The analysis of foreign countries experience in information technologies application in higher education

Iuliia Kotliarenko[1,*] and *Alvina* Kolesnichenko[1]

[1]Rostov State Transport University, 2, Rostovskogo Strelkovogo Polka Narodnogo Opolchenia sq., Rostov-on-Don, 344038, Russia

Abstract. This paper analyses the use and effectiveness of modern information technologies application in higher education in different countries. This form of learning needs to provide the level of knowledge and competences corresponding to the traditional learning. This article shows advantages and disadvantages of ICT usage in higher education. This article gives the relevance of the comprehensive definition of ICT and their impact on e-learning and teaching processes. The analysis of the pedagogical experience of states with a high level of technological development is interesting and relevant for educational system of Russia This paper focuses on the different models of distance education and the aim of the article is to analyse the present status of the use of digital technologies in foreign countries.

1 Introduction

In the last few years there has been a growing interest in electronic technologies. They quickly penetrated the educational process, completely changing the presentation of the teacher's communication with the student. Having gone from using a printing machine in classes to creating unified information educational spaces, digital, electronic and information and communication technologies (ICT) have become an indispensable element of the modern educational process, opening the whole world to its subjects, filling the content of education with modern meanings and challenges. Such form as distance teaching and learning spread over the world making possible education for all throughout the life. Now there are various models of distance education, its structure and management, different types of its technical and methodological support [1]. An increasing number of scientists believe that the theoretical idea of continuing education should form the basis for the renewal of education systems. Quite recently, considerable attention has been paid to the functions of the teacher. Moreover, in UNESCO's view, encouraging "digital literacy" and ensuring greater mastery of the new information and communication technologies, which should be seen both as educational discipline and as pedagogical tools capable of enhancing the effectiveness of educational services [1]. Undoubtedly, open and distance education increase not only the general educational level of society, but also contribute to the training and retraining of specialists in connection with the transition to new technologies. The teacher's role changes from the main source of knowledge to the moderator, tutor, and consultant. Therefore, the analysis of the pedagogical experience of states with a high level of technological development is interesting and relevant for educational system of Russia.

*e-mail: kotlakot@rambler.ru

In scientific articles of researchers from different countries we can find various terms defining usage of information technologies in higher education. Among them, they are "e-learning", "information and communication technologies", "digital technologies", "computer technologies", "electronic technologies". From our point of view we consider all these terms equal and substitutable [2–4]. Digital technologies are actively applied in distance educational process as well as blended education [5].

In recent years, research on the issue of distance learning has become very popular. In the studies of Ronny Scherer, Sarah I. Hofer and other foreign authors an attempt was made to identify the competence and e-learning perspectives in higher education institutions [6–8]. According to a number of foreign researchers (Michael Sailer, Julia Murböck, Frank Fischer, Albina Bilyalova) and the Russian scientist T.E. Isaeva [12], the process of digitalization of the educational process embraced all countries [9–12].

The relevance of our study is stipulated by the fact of the lack of comparative analysis of the experience of foreign countries in information technologies application in higher education.

2 Methods and materials

Nowadays in Russia we can observe an active process of using information technologies in the educational sphere including foreign language teaching. Numerous digital resources play a significant role in improving an educational process as they attract learners with an interactive form, great opportunities of their application with usage of Internet and multimedia in synchronous, asynchronous as well as blended learning. At same time, information technologies contribute to better assimilation of knowledge and acquired skills and abilities. However, along with advantages of digitalization of higher education we can take notice some difficulties of this process connected with a low rate of its development in Russia in comparison with other countries.

The study is devoted to investigating the experience of applying information technologies in higher education including in the process of teaching a foreign language abroad. According to the Global Competitiveness Report conducted in 2017, the data of competitiveness among 137 countries were given, where Russia ranked 38th place, while Switzerland was on 1st place, the USA was followed, Singapore, the Netherlands, Germany and many others [13]. Regarding the indices of IMD World Digital Competitiveness Ranking 2020 considering digital competitiveness of countries, Russia ranked 43th out of 63 [14].

The leading countries mentioned in these reports have greatly succeeded in such branches as IT technologies, economy, industry, science, etc. as well as in education and their success in all spheres is directly dependent on the high level of education, particularly higher education providing highly qualified specialists. In this article we will try to prove this idea of interaction between digital development of education and world recognition, competitiveness of these countries. The analysis of experience of the countries advanced in this sphere facilitates understanding of the importance of new technologies implementation in the educational process and reveals some gaps of information technologies application in our country and the ways of improving the present situation.

To achieve this goal, the following objectives must be achieved:

- to describe and analyse foreign countries experience in information technologies application in higher education;
- to reveal advantages and disadvantages of using digital technologies in the educational process;
- to find out interaction between digital literacy and competitiveness of the developed countries.

As the main methods of the research, the following are used:

- a method of content analysis, as a result of which an analysis of foreign countries experience in ICT application in higher education was made in order to assess the effectiveness of its use in e-learning teaching;
- systematization and classification;
- empirical research methods—description and comparison—made it possible to analyse digital technologies, to distinguish their advantages and disadvantages.

The theoretical basis of the study was the scientific work of scientists: Ansuman Sar, Satya Narayan Misra [17], T.E. Isaeva [12], Yu. Zhao, Ana Maria Pinto Llorente, Maria Cruz Sánchez Gómez [7], Yuk Ming Tang, Pen Chung Chen et al. [15], Ronny Scherer, Sarah K. Howard et al. [8], Martin Daumiller et al. [16–18] on methodological issues of the use of digital technologies in the process of teaching foreign languages at the university.

3 Results

Nowadays distance education has a strong development potential all over the world. While only 2.4% of the 222 million students around the world have access to international mobility, an opening of the offer of training distance learning on learners residing beyond national borders seems all right to overcome, not only the difficulties, but also the lack of access to the teaching of audiences who do not have the opportunity to study abroad. It is also an asset for the internationalization of educational institutions superior: showcase of the quality of training offered, distance education can be seen as an instrument of promotion abroad. This fact finds evidence in the analysis of experience of using digital technologies in higher education in various countries given below.

3.1 The USA

The United States of America was the first country that developed and introduced computer technologies in the educational process. It began to use the first operating computers ENIAC for educational purposes in 1946 in the University of Pennsylvania. Since then the process of information technologies implementation into learning has constantly been developed and in 2000-s the most of American universities used Internet technologies in education including distant form. Many universities created their own online courses for attracting students from all over the world, for example, Stanford University, University of Michigan, etc. Thus, Massive Open Online Courses (MOOC) appeared and they offer their learners curriculums of various higher educational establishments. The most popular among them—"Coursera" developed by Stanford University (up to 400 courses), "EDX"—a project of Harvard University and Massachusetts Institute of Technology (targeted at mastering a range of disciplines by students of different countries).

The rapid age of the computer technology development affected language education in the USA. It became possible due to wide spread Internet, electronic education, creation of online courses, usage of various digital resources both in practical classes in classrooms and at home remotely. It had an impact on transition of the role of a teacher from a leader to a tutor and changing the way of a language learning by students.

The term CALL (Computer-Assisted language Learning) appeared in pedagogical science in early 1960-s and it is defined as the process of a language teaching by means of computers. First CALL represented a number of repetitive training exercises for forming language skills. Then in 1970–1990-s the emphasis was placed to communicative skills with

using speech models, situations and as a result speaking a fluent language. In 1990–2000-s a language teaching technologies included multimedia, Internet applications and the main purpose of CALL was to develop learners' different skills—listening, reading, speaking, writing oriented on the specific sphere of application of acquired language skills and speech abilities in social interaction (the so-called integrative stage). The intelligent stage of CALL (ICALL) lasts from 2000-s until present days and it is distinguished by a high level of artificial intelligence development, using its technologies. Effective self-learning systems are considered the great achievement of the intelligent stage as they allow students to master a foreign language independently in their own regime when it is convenient for every individual and such form of education positively affects the development of abilities to self-study, independency, and motivation to learning a language. ICALL implies using a great variety of intellectual programs, multimedia means and other digital resources aimed at satisfaction of learners' needs in obtaining necessary information, learning authentic materials, forming the required competences. ICALL can be used by means of various devices in different learning formats—synchronously and asynchronously, with distance and blended learning.

In recent years the trend to using mobile versions of educational language programs in the form of applications has greatly increased in the USA as well as in the world. Such technologies got a title MALL (Mobile-Assisted language Learning). This fact reveals understanding the necessity of learners to master a foreign language and apply individual digital courses for achieving this purpose.

3.2 Western Europe

Distance education in Europe was intensively developed in the early 1970s. This was due to the creation of a number of open universities (universities of distance education). Currently, each European country has a group of educational institutions implementing remote programs. The methods of such training are quite well worked out. Training programs using new information technologies, including satellite television, computer networks, multimedia are of great interest. The European Commission adopted the main provisions of the Current Plan for Digital Education in Brussels on January 17, 2018, calculated until 2022. Education and learning as part of continuing education play an important role in creating a European identity based on shared cultural values. Education is designed to help young people formulate and express their opinions, be involved in social processes and thus shape the future of Europe, characterized by developed democracy, solidarity and inclusion. Digital competence is part of the revised European reference system of key lifelong learning competencies that all citizens must possess. Digital competence means the confident and critical use of digital technology and includes the knowledge, skills and attitudes required by all citizens in a rapidly developing digital society. The European System of Digital Competence for Citizens describes digital competence in five areas:

- information literacy and data management skills;
- communication and collaboration through digital technologies;
- creation of modern digital content;
- security in a broad sense—for personal data, for human health and for environmental conservation;
- identify and solve conceptual problems in the digital environment.

One example is the French National Center for Distance Learning (CNED) that was founded in 1939. The scope of its activities is evidenced by the following data: the number of training courses is 2.5 thousand, the number of users is 185 thousand, branches in

120 countries of the world, 5 thousand teachers participate in the development of training courses and educational activities. There are CNED branches in Toulouse and Vanva, Rouen, Rennes, Poitiers, Lyon, Lille and Grenoble. The Distance Education Center offers training in various institutions to everyone. People of almost any age can take part in the program—from the kindergarten to the post-graduate school. In addition, CNED is constantly organizing advanced training courses. The main areas of work of the center are also characterized by the main target groups—"School", "University", "Competition". The latter is attended by people who want to take vacancies in the public civil service. There are also directions "Professional", "Culture" and so on. According to statistics, more than 300,000 people from around the world receive training at CNED every year. Technical tools used in organizing the work of CNED include satellite television, video and audio cassettes, e-mail, Internet, as well as traditional literary sources. If distance learning systems do not use the feedback principle, then the information needed to conduct lectures, seminars and other types of classes is usually centrally recorded on a video cassette or video disc. Further, these materials are sent, including through computer networks, directly to educational institutions where they are used in training sessions. Educational institutions can use these resources through the Internet. Training programs are regularly broadcast on the national television. New Information Technologies used to provide primarily mechanical and automation, electronics and computer science, economy and management training programs, as well as classes in humanitarian disciplines. For example, linguists work with a program that includes information from the Larousse encyclopedic dictionary.

It is interesting to note the experience of the Universidad National de Educacion a Distancia (UNED) in Spain, which recently celebrated its 30th anniversary. It is one of the largest educational institutions in the country. It includes 58 training centers in Spain and 9 abroad (Bonn, Brussels, Geneva, London, Paris, etc.). Its students also have the opportunity to study in New York and Rome. Programs combine the benefits of American and European training systems. Practical training mostly focus on case studies. The formation of the UNED concept was influenced by the Open University of Great Britain, established some years earlier. UNESCO International Chair was organized at the University of Distance Education in 1997 to actively promote research and development in the field of remote education. At the same time, due to the specifics of distance education, the university uses advanced technologies to provide all students with high-quality and uninterrupted services. Participation of UNED in the international academic mobility programs provides the mutual movement of students from one university to another (both in Spain and abroad), with the aim of teaching: ERASMUS, Ibeoamerica Scholarship Prof, PILAR, MOONLIGHT.

3.3 Australia

Australia began to use multimedia in a distant form of education in 1970 and actively implemented open and flexible education with using Internet and modern digital technologies in middle of 1980-s up to present days. The usage of these technologies are aimed at more active interaction between a teacher and a separate student, a teacher and a group of students and communication within a group.

Combination of blended education and the modern digital technologies eliminates borders between traditional and distant forms of education. All universities in Australia provide higher education distantly. This form of training is very popular among students (about 29% who choose distant form), especially among undergraduates and postgraduates who have the formed skills of self-study and research activity. Online lectures strategies for the development of distance education are widespread in Australian universities because of students' workload, a great number of foreign students without good knowledge of English.

One of the most important priorities of Australian government in the sphere of higher education is implementation of distant education in higher schools. All higher educational establishments of the country fulfil national strategies for the development of distance education and meet all necessary requirements aimed at increasing their competitiveness in comparison with other universities of Australia and foreign countries. The system of higher education comprises state and private universities as well as "Non-University Higher Educational Providers". All of them trend to attract more students by ensuring accessible, flexible education based on the modern pedagogical experience including the usage of digital technologies. There are even "Universities of Third Age" representing free or cheap online courses intended for elder people.

All higher schools provide online educational services on the international market; they are especially popular among Asian countries. In order to be required and take the place among the best in the world Australian universities create various national and international associations of distant education, "Open Universities Australia", they exchange their experience in using digital technologies.

The association "Open Learning Australia" was founded in 1992 on the basis of Monash University with the purpose of giving higher education to most of learners of different age and status with various qualification, skills and abilities, for those who couldn't receive a diploma before. It helped applications to choose the appropriate university. In 2004 this company was renamed into "Open Universities Australia" and the association includes 20 main universities. It uses a smart platform "Smartthinking" offering free round the clock training and consulting services, interaction with a teacher, an assessment system. The educational process including teaching a foreign language is carried out by means of digital technologies.

Australian universities faced competition in providing educational services from the USA, European and Asian countries. This fact led to the development of national training platform "Open2Study" offering free online courses competitive to such popular American platforms as "Coursera" and "EDX". "Open2Study" represents interactive weekly modules the assimilation of which requires four weeks and passing a test after each module. "Open Universities Australia" also develop educational platforms for higher schools in Australia, New Zealand, and Great Britain targeted at giving students professional training.

One of the effective ways of promoting Australian universities in the international educational space has become implication of online courses (Massive Open Online Courses) so popular in the USA. Universities of Australia provide their own courses; some of them are placed on global platform including "Coursera", "Open2Study" of "Open Universities of Australia".

Introduction of new information technologies in the educational process changes traditional teaching form in higher schools in Australia and thereby increases a number of higher educational providers and toughens competition among them. The process of transition to distant education leads to lack of information about applicants and it has a negative impact on full-time education. That's why the Australian universities will make efforts to preserve the advantages of full-time education in the terms of digitalization of higher education as well as to give an open access to their courses and to develop new technologies of pedagogical interaction in information environment.

3.4 East and Southeast Asia

A great success in the sphere of higher education has been achieved in the Asian countries. Nowadays Asia takes the leading position in the provision of educational services. And this fact is proved by the high rating of Asian universities according to the world university rating conducted in 2017. The list of the best 200 higher educational establishments in

the world included 13 universities from China, 9—from Japan, 16—from South Korea. In addition to these countries, the list comprises high schools in Taiwan, India, Malaysia and Singapore. Twenty-four Asian universities were mentioned as the best among the world ones. This fact finds its explanation in the correct choice of direction for transforming and organizing the whole educational process including higher education in the countries of East and Southeast Asia.

The great improvements in education were made due to effective adoption of the best European and American training models and contribution of their own national values in that process. Therefore, they managed to combine global trends in education with their culture, national traditions and customs formed under the influence of historical, political and socio-economic factors. These countries provided significant funding for the education sector, created international programs for partnership with the leading educational centres of the world. They try to attract foreign specialists to their universities including English teachers chosen from native speakers. High quality education in Asia is achieved due to increasing motivation of students to study and educators—to professional growth and introduction of modern digital technologies.

Information technologies or E-learning in higher schools are widely used because it is a prosperous form of a future specialist's preparation to his professional activity and it gives him an opportunity to be competitive in labour market. E-learning systems represent advanced multimedia technologies incorporating both visual information system and dynamic one that have an impact on learners' sight and hearing and contribute to a better assimilation of the material. E-learning is aimed to solve the problem of "information inequality" in South Korea and it finds application in distant form. In 2009–2010 in the Summit of South East Asian Nations Association (ASEAN) the project of creation of Cyber-university unifying all Asian countries was developed and adopted. It combined the best 27 universities of Burma, Vietnam, Cambodia, Laos, Thailand, South Korea as members of Association of South East Asian Nations. The purpose of this collaboration is to make higher education of these countries both high qualified and accessible by means of digital technologies.

Singapore takes the leading position in the world in digitalization of the educational process at schools as well as at universities. They began their programs of developing information and computer technologies in 1997 and have done well since that time. Both students and teachers have digital competences. All conditions are created for using computer technologies as means of teaching, flexible networking environment made it possible to experiment and choose the appropriate variant of modern technologies in a teaching process. Singapore actively implements various models of partnerships between educational institutions and potential employers. Among them it is necessary to mention national industrial enterprises as well as international IT companies such as "Microsoft", "Lenovo", etc. Flexibility, variability and integrity are the main components of digital educational space.

South Korea is also the leader by introduction of web intellectual environment into the educational process. South Korea began its innovative development in the educational sphere by means of digital technologies in 1997. Nowadays E-learning in this country is high developed at the level of a separate industry providing schools, universities with educational content essential for each particular discipline and as a result ensuring educational and administrative services. South Korea managed to be the leading country in the world by using smart-education.

The modern universities of South Korea, China, Singapore and Malaysia consider one of the chief requirements of education modernization introducing English-learning courses. Among foreign languages, English is highly demanded. It is explained by the fact that English presents a means of global communication and academic mobility. Universities of different countries invite foreign professors for reading courses; students can get a degree in the

Table 1. Using information technologies in higher education of foreign countries

The country	The period of introducing computer technologies in education	Modern state	Advantages	Disadvantages
The USA	1947—the first operating computers, 2000-s—active usage of Internet technologies	Development of ICALL: using mobile versions of educational language programs in the form of applications	Students study independently in their own regime and to develop abilities to self-study	Students' attention is scattered, they cannot focus on the main material
Western Europe, France	1980-s—using Internet and modern technologies	Personalize the entire period of study and reduce the time of communication between teachers and students (CNED)	Flexibility of the training process. Each student take a distance learning course at an individual pace	Distance course helps to have high self-organization skills
The UK	1963—"Air University" in the UK, 1969—the Open University (mail, TV and radio broadcasting, telephone consultations)	The world leaders in the field of open and distance learning, offering its services in the UK, but also in a number of other European countries	A great selection of classes from general education requirements to highly specialized courses in challenging subjects	University studies are largely theoretical and rarely offer much real-world experience
Germany	1974—using modern technologies in the Fern Universität in Hagen	Means of communication between students and teachers are constantly researched, evaluated, improved	Control through virtual consultations, conferences. Students are provided with access to the university library on-line	Teachers and students should have permanent means of communication and access to the Internet
Australia	1970—using multimedia in a distant form of education	Creating online courses, educational platforms	Competitive on the international market of educational services	Accent is particularly made on distant form of higher education
Asian countries	1997—innovative development by means of digital technologies	E-learning is at the level of a separate industry and as a means of academic mobility and global communication	Higher education is required by students all over the world	A local English model combines the norms of international English and national features

English language in a foreign country. International incorporation has a positive impact on the education development. Japan, Malaysia and China attract foreign students and teachers as well as provide language courses and schools in Singapore, Malaysia, Thailand, Bali. Bilingual teachers are also in great demand in Asian countries.

One of the features in English teaching in these countries is that British English is not cultivated as a standard of a "right" language, but different dialects or variants are created and supported by teachers. Such approach leads to students' acquaintance with diversified English variants that provides language awareness as the English language performs the function of nations unification. Variants of English differ from each other by cultural features, peculiarities of mentality. Thus, their own model of the English language (local English model) is developed by bilingual teachers combining the norms of international English and national features. In Singapore bilingual education includes teaching of all disciplines in English and simultaneously learning an official native language. This approach combines students' development of Asian cultural traditions and it leads to forming language competencies necessary for forming a global outlook. It gives Singapore graduates an advantage in competition on labour market.

Taking into account computer technologies application in teaching a foreign language (English or any other, for example, Russian so popular in China) in Asian countries, it is necessary to note that they became widespread in higher school. Students can develop their communicative skills in the sphere of a foreign language by means of using modern social platforms, chats and sites. A great choice of interactive courses enables students to practice a language and acquire necessary skills.

Therefore, the usage of digital technologies in a language education is widely spread in all countries of East and Southeast Asia as well as all over the world. The Asian countries created universities of the world level forming disciplinary and interdisciplinary programs, improving campuses infrastructure and introducing into international cooperation. So great achievements were made in most of Asian countries due to the attitude to education as a great value for the whole culture from the side of all participants of the educational process.

To clearly demonstrate the world trends in using information technologies in the educational process of higher schools, we need to present the research data in the form of a table 1.

The results in the table reveal that information technologies are widely used in higher education all over the world. The process of digitalization of the educational space embraced all countries. Some of them have succeeded in this, others try to keep up and catch up with the leaders, learn from their experience. However, it is evident that each country follows its own way combining its cultural traditions, peculiarities of nation's mentality with the best foreign practices in applying digital technologies in higher schools.

4 Discussion

The conducted research has confirmed our hypothesis about interaction between success of the countries in digital competitiveness ranking the first places (according to the World Digital Competitiveness Ranking) and the level of digital development in the educational sphere. Undisputed leaders in this sphere are the developed countries of Western Europe and the USA that have applied computer technologies for a long time and have a great experience in using them in the educational space including higher schools.

The experience of these countries was adopted by many other countries such as Australia, East and Southeast Asian countries being analysed in the conducted research. Both Australian and Asian universities faced competition in providing educational services from the USA and European countries. This fact explains the necessity of creating their own open courses, educational platforms, etc. in Australia and Asia. A big leap in introducing modern

digital technologies in higher education was made by Asian countries which have successfully combined the best European and American training models and contribution of their own national values in that process. Moreover, nowadays Asian universities are in the top of the world best universities.

The conducted study reveals that great achievements in the sphere of digital higher education were made due to the following main factors:

- accessibility of higher education due to introduction of digital technologies and transition to distant or blended forms of education;
- flexibility of higher education because of individual approach to every student giving him an opportunity to study in their own regime when it is convenient for him through using digital resources; and such form of education positively affects the development of abilities to self-study, independency and research activity;
- integrity of higher education implying unity of educational standards, assessment criteria, presentation of general requirements for the formed competencies of a specialist;
- awareness of higher education as a value that contributes to increasing motivation of students to study and educators—to professional growth and mastering digital competencies necessary for modern digital educational space;
- trend to international cooperation with foreign countries that leads to be competitive on the world market.

We also revealed that in all analysed countries foreign language teaching is conducted by means of digital technologies. The most of these countries create educational content themselves providing their own courses of a foreign language and educational platforms, services (the USA, Great Britain, France, Australia) and make them available in open access. Asian countries consider English as a means of global communication and academic mobility and make great efforts in mastering this language inviting bilingual teachers, providing language internships, conducting lectures and practical classes in English as well as using a great variety of information resources both in traditional way on classes at the university or remotely at home.

5 Conclusion

As a result of the given research, we should conclude that all analyzed countries that actively apply digital technologies in higher education including foreign language teaching observe both advantages and disadvantages of digitalization process in educational sphere. First of all, this process requires possession of digital competence of teachers and students. Second, educators observe the drawback of excessive using information resources that is manifested in the fact that students' attention is scattered, they cannot concentrate on the main material, as they are distracted by additional functions, application capabilities, etc. Young people stop reading books, scientific articles that leads to lack of critical and analytical thinking, ability to research activity. Thirdly, excessive use of computer, mobile and other digital means leads to health problems, blurred vision, absent-mindedness, disorder of cognitive abilities. The above-mentioned factors may cause decline in the quality of education, deterioration of results in mastering a foreign language.

In spite of the existing problems, the conducted research proves the effectiveness of information technologies application in foreign language teaching as well as in higher education in general. The successful experience of foreign countries confirms this fact. It is important for Russian education to take the best experience of the educational systems of the leading coun-

tries and implement it in higher education of our country. It will ensure the competitiveness of Russian higher education and the whole country as well.

The conducted research has a great practical importance as it contains the detailed analysis of practical usage of information technologies in foreign language teaching and higher education as a whole. It can be applied by foreign language teachers, methodologists and educational authorities for considering foreign experience and further development of its basic ideas as well as implementation of some relevant trends into the Russian higher education system. This is the prospect of further research.

References

[1] *UNESCO Universal declaration on cultural diversity*, Adopted by the 31st Session of the General Conference of UNESCO, 2 November 2001, Paris, **15** (2001), URL https://www.un.org/en/events/culturaldiversityday/pdf/127160m.pdf

[2] S.I. Hofer, N. Nistor, C. Scheibenzuber, *Online teaching and learning in higher education: Lessons learned in crisis situations*, Comput. Hum. Behav., **121**, 106789 (2021), DOI: 10.1016/j.chb.2021.106789

[3] M. Fernández-Gutiérrez, G. Gimenez, J. Calero, *Is the use of ICT in education leading to higher student outcomes? Analysis from the Spanish Autonomous Communities*, Comput. Educ., **157**, 103969 (2020), DOI: 10.1016/j.compedu.2020.103969

[4] K.M. Moser, T. Wei, D. Brenner, *Remote teaching during COVID-19: Implications from a national survey of language educators*, System, **97**, 102431 (2021), DOI: 10.1016/j.system.2020.102431

[5] B. Bruggeman, J. Tondeur, S. Vanslambrouck, *Experts speaking: Crucial teacher attributes for implementing blended learning in higher education*, Internet High. Educ., **48**, 100772 (2021), DOI: 10.1016/j.iheduc.2020.100772

[6] V. Milićević, N. Denić, A. Jovanović, *E-learning perspectives in higher education institutions*, Technol. Forecast. Soc. Change, **166**, 120618 (2021), DOI: 10.1016/j.techfore.2021.120618

[7] Y. Zhao, A.M.P. Llorente, M.C.S. Gómez, *Digital competence in higher education research: A systematic literature review*, Comput. Educ., **168**, 104212 (2021), DOI: 10.1016/j.compedu.2021.104212

[8] R. Scherer, S.K. Howard, F. Siddiq, *Profiling teachers' readiness for online teaching and learning in higher education: Who's ready?*, Comput. Hum. Behav., **118**, 106675 (2021), DOI: 10.1016/j.chb.2020.106675

[9] Y. Perbawaningsih, *Plus Minus of ICT Usage in Higher Education Students*, Procedia Soc. Behav. Sci., **103**, 717 (2013), DOI: 10.1016/j.sbspro.2013.10.392

[10] M. Sailer, J. Murböck, F. Fischer, *Digital learning in school: What does it take beyond digital tecnology?* Teach. Teach. Educ., **103**, 103346 (2021), DOI: 10.1016/j.tate.2021.103346

[11] A. Bilyalova, *ICT in Teaching a Foreign Language in High School Procedia*, Procedia Soc. Behav. Sci., **237**, 175 (2017), DOI: 10.1016/j.sbspro.2017.02.060

[12] T. Isaeva, N. Malishevskaya, L. Cherkasova, A. Kolesnichenko, *University faculty motivation to students' distant evaluation*, E3S Web Conf., **210**, 18071 (2020), DOI: 10.1051/e3sconf/202021018071

[13] *QS World University Rankings (2016–2017)*, URL https://www.topuniversities.com/university-rankings/world-university-rankings/2016

[14] *IMD World Digital Competitiveness Ranking 2020*, URL https://www.imd.org/news/updates/IMD-2020-World-Competitiveness-Ranking-revealed

[15] Y.M. Tang, P.C. Chen, G.T.S. Ho, *Comparative analysis of Student's live online learning readiness during the coronavirus (COVID-19) pandemic in the higher education sector*, Comput. Educ., **168**, 104211 (2021), DOI: 10.1016/j.compedu.2021.104211

[16] M. Daumiller, R. Rinas, J. Hein,, S. Janke, O. Dickhäuser, M. Dresel, *Shifting from face-to-face to online teaching during COVID-19: The role of university faculty achievement goals for attitudes towards this sudden change, and their relevance for burnout/engagement and student evaluations of teaching quality*, Comput. Hum. Behav., **118**, 106677 (2021), DOI: 10.1016/j.chb.2020.106677

[17] A. Sar, S.N. Misra, *A study on policies and implementation of information and communication technology (ICT) in educational systems*, Materials Today: Proceedings (2020), DOI: 10.1016/j.matpr.2020.10.507

[18] J. Calvert, R. Abadia, *Impact of immersing university and high school students in educational linear narratives using virtual reality technology*, Comput. Educ., **159**, 104005 (2020), DOI: 10.1016/j.compedu.2020.104005