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To cite this article: Igor V Kovalev and Anna A Voroshilova 2020 J. Phys.: Conf. Ser. 1691 011001

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Overview of the I Scientific Conference on Advances in Science, Engineering and Digital Education – ASEDU-2020

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Abstract. The overview describes the main directions and results of the I International Scientific Conference ASEDU-2020 held in Krasnoyarsk in October 8-9, 2020. It gives the details about the participants and the proceedings.

The Volume contains Proceedings of the I Scientific Conference on Advances in Science, Engineering and Digital Education (ASEDU-2020) which was held at the Krasnoyarsk Science and Technology City Hall in Krasnoyarsk, Russian Federation and at Krasnoyarsk State Pedagogical University named after V. P. Asfawyev in October 8-9, 2020.

The purpose of these scientific events is to share the results and prospects in the field of application and development of the digital educational environment based on innovative technologies. The conference was dedicated to modern achievements in science, engineering and digital education. The key speeches and discussion were devoted to the urgent issues of introducing modern methods and technologies in education, including the trends and possibilities of modern education in mathematics, physics, computer science, pedagogy, etc.

The I Scientific Conference on Advances in Science, Engineering and Digital Education (ASEDU-2020) was jointly organised by the International and Russian Union of Scientific and Engineering Associations (Moscow, Russia), Krasnoyarsk State Pedagogical University named after V. P. Asfawyev and Krasnoyarsk Science and Technology City Hall.

The Program Committee and Editorial Board included prominent professors and scientists from the Russian Academy of Sciences, University of Maribor (Slovenia), Scientific Institute (Ulaanbaatar, Mongolia), IGM International Company (Almaty, Republic of Kazakhstan), Ruhr University in Bochum (Germany), Liaoning Normal University (China), Siberian Federal University (Russia), Reshetnev Siberian State University of Science and Technology (Russia), Ministry of Science, Research and Culture (Potsdam, Germany), Voronezh State Technical University (Russia) as well as specialists from Russian and foreign leading education and scientific organizations.

The international scope of the Conference was confirmed by the participation of representatives from 10 countries besides Russia (UK, Czech Republic, Ukraine, Malawi, Kazakhstan, Vietnam, Belarus, Uzbekistan, Iraq, Tajikistan, Kyrgyzstan):

- «Kharkiv Humanitarian-Pedagogical Academy» of the Kharkiv Regional Council, Kharkov, Ukraine
- Belarusian State University, Minsk, Belarus
- Bukhara Engineering-Technological Institute, Bukhara, Uzbekistan
The participants from Russia represented more than 200 universities, scientific institutes and organisations, centers for education development from more than 40 regions of the Russian Federation:

- Academy of Labor and Social Relations, Moscow
- Academy of Management of the Ministry of Internal Affairs of Russia
- Academy of Social Management, Moscow
- Admiral F.F. Ushakov State Maritime University, Novorossiysk
- Air Force Academy named after Professor N.E. Zhukovsky and Yu. A. Gagarin
- Altai State Technical University, Barnaul
- Altai State University, Barnaul
- Amur State University, Blagoveshchensk
- ASE Joint Stock Engineering Company, Nizhny Novgorod
- Baltic Fishing Fleet State Academy
- Bashkirk Academy of Public Service and Management under the Head of the Republic of Bashkortostan
- Bauman Moscow State Technical University
- Belgod State Agrarian University named after V. Ya. Gorin
- Belgorod State National Research University
- Belgorod University of cooperation, Economics and law
- Branch of the Ufa State Petroleum Technological University in Sterlitamak
- Bryansk State Technical University
- Bunin Yelets State University, Yelets
- Buryat Yelets State University, Yelets
- Center for Education Development of the Russian Academy of Education
- Center for Informatization of Vyatka technical Lyceum, Kirov
- Central branch of the Russian State University of Justice
- Chechen State University, Groznyy
- Chuvash State University, Cheboksary
- Control Systems LLC, Krasnoyarsk
- Department of Digital Technologies in Education, Vyatka State University, Kirov
- Department of Nursing, Orenburg State Medical University
- Department of Pedagogy, Institute of Pedagogy and Psychology of Education FSEI HE Moscow City Pedagogical University
- Department of Zoology and Ecology, Moscow State Pedagogical University
- Diplomatic Academy of the Ministry of Foreign Affairs of the Russian Federation, Moscow
- Don State Technical University, Rostov-on-Don
- Publishing House “Education and Science” Praha, Czech Republic
- Tajik State Finance and Economics University, Dushanbe, Republic of Tajikistan
- Tashkent State Technical University named after Islam Karimov, Tashkent, Uzbekistan
- University of Al-Qadisiyah, Diwaniyah, Iraq
- Oles Honchar Dnipro National University, Ukraine
- Nikolaev National University named after V. O. Sukhomlinsky, Ukraine
- Kh Dosmukhamedov Atyrau University, Kazakhstan
- Scientific and Technical Centre of JSC Uzbekenergo, Uzbekistan
- Kharkiv National Medical University, Ukraine
Ekaterinburg Academy of Contemporary Art
Engineering and Technological Academy of the Southern Federal University, Togang
Faculty of Biology and Chemistry Chechen State University, Grozny
Far Eastern Institute of Management - branch of the Russian Academy of National Economy and Public Administration, Khabarovsk
Far Eastern State Agrarian University
Federal Research Center «Computer Science and Control» of Russian Academy of Sciences», Moscow
Federal School for Advanced Studies RANEP, Moscow
Financial University under the Government of the Russian Federation
First Moscow state medical University named after I.M. Sechenov
Gzhel State University, Moscow region
Herzen State Pedagogical University of Russia
Yakovlev Chuvash State Pedagogical University, Cheboksary
Immanuel Kant Baltic Federal University
Institute of Art Education and Cultural Studies of Russian Academy of Education, Moscow
Institute of land surveying, cadastre and nature management of Krasnoyarsk state agrarian university
Institute of Railway Transport, a branch of Far Eastern State University of Transportation in Ussuriisk
Institute of world civilizations
Irkutsk National Research Technical University
Irkutsk State Agrarian University named after A.A. Zhnevsky
Irkutsk State University, Irkutsk
ITMO University, Saint Petersburg
JSC “Alfa Bank”. Moscow
JSC "Research and Development Institute of Construction Technology – Atomstroy"
JSC SPE "Radar MMS"
Kaluga State University named after K.E. Tsioflovski
Kaskad Ltd
Kazan National Research Technological University
Kazan state institute of culture
Kazan State Power Engineering University
Kirov State Medical University
Krasnodar Higher Military University of Name General of Army S.M. Shtemenko
Krasnodar University of the Ministry of Internal Affairs of the Russian Federation, Voronezh Institute of the Ministry of Internal Affairs of the Russian Federation
Krasnoyarsk Science and Technology City Hall, Krasnoyarsk
Krasnoyarsk scientific and research institute of agriculture
Krasnoyarsk State Agrarian University
Krasnoyarsk State Medical University named after Professor V.F. Voino-Yasenetsky
Krasnoyarsk State Pedagogical University named after V.P. Astafyev
Kuban State Agrarian University named after I.T. Trubilin, Krasnodar
Kuban State Technological University, Krasnodar
Kuban State University, Krasnodar
Kurgan State University
Kuznetsov Naval Academy in Kaliningrad
Lesosibirsk School of Education
LLC "Agrostroy", Russian University of Transport (MIIT)
LLC «RN–Vankor»
Lobachevsky University, Nizhny Novgorod
Lomonosov Moscow State University
Ltd Impulse-Service
Lyceum, Protvino, Moscow region
M.K. Ammosov North-Eastern Federal University, Yakutsk
Mari State University, Yoshkar-Ola
Mendeleeve University of Chemical Technology of Russia, Moscow
Michurinsk State Agrarian University
Military Institute (engineering) of the Military Academy logistics support named after Army General A. V. Hrulev, St. Petersburg
Military University of the Russian Federation, Defense Ministry, Moscow
Minin State Pedagogical University of Nizhny Novgorod
Ministry of Education and Science of Kuzbass, Kemerovo
• Saint-Petersburg University of EMERCOM of Russia
• Saint-Petersburg university of State fire service of EMERCOM of Russia
• Samara National Research University
• Samara State Agrarian University
• Samara State Technical University,
• Samara State University of Economics
• Samara State University of Social Sciences and Education
• Saratov Socio-Economic Institute of Plekhanov (branch) of Russian University of Economics named after G.V.Plekhanov
• Saratov State University
• School No 1579, Moscow City University
• School number 1191, Moscow
• Secondary school No. 2, Chaikovsky
• Sevastopol State University
• Sholom-Aleichem Priamursky State University, Birobidzhan
• Shukshin Altai State University for Humanities and Pedagogy, Biysk
• Siberian Federal University, Krasnoyarsk
• Siberian Fire and Rescue Academy EMERCOM of Russia, Zheleznogorsk
• Siberian State Automobile and Highway University
• Siberian State Industrial University
• Siberian State Medical University, Tomsk
• Smolensk state medical University
• Sochi State University
• South Ural State Humanitarian Pedagogical University, Chelyabinsk
• South Ural State Medical University
• South Ural State University
• State Academic University for the Humanities, Moscow
• State Marine Technical University, St. Petersburg
• State University of Management, Moscow
• State University, Kirov
• Stavropol State Pedagogical Institute
• Stock Company «Experimental Design Bureau «Electroavtomatika» named after P A Yefimov, Saint Petersburg
• T.F. Gorbachev Kuzbass State Technical University, Kemerovo
• The branch of the Far Eastern Federal University in Ussuriysk
• The Institute for Humanities Research and Indigenous Studies of the North, Russian Academy of Science, Siberian branch, Yakutsk
• The Main Directorate of EMERCOM of Russia for Krasnoyarsk Territory, Krasnoyarsk
• The Russian Presidential Academy of National Economy and Public Administration, Moscow
• The Russian Research Institute of Economics, Politics and Law in Science and Technology (RIEPL)
• Togliatti State University
• Udmurt State University, Izhevsk
• Ufa State Petroleum Technological University
• Ulyanovsk State Pedagogical University named after I. N. Ulyanov
• University of the Inter-Parliamentary Assembly of the Eurasian Economic Union
• Ural Federal University
• Ural Institute of State Fire Service of EMERCOM of Russia, Ekaterinburg
• Ural State University of Architecture and Art, Ekaterinburg
• Ural State University of Economics, Yekaterinburg
• V.A. Trapeznikov Institute of Control Sciences of Russian Academy of Sciences
• V.I. Vernadsky Crimean Federal University, Simferopol
• Vladimir branch of the Russian presidential Academy of national economy and public administration
• Vladimir State University named after Alexander Grigorievich and Nikolai Grigorievich Stoletov
• Volgograd State Socio-Pedagogical University
• Volgograd State University
• Voronezh Institute of Government Communications (branch) of the Academy of the Federal security service of Russia
• Voronezh Institute of the Federal Penitentiary Service of Russia
• Voronezh Institute of the Ministry of Internal Affairs of the Russian Federation
• Voronezh state pedagogical University
• Voronezh State Technical University
• Vyatka State University
• Volokolamsk agricultural College «Kholmogorka»
• Voronezh Institute of Government Communications (branch) of the Academy of the Federal security service of Russia
• Voronezh State Technical University
• Voronezh State Technical University
• Western branch of The Russian Presidential Academy of National Economy and Public Administration
• Yakut State Agricultural Academy, Yakutsk
The event has offered a platform for bringing together students, postdocs, innovative academics and education experts to exchange their ideas and contribute new approaches and digital technology to modern education in mathematics, physics, computer science, pedagogy, etc. Great interest was aroused by the section about innovative pedagogical technologies, digital education. These directions stimulated lively discussions among researchers as well as teachers.

The Conference provided the premier interdisciplinary and multidisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered and the solutions adopted in the fields of engineering and natural science education, information and communication technologies in higher and vocational education, development of digital educational environment based on innovative technologies, STEM-Education, theory and practice of effective management of an educational organization in modern conditions, engineering education and WorldSkills, problems and prospects of modern mathematical education, etc.

Although the schedule of the Conference was very tight, there were very vivid discussions among the participants. The program of the Conference consisted of keynote and plenary talks and numerous presentations.

The program of the Conference consisted of keynote and plenary talks and numerous presentations and included the following scientific directions:

- Engineering and natural science education;
- Problems and prospects of modern mathematical education;
- Physics: problems and prospects of modern education;
- Information and communication technologies in higher and vocational education;
- Urgent issues of digital transformation in education;
- Development of digital educational environment based on innovative technologies;
- Digital education: new methods and ways of organizing the educational process in the context of digitalization;
- STEM-Education;
- Engineering education and WorldSkills;
- Modern educational technologies;
- Use of artificial intelligence in education to improve learning outcomes;
- Modern pedagogical technologies in education;
- Theory and practice of effective management of an educational organization in modern conditions.

All participants were invited to present their papers in this Volume and all submitted manuscripts went through the independent peer review process. We are very grateful to all reviewers from Russia, China, Slovenia, Germany and Republic of Kazakhstan for their time and highly professional comments. We deeply believe that their reviews gave opportunity to improve the scientific quality of the presented papers which may be useful for academic, scientific and education partners.

More than 450 reports were submitted to the Organizing Committee of the Conferences ASEDU-2020. 295 reports were selected for inclusion into this Volume after the review process. All the papers were subjected to rigorous peer-review by conference committee members and international reviewers. The papers were selected based on their quality and relevance to the Conference directions. The proceedings present to the readers the recent advances in the field of natural science and engineering education (section 1), digital education (section 2), modern educational technologies (section 3), innovative pedagogical technologies (section 4). These papers reflect modern education and digital approaches in all Conference directions, broaden the researches of the previous Conferences [1-10]. We hope that you enjoy the reading of the papers.

We chose the IOP Journal of Physics: Conference Series to provide all contributors with the opportunity to publish their papers in an international, peer-reviewed journal. This is understood and
appreciated by all the participants of our Conference, and therefore this Volume provides an excellent overview of the main topics of our Conference.

**Acknowledgements**

We express our gratitude to the administration of Krasnoyarsk State Pedagogical University named after V. P. Asafyev for cooperation in organisation of ASEDU-2020. We are grateful to scientists and professors of Universities and specialists from Russian and foreign leading education and scientific organizations for active participation in the Conference.

On behalf of the conference committee and organizers, we would like to thank all the authors who contributed to this Volume as well as to the reviewers, speakers and all the conference participants for their support to ASEDU-2020.

We express gratitude to IOP Publishing for an opportunity to publish the Proceedings of the Conference to provide open access and to make them available for worldwide recognition.

**References**