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ADVANCED CENTRE FOR PhD STUDENTS AND YOUNG RESEARCHERS IN INFORMATICS (ACESYRI)

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Abstract. This article talks about the Center for Professional Training of Students and Young Researchers in Computer Science (ACeSYRI), which was created to provide an innovative infrastructure for international cooperation between students, researchers and teachers of Kazakhstani and European universities. ACeSYRI provides unique opportunities for the exchange of experience and knowledge between students and teachers from different countries, which in turn enriches the scientific and cultural experience of all participants.

Keywords: informatics, researchers, international cooperation, platform

ИНФОРМАТИКА БОЙЫНША PhD ДОКТОРАНТТАР МЕН ЖАС ЗЕРТТЕУШІЛЕРГЕ АРНАЛҒАН ЖЕТЕКШІ ОРТАЛЫҚ (ACESYRI)

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Аңдатпа. Бұл мақалада Қазақстандық және Еуропалық университеттердің студенттері, зерттеушілері және оқытушылары арасындағы халықаралық ынтымақтастық үшін инновациялық инфрақұрылымды қамтамасыз ету мақсатында құрылған Информатика бойынша студенттер мен жас зерттеушілерді кәсіби даярлау орталығы (ACeSYRI) туралы айтылады. ACeSYRI әр түрлі елдердің студенттері мен оқытушылары арасында тәжірибе және білім алмасу үшін бірегей мүмкіндіктер береді, бұл өз кезегінде барлық қатысушылардың ғылыми және мәдени тәжірибесін байытады.

Түйін сөздер: информатика, зерттеушілер, халықаралық ынтымақтастық, платформа.

ЦЕНТР ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКИ СТУДЕНТОВ И МОЛОДЫХ ИССЛЕДОВАТЕЛЕЙ В ИНФОРМАТИКЕ (ACESYRI)

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Аннотация. Данная статья рассказывает о Центре профессиональной подготовки студентов и молодых исследователей в области информатики (ACeSYRI), который создан с целью обеспечить инновационную инфраструктуру для международного сотрудничества между студентами, исследователями и преподавателями казахстанских и европейских университетов. ACeSYRI предоставляет уникальные возможности для обмена опытом и знаниями между студентами и преподавателями из разных стран, что в свою очередь обогащает научный и культурный опыт всех участников.

Ключевые слова: информатика, исследователи, международное сотрудничество, платформа.

Introduction. ACeSYRI is a national ERASMUS+ project (no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP) which is implemented in Kazakhstan (Fig.1). This project joins 3 partners from the EU:

- University of Žilina, Slovakia (coordinator);
- University of Łódź, Poland;
- Universite de Lorraine, France;
- and 9 partners from Kazakhstan:
- Nazarbayev University;
- Satbayev University;
- Zhangir khan West Kazakhstan Agrarian-Technical University;
- Korkyt Ata Kyzylorda State University;
- Manash Kozybayev North Kazakhstan State University;
- Suleyman Demirel University;
- Almaty University of Power Engineering and Telecommunications;
- Higher Education Development National Center of the Ministry of Science and Higher Education of the Republic of Kazakhstan (initially - Bologna process and Academic Mobility Center of the Ministry of Science and Higher Education of the Republic of Kazakhstan);
- Kazakhstan Information Security Association.



Fig.1. - The logo of the project was chosen based on the competition among the project partners' propositions

Coordination Team. The project coordinator was University of Žilina (Žilinská Univerzita v Žiline, UNIZA, Slovakia) and coordination team worked at Faculty of Management Science and Informatics (FRI).

The University of Žilina is located in the northwest region of Slovakia. In recent years, the university has become an educational institution with a broad profile in scientific fields like technology, economics, management, and educational sciences. The university enjoys a very close cooperation with enterprises in the fields of transportation, telecommunication, and information technologies. Being a central Europe university, the UNIZA has received help during the transformation of educational processes towards modern European requirements. The broad experience obtained during this transformation process and the knowledge about the problems have been used to help PC universities to undergo the same process towards the Bologna requirements.

The Faculty of Management Science and Informatics provides study programs for bachelor, master, and doctoral degrees. In total more than 3,500 students study at the Faculty. The Faculty has been involved in many long-time research partnerships with enterprises on the national and international levels. Faculty specialists have a great experience with the development of medium and large-sized information systems. The broad expertise of ZU was used in the ACESYRI portal implementation.

The principal aim of the ACeSYRI is the creation of a background and platform (including technical tools) for long-time cooperation of Kazakhstan and EU universities in ICT for PhD student education and internalization of this education. It means an increase in the level of internalization of the Kazakhstan universities involved in the project. The achieving of this aim is implemented by

There are some ways indicated in the project for this goal achievement. In this paper, we propose to consider two of them. The first of them can be named an “organization”. According to this way, the internalization of the PhD study is implemented and supported by the different international events and activities in which representatives of the project partners are involved. As first, international conferences and workshops are organized under the project to support the publication of PhD students and younger researchers in IT at the international level.

The second way for the internationalization of studies of PhD students and younger researchers can be named “technical”. The technical tool, which is the ACeSYRI portal, supports the cooperation of PhD students and younger researchers from Kazakhstan universities and researchers from EU universities.

International events. Participation at International events, representation, and discussion of own results are important steps in the carrier of every researcher. It is especially important for PhD students and younger researchers. Therefore, a number of national and international events were organized within the framework of the project. Events in 2020-2021 were held online due to quarantine restrictions.

One of the first events was *the International Conference on Information Technologies & Management, which took place on May 5, 2020*, and was organized by Satbayev University (Almaty, Kazakhstan). At this conference, 19 scientific reports have been presented and discussed by PhD students and younger researchers.

From June 9 to 19, 2020, the Kazakh National Research Technical University named after K. I. Satpaev (Satbayev University) together with the Institute of Information and Computing Technologies of the Ministry of Education and Science of the Republic of Kazakhstan (IICT MES RK) held *summer series of seminars on Artificial Intelligence and Machine Learning (AI&ML 2020)*. The series of seminars were held in an online format via the Zoom cloud meetings platform and total number of participants was 43 teachers and young researchers. The summer series of seminars program has included two parts: (a) the foundation of Artificial Intelligence and Machine Learning and (b) their practical applications. In these parts, presentations were made by the specialists in different fields of Artificial Intelligence and Machine Learning.

The online workshop on Research Methods in Information Technologies & Computer Science was held at Nazarbayev University on July 27-31, 2020. This workshop was aimed at basic methodology and internationalization of research in Kazakhstan. More than 50 participants took part in the meeting. There were a lot of project external participants from many various institutions of Kazakhstan at this workshop. The workshop' presentations were in three different areas:

1. Research Methodology - this was the most prominent part of the workshop and it included research paper writing methodology, hands on latex and Mendeley study, grant writing and research approaches;

2. Internationalization - this part was focused on the possibilities of young students and researchers to do joint research, sharing experiences of currently or previously employed Kazakhstani researchers abroad, etc;

3. Interdisciplinarity - this part was focused on showing some of the new and previously unexplored research venues and how IT and CS is used in sciences and other fields.

Representatives of University of Žilina, Nazarbayev University and Satbayev University on October 27-29, 2020 organized the online *workshop on Reliability Engineering and Computational Intelligence (RECI)*. This workshop was held on ZOOM-online platform of Nazarbayev University. The main aim of the workshop was to bring together PhD students, young researchers, and teachers from the academy as well as industry working in all areas of Reliability Engineering and Computational Intelligence.

Experts gave a review of the future perspectives in their areas at the plenary sessions of the RECI workshop. These experts were been from different EU universities: prof. Coen van Gulijk (University of Huddersfield, United Kingdom), prof. Antoine Rauzy (Norwegian University of

Science and Technology, Norway), prof. Vyacheslav Kharchenko (National Aerospace University, Ukraine), dr. Nicolae Brinzei (University of Lorraine, France), dr. Miroslav Kvassay and dr. Jan Rabcan (University of Žilina, Slovakia).

Different presentations and papers of PhD students, young researchers and University teachers were presented in the workshop. More than 135 participants took part at this 3-days workshop. 23 presentations were discussed at four oral Working Sections. More than 24 papers of participants were presented at the Poster Section. Abstracts of all these works were included into the RECI workshop's abstract proceedings. These proceedings and posters have been published on RECI workshop web-site with open access (<https://ki.fri.uniza.sk/RECI2020>).

On April 24, 2021, graduate students from Satbayev University gave a speech to undergraduates studying in the discipline "Fundamentals of Artificial Intelligence". The essential purposes of the seminar were (a) to disseminate the results of the project by exchanging the experience of doctoral students and undergraduates based on research conducted by doctoral students under ACeSYRI project; (b) to approbate the presentation skills of PhD students which involved at the ACeSYRI project, and (c) to attract undergraduates to research conducted by graduate students.

The online conference on *Int. Conf. on Digital World and Engineering Education* (ICDWE-2021) was held at Almaty University of Power Engineering and Telecommunications on April 30, 2021. Conference ICDWE was organized as an international forum for disseminating information about the ACeSYRI project, sharing knowledge and methodology in applications of AI, software engineering, machine learning, etc. The presentations created under the ACeSYRI project have been presented at the conference. More than 40 participants took part in this event. 17 young researchers (students and PhD students) obtained new experiences in the research area. They have exchanged knowledge and received new ideas for implementation.

The *Kazakh Section of the International Conference on Information Technologies and Management* (IT&M2021) was held at the Satpayev University on May 05, 2021. The international conference was organized in Riga (April 23-24, ISMA, Latvia) and Almaty (May 05, KazNRTU, Kazakhstan). The Kazakhstan Section was held under the auspices of the Erasmus+ project ACeSYRI, aimed at creating an international center for training PhD students and young researchers. The Section was held in two parts: (a) Artificial Intelligence and Computer Vision; and (b) Data Analysis, Big Data, Software, and Hardware.

The *PhD Forum of ACeSYRI* has been organized on May 24-27, 2021 by the faculty of School of Engineering and Digital Sciences at Nazarbayev University. This PhD Forum has been held within the 51st IEEE International Symposium on Multiple-Valued Logic (ISMVL 2021).

The ACeSYRI PhD Forum is intended for PhD students, young researchers, their scientific and academic supervisors from various countries. The main goal of the Forum is to expose the research of these young researchers to a highly qualified research and academic audience, to initiate communication and international cooperation with international faculty and researchers and to attend the IEEE ISMVL symposium to listen, communicate and find innovative ideas in an international framework. More than 70 participants took part in this event. 20 of them were PhD students.

From June 7 to 19, 2021, the Satbayev University together with the Institute of Information and Computing Technologies of the Ministry of Education and Science of the Republic of Kazakhstan (IICT of the Ministry of Education and Science of the Republic of Kazakhstan) held an *ACeSYRI summer series of seminars on artificial intelligence and machine learning* within the framework of the ACeSYRI (Erasmus+) project. and focus on internationalization. The series of seminars was held in an online format through the Google Meet platform, and the total number of participants was 67 people. 4 of them are representatives of foreign organizations from Slovakia, Poland and Russian Federation. 45 event participants are university teachers, employees of different organizations from Kazakhstan, and 18 participants are PhD students and young researchers.

Representatives of University of Žilina on June 22-24, 2021 organized the 3-days workshop on ACeSYRI: Modern Experience for PhD students and Young Researchers. This workshop was held on MS Team - online platform of University of Žilina. The ACeSYRI workshop holds simultaneously

takes place during the conference Information and Digital Technologies (IDT 2021). IDT 2021 provides a forum for presentation and discussion of scientific contributions covering the theories and methods in the field of information and digital technologies, and their application to a wide range of industrial, civil and social sectors and problem areas.

The ACeSYRI workshop program is divided into two essential parts. The first part contents one Plenary section and three regular Sections that cover numerous aspects of Informatics. 26 young researchers from Kazakhstan, France, Slovakia, Belarus, Russia, and Ukraine have been selected for present their results in this part. These researchers were recommended by members of the Program Committee of the workshop. The second part includes the IDT 2021 Conference. More than 65 reports of researchers from different countries (Belarus, Canada, Czech Republic, Finland, France, Germany, Hungary, Italy, Kazakhstan, Poland, Russia, Slovakia, Slovenia, Spain, Turkey, Ukraine, United Kingdom, and USA) have been presented in this part.

1. ACeSYRI portal. The developed portal ACeSYRI is the technical tool to start the cooperation of PhD students and young researchers from Kazakhstan and supervises from EU universities. The link to the ACeSYRI portal is <http://acesyri.fri.uniza.sk>. The portal supports youth recruitment support researchers (graduate and PhD students), working under the guidance of the faculty of national universities. The ACeSYRI portal allows the linking of 3 groups:

- representatives of foreign universities (tutors or co-advisors), who form an actual Topic for its subsequent solution;
- employees of national universities (scientific supervisors), in the competence of which to lead the solution to this Topic. They separate the proposed Topic into somewhat logical completed individual Tasks. These tasks act as names of PhD or Master thesis, term or research papers, etc.;
- young researchers (Master's or PhD students) who choose these tasks for solutions and solve them.

The portal acts as an information bulletin board, which contains contact information for users of these 3 groups, names, and short descriptions of formulated topics and tasks. The ACeSYRI portal allows for increasing internationalization, networking, and research development in Kazakhstan. In particular, the portal allows us to (a) search for external foreign advisers; (b) select national research supervisors; and (c) find research topics for PhD students. There are two variants of ACeSYRI portal usage (Fig.2).

Variant A –The full exploitation of the portal. This variant is possible for the existing pool of foreign teachers who have an interest in cooperating with researchers and young researchers from Kazakhstan. These foreign teachers are proposing their Topics for co-supervising (short description of own research areas). At the same time, there are scientific supervisors (teachers) from Kazakhstan who have an interest in cooperation with these foreign researchers in the frame of this Topic's development. Each supervisor is able to divide this Topic into several own Tasks. These Tasks are local works that are proposed for PhD students, young researchers, and students for the implementation and preparation of the thesis. The Task is appointed to him as Enrolment. After the Task is solved, the young researchers can upload at the portal some documents (results) as open-access or private publications.

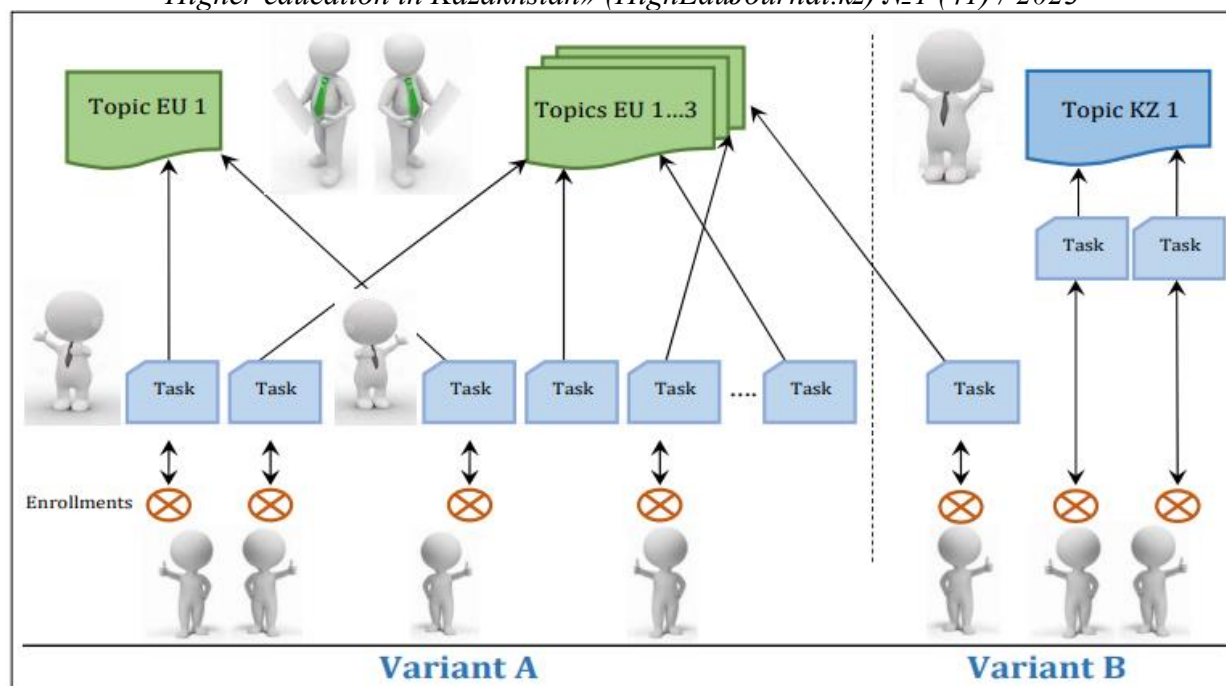


Fig.2 - The variants of the portal ACeSYRI use

Variant B – The initial portal’s usage when a database of foreign researchers is not huge. In this case, the Topic will be proposed by national scientific advisors. This advisor will separate this Topic into its local tasks for each PhD student and young researcher too. Finally, each PhD student or young researcher will select their task for solving. So, we form a connection between the foreign researcher (co-advisor), national advisor (teacher), and PhD student or young researcher.

Joining the ACeSYRI portal users is possible by very simple registration, which includes information about a registered person (name, e-mail, affiliation) and password. The registration is implemented by different accounts depending on the user’s role (Fig. 3).

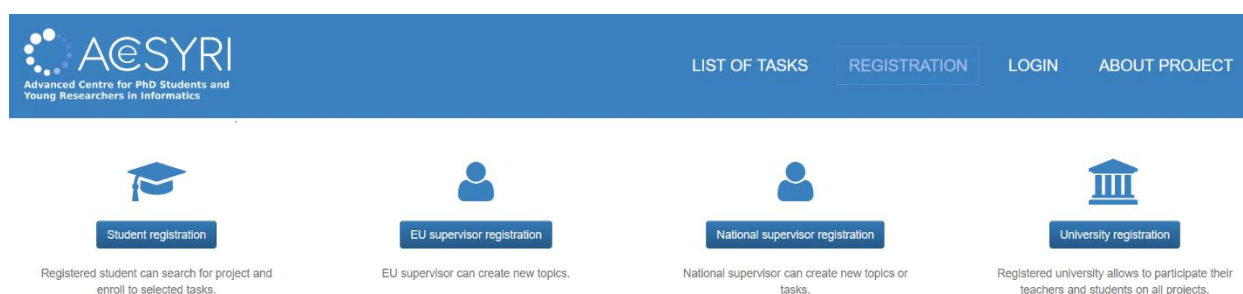


Fig.3 - The registration page of the ACeSYRI portal

So, this portal connects representatives of three target groups: (a) potential co-advisors of PhD students from foreign Universities; (b) national scientific supervisors and (c) young researchers (Master and PhD students) from Partner Countries.

The project partners believe that the developed background under the project ACeSYRI allows for improving the level of the internalization of universities and it will be possible not for the project partner only, but and for other PhD students and young researchers which are able to join by participation at organized international scientific events or the ACeSYRI portal.

ACeSYRI provides unique opportunities for the exchange of experience and knowledge between students and teachers from different countries, which in turn enriches the scientific and

cultural experience of all participants. The center also provides access to state-of-the-art technological infrastructure and provides research opportunities for young researchers.

Thanks to ACeSYRI, postgraduate students will have the opportunity to get acquainted with modern methods and technologies in the field of computer science, as well as broaden their horizons through participation in various international conferences and seminars. All this contributes to the development of research potential and provides better prospects for further careers in the field of information technology.

Thus, ACeSYRI is an important step towards providing high-quality international education for graduate students and young researchers in the field of computer science, and also contributes to the development of the scientific and technical potential of Kazakhstan.

REFERENCES

1. Национальный проект «Качественное образование «Образованная нация» [Электронный ресурс]. URL: <https://adilet.zan.kz/rus/docs/P2100000726>
2. Omirbayev S., Mukhatayev A., Biloshchytskyi A., Kassenov K. National model of the quality assurance of education in Kazakhstan: format, tools, and regulatory mechanisms // Scientific Journal of Astana IT University, Volume 8, 2021. P.64-73.
3. The Global Knowledge Index (GKI). By the United Nations Development Programme Regional Bureau for Arab States (RBAS), One United Nations Plaza, NEW YORK, NY10017, USA, and the Mohammed Bin Rashid Al Maktoum Knowledge Foundation, MBRF, Dubai World Trade Center, DUBAI, 214444, UAE, <https://www.undp.org/publications/global-knowledge-index-2021>.
4. Rus S., Tamasila M., Mocan M., Ivascu L., Turi A. Conditions for enhancing the competitiveness of the Romanian higher education system: Case study. (2018) Proceedings of the 32nd International Business Information Management Association Conference, IBIMA 2018 - Vision 2020: Sustainable Economic Development and Application of Innovation Management from Regional expansion to Global Growth, pp. 182 – 190.
5. József Kabók, Slobodan Radišić & Bogdan Kuzmanović (2017) Cluster analysis of higher-education competitiveness in selected European countries, Economic ResearchEkonomika Istraživanja, 30:1, 845-857, DOI: 10.1080/1331677X.2017.1305783.
6. Li-Jun Xu, Yan Liang, Jin-Tao Su, Tong Ouyang, Jia-Ming Zhu, "The Comprehensive Evaluation of the National Higher Education System Based on EWM and ARMA Models", Complexity, vol. 2021, Article ID 9987584, 13 pages, 2021. <https://doi.org/10.1155/2021/9987584>.
7. Parakhina, Valentina & Godina, Olga & Boris, Olga & Ushvitsky, Lev. (2017). Strategic management in universities as a factor of their global competitiveness. International Journal of Educational Management. 31. 62-75. 10.1108/IJEM-03-2016-0053.
8. Stahlke, Herbert & Nyce, James. (1996). Reengineering Higher Education: Reinventing Teaching and Learning. CAUSE/EFFECT. 19.
9. Mense, Evan & Lemoine, Pamela & Garretson, Christopher & Richardson, Michael. (2018). The Development of Global Higher Education in a World of Transformation. Journal of Education and Development. 2. 47. 10.20849/jed.v2i3.529.
10. Portnoi, L., Bagley, S. 2016. Welcome to the Era of "Global Competition 2.0". The AAUP's Role in a Globalized, Competitive Higher Education Landscape, https://www.nafsa.org/_/File/_/ti_january2016.pdf.
11. Luksha, P., Peskov, D. 2014. Future of Education: Global Agenda, map.edu2035.org/attachments/7/a52816a4-8139-412c-809f-74ad18ca5292.pdf.
12. Education in a post COVID-19 world: Nine ideas for action. UNESCO, International Commission on the Futures of Education, 2020. <https://en.unesco.org/news/education-post-covid-world-nine-ideas-public-action>.

13. Analytical report on the implementation of the principles of the Bologna Process in the Republic of Kazakhstan, 2018. - Astana: Center for the Bologna Process and Academic Mobility of the Ministry of Education and Science of the Republic of Kazakhstan, 2018. p. 64
14. Yang Y. Construction of School Quality Assurance System Based on Big Data Analysis // Lecture Notes on Data Engineering and Communications Technologies, 2022, Vol.102, P. 381 – 388.
15. Guan Q., Wang Y. Factors affecting the efficiency of university administration based on big data analysis // ACM International Conference Proceeding Series, 25 May 2021, 2nd International Conference on Computers, Information Processing and Advanced Education, CIPAE 2021, P. 935 – 938.
16. Du, G., Yuan, J., Miao, F., & Wei, P. (2017). Effectiveness of design process of education quality assurance system based on EFQM model. Eurasia Journal of Mathematics, Science and Technology Education, 13(12), 8205-8211. <https://doi.org/10.12973/ejmste/80784>
17. Miloš Krstić, José António Filipe, José Chavaglia. Higher Education as a Determinant of the Competitiveness and Sustainable Development of an Economy //Sustainability 2020, 12, 6607; <https://doi.org/10.3390/su12166607>
18. Bragg, D. D., & Ruud, C. M. (2011). The adult learner and the applied baccalaureate: Lessons from six states. Champaign: Office of Community College Research and Leadership, University of Illinois at Urbana-Champaign
19. Die Agentur für Qualitätssicherung und Akkreditierung Austria [Электронный ресурс]. URL: <https://www.aq.ac.at/de/>.
20. Agencija za razvoj visokog obrazovanja i osiguranje kvaliteta [Электронный ресурс]. URL: <http://www.heg.gov.ba/>.
21. National Evaluation and Accreditation Agency [Электронный ресурс]. URL: <http://www.neaa.government.bg>.
22. The Agency for Science and Higher Education [Электронный ресурс]. URL: <https://www.azvo.hr/en>.
23. The Ministry of Education, Youth and Sports [Электронный ресурс]. URL: <https://www.msmt.cz/?lang=2>.
24. National Accreditation Bureau for Higher Education [Электронный ресурс]. URL: <https://www.nauvs.cz/index.php/en/>.
25. The Council for Higher Education Accreditation [Электронный ресурс]. URL: <https://www.chea.org/>.
26. Association of Specialized and Professional Accreditors [Электронный ресурс]. URL: <https://aspa-usa.org/>.
27. Ministry of Education, Culture, Sports, Science and Technology [Электронный ресурс]. URL: <https://www.mext.go.jp/en/about/mext/index.htm>
28. TAFE Directors Australia [Электронный ресурс]. URL: <https://tda.edu.au/>.
29. Australian Council for Private Education and Training [Электронный ресурс]. URL: <https://www.iteca.edu.au/>.
30. Ministry of Education [Электронный ресурс]. URL: <https://www.moe.gov.sg/>.
31. Федеральный закон об образовании в Российской Федерации [Электронный ресурс]. URL: http://www.consultant.ru/document/cons_doc_LAW_140174/
32. The Office for Students [Электронный ресурс]. URL: <https://www.officeforstudents.org.uk/>
33. The Quality Assurance Agency for Higher Education [Электронный ресурс]. URL: <https://www.qaa.ac.uk/>

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