FUTURITY
Education

DOI: https://doi.org/10.57125/FED.2022.25.12.03

How to cite: Haidabrus, B. (2022). Information technology and management in higher education and science, *Futurity Education, 2*(4), 29-41. https://doi.org/10.57125/FED.2022.25.12.03

Information Technology and Management in Higher Education and Science

Bohdan Haidabrus

PhD in Project and Program Management, Associate Professor Faculty of Business and Economics, Riseba University of Applied Sciences, Riga, Latvia, https://orcid.org/0000-0002-9040-9058

***Correspondence email:** *haidabrus@gmail.com.*

Received: September 28, 2022 | **Accepted:** November 18, 2022 | **Published:** December 25, 2022

Abstract: Today IT is one of the most important factors that has a strong impact on the education and science system quality in the whole world as well as in Latvia. The basis of the use of information technologies in higher education and science research is the system analysis qualitative combination of methods. During the research the existing base of scientific literature, methods of analysis, synthesis, induction, deduction, concretization, methods of generalization and analogies were used. As a result of the research, it was found that the introduction of information technology in the field of science and higher education is of great importance for the actual development in these fields. It will be helpful for the professional training of specialists capable of developing selected spheres and competing in the modern labor market. In the course of the research, the main indicators which conduct to the increasing the level of information literacy were identified. A number of advantages and disadvantages of information technologies in the scientific and educational sphere use are highlighted. One identified the main tasks of using information technologies in the field of science and higher education. The main advantages of information system in the process of learning in higher educational institutions use are highlighted. The results of the research are of great practical importance, as they can be used as a basis for further work in this direction.

Keywords: higher education, information technology, science, development, implementation.

Introduction

Information technologies, electronic services, social networks, the Internet have entered into almost all spheres of society. The introduction of information technologies into the life of society has led to their widespread use in the scientific and educational fields. The UN report on human development notes the emergence of new technologies with the development of human potential.

From the point of view of science and higher education, virtual space becomes an information space, a place for students' knowledge monitoring as well as electronic journals are used for posting the marks. The global computer learning market, according to the Gartner Group (a research and consulting company specializing in information technology markets), is growing at approximately 13% per year. A system of distance learning (DL) in higher educational institutions has wide development, which provides the acquisition of knowledge using distance learning technologies, i.e. computer technologies. Namely, thanks to computer communication, hybrid fields of science are created, which is expressed in citation and in the mutual use of methods from different disciplines, which leads to the standardization of knowledge (Kalyanaraman et al., 2018; Chergui et al., 2020). At the present time information technologies have become a priority in the modern development of science and higher education and are attractive for applicants and scientists when choosing a higher educational institution, i.e. information technologies lead to promising changes in higher education in general and determine the competitiveness of universities in the market of scientific and educational services (Chauhan et al., 2021).

Research Problem

Today, information technology is one of the most important factors that have a strong impact on the quality of the education system both in the world in general and in Latvia in particular. As the main problem of the research, the features of the use of information technologies in higher education and science are highlighted.

Research Focus

This study is focused on identifying the features of the disadvantages and advantages of introducing information technologies in higher education and science.

Research Aim and Research Questions

The main purpose of this article is to study the features of the use of information technology in higher education and science.

Research Methodology

The choice of specific research methods is in connection with the nature of the factual material, the conditions and objectives of this research. The selected methods are an ordered system in which their place is determined in accordance with each stage of the research of the application of information technologies in higher education and science, the use of techniques and operations with theoretical and

factual material in a given sequence. The research of the features of the use of information technologies in higher education and science is based on a qualitative combination of methods of system analysis. In particular, the following methods were used in the study: analysis, synthesis, induction, deduction, concretization, generalization methods, analogies and mathematical methods. The basis of research is the work of famous scientists. Despite the achievements in the field of application of information technology in education, the conceptual foundations of information technology support for education, taking into account the specifics of the introduction of modern information tools in education and science, as well as influencing the further development of scientific and educational systems, are currently insufficiently developed. The purpose of this article is to study the features of the use of information technology in higher education and science.

Research Results

The beginning of the 21st century is rightfully considered the stage of active development of the absolute information technology industry. The characteristics of the current stage of the higher education system in the world in the context of the development of information technologies are presented in Table 1.

At present time, an innovative strategy for organizing training is an integral part of not only domestic education, but of all world system of education in general, which in turn contributes to improving the quality level of the education system. The activity of a modern person is hard to imagine without information technologies, thanks to which it is possible to obtain the necessary information, its introduction into the spheres of the economy, public consumption, production, education and science. The problems of pedagogical expediency of use, analysis of prospects, possible aspects of the development and implementation of information technologies in the educational system are studied in many scientific works. Dudar et al. (2021) correctly noted and made an in-depth emphasis on the possibility of using information technology in education. He proclaimed the idea of combining technical and pedagogical sciences, as a result of which it is possible to build a perfect technical or industrial pedagogy.

The psychological and pedagogical aspects of the use of information resources in the scientific and educational field were studied in detail in the works of Penprase (2018). In his developments, he focuses on the computer as an important tool for improving the effectiveness of learning, the development of human psychology, but at the same time emphasizes the importance and weight of pedagogical work, replace which is not subject to the computer with the greatest desire. Only the teacher is given to become a full-fledged mentor for the student. At all times, the teacher's word has been famous and famous, with the help of which he teaches, develops and educates the younger generation in the face of students. The computer only contributes to the harmonization of the relationship between the teacher and the student, due to which a higher level is achieved in the scientific and educational process (Penprase, 2018).

Table 1

Characteristics of the Current Stage of the System of Higher Education in the World in the Context of the Development of Information Technologies

Category	Characteristic
Information revolutions	Currently, the formation and development of cross-border forms of information and telecommunication Networks
Evolutionary stages of the educational system	From 2012 to the present, globalization and mass character
Educational revolutions	Distance and e-learning
Characteristics of the educational sphere	- since 2012 - the creation of massive open online courses. - Availability of alternative courses - sources of knowledge of the highest quality . - Education has become pragmatic - Recognized educational hubs appear (USA, Australia, UK, etc.) - It becomes prestigious to get an education in another country - There has been a transition from knowledge, skills to competencies - A large flow of information is contained on the Internet, including unverified and - incorrect information - Knowledge Triangle - Diverse missions of universities in the knowledge society
Learning Outcome	Citizen of the world. A professional capable of learning on his own throughout his life
University Success Criteria	Number of foreign scientists and students Availability of fundamental research. Reputation in the academic and professional - environment. Commercialization of research results

Source: grouped by author.

The totality of the latest electronic computing and telecommunication tools that ensure the collection, storage, processing, expression and use of information form a single system called "information technology" (Poveda-Pineda & Cifuentes-Medina, 2020). From the standpoint of another contemporary scientist, Fuchs (2021), the term "information technology" is perceived only as a harmonious symbiosis of ways and means that favorably contribute to the increase of human knowledge and abilities to use technical and social devices.

Thanks to the advanced technologies of the countries of the world community, there is currently a picture of the active use of the latest information resources in almost all fields of activity: in the economy, science, aviation, ecology, etc. At the same time, for the subsequent competent application of these technologies in practical activities, a person must receive a professional high- quality education. It is in the concept of "education" that the fundamental basis of all knowledge, skills and abilities necessary in further labor practice is laid (Qureshi et al., 2021). Watching the pace of evolution of the information society, we increasingly understand the inevitability in the advanced methods of education, because. it is impossible to achieve the desired result in the training of highly qualified specialists with one traditional form of education. The practice of dynamic introduction of information and communication technologies into the educational process demonstrates the possibility of exchanging experience with the world's leading universities, as well as attracting the best teachers for internships.

According to the report of the American Library Association, absolutely all sectors of society must be information-savvy so that, if necessary, it is possible not only to apply specific information, but also

to detect, identify and evaluate it (Keržič et.al., 2021). Subsequently, the theory of information literacy received broader analytical research, which allowed the individual to adapt in the field of constantly modernizing information technologies, in addition to using existing ones, as well as the ability to understand information production in general. In scientific and educational activities, the information competence of a teacher and a student serves as a fundamental basis not only in obtaining information, but also in its exchange, readiness to apply in practical life (Bond et al., 2021). In the course of the research, the main indicators conducive to increasing the level of information literacy were identified:

- understanding the need for information;
- an attempt to fill the information gap;
- formation of search tactics;
- the ability to find the necessary information;
- availability of access to information;
- processing and comparative analysis of the received information;
- the ability to apply or convey information depending on the situation;
- creativity to new discoveries through already existing information.

On the basis of the research, it was found that both the quality of the entire educational process and the facilitation of finding and collecting information play the main role in improving the information literacy of teachers, which will make it possible to convey information to students in the most correct and accessible way. A necessary criterion for improving the effectiveness of teaching methods is the latest information technologies application to education.

Currently, all new information technologies are being actively developed and created for the purpose of accessible education of the younger generation. Therefore, the teacher, first of all, should systematically improve knowledge in the field of information communications, raise the level of information culture, while not abusing these technologies in their practical activities, but treating them with a creative approach. Media means and methods, as the latest achievements of modern science, are a source of professional growth and self-improvement of a teacher (Cabaleiro-Cerviño & Vera, 2020). According to the author, the modernization of the educational process primarily consists in replacing the outdated teaching methodology (lecture practice) with a more advanced teaching system (research activities, independent work). At the same time, the global problem of higher education institutions is the reduction of teaching hours allocated to subject disciplines, in relation to the growth in the scale of information. And the so-called "information reform" has had and is having a beneficial effect on the degree of students' preparation, thereby expanding their horizons and worldview (Escorcia Guzman et al., 2022).

Awareness and solution of the problem of informatization of educational activities in higher educational institutions is reduced to the desired result. Based on the research, it was found that thanks to computer technology, it is provided:

- assimilation of a huge format of information;

- simplified access to the necessary reference literature;

- choosing a dilemma with respect to a similar point of view;

- professional approach to solving the questions or tasks;

- comparative analysis with alternative options.

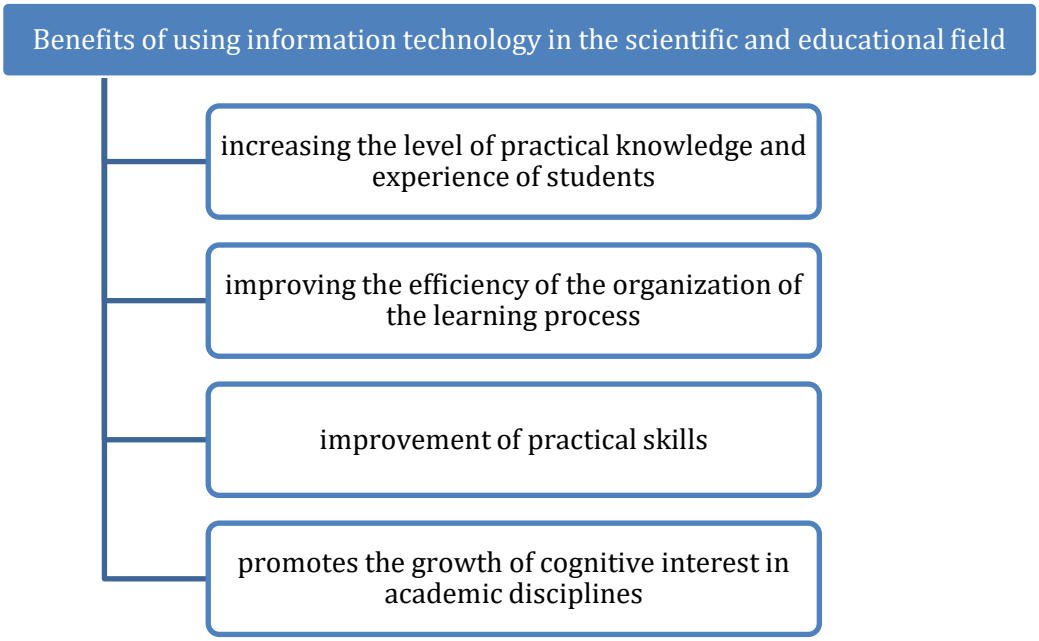
Therefore, it is very convenient and comfortable in the scientific and educational field of activity to systematically resort to the help of electronic technological resources, which in this regard must be steadily improved and updated.

At the same time, in the leading circles of higher education institutions, there is doubt about the acceptability of the phrase “educational technologies” today. Usually, we can hear about information or communication technology. Together, these technologies are aimed at solving more global problems, or rather, at creating new educational models in which information, communication and computer technologies will be harmoniously combined with the educational process (Escorcia Guzman et al., 2022).

Information technologies, widespread in the educational environment, help to meaningfully develop academic disciplines, interacting with other related subjects. Thus, science is “equipped” with new discoveries, achievements and knowledge, which in turn contributes to educational progress and an increase in the level of students' knowledge (Megnounif & Kherbouche, 2020). The research identified a number of advantages that the use of information technology in the scientific and educational sphere has, these advantages are presented in Fig. 1.

Figure 1

Benefits of Using Information Technology in the Scientific and Educational Field



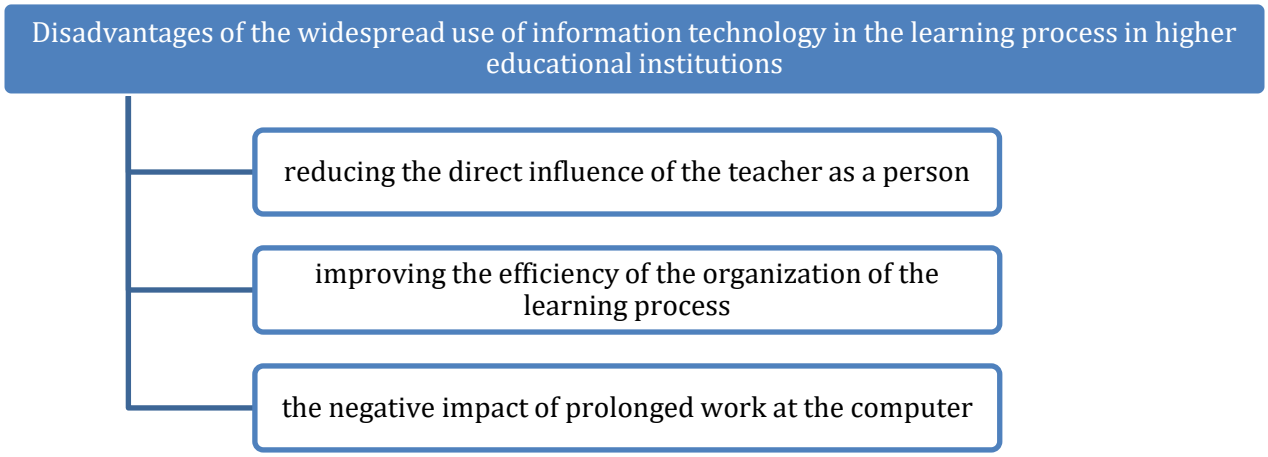
Source: grouped by author.

The advantages of information technologies in the learning process are indisputable, since they act as universal moderators of visual learning of the material, combined with logical thinking. This is the main purpose of information technology, as student can be easily involved in the educational process and successfully trained, because information is presented using accessible methods in audio and video formats (Marinoni & Jensen, 2020).

But the widespread use of information technology in the learning process in higher educational institutions is not without certain drawbacks (Fig. 2).

Figure 2

Disadvantages of the Widespread Use of Information Technology in the Learning Process in Higher Educational Institutions



Source: grouped by authors.

Thus, it was found that information technologies perform an important function not only in strengthening the educational foundation, but also in improving the quality of science and education. Thanks to the improvement of information technologies, access to educational programs of various levels and standards is increasing up to the international format (Krassadaki et al., 2022).

Modern information technologies introduced into the scientific and educational sphere allow teachers to qualitatively change the essence, methods and methodological forms of the educational process in higher education. In the course of the research, the main tasks of using information technologies in the field of science and higher education were identified, the results obtained are presented in Fig.3.

Figure 3

The Main Tasks of Using Information Technologies in the Field of Science and Higher Education

The main tasks of using information technologies in the field of science and higher education

- increasing the intellectual potential of students in the information society;
- in the direction of the educational system and the entire educational process in the direction of improvement, the formation of relationships between the student and the teacher, based on respect for the rights of each person;
- support and development of individual potential, of each person, laid downby nature;
- improving the effectiveness of both scientific and educational processes;

Source: grouped by authors.

In the process of educational and methodological work, most teachers with great pleasure resort to the help of the latest information technologies, taking into account their importance in the educational field. However, the procedure for increasing the effectiveness of the use of information in society with the help of advanced information technologies is consistent and systematic. Information technology today is a means that complements the mechanism of education, and mandatory installations of a modern educational institution (Pei et al., 2022). Thanks to the qualitative development of information technologies, it becomes possible to improve the education system, as a result of which millions of people can receive free education of the highest level without any big costs. That is why, in the name of creating and modernizing an innovative educational platform, it is advisable to consider the use of electronic information technologies in the educational process from a strategic angle (Escorcia Guzman et al., 2022). In many developed countries of the world, including Latvia, the educational field of activity in higher educational institutions is presented in the format of information resources of remote access. The very nature of technological novelty is aimed at the use of information tools in education in order to prevent the emergence of contradictions, as in traditional education.

In the course of the research, a number of contradictions were identified, the elimination of which is aimed at the introduction of information technologies in the field of higher education. The research showed that the main among such contradictions are:

- increasing the level of theoretical knowledge, but lack of skills in their practical application;

- the potential threat of doubts in the conclusions and assessments, leading to a loss of flexibility of thinking;

- rapid turnover of updating educational knowledge and its low actualization in practice;

- lack of a clearly defined creative and innovative orientation.

It can be argued that in the educational field of activity of higher educational institutions, information serves as an innovative core for strengthening the student's position and mastering not ready-made material, but independently obtained in the process of research and analysis of electronic

information resources. It follows from this that along with the teacher, the student is also responsible for systematizing of information resources.

Technological innovations in the educational sphere of higher educational institutions play a high role. The inclusion of the latest information and communication technologies in scientific and educational work, the massive use of leading information resources entails considerable financial investments, but it creates prospects for improving the quality of education, thereby ensuring the demand for a higher educational institution at the fair of educational services (Rapanta et al., 2020).

The main merit in achieving high results in the education and training of students belongs to the close-knit team and well-coordinated work of the university, built on the principle of trust. Consequently, decisions are made by the management together with the university staff, and then they are already implemented by the information and technical service of the university.

Thus, it can be argued that the information system used in the learning process in higher education institutions has many advantages:

- firstly, all the necessary information for the successful operation of the institution can be grouped and organized into a single file or folder;
- secondly, it provides convenient and quick access to information from other departments. To do this, you need to make the right request in the “find” window, and the information of interest after a certain waiting time will appear on the monitor of the electronic device. Thus, the introduction of information "know-how" in the educational sphere of activity of higher educational institutions facilitates the work in the management of an educational institution.

Discussion

According to scientific research, there are four fundamental aspects for the introduction of information technologies in the system of science and education: social, professional, pedagogical and catalytic. The social aspect is determined by the priority of information technology in the life of society (Freitas & Paredes, 2018). The professional aspect is the need to prepare students for professional activities that require certain knowledge when using computer technology. The pedagogical aspect is that technologies are introduced into the learning process, which determines the wide possibilities of communication and better materials, which enhances the teaching of traditional subjects. The catalytic aspect predetermines the improvement of teaching, administration, management, having a positive impact on education in general and changes the authoritarian relationship between teachers and students.

Rapanta (2020) notes the following benefits from the introduction of information technology in higher education:

- Strengthening the overall student motivation;
- Transition from passive to active learning;
- Improving the quality of teaching;
- More simplified student access to educational materials.

In April 2019 an international scientific and practical conference "Modern information and communication technologies in higher education: new educational programs, pedagogy using e-learning (computer learning) and improving the quality of education" was held at the University of Rome "La Sapienza" (Italy), where topical directions for increasing the competitiveness of modern universities were considered: the integration of innovations in education and research; academic mobility and networking of universities; international cooperation and new demands of the labor market. Consideration of these aspects at the European level highlights the role of the use of computer technology in teaching in universities (Poveda-Pineda & Cifuentes-Medina, 2020).

In world practice, new trends in the training of a multilingual specialist are also emerging. And English is a priority in connection with its use in the organization of computer training (software in English). “When students work in stable and dynamic dyads, the level of language competence sharply increases” (Gorozidis et. al., 2021). In this regard, the use of computer technology in the study of English is currently very relevant and important, and this leads to an increase in the amount of independent work of the student, since there is currently a large selection of ways to search for information, for example, it can be an electronic textbook or search engines such as Google, Google schools, Base (academic information search), Yahoo, Refseek (academic information search), Informine, Ask, Bing, MSN, etc., and it is best to choose the right search engine taking into account the following aspects - ease of use of the search engine, the quality of the results and the timing of finding the results. There are also many electronic dictionaries, such as Multitran (one of the best) and Lingvo. On the Macmillan website, you can even get into a virtual room where you can interact with the community. The participation of students in electronic testing (control of residual knowledge, or intermediate control of knowledge) can also be attributed to the independent work of the student, with the obligatory presence of a training test in the Academic NT system for pedagogical assessment at the university. But with all the available information resources, there are also certain difficulties in introducing computer technologies in the study of any discipline, which lie in the fact that it is necessary to observe the principle of an individual and differentiated approach in teaching students, and it is also necessary to compose electronic tests in accordance with the curriculum, while within the framework of computer testing, it is possible to take into account the level of training of students and develop test tasks of varying degrees of complexity (Ozdamli & Cavus, 2021). Given the existing difficulties, the use of new information technologies in teaching predetermines a more active position of the student himself in the process of mastering knowledge and in the scoring system, since a student, having Internet access via a mobile phone, can instantly find out his results of midterm tests and see their rating marks, put down by the teacher for the module according to the training program (Tartavulea et al., 2020). At the same time, the spirit of competition appears among students, which leads to an increase in their activity and to an increase in the overall student motivation. And also, a new type of cognitive activity using information technology requires students to focus and attention, which contributes to the development of cognitive independence and student confidence and leads to the formation of skills to independently replenish their knowledge, search for information and navigate in a huge flow of information, which improves the quality of knowledge. As well as the interactivity of students and the actualization of their tasks is achieved by using video presentations at scientific conferences of the university with a focus on the practical activities of future competitive specialists in the labor market. Thus, it is impossible not to agree with the statement of Bill Gates that investments in electronic infrastructure and education are the key to ensuring the future competitiveness of the economy of any country.

Conclusions and Implications

Thus, as a result of the research, both positive and negative aspects of the use of information technologies in the educational process were identified. Among the positive aspects of the use of information technologies in science and higher education, we highlight the following: a significant simplification of the learning process, increasing the intellectual potential of students, strengthening the degree of learning at all stages of the educational system.

As for the negative impact on the educational process, this is viewed through the prism of the problem of the relationship of information. For example, a computer has a large amount of information and data, and students are not physically able to master all this material in a short period of time. Most scientists of our time regarding the theory of the possibility of replacing human communication with computer learning agreed on the following opinion: a computer is not able to transform into human communication, learning the inner worldview, judgments and thoughts. In this situation, it is very important to correctly approach the system of vocational training, in which the computer occupies the position of an auxiliary element, but in no case replaces the live communication between the teacher and students. As a result of the research, it was found that the introduction of information technologies in the educational process contributes to the following:

- easy access to information that is freely and openly available to potential users;

- simplified search for the necessary information, which in modern conditions requires less time and money;

- an increased degree of students' interest in mastering the educational material, further analysis and subsequent application in practical professional activities.

Without the active use of modern information technologies in the scientific and educational process, intensive innovative renewal of science and education systems is impossible. It is thanks to the wide use of the latest computer, telecommunication tools and information resources of the developed countries of the world that the level of professional training of graduates for life and work in the modern information society increases in higher educational institutions.

References

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*(1), Article 50. https://doi.org/10.1186/s41239-021-00282-x

Cabaleiro-Cerviño, G., & Vera, C. (2020). The impact of educational technologies in higher education. *GiST Education and Learning Research Journal, 20,* 155–169. https://doi.org/10.26817/16925777.711

Chauhan, S., Gupta, P., Palvia, S., & Jaiswal, M. (2021). Information technology transforming higher education: A meta-analytic review. *Journal of Information Technology Case and Application Research, 23*(1), 3–35. https://doi.org/10.1080/15228053.2020.1846480

Chergui, M., Chakir, A., & Mansouri, H. (2020). Smart pedagogical knowledge management system. *Universal Journal of Educational Research, 8*(12), 6585–6597. https://doi.org/10.13189/ujer.2020.081223

Dudar, V. L., Riznyk, V. V., Kotsur, V. V., Pechenizka, S. S., & Kovtun, O. A. (2021). Use of modern technologies and digital tools in the context of distance and mixed learning. *Linguistics and Culture Review, 5*(S2), 733–750. https://doi.org/10.21744/lingcure.v5ns2.1416

Escorcia Guzman, J. H., Zuluaga-Ortiz, R. A., Barrios-Miranda, D. A., & Delahoz-Dominguez, E. J. (2022). Information and Communication Technologies (ICT) in the processes of distribution and use of knowledge in Higher Education Institutions (HEIs). *Procedia Computer Science, 198*, 644–649. https://doi.org/10.1016/j.procs.2021.12.300

Freitas, A., & Paredes, J. (2018). Understanding the faculty perspectives influencing their innovative practices in MOOCs/SPOCs: A case study. *International Journal of Educational Technology in Higher Education, 15*(1), Article 5. https://doi.org/10.1186/s41239-017-0086-6

Fuchs, K. (2021). Students' perceptions concerning emergency remote teaching during COVID-19: A case study between higher education institutions in Thailand and Finland. *Perspectives on Global Development and Technology, 20*(3), 278–288. https://doi.org/10.1163/15691497-12341595

Gorozidis, G. S., Papaioannou, A. G., & Christodoulidis, T. (2021). Measuring teacher perceptions of their task-initiated achievement goals. *International Journal of Educational Research, 110*, Article 101866. https://doi.org/10.1016/j.ijer.2021.101866

Kalyanaraman, P., Margret Anouncia, S., & Balasubramanian, V. (2018). An investigation on E-learning tools and techniques towards effective knowledge management. In S. Margret Anouncia & U. Wiil (Eds.), *Knowledge computing and its applications* (pp. 335–346). Springer. https://doi.org/10.1007/978-981-10-8258-0_15

Keržič, D., Danko, M., Zorko, V., & Dečman, M. (2021). The effect of age on higher education teachers' ICT use. (2021). *Knowledge Management & E-Learning: An International Journal, 13*(2), 182–193. https://doi.org/10.34105/j.kmel.2021.13.010

Krassadaki, E., Tsafarakis, S., Kapenis, V., & Matsatsinis, N. (2022). The use of ICT during lockdown in higher education and the effects on university instructors. *Heliyon, 8*(11), Article e11214. https://doi.org/10.1016/j.heliyon.2022.e11214

Marinoni, G., & Jensen, H. (2020). *The impact of Covid-19 on higher education around the world.* International Association of Universities. https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf

Megnounif, A., & Kherbouche, A. (2020). Knowledge management promising contribution to university performance: Empirical study based on teachers' opinions. *Journal of Information & Knowledge Management, 19*(3), Article 2050022. https://doi.org/10.1142/s0219649220500227

Ozdamli, F., & Cavus, N. (2021). Knowledge sharing technologies in higher education: Preferences of CIS students in Cyprus. *Education and Information Technologies, 26*(2), 1833–1846. https://doi.org/10.1007/s10639-020-10336-8

Pei, B., Xing, W., Zhu, G., Antonyan, K., & Xie, C. (2022). Integrating infrared technologies in science learning: An evidence-based reasoning perspective. *Education and Information Technologies, 28*, 8423–8443. https://doi.org/10.1007/s10639-022-11538-y

Penprase, B. E. (2018). The fourth industrial revolution and higher education. In N. W. Gleason (Ed.), *Higher education in the era of the fourth industrial revolution* (pp. 207–229). Palgrave Macmillan. https://library.oapen.org/bitstream/handle/20.500.12657/23279/1/1006877.pdf#page=216

Poveda-Pineda, D. F., & Cifuentes-Medina, J. E. (2020). Incorporación de las tecnologías de información y comunicación (TIC) durante el proceso de aprendizaje en la educación superior. *Formación Universitaria, 13*(6), 95–104. https://doi.org/10.4067/s0718-50062020000600095

Qureshi, M. I., Khan, N., Raza, H., Imran, A., & Ismail, F. (2021). Digital technologies in education Does it enhance the effectiveness of learning? A systematic literature review. *International Journal of Interactive Mobile Technologies (IJIM), 15*(4), 31–47. https://doi.org/10.3991/ijim.v15i04.20291

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*(3), 923–945. https://doi.org/10.1007/s42438-020-00155-y

Tartavulea, C. V., Albu, C. N., Albu, N., Dieaconescu, R. I., & Petre, S. (2020). Online teaching practices and the effectiveness of the educational process in the wake of the COVID-19 pandemic. *Amfiteatru Economic, 22*(55), 920–936. https://doi.org/10.24818/ea/2020/55/920