

## The Influence of Digital Creative Technologies on the Development of Education and Medicine



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### Abstract

A concise and factual abstract The purpose of scientific research is to trace the patterns of change in the development of education and medicine and justify the direction in which they will develop so that people will be ready for rapid change, and education prepares professionals capable of implementing new digital technologies that improve human health. The methodology of the study is to use such methods as analysis and synthesis, categorical analysis, comparative analysis, sociological method, and other methods of scientific knowledge. The purpose of the study was to identify patterns of change in the development of medicine and education due to the impact on them of digital technology. The article reveals the content and essence of digital technologies, which are introduced in medicine, require training in the provision of medical care; analyzes the directions of development of medicine in the context of philosophical reflection, and tests the effectiveness of their use. The practical significance of the study lies in the philosophical understanding of the interaction between education and medicine, according to which the future of our civilization, based on cellular medicine, the discovery of stem cells, which are developed using modern technology and new standards of medicine.

### Keywords

*digital technologies;*  
*education;*  
*human health;*  
*medicine;*  
*technology convergence;*

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## 1 Introduction

In today's digital society, the philosophy of medicine of the XXI century is based on the exponential growth and convergence of technologies, based on artificial intelligence, 3D printers, genomes, and stem cells. When it comes to medicine, it turns out that the medical system is sicker than patients. Therefore, this problem must be implemented in education and through education to prepare highly professional and competent professionals who would implement their educational scientific knowledge in medicine. Therefore, in our opinion, education and medicine are closely linked, as education prepares highly intelligent and professional staff for medicine, and the philosophy of education is a scientific and intellectual project of the XXI century.

Education prepares a specialist using creative technologies, creativity, self-organization, the ability to respond creatively to all crises of modern society, using the breakthrough potential of modern medical science, and understanding the responsibility and value of the medical profession in today's pandemic world. Today, modern medicine has many problems, as people face many diseases, so it must be formed as a purposefully organized process of providing education with information and computer technologies that can transform modern medicine. Today, going to the doctor is more associated with illness than with health, because it is a reaction to an event, not a work in advance (Korthagen et al., 2006; Chick et al., 2020).

Due to the technological merger of convergent technologies, there is a change in the paradigm of both education and medicine. The first is shifting the focus from illness to health, moving from a system that responds to the consequences to a system that acts in advance and seeks a personal approach to each patient. The second is to change the management system of medicine, and use the potential of augmented reality, artificial intelligence, and exponential growth of information (use of big data), which can be considered as a purposefully organized process of providing education in methodology, technology and practice (Mokliuk et al., 2022).

Therefore, it is necessary to form an army of highly professional medical professionals who would develop skills in the use of information and communication technologies in the process of solving creative tasks in collecting, searching, evaluating, selecting, information and its transformation into modern medicine. Today, it is impossible to imagine a field of human activity in which computers are not used (Trusova et al., 2021). There are more and more demands on computers, which force specialists to improve information processing technologies. The more widespread the use of computers, the higher their intellectual level, and the more information involved in the process (Kunderevych et al., 2022).

The purpose of the study is to analyze the impact of digital technologies on education and medicine and to test the effectiveness of their use in modern medical discoveries that represent a new scientific direction in the philosophy of medicine (Pagoropoulos et al., 2017; Papadopoulos et al., 2020). The object of research: digital technologies in education and medicine. The subject of research: the influence of digital technologies on the development of medicine in the context of philosophical thinking. The article aims to trace the patterns of change in the paradigm of medical development and understand in which direction medicine will develop so that people are ready for rapid change, and education prepares specialists who can implement new medical technologies that improve human health (McMichael et al., 2006; Frumkin, 2001). Schools and universities are designed to prepare a new generation of M - the future. Today, young people need to be taught those professions that have not yet been invented, as most of the education is stuck in the past, preparing for tasks that no longer exist. To survive, universities and business schools need to focus more and more on personal transformation, interactive learning, and the development of new educational programs.

## 2 Materials and Methods

The article uses a systematic methodology and Agile methodology as a methodology of flexibility, through which you can analyze the complex problems of today, in particular the impact of digital technologies on the

development of education and medicine in the context of philosophical thinking. Agile methodology is a methodology of complex adaptive systems, flexible management, and innovation components, based on the use of information and computer technologies in medicine and education (Zinsstag et al., 2011; MacLennan et al., 2002). Agile methodology is a theoretical basis for the model of research and innovation component in promoting flexible approaches in the use of digital components, which aims to reduce the gap between development and business (Marty, 2021). New creative digital technologies used in medicine require that the level of skill in the application of techniques and design must be extremely high to expand the use of technology in the industrial environment. According to the Agile methodology, all organizations must be flexible, as changes must be constantly accepted, making sure that the management system can be constantly deployed, deepened, and improved (Appello, 2019).

To do this, we must constantly create flexible and reliable software that would improve digital technology, which is the locomotive of the development of education and medicine, which requires the evolution of technical methods, engineering skills, and continuous improvement. At the same time, we should take into account the speed of spread of artificial intelligence, improving its forms and abilities, and options for strategic selection of superintelligence, which is just winning a decisive victory.

However, concrete measures should be proposed to help control superintelligence in the future. Superintelligence is an intellectual system of any nature, the mental abilities of which far exceed the abilities of people in all important fields of activity, including education and medicine. To prevent the risks of the AI revolution while taking these factors into account, we suggest focusing on analyzing strategies and building the capacity of digital technologies in medicine to predict the future of education and medicine, as medicine is human health that affects everyone (Bostrom, 2020).

At the same time, one of the research methods is analysis and synthesis, which is used for the theoretical basis of research; categorical analysis - to clarify the basic concepts of the study; comparative analysis - during the generalization of foreign experience; sociological method - the use of statistical information on the use of digital technologies in medicine and education.

Methods, approaches, and tools of research can be deepened through the use of algorithms for the gradual development of digital creative technologies and the formation of methods of digital competencies in education. These are Scrum - the "digital structure" approach and Kanban - the "balanced approach", which are used in innovation and contribute to the creation of an innovative digital product. Due to their introduction, the share of digital products and services is increasing, as well as the development of new forms of business based on digital technologies (digital economy).

The main hypothesis of the study, which is proposed to address the development of digital technologies in education and medicine, is the idea of introducing major drivers of digital technologies to improve new thinking and technologies that will change education and medicine in the coming years (Altrade, 2021).

Innovative digital thinking implemented in education and medicine through digital creative technologies demonstrates the high-tech basis of a quantum future capable of managing innovation processes. Therefore, education must be correlated with the development of digital technologies, as today there is a fusion of brain and technology, education must be highly intelligent, and designed to work with artificial intelligence and superintelligence.

Digital technologies include the formation of innovation and intellectual potential of the country as a high-intelligence and high-tech base, which requires the development of creative digital technologies in the economy, education, culture, and worldview. At the heart of the digital man and society is the formation of values based on the use of digital technologies and the search for new forms of personal self-expression in the postmodern era (Kyrychenko et al., 2021). Schwab Klaus in "The Fourth Industrial Revolution" said that the Fourth Industrial Revolution will affect the development of digital society, digital man, digital worldview, and digital technology (Schwab, 2019), and O'Reilly Tim said that it will change our lives (O'Reilly, 2018).

### 3 Results and Discussions

#### *Digital technologies in education*

The modern period of development of society (Hlebova et al., 2021) is characterized by the strong influence of computer technology, which penetrates all spheres of human activity, and ensures the spread of information flows in society, forming a global information space. An integral and important part of these processes is the computerization of education (Mokliuk et al., 2022). Today, smart education should be formed as highly intelligent, high-tech, and highly professional education (Voronkova et al., 2017). Today, the world is obsessed with digital creative technologies, which are invading all spheres of human life, digital addiction has already become one of the most common causes of anxiety, depression, and mental disorders, especially among young people.

The future of digital technology lies in the big data of artificial intelligence and robotics, quantum computers mean a million times higher speeds, qubits are used today, not bits. Education today must take root in four areas that will truly determine the future: 1) the Internet of Things; 2) big data; 3) cloud computing; 4) artificial intelligence. Each of them is already well known, but it is their new combination that will lead to the next revolution. The creative class is a factor in the implementation of this revolution and the improvement of human capital in the context of the development of smart education (Nikitenko, 2021).

Man is already part (Samodryn et al., 2021) of the Internet of Things, despite the health risks, so a new model of the "new enlightenment" should be formed as a factor in shaping new values of science, progress, humanism (Punchenko et al., 2019). All humanity will be in the cloud, more than 90% of all Internet users in the world use e-mail on cloud technology, and artificial intelligence will gradually take over the world.

In the future, the Internet will become more powerful than the president of a large country. So what should education be like in such a rapid development of digital creative technologies? Education should form a specialist who has systematic, creative, original, philosophical, and expert thinking, as digital technology will change our whole lives. Therefore, man must be prepared to use all these technologies for the benefit of man, society, and civilization. Patrick Dixon in *The Future of (Almost) Everything*. How the world will change over the next 100 years "notes that education and medical technology will change our whole life, education, culture, civilization, and communication (San Kim & Sohn, 2020; Lee et al., 2019).

#### *Digital technologies involved in medicine and medical training*

Thus, we give examples of the implementation of breakthrough technologies in medicine. Alhaber Medical, called Verity Life, develops a wide range of internal and external sensors that monitor everything from blood sugar to its full chemical composition. An affordable portable 3D device for ultrasound diagnostics based on artificial intelligence from Eco Imaging will soon be able to monitor the human body. Emphasis should also be placed on the combination of easy-to-use medical sensors and diagnostic artificial intelligence, which is accessed through an application that detects more than 50 common diseases.

All these developments represent the future of medicine, in which we will have constant monitoring of our bodies, using simple diagnostic methods. The working name of this new industry is mobile health services, which will have a market share of \$ 102 billion by 2022. The medical portal will have to give way, as it is an opportunity to have a personal virtual doctor in everyone's pocket. Now the market is filled with medical chatbots based on artificial intelligence, which have created a wave of mergers of networks, sensors, and computing technologies. These supplements diagnose hundreds of diseases, including mental health.

The philosophy of medicine of the XXI century concerns technologies and shifts in paradigms of human thinking as on technological rails of reorganization of medicine there is a reorganization of training of personnel of medical service. The locomotive should be the convergence of sensors, networks, and artificial intelligence, which transform the principles of disease diagnosis using 3D printers that change the nature of medical procedures, artificial intelligence, genomics, and quantum computing change the very nature of medicine. This process is accompanied by significant changes in paradigms of thinking, based on algorithmic, systematic, and predictive thinking, determined by the strong influence of computer technology, forming a new system of medical education, adequate to the modern technical capabilities of the era (Nikitenko et al., 2021).

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*Directions of development of medicine of the future in the context of philosophical understanding*

We draw attention to the development of medicine of the future in the context of philosophical thinking, based on cell medicine, the concept of which appeared in the 1990s after the discovery of stem cells, which were planned to be used in the fight against the disease. The patient is implanted with living cells, which to some extent affect the various body functions: grow hair, rejuvenate tissues, kill cancer, repair damaged heart, treat autoimmune diseases, and increase muscle mass. In addition, the human placenta contains a significant supply of stem cells that can be converted into drugs, and use without any moral and ethical compromises. In the course of this work, doctors made two more important discoveries.

First, as people get older, their stem cell supply declines sharply, and this process is called "stem depletion."

Second, the placenta contains not only stem cells but also immune cells, such as natural killer cells and T lymphocytes. Both are critical to fighting cancer as long as they can recognize the threat.

In 2017, when the CAR-T treatment method first appeared, the procedure cost half a billion dollars. Since the cells of each patient must be "charged" individually, the question arose of how to produce drugs en masse. In 2018, Selgene Corporation created its medical unit using placental immune cells and created a universal version of the drug. Instead of looking for an individual approach, the company could quickly produce CAR-T in large quantities so that patients could receive medication within hours of being diagnosed.

Experts call personalized genomics a medical revolution. If scientists decipher the gene, we will be able to optimize our "I": choose the perfect food, the perfect medicine, the perfect workout, and which nutritional supplements are best for your physiology. The exponential increase of information evolving according to Moore's Law promotes the development of convergent technologies that are beginning to merge and develop exponentially. For example, medicines are increasingly being made not only through advances in technology, but also through the development of artificial intelligence, quantum computers, and the development of many other industries ([Diamandis et al., 2021](#)).

*New digital creative technologies in the service of medicine*

In 2018, the National Institute of Health at Harvard and similar organizations launched the All of Us project, donating \$ 27 million in grants to decipher millions of genomes. If they succeed, they will be able to grow organs for transplantation, get weapons to fight viruses and cancer, and buy cheap drugs and vaccines. Another goal is to learn how to edit the genome using CRISPR technology, also known as "molecular scissors". It is too early to say anything, but progress in this direction is impressive. Scientists have recently constructed a gene for resistance to cocaine addiction and used it in mice, "turned off the gene responsible for muscular dystrophy in dogs," and began developing personalized cancer treatment plans for humans.

Thanks to an army of cheap new robots to hit the market in 2020, the robots will be able to "democratize surgery." A microscopic robot has already been created that moves through tissues at a speed of about 60 cm/h, and very clearly and accurately, directs its weak magnetic fields. In a few years, they will reach the peak of their development and will be actively used for diagnosis, local use of drugs, and minimally invasive surgery. 3D printers are also part of the operating room, which helps create prostheses and organs, specialists create organs, ears, heart shunts, spinal cord, skull plates, hips, and special surgical instruments, and electronics printing allows you to make bionic parts of the body.

Cellular medicine is successfully developing in the fight against the disease. The patient is impressed by living cells, which to some extent affect various body functions: grow hair, rejuvenate tissues, kill cancer, repair damaged heart, treat autoimmune diseases, turning human stem cells, which contain a significant supply of stem cells, into real drugs. This is by no means a complete list of the discoveries made by modern medicine with the help of modern breakthrough technologies, and philosophy helps a person to be healthy, happy, and in demand, for which man was above all and created a human race ([Gemel et al., 2021](#)).

The main problem in the development of new digital creative technologies is new opportunities and patterns of change in the development of education and medicine, so people must be ready for rapid change, and education prepares professionals who can implement new technologies that improve health and find new ways improve life, and this path will go down in history.



Human-digital transformation of education and medicine is considered at the level of a three-level model of the modern world: 1) digital breakthrough technologies at the level of education, which requires a high level of cognitive abilities, formation of digital (algorithmic) worldview as a breakthrough, innovative, systemic; 2) digital breakthrough technologies at the level of medicine, which are considered as a breakthrough of discoveries in medicine at the level of digital innovation component, as a result of which fantastic ideas can become a reality; 3) digital innovative thinking that will change science and technology and make a breakthrough into a new future that will change the world along with ideas that go beyond the usual imagination from the time of the first industrial revolution to the present. O'Neill is trying to prove to us that exponential growth is increasing today, BIG DATA is a weapon of mathematical destruction, and algorithms are increasingly regulating people's lives (O'Neill, 2020).

#### *Scientists have studied the causes of aging*

Scientists have identified nine causes of internal decline (apocalypse), which leads to the aging of the body, which is a programmed process.

1. Genome instability harms us and shortens life expectancy, as the wrong genes "print" diseases like cancer.
2. Reduction of telomeres. Inside the cell, DNA forms filamentous structures called chromosomes. At some point, the cell stops dividing and we become less protected from disease.
3. Epigenetic changes. Throughout life, environmental factors affect our genes and sometimes not in the best way.
4. Loss of proteostasis. Inside the cell, the weather makes proteins, they transport "materials", send signals and turn off various processes and maintain the structure of cells, but over time, proteins lose their effectiveness, so the body disposes of them.
5. Failure to recognize nutrients. The human body needs more than 40 different nutrients to be healthy, for everything to work properly, and for cells to be able to recognize and process them.
6. Mitochondrial dysfunction. Mitochondria are a kind of power plant that, by converting oxygen and food into energy, gives our cells "fuel", but over time their productivity declines.
7. Cellular aging. Under the influence of stressors, cells periodically "age". At the same time, they lose the ability to divide and die.
8. Depletion of stem cells. With age, our supply of stem cells decreases, sometimes by tens of thousands, and those that remain become much less active, which means that our internal system of tissue and organ repair cannot do its job.
9. Changing the intercellular connection. For the body to function properly, there must be a connection between the cells. "Messages" are transmitted through the blood, immune and endocrine systems, but over time the signals weaken. All these problems need to be addressed immediately, as the problem of human health remains one of the global problems of mankind, - said O. Puchenko (Puchenko et al., 2021).

#### *Directions of development of explosive development of medicine*

Investments in the development of aging technologies are already growing, so that future generations can live for decades longer. The search for rejuvenating proteins has led to a real biological "gold rush". And its greatest discovery is the secondary structure of DNA (double helix), which is a sequence of three billion nucleotide pairs containing nitrogenous bases, denoted by the letters A, T, C, G, which carry this code, defining which can read the book of life.

The human genome is an extremely important milestone in the history of medicine, summed up by Nobel Laureate David Baltimore, who said: "Today, biology is an information science." The driving force behind this unusual explosive development of medicine is partly quantum theory and the computer revolution, which has given us accurate models of the location of atoms in every protein and DNA molecule, which requires a stable digital concept in the context of challenges, threats, priorities (Nikitenko et al., 2019).

It is no coincidence that science has emerged, such as bioinformatics, which involves the rapid scanning and analysis of the genomes of thousands of organisms using computers. Scientists have now learned to grow skin, blood, blood vessels, heart valves, cartilage, bones, noses, and ears from human cells in the laboratory.

health. After a while, in a few decades, it will be possible to grow from cells of almost any organ. Therefore, the study of digital reality as a factor in achieving the stability of society in conditions of stochasticity, uncertainty, instability, and bifurcation (Oleksenko et al., 2019).

One big problem is learning to grow tiny capillaries that supply blood to cells, every cell in the body must have access to the circulatory system. In addition, there is the problem of growing complex structures. The kidney, which cleanses the blood of toxins, consists of millions of tiny filters, so it is difficult to create a matrix for these filters. However, the most difficult of all organs to grow the human brain is the prospect of the next few decades. "Stem cells" are the "mother of all cells", they can transform into any type of body cells. Every cell of our body contains the complete genetic code needed to create our whole body. Stem cells can potentially cure many diseases, including diabetes, heart disease, Alzheimer's disease, Parkinson's disease, and even cancer, which opens up endless possibilities for humans, says the Physics of the Future. How science will affect the destiny of mankind and change our daily lives in the XXI century" (Michio, 2017).

The solution of this problem testifies not only to the general theoretical, general philosophical, but also praxeological dimension, the essence of which is the implementation at all stages of progress - economic, educational, and cultural formation of digital modern society as a whole. All this requires the development of new creative technologies - information, intellectual, digital, and cognitive, influencing the formation of creative values and their transformation into human development and their implementation in education and medicine, based on 12 breakthrough digital technologies of the future, said Kelly Kevin (Kevin, 2018).

## 4 Conclusion

Thus, we note that we have explored potential breakthroughs in medicine with the help of modern technology, and new standards of personalized medicine. We hope that we have managed to create a new scientific direction in the philosophy of medicine, based on the interaction and influence of digital technologies that contribute to modern breakthroughs in medicine, and education helps to train highly qualified and professional specialists in both breakthroughs digital technology and medicine.

It is education that focuses on human capital and its development, which will create new opportunities for the introduction of digital technologies because today we need to develop biology, called information science, genomic medicine, molecular genetics, gene therapy, stem cells, the development of which will help cure many diseases. Thanks to the digitalization of education and the development of algorithmic culture, digital competencies should be formed following the European program DigiComp 2.0, which includes 26 digital competencies and digital skills (competencies), shaping the digital person and digital worldview (Skinner, 2020).

The development of this model of the impact of digital technologies on the development of medicine of the future in the context of philosophical understanding will help improve the interaction of education, medicine, man, humanity, and civilization, increase the digital development of education, and society according to international rankings. The basis for the formation of a new model of the impact of digital technologies on the development of medicine - new business opportunities that open the digital world and form new creative skills - critical thinking, creativity, and innovation. All this indicates that civilization is in a state of digital breakthrough and needs to form a philosophy of creative digital development of both education and medicine, because medicine is based on the health of the nation, and this is a global problem today.

Thus, the development of digital technologies in education and medicine is an important philosophical, socio-economic, managerial, and educational problem, the solution of which is the focus of governments, states, scientists, scientific communities, and paradigms. The solution to this problem will be the development of people's potential, in particular the implementation of the Digital Sprint Program (33 steps for the development of Ukraine's digital economy) and the program "Ukraine - a new center of European education." As a result of the tasks of this project, a new scientific direction will be formed and the model "Philosophy of Digital Development in Ukraine" will be presented.

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## References

- Altrade Dagogo (2021). From Einstein to artificial intelligence: science and technology that changed the world / trans. from English I. Wozniak. Kharkiv: Vivat. 368.
- Appello, J. (2019). Management 3.0. Agile management. Leadership and team management. Kharkiv: Morning: Fabula. 432.
- Bostrom, N. (2020). Superintelligence. Strategies and dangers of smart machines development / translated from English by Anton Yashchuk, Antonina Yashchuk. Kyiv: Our format. 408.
- Chick, R. C., Clifton, G. T., Peace, K. M., Propper, B. W., Hale, D. F., Alseidi, A. A., & Vreeland, T. J. (2020). Using technology to maintain the education of residents during the COVID-19 pandemic. *Journal of surgical education*, 77(4), 729-732. <https://doi.org/10.1016/j.jsurg.2020.03.018>
- Diamandis Peter & Kotler Stevens (2021). The future is closer than it seems. How technology is changing business, industry and our lives / trans. from English Dmitry Kozhedub. Kyiv: Laboratory. 320.
- Dixon Patrick (2021). The future of (almost) everything. How will the world change over the next hundred years / trans. from English I. Wozniak. Kharkiv: Vivat. 432.
- Frumkin, H. (2001). Beyond toxicity: human health and the natural environment. *American journal of preventive medicine*, 20(3), 234-240. [https://doi.org/10.1016/S0749-3797\(00\)00317-2](https://doi.org/10.1016/S0749-3797(00)00317-2)
- Gemel Gary & Zamnini Michele (2021). Anthropocracy. Creating companies in which people – are above all / trans. from English Dmitry Kozhedub. Kyiv. 336.
- Hlebova N., Oleksenko K., Oleksenko R., & Afanasieva L. (2021). Subjunctive aspects of sociological support of the modern teacher formation process in the development context of the new Ukrainian school system. *Linguistics and Culture Review*, 5(S1), 439-450. <https://doi.org/10.21744/lingcure.v5nS1.1427>
- Kevin, K. (2018). Inevitable. 12 technologists that shape ur future / trans. from English Natalia Valevskaya. Kyiv: Our format, 304.
- Korthagen, F., Loughran, J., & Russell, T. (2006). Developing fundamental principles for teacher education programs and practices. *Teaching and teacher education*, 22(8), 1020-1041. <https://doi.org/10.1016/j.tate.2006.04.022>
- Kunderevych, O., Bogonis, P., Kliuchko, Y., Chukhrai, L., & Sinenko, O. (2022). Educational information technologies in pandemic: Advantages and disadvantages. *International Journal of Health Sciences*, 6(1), 61-67. <https://doi.org/10.53730/ijhs.v6n1.3172>
- Kyrychenko, M., Nikitenko, V., Voronkova, V., Harbar, H., & Fursin, A.A. (2021). The search for new forms of personal expression in the era of postmodernism. *Amazonia Investiga*. 10 (42), 248-254.
- Lee, C., Kogler, D. F., & Lee, D. (2019). Capturing information on technology convergence, international collaboration, and knowledge flow from patent documents: A case of information and communication technology. *Information Processing & Management*, 56(4), 1576-1591. <https://doi.org/10.1016/j.ipm.2018.09.007>
- MacLennan, A. H., Wilson, D. H., & Taylor, A. W. (2002). The escalating cost and prevalence of alternative medicine. *Preventive medicine*, 35(2), 166-173. <https://doi.org/10.1006/pmed.2002.1057>
- McMichael, A. J., Woodruff, R. E., & Hales, S. (2006). Climate change and human health: present and future risks. *The Lancet*, 367(9513), 859-869. [https://doi.org/10.1016/S0140-6736\(06\)68079-3](https://doi.org/10.1016/S0140-6736(06)68079-3)
- Michio, K. (2017). Physics of the future. How science will affect the destiny of mankind and change our daily lives in the XXI century. Lviv: Chronicle. 432.
- Mokliuk, M., Popova, O., Soroka, M., Babchenko, Y., & Ivashchenko, I. (2022). Internet technology as one of distance education during pandemic. *International Journal of Health Sciences*, 6(1), 11-20. <https://doi.org/10.53730/ijhs.v6n1.2981>
- Nikitenko Vitalina (2021). Creative class as a factor of human capital improvement in the context of smart education development. *Humanities Studies. Issue 7*(84). 22-30.
- Nikitenko, V., Andriukaitiene, R., Puchenko, O. (2019). Formation of sustainable digital economical concept: challenges, threats, priorities. *Humanities Studies. Issue 1*(78). 140-153. <https://doi.org/10.26661/hst-2019-1-78-11>
- Nikitenko, V., Voronkova, V., Andriukaitiene, R., & Oleksenko, R. (2021). The crisis of the metaphysical foundations of human existence as a global problem of post-modernity and the ways of managerial solutions. *Propósitos y representaciones*, 9(1), 96.
- O'Neill Kate. BIG DATA (2020). Weapons of mathematical destruction. How big data increases inequality and



- threatens democracy / trans. from English O. Kalinina. Kyiv: Force Ukraine.336.
- O'Reilly Tim (2018). Who knows what the future will be like / trans. from English Yulia Kuzmenko. K.:Our Format, 448.
- Oleksenko, R., Voronkova V., & Nikitenko V. (2019). Examination of digital reality as a factor in achieving the stability of society in stochasticity (uncertainty, instability, bifurcation) conditions. Quarterly German scientific / popular science bulletin "Results of the scientists' work: sociology, criminology, philosophy and political science. 1(4), 1-10.
- Pagoropoulos, A., Pigosso, D. C., & McAloone, T. C. (2017). The emergent role of digital technologies in the Circular Economy: A review. *Procedia CIRP*, 64, 19-24. <https://doi.org/10.1016/j.procir.2017.02.047>
- Papadopoulos, T., Baltas, K. N., & Balta, M. E. (2020). The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. *International Journal of Information Management*, 55, 102192. <https://doi.org/10.1016/j.ijinfomgt.2020.102192>
- Punchenko, O., Voronkova, V., & Punchenko, N. (2019). Conceptual model of "new education" as a factor in the development of transformational processes in education. Mokslas ir praktika: aktualijos ir perspektyvos Taptautinė mokslinė - praktinė konferencija 2019 m. gegužės 09-10 may, Kaunas Tezių rinkinys (internete). 66-67
- Punchenko, O., Voronkova, V., & Vodopyanov, P. (2021). Healthcare as a global problem of humanity. International scientific-practical conference "Management. business. technologies - innovation. trends and challenges ". 20 – 21 May 2021, Marijampole. 204-212.
- Samodryn A., Moskalyk H., Oleksenko R., Khavina I., & Leushyna O. (2021). Formation of V. Vernadsky's noospheric ideas as the basis of the educational pedagogical policy strategy. *Linguistics and Culture Review*, 5(S1), 978-996. <https://doi.org/10.21744/lingcure.v5nS1.1475>
- San Kim, T., & Sohn, S. Y. (2020). Machine-learning-based deep semantic analysis approach for forecasting new technology convergence. *Technological Forecasting and Social Change*, 157, 120095. <https://doi.org/10.1016/j.techfore.2020.120095>
- Schwab, K. (2019). The Fourth Industrial Revolution, Forming the Fourth Industrial Revolution. Kharkiv: Family Leisure Club, 426.
- Skinner, C. (2020). Digital man / trans. from English G. Yakubovska. Kharkiv: Morning: Fabula. 272.
- Trusova, N. V., Oleksenko, R. I., Kalchenko, S. V., Yeremenko, D. V., Pasiaka, S. R., & Moroz, S. A. (2021). Managing the intellectual potential in the business-network of innovative digital technologies. *Studies of Applied Economics*, 39(5).
- Voronkova, V., & Kyvliuk, O. (2017). Philosophical reflection smart-society as a new model of the information society and its impact on the education of the XXI century. Future Human Image. 2017 Future Human Image, Vol 7. 154-163.
- Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. (2011). From "one medicine" to "one health" and systemic approaches to health and well-being. *Preventive veterinary medicine*, 101(3-4), 148-156. <https://doi.org/10.1016/j.prevetmed.2010.07.003>

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