Springer.
- Scherer, R., & Siddiq, F. (2019). The relation between students' socioeconomic status and ICT literacy: Findings from a meta-analysis. *Computers & Education, 138*, 13-32.
- Shengquan, Y., & Li, C. (2006). Construct harmonious information ecology and break through predicament of educational informatization. *Distance Education in China, 5*, 78-84.
- Sofronova, N. V. (2015). The role of public organizations in the process of preparing IT specialists. In I. Sh. Mukhametzyanov & R. R. Fakhrutdinov (Ed.), *Informatization of Education-2015: Proceedings of the International Scientific-Practical Conference* (pp. 361-364). Volgograd, Russia.
- Sofronova, N. V. (2016). The system of propedeutic training in computer science. *Primary School, 3*, 43-47.
- StudPortal. (n.d.). *All-Russian student portal*. Retrieved from <https://portalstudenta.ru>.
- Taylor, R. P. (1987). How will computing change education? *Education and Computing, 3*(1-2), 101-105.
- Vagramenko, Ya. A., Rusakov, A. A. (2017). Pedagogical aspects of the impact of ICT on the nature of modern education. *Educational Technologies and Society, 20*, pp. 384-390.
- Vega-Hernández, M. C., Patino-Alonso, M. C., Galindo-Villardón, M. P. (2018). Multivariate characterization of university students using the ICT for learning. *Computers & Education, 121*, 124-130.
- Vergel de Dios, B. (2016). *Building and sustaining national ICT: Education agencies lessons from the Philippines*. Washington, D.C.: The World Bank.
- Wallace, P. (2009). Distance learning for gifted students: Outcomes for elementary, middle, and high school aged students. *Journal for the Education of the Gifted, 32*(3), 295-320.
- Williamson, B. (2016). Digital education governance: data visualization, predictive analytics, and 'real-time' policy instruments. *Journal of Education Policy, 31*(2), 123-141.
- Zamyatin, K. (2012). The education reform in Russia and its impact on teaching of the minority languages: an effect of nation-building? *Journal of Ethnopolitics and Minority Issues in Europe, 11*(1), 17-47.
- Zaslavsky, A. A. (2016). Classification of services for the organization of information space at educational organizations. *RUDN Journal of Informatization in Education, 4*, 106-112.