Artificial Intelligence and Institutional Transformations of the Education System in the Context of the Sustainable Development Paradigm

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ABSTRACT

The article considers the prospects for improving the global educational system in the context of active development and implementation of developments in the field of artificial intelligence in the educational process. The main focus is made on the compliance of possible strategies for the interaction between the educational environment and AI with the standards of the sustainable development paradigm approved by the UNO for the next decade. In the context of the study, both constructive and destructive scenarios of human interaction with AI are taken into account. At the same time, the position is argued that risks and dangers still prevail over the technological opportunities that the new stage of development of AI technologies can provide. Therefore, as the main conclusion, it is proposed to place a bet on maximizing the development of total human intelligence through the introduction of new educational strategies in the future of implementing high-quality, accessible to all primary, secondary and higher educational levels on a global scale. At this stage of the development of civilization, this task is a priority. In addition, restrictions on the development and implementation of AI are necessary to avoid the unpredictable consequences of a "technological singularity".

Keywords: Artificial Intelligence, Education, Sustainable Development, Globalization, Strategy, Technological Singularity.

1. INTRODUCTION

Education and science play a key role in the development of a just, peaceful and sustainable society (global, continental, regional and national). Moreover, education is one of the crucial conditions for the implementation of the UNO global strategy "Transforming our world: the 2030 Agenda for Sustainable Development" ("Agenda 2030"). The latter forms practical tasks for modern governments regarding the transformation of the education system ("Education for sustainable development"). Accordingly, educational institutions need to transform and improve as institutions that must create and strengthen a safe, inclusive and effective environment for all members of society in the context of technological evolution and digital transformation.

The analysis of large-scale trends is necessary today for making decisions that will ensure the formation of a sustainable and future-ready educational environment. It is already possible to identify the main mega-trends that affect the future of education: globalization and digitalization. For example, in OECD countries, it is predicted that this will initially affect higher education systems, as they will have to make more efforts to attract the best students in a much more mobile and competitive market. While in many countries adults do not have adequate skills to manage complex digital information, so governments and employers need to take a serious approach to issues that relate not only to continuing education, but also to its comprehensiveness.

Education at the current stage is significantly lagging behind the pace of digitalization, so it is necessary to make much greater efforts to use the strengths of new technologies, while at the same time solving problems

regarding possible abuses, such as cyber attacks and privacy issues. In modern conditions, there is an increasing need for digital literacy and critical thinking not only among young students, but also among older people, which, in the end, will help to achieve success in cooperation at all levels – both in education and science, and in society as a whole.

Universities in particular and educational institutions in general should teach solidary cooperation and partnership, create conditions for developing skills for implementing sustainable development strategies, develop critical thinking, and share responsibility between students and the entire educational team. In fact, it is the educational institutions of society that can be examples of a sustainable way of life [1, 58-63].

2. METHODOLOGICAL BACKGROUND, GOALS AND PROSPECTS

Based on the fact that the phenomenon of internationalization in the context of globalization is quickly increasing, and their properties are determined by the laws dictated by the leading trend of global development, these phenomena acquire a special meaning in the context of their impact on institutional transformation in education (at all levels – primary, secondary and higher).

In such conditions, a necessary element of a productive educational policy is the analysis of the main trends of the present day, which must be taken into account for decision-making, in order to ensure an appropriate educational environment and culture of educational processes. In particular, today the developments in the field of artificial intelligence (AI), robotics and intelligent systems are rapidly developing. Right now, in the present time, they already bring benefits (and, at the same time, possible danger and harm). Even today, they significantly determine our existence and, judging by trends, will soon determine it even more.

The global pandemic has provoked unprecedented challenges in every aspect of the interaction of the individual and society. So, in universities, the transition to virtual teaching and learning has activated discussions about the future, and indeed the relevance of the usual mode of contact classes. But even with the pandemic, we are already living in the era of the Fourth industrial revolution (4IR), where cybernetics and computing are embedded in everyday life. As noted by the British researcher L. Parisi, the production of knowledge in universities "began to include the machine way of thinking" [2].

It is worth noting that the trend itself has been outlined for a long time. Since the time of the USSR, the development of such a direction as "engineering psychology and pedagogy" has begun, which studies the processes and means of information interaction between a person and a machine, as well as with/between technical means of automation. In modern realities, a fundamental conceptual theoretical-applied and methodological-instrumental material-book has already been developed for use in Higher Education Institutions for the development of universities "White book: Artificial intelligence in higher education". It describes and defines the capabilities, powers and challenges of artificial intelligence in research and training, promotes discussion of possible changes in teaching practices and opportunities, learning culture, and further development of educational and training content in interaction with the use of artificial intelligence in the context of modern neuroscience trends.

In addition, this material presents a vision of the future of university education and training from the point of view of students and teachers, demonstrating how education and training can change in the coming years due to the development of artificial intelligence [3]. Equally important is the fact that the European Commission has adopted and approved an Action plan for digital education [4]. Taking into account all these factors, we have attempted a systematic analysis of the arguments "for" and "against" the strategies being implemented today in the development of the educational environment related to the AI phenomenon.

3. CURRENT TRENDS AND MAIN ISSUES

Robots are becoming more and more human-like, and people are learning to interact with them, constantly improving them not only externally, but also internally. The review of the researches on this issue, which is now coming to the "forefront" not only in robotics and AI, but also in evolutionary genetics, psychology, philosophy, pedagogy, psychiatry, microbiology, anthropology, neurology and other sciences, shows that the transhumanist approach is becoming increasingly influential, according to which if machines (androids, cyborgs, etc.) acquire the ability to feel and empathize, they will no longer be machines.

Evolution (both natural-biological and human – organized-social-technological-intellectual, etc.) will necessarily lead to the expansion of thinking, endowed with rights and status of new species (along with Homo Sapiens). As the anthropologist, neurologist, and biologist J. Lindblad called this interspecific community – Homo Sapientissimus [5]. In addition, active robotization of the social environment may entail significant risks in the direction of involution or infantilization of humanity [6]. In addition, this process will contribute to significant changes in employment, since AI will inevitably be used to replace human labor or significantly transform it, as a result of which even permanent human education throughout life will not keep up with the pace of change, bringing "technological

unemployment" [7], when even creative professions may be under threat [8].

So, one of the most significant achievements of modern cognitive technologies is a talking robot – Android Pepper – which is officially accepted to a high school in the Japanese city of Waseda. In particular, Pepper learns together with children who are given the opportunity to use a unique chance to communicate with the robot. Scientists and teachers believe that such communication will be useful to them in the future. According to the developers, the robot is equipped with a significant number of cameras and sensors that allow it to recognize and respond to almost the entire range of human emotions. He also has the ability to self-study [9]. Earlier in Japan, for the first time in history, a cybernetic Android named NAO was enlisted in the staff of the largest bank in Japan, the Bank of Tokyo-Mitsubishi UFJ. NAO are humanoid robots developed by the Corporation of information technologies SoftBank. They move easily and gesture with manipulators, use cameras and sound sensors to respond to visitors, answer questions, and can maintain thematically diverse conversations in many languages [10].

In our opinion, modern social designers should pay special attention not only to the latest innovative technological trends, but also use prognostics. And for this, first of all, many scientists recommend reading science fiction, because this literature stimulates brain activity, develops imagination and thinking. In addition, as K. Skinner notes, "fiction quickly turns into scientific facts" [8, 102]. It is no accident that science fiction is currently receiving significant attention in China. So, N. Gaiman in an interview for "The Guardian" said that the interest in science fiction among the Chinese is due to the fact that they were brilliantly able to inherit existing technologies, but not to introduce innovations and inventions, because there were problems with the development of fantasy [11].

As a result, the Chinese sent their representatives to the United States – to Apple, Microsoft, and Google – where they asked people who invent the future to talk about themselves. It turned out that they all read science fiction as children. Focusing on science fiction in China has had a positive impact on the level of Chinese school children's wins in international competitions. In other words, the Chinese began to actively shape their image of the desired constructive future, projecting their country along with the United States as a "superpower of artificial intelligence" [7].

However, the fear of artificial intelligence (AI) appeared in the 1960s due to the research of the British mathematician and cryptographer I. Good, who worked with A.Turing on hacking the German cipher machine "Enigma" during World War II. Good's thoughts about AI led him to think of a superintelligent machine that, through self-learning, can surpass human intelligence, no matter how brilliant it is. When this machine begins to produce similar machines, there will be a so-called "intellectual explosion" and this will be the last invention made by man.

In 1965, he created the concept known today as the "intellectual explosion" or "technological singularity", which provides for the possibility of superhuman intelligence [12].

The latter represents a hypothetical moment in the future when technological development becomes unmanageable and irreversible, which leads to radical changes in the nature of human civilization. In futurology, "technological singularity" is understood as an explosive increase in the speed of scientific and technological progress, which is likely to occur due to the creation of artificial intelligence and machines capable of self-reproduction. A hypothetical moment, after which, from the point of view of proponents of this concept, technical progress will be so accelerated and complicated that it will be impossible to understand.

Table 1. The global dynamics of the rate of introduction of AI

Year	The growth of investment in the development of AI (in billions of dollars)	Operational stock of industrial robots (in thousands of units)	Introduction of industrial robots (in thousands of units)	Profit growth from robotics (in billions of dollars)	Volume of private investment for implementing AI in the educational sector process (in billions of dollars)
2009	341	1.021	60	< 1	< 0,5
2010	428	1.059	121	< 1	0.5
2011	994	1.153	166	< 1	0.7
2012	1.070	1.235	159	< 1	0.9
2013	1.760	1.332	178	< 1	1.3
2014	4.160	1.472	221	< 1	1.8
2015	6.120	1.632	254	1	4.2
2016	9.590	1.838	304	4	3.2
2017	15.170	2.125	400	30	4.4
2018	27.340	2.440	422	155	8.2
2019	> 70	2.722	373	360	7.0

But what if a superintelligent machine one day "realizes" that it doesn't need a human and starts restricting people's rights and maybe even eliminating them?.. Actually, it is not surprising that in our time, the ideas of I. Good have regained relevance and they were picked up by leading representatives of science and the IT industry. Thus, the American philosopher K. Koch offers the following logical chain for understanding this problem: he believes that since superintelligent machines, by definition, significantly exceed the capabilities of human intellectual activity, therefore, they will be able to cope much better with such intellectual activity as designing machines and the need for human life will be questioned. Thus, "the first superintelligent machine is the last invention that man will ever need, provided that the machine is docile enough to tell us how to keep it under control" [13].

From the point of view of the famous physicist S. Hawking, "the development of fully artificial intelligence can bring the end of the human race closer" [14]. And the founder of Microsoft, B. Gates, believes that at the initial stage, machines can free a person from a significant amount of work, which can be quite a constructive solution if they have reliable control over their actions. But the downside of this progress is that "in a few decades, AI will be strong enough to be a cause for concern" [15], meaning that this process itself is very risky.

The head of "Tesla" I. Musk went even further, he allocates billions of dollars to analyze these problems and, in particular, donated millions to research in the field of AI security "Future of Life Institute" [16]. He also compared AI developers to exorcists armed with Holy water trying to tame a demon. Thus, a well-known innovator of our time emphasizes that "AI is much more dangerous for humanity than nuclear weapons" [17], so the process of mass production of AI is extremely dangerous.

4. CONCLUSIONS

When universities state that it is worth paying significant attention to 4IR, it means that they can no longer rely on traditional forms of human thinking and imagination. But they need a mindset that depends on the algorithmic operations of machine technologies. In this sense, 4IR has changed not only what we do and how we do it, but also who we are or, more precisely, who we have become. In particular, N. Davids and Y. Vagid, analyzing this problem, emphasize that the point is not that machines have replaced man, but that "people have become embodied in machines" [18, 56].

And it is no longer important what biological, synthetic, organosilicon, natural or artificial origin will have new species that will claim to join the human race. But in this case, the title and status of "Human" will require even more correspondence and evidence-based affiliation than today, when it is automatically assigned to all representatives of the biological species "Homo Sapiens" (even those quasi-human beings who are guided solely by instinctive goals and needs of reflexes). The secondary nature of names is precisely what name to give to a phenomenon, and not its semantic essence.

That is why we need to think carefully about the prospects for the development of forced distance education triggered by the pandemic, since our main task today is to preserve inter-human relations.

In the context of a global pandemic and the approaching prospect of achieving a "technological singularity", we need new knowledge and skills, including in the use of technologies and ideas to work effectively with them. Also, taking into account the importance of the growing "human factor", purely humanistic dimensions come to the fore when determining higher education strategies for the sustainable development of modern societies [19]. In particular, an important practical mechanism for achieving effective results in the implementation of the sustainable development strategy is to maximize opportunities for free, inclusive, fair and high-quality completed primary, secondary and higher education for all members of the human race, which will require us to re-evaluate existing socio-economic strategies both on a national and global scale.

In our opinion, the mission of universities of the XXI century is to form a developed personality, a person of a high cultural level who is able to act in situations that are characterized by significant risks-economic, environmental, political, etc. A university graduate who is able to implement successful life activities in such conditions and act as a subject for implementing sustainable development goals should possess not only, and not so much, individual professional competencies, but such general qualities as the ability to solve complex problems, have critical, independent and original thinking, as well as the ability to generate new knowledge and act in a situation of uncertainty, when implicit knowledge and skills, as well as any ready-made instructions, are either absent or ineffective [20].

That is why higher education can and should form a cultural personality and a citizen of a global society that can effectively act in the conditions of the XXI century, which is characterized by uncertainty and risk. To do this, all levels, models and systems of education must be transformed to develop human intelligence on a global scale through the introduction of new educational strategies and their implementation based on shared values that future professionals share and follow, both in their professional activities and in their daily lives.

THE AUTHORS' CONTRIBUTION

The authors' contribution consists in a systematic analysis of the leading theoretical positions and practical trends regarding the role of AI in current and future educational strategies in terms of their constructive and destructive components. The authors tend to recognize the priority of skeptical arguments and advocate the development and implementation of innovative strategies to ensure affordable quality education for citizens of the global society, many of whom currently do not have access to this service. The direction of the main efforts to this vector of life improvement is more promising than the introduction of full-scale programs for the development of artificial intelligence.

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