

THE KEY ROLE OF ARTIFICIAL INTELLIGENCE IN EDUCATION 4.0**Iryna Malynovska**

Senior Lecturer at the Department of Foreign Philology and Translation,
State University of Trade and Economics, Ukraine
e-mail: i.malynovska@knute.edu.ua, orcid.org/0000-0002-0867-3715

Iryna Smyrnova

Doctor of Pedagogical Sciences, Professor,
Professor at the Department of Management in the Transport Industry,
Danube Institute of National University "Odesa Maritime Academy", Ukraine
e-mail: phd.smyrnova@gmail.com, orcid.org/0000-0003-2085-5391

Summary

In the article, the authors analyse the basic concepts of "artificial intelligence" and "Education 4.0" and assess the prospects for their implementation in Ukrainian society. It is established that against the backdrop of rapid technological development in the context of Industry 4.0, the issue of effective transformation management is becoming increasingly important in order to implement the necessary changes at the right time. To keep pace with the realities of the fourth industrial revolution, the concept of Education 4.0 was created, which envisages new approaches to teaching, communication between students, digital learning and other aspects of higher education. The purpose of this study is to establish the directions of transformation in higher education in Ukraine, taking into account the current conditions: the war started by the Russian Federation and to determine the level of knowledge of students about the basic concepts of Education 4.0 and to determine the level of use of artificial intelligence tools in their educational institutions. Artificial intelligence methods are increasingly supporting Education 4.0. We are seeing an ever-growing demand for adaptive and personalised education.

The study involved 150 students from the Danube Institute of the National University of Odesa Maritime Academy and the State University of Trade and Economics. The survey was conducted in Google Forms developed by the authors, where students had to answer questions about the specifics of using artificial intelligence and Education 4.0 in closed answers. Having analysed the answers of students, it can be concluded that only a third of respondents have an idea of the basic concepts of Education 4.0 and its role in the educational environment, and personalised learning takes place in educational institutions, according to the vast majority of students, which is a prerequisite for both the use of AI and the implementation of Education 4.0.

Key words: information and communication technologies, education transformation, personalisation, digitalisation, educational process, educational institutions, artificial intelligence.

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1. Introduction

The use of digital technologies in the educational environment is one of the most important and sustainable development trends in the world today. Digital technologies make it possible to intensify the educational process, make it mobile, differentiated and adapted to the

realities of today. Moreover, digital technologies and artificial intelligence tools can ensure the continuity of learning in the face of unpredictable influences (e.g., pandemics or war). The challenges of the future of education involve different perspectives: assessing learning success through digital media, determining the competencies of students required for further education, unifying the skills that teachers must have to meet the requirements of a globalized and digitalized society. Introduction of new technologies that help to achieve meaningful learning for students and ensure personalization and continuity. Today, in the field of higher education, there is a call for the development of meaningful learning based on the use of artificial intelligence and enabling the formation of digital competencies in students to address the issues shaped by the Industrial Revolution 4.0. It is worth noting that the era of the third level of technological development, called Industry 3.0 (electronics, information and communication technologies, automation and partial robotization of production processes, etc. The transition to the next level is underway – Industry 4.0 (artificial intelligence, cyber-physical systems, industrial and communication digitalization, robotization of production processes, the Internet of Things, etc.) The transition stage raises new demands for education at all levels. In the program of the great transformation "Education 4.0: Ukrainian Dawn", the main requirement is to ensure that the national education system is compliant with the technological mode of Industry 4.0.

2. Analysis of scientific sources

Research related to the use of artificial intelligence in education can be found in the works of O. Spirn, L. Kartashova, O. Humennyi, N. Volkova, N. Kustra, D. Lubko, Y. Nikol'skyi, V. Pasichnyk and other scholars.

Education 4.0, according to J. Miranda, means "the desire to educate a new generation of highly competitive professionals who are able to use the right physical and digital resources to provide innovative solutions to current and future societal problems" (*Miranda, 2020*). Other scholars note that Education 4.0 provides resources for learning and developing competencies and skills for Industry 4.0 (*Mourtsis, 2018*).

Among the higher education institutions that use artificial intelligence, it is worth noting: The Technical University of Munich, which conducts research in the areas of virtual reality, artificial intelligence, and machine learning; the University of Birmingham, which uses a blockchain-based academic certification system; the University of Arizona, which has opened a number of research laboratories for the study of Industry 4.0 technologies, including a blockchain laboratory.

In the studies of In the research of foreign scholars, much attention is paid to the use of learning tools, the new emerging digital culture, and the peculiarities of education development in the context of the widespread use of artificial intelligence tools.

3. The impact of artificial intelligence on education 4.0

Education 4.0 is an open education of a knowledgeable society that provides training, retraining and advanced training for the professional staff of Economy 4.0.

The main goal of Education 4.0 in Ukraine is to ensure the versatile development of the personality of students (XXI century) in accordance with their individual needs and the needs of various socio-economic systems, the integration of the education system of Ukraine into the European and world educational space, increasing competitiveness and socio-economic efficiency functioning and development of educational institutions and the education system as a whole in the conditions of open markets for educational services and labor.

Successful implementation of the new model of training requires a clear understanding of the peculiarities of Education 4.0 (the programme of the great transformation "Education 4.0: Ukrainian Dawn"), its main characteristics, and also requires adaptation of the practice of training skilled workers to the changing requirements.

After analyzing the work of scientists (*Bykov, 2017*), the authors note that this goal can be achieved by:

- implementation in education of modern paradigms of human-centeredness, equal access to high-quality, continuous education, principles of open education;
- Necessary improvement of organizational-economic, functional-purpose and content-technological subsystems of the national education system;

Introduction of innovative pedagogical systems into educational practice built on the basis of the latest achievements of national and international psychological and pedagogical science (primarily e-pedagogy and digital humanistic pedagogy), advanced educational practices of educational institutions (primarily those providing training on the principles of open education), as well as the latest achievements of scientific and technological progress (primarily in the field of ICT).

Education 4.0 should ensure the continuous reproduction and development of the national culture in the younger generations, the preparation of the younger generation for full-fledged active work in the new socio-economic conditions of the 21st century, the internationalization and integration of educational systems, the versatile development of the individual in accordance with individual human needs and the personnel requirements of Society 4.0. This will allow to continue the integration of the Ukrainian system into the European and world educational space, to ensure an increase in the competitiveness of future specialists and the development of educational institutions of different levels and the entire education system in the conditions of open markets for educational services and labor, in the new realities of human life in society. 4.0.

In Education 4.0, artificial intelligence can play a key role in identifying new educational success factors and enabling personalized, adaptive learning by answering common student's questions using learning analytics and predictive modeling. Education 4.0 completes the phenomenon of digital integration in everyday life, when people, tools and materials come together to solve problems, debug and discover new innovative theories. Education 4.0 has ubiquitous information and a dynamic process of teaching and learning (*Zhongshan, 2020*).

4. "Ukrainian Dawn: Education 4.0"

The strategy for the development of artificial intelligence in Ukraine is designed for the period 2022-2030 and its implementation will be carried out in two stages: – Stage I – 2022–2025; – Stage II – 2026–2030 On December 9, 2022, the Minister of Education and Science of Ukraine, during a Government meeting, presented the major transformation program "Education 4.0: Ukrainian Dawn", which was prepared by the MES team on the basic principles and principles of the Ukraine Recovery Plan.

The strategic direction is the harmonization of the Ukrainian and European educational spaces to match the domestic education system with the technological structure of Industry 4.0. According to this strategy, it is stated that Education 4.0 is an education that meets the requirements for human resources of Industry 4.0, where people and technologies are combined to open up new opportunities. The Education 4.0: Ukrainian Dawn program has become part of the Post-Victory Recovery Plan for Ukraine, which includes:

- restoration and development of Ukrainian education according to the principles of European integration;
- reconstruction of the destroyed infrastructure taking into account modern security and construction technologies;
- integration of the Ukrainian and European educational space;
- compliance of the education system with the technological principles of Industry 4.0;
- digitization in the field of education (it is planned to create a modern digital educational infrastructure, develop digital content for educators and launch a digital educational passport in a smartphone).

5. Research results

In the learning process, students must be prepared in accordance with industry requirements according to the fundamental principles of Education 4.0. Education 4.0 requires teachers, educators, administration to be universal and adaptive to the necessary changes; students must study in a business-like manner, following the basic Education 4.0 standards. In the study, the authors aimed to determine the level of education of Ukrainian students regarding the basic concepts of Education 4.0 and the use of artificial intelligence tools in their educational institutions.

The survey was conducted in a Google Form developed by the authors, where students in closed small answers answered questions regarding the specifics of the use of artificial intelligence and Education 4.0 in their higher education institutions.

The results of the study are presented in Fig. 1.

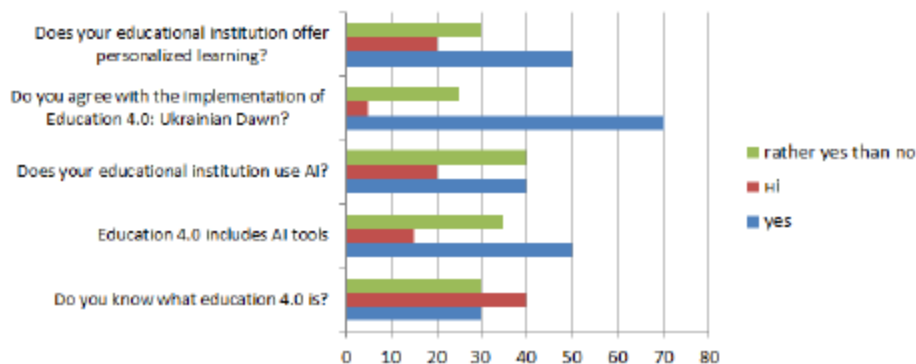


Fig. 1. Answers of the respondents

After analyzing the answers of the students, let us summarize: only 30% of students have an idea about the basic concepts of Education 4.0 and its role in the educational environment; while 40% of students have no idea what this concept is. When asked if Education 4.0 includes AI tools, 50% of respondents answered yes, 15% said no, and 35% said yes rather than no; according to 40% of applicants, AI is used in their educational institution; personalized learning takes place in educational institutions according to 80% of students who answered yes, and "rather yes than no". A total of 95% of students support the place of "Education 4.0: Ukrainian Dawn" in the implementation of Ukrainian society. At the same time, students noted that artificial intelligence will play a key role in higher education.

The analysis of the study allows us to state that Education 4.0 and artificial intelligence tools can increase the effectiveness of student learning, motivate them through adaptive and personalized learning, automate answers to common questions and improve the quality of online exams; improve student self-reflection and create a more personalized learning experience.

6. Conclusions

In other words, students' understanding of the main trends in modern society, understanding of important trends in the educational environment allows to create a powerful conscious specialist. The reflection of students after completing a course or studying in general should have certain results, and Education 4.0 and AI tools can help with this. The results of this study can be useful for teachers, educators, and researchers to better analyze and discuss the peculiarities of using AI in higher education institutions and to promote the implementation of Education 4.0 in Ukraine.

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