PROSPECTS AND TRENDS OF DIGITAL TWINS IN EDUCATION

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Abstract
This article briefly describes the nature, problems and issues of digitization of education, the perspective of the "digital twin" of the learner for the development of person-oriented education as an important issue of the process of digital transformation in education in the age of digital technologies, and the tendency of its development is mentioned.

Keywords. Mixed education, educational platforms, digitization, IoT, digital twin, human ecology, biological rhythm, chronobiology, bioinformatics.

The Global Innovation Index (GII) in evaluating the scientific and technical achievements of the leading countries in the world emphasizes that the development of the country's economy, the provision of progressive changes in the production of products in the material sector, and the increase in the competitiveness of national products in the world market are closely related to the problem of personnel. . That is, it shows the need to establish new models of educational processes, within which it is possible to achieve educational results planned by each student and move to the personalization of the educational process. Today's educational initiatives are not only able to leverage technology to tailor content and create more engaging learning experiences for students, but they also provide ways to seamlessly incorporate on-the-job learning into the day-to-day work of professionals in their fields. . The development of mobile communication, Internet services and information and communication technologies creates wide opportunities for digitalization of education [1].

In our republic, special attention is paid to the use of information and communication technologies in the field of digitization of education in this direction. In the "Digital Uzbekistan - 2030" strategy, among other things, "... creation of a system of automation of education management and comprehensive analysis using modern information and communication technologies in the educational process..., ... higher "Laboratories for the application and study of the Internet of Things, robotics, artificial intelligence technologies in educational institutions in the relevant fields, as well as organizing the involvement of foreign enterprises in this field" and PQ-4996 of February 17, 2021 No. "On measures to create conditions for the rapid introduction of artificial intelligence technologies" in accordance with the "Digital Uzbekistan-2030" Strategy and the rapid introduction of artificial intelligence technologies and their widespread use in our country in order to provide access to digital information and its high quality, to create favorable conditions for training qualified personnel in this field, "to provide access to information resources and knowledge in the field of artificial intelligence of local enterprises and specialists, as well as development of the necessary educational environment" are defined as priority tasks.

Digitization in education refers to the use of desktop computers, mobile devices, the Internet, software applications, and other types of digital technologies to teach students of all ages. Computer-assisted test taking, online universities, e-books, and educational software are just a few examples of digitization of education today.

Digitization of the educational process is connected with the need for widespread introduction of innovative technologies, in particular, with the emergence of new requirements for the formation of

basic competencies in future personnel and the formation of a new digital generation. In the international concept of education until 2030 (SDG4), "creating opportunities for quality education throughout life" was defined as an urgent task. Digitization of the educational process can supplement, enrich and change education for the better. It can contribute to ensuring openness and equity in education, improving the quality of teaching and learning, and improving the skills of teachers, as well as improving governance with appropriate policies, technologies and opportunities. Modern generation - children of high technologies, paper and mass media are not interesting and incomprehensible for them. In this situation, the teacher should learn to adapt to the changing reality, acquire media competence in improving the educational process through media education. Because during the quarantine period of the Covid-19 pandemic that started in 2020 in Uzbekistan, along with the countries of the whole world, several (normative-legal, infrastructural and economic) problems of media education were clarified. Online classes were organized through television and on various electronic educational platforms - MOODLE, iSpring Learn, Google Classroom, ZOOM, and even social networks (Telegram). [2] Many have concluded that online teaching is a more complex process than online information transfer.

However, it is important to remember that it is wrong to assume that digital learning can be achieved through small changes and the use of new tools in the online environment. When it comes to digital transformation, it should not be assumed that just posting lecture videos online is enough, because there is a big difference between distance learning and a real digital learning environment. It's important to understand what needs to change to improve quality. Distance learning is usually an extension of a traditional in-person course, with core videos and resources available online for added flexibility. Digital education, on the other hand, requires transformers to completely rethink the content of digitization and how students interact with it. Today's youth cannot be stopped from Email, Whatsapp, Telegram, Facebook, Instagram, Tiktok, YouTube, Smartphones, computers and tablets. Today's student acquires, processes and shares information faster than ever before. Students are changing and it is imperative that the education industry keeps pace with the digital transformation.

Another important issue that needs to be solved in the digitalization of education is to take into account the physiological indicators (physical condition, mood, health, eating habits, etc.) is the issue of digitalization of person-oriented education. Bioinformatics research can be used to solve this problem [4].

Humans have known about the existence of biological rhythms since ancient times. Ancient scholars Hippocrates, Ibn Sina and others wrote in their works that the instructions for proper lifestyle, nutrition, activity and rest phases were already given in ancient rare books. The founder of chronobiology, the science of biorhythms, is the German doctor Christopher William Heufeland, who in 1797 drew the attention of his colleagues to the universality of rhythmic processes in biology: every day, life repeats itself in certain rhythms, in a daily cycle. It regulates the vital activity of all living beings, including the human body, related to the rotation of the Earth around its axis [6].

In [7], after studying information about biological rhythms and their functional importance for the human body, it was stated that it can be concluded that biological rhythms directly affect the functioning of the body and ensure its wave-like character. That is, research was conducted on the effect of biorhythms on human performance, and the hypothesis was confirmed. In addition, the human body obeys the rhythms set by nature itself, and these rhythms affect all processes occurring in the body, taking these rhythms into account and respecting them is the basis of human health.

Currently, there are intelligent Internet of Things (IoT) that detect human blood pressure, heart rate, body temperature, and similar physiological indicators, so that the research of biological rhythm and physiological data processing methods, the educational and research activities of the learner are available. It is important to develop an evaluation and forecasting system.

Innovative intellectual centers and a number of prestigious universities in the world are working on the project of creating the concept of digital twins of students. “A digital twin is a digital copy of a physical object or process that helps optimize business performance. The concept of "digital twin" is part of the fourth industrial revolution (Industry 4.0) and is designed to help enterprises identify physical problems faster, predict their results more accurately and produce better products.

The concept and concept of "digital twin" was accepted as a scientific term in 2003 by Dr. M. Greaves of the Florida Institute of Technology and NASA expert J. Vickers. According to M. Greaves, the digital twin concept model includes three main components: 1) physical products in real space, 2) virtual products in virtual space, and 3) data and information connecting virtual and real products. data links. With the widespread introduction of this technology into the industrial sphere, more and more new interpretations of it appeared. But there are not many authors dealing with the concept of "Digital Twin" in education. In an analysis in [5], Australian University researcher S. Sepasgozar refers to digital learning technology from the perspective of online education in the field of architecture and includes "five new digital technologies using virtual and augmented reality" that represent "virtual technology opportunities for learning". ” is included. On the other hand, the authors of the Helsinki Metropolitan University of Applied Sciences - A. Liljaniemi and H. Paavilainen, while analyzing the technology of digital education in engineering education, "by introducing new digital technologies such as digital education, we students, teachers and can provide companies with new knowledge and digital education can increase educational motivation". Colleagues from the University of Tampere - J. David, A. Lobov and M. Lanzlar describe the digital twin as "a tool for teaching students to work with production systems and this the proposal is based on the introduction of learning theories in the framework of pedagogical digital twins." Recorded in 2018.

The idea of a student's digital twin includes several components: information about the student's success, academic work, his achievements in competitions, competitions, hobbies (sports, art, healthy lifestyle, etc.) database that stores data; university portal and chatbot that collects student information, student surveys; The element of artificial intelligence is an assistive technology that allows the student to set goals (desired job type, position, average income) for starting a career trajectory and receive recommendations for building an individual education and personal development trajectory [3].

For example, audio and visual instruction can change students' comprehension speed, etc. The Bill Gates Foundation has been developing "highly personalized" learning methods for several years, including programs and apps that create individual trajectories and strategies for each student. The Russian Academy of Sciences also believes that a student must first be "digitized" to take these characteristics into account. That is, the main parameters of the child/student condition are taken into account during the educational process. In addition to psychophysiological characteristics, the emotions experienced by the student are also taken into account, even "digitized" with the help of a video camera. After the full study, an identical "digital twin" is created to get a more complete picture of the student, where they try different ways of presenting the material, and the best way to learn is to the "original". is used. As a result, individual teaching methods are selected that provide the most personalized education for each student.

For these purposes, we jointly process the data obtained through the medical smart watch and the student's biorhythm indicators about the student's physiological indicators during the lesson, after-school independent education, during the day's activities, and conduct correlation and regression analyzes and We are conducting research on the development project of the algorithm and software for the intellectual analysis of chronobiological processes through internet objects in the development of mental abilities of a person based on machine learning methods.

Research has shown that synchronous and asynchronous teaching technologies can be used together in distance education, such as for part-time students, and teachers should consider student motivation and needs, specific requirements for course content, and available technical support. Positive attendance of students should always be encouraged, timely assessment of given answers, competence of the teacher in group and individual work is important.

In the digitalization of education, it is important not only to organize education technologies, but also to automate the chronobiological analysis of learners, to develop a decision-making system for pedagogues.

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