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## Artificial Intelligence in higher education: opportunities and challenges

### Штучний інтелект у вищій освіті: можливості та виклики

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Written by:

**Nadiia Ryzheva<sup>1</sup>** <https://orcid.org/0000-0001-8379-4325>**Dmytro Nefodov<sup>2</sup>** <https://orcid.org/0000-0003-1992-7271>**Svitlana Romanyuk<sup>3</sup>** <https://orcid.org/0000-0002-9905-8880>**Hanna Marynchenko<sup>4</sup>** <https://orcid.org/0000-0003-3208-0546>**Mariia Kudla<sup>5</sup>** <https://orcid.org/0000-0002-1868-9892>

#### Abstract

The article reveals the meaning of the concept of artificial intelligence and proves the necessity of its application in the educational space. The purpose of the article is to show the importance of artificial intelligence as an educational and entertainment tool in higher education. The methodological concept is aimed at ensuring the effectiveness of students' education with the help of artificial intelligence. The research results show the types (weak and strong), directions, functions of artificial intelligence; the importance of edutainment in higher education and its main principles are revealed. Artificial intelligence is presented as a toolkit of edutainment in higher education and the importance of using artificial intelligence functions for edutainment in US higher education to improve human skills and abilities is shown. The significance of the avatar and virtual teacher in the educational process is revealed. During the

#### Анотація

У статті розкрито зміст поняття штучного інтелекту та доведено необхідність його застосування в освітньому просторі. Метою статті є показати важливість штучного інтелекту як освітньо-розважального інструментарію у вищій освіті. Методична концепція спрямована на забезпечення ефективності навчання студентів за допомогою штучного інтелекту. У результатах дослідження показано типи (слабкий та сильний), напрями, функції штучного інтелекту; розкрито значення едудейнменту у вищій освіті та його основні принципи. Штучний інтелект представлено як інструментарій едудейнменту у вищій освіті та показано важливість використання функцій штучного інтелекту з метою едудейнменту у вищій освіті США для вдосконалення навичок і здібностей людини. Розкрито значущість в освітньому процесі аватара і віртуального

<sup>1</sup> Doctor of Historical Sciences, Professor, Head of the History Department, V.O. Sukhomlynskyi National University of Mykolaiv, Ukraine. WoS Researcher ID: DYO-3497-2022

<sup>2</sup> Doctor of Historical Sciences, Associate Professor at the Department of History, V. O. Sukhomlynskyi National University of Mykolaiv, Ukraine. WoS Researcher ID: F-6345-2019

<sup>3</sup> Doctor of Pedagogical Sciences, Professor, Department of Pedagogy and Methodology of Primary Education, Yuriy Fedkovych Chernivtsi National University, Ukraine. WoS Researcher ID: D-9584-2016

<sup>4</sup> Ph.D. in History, Teacher of the History Department, V.O. Sukhomlynskyi National University of Mykolaiv, Ukraine. WoS Researcher ID: AAR-4479-2020

<sup>5</sup> Ph.D. in Education, Associate Professor, Department of Pedagogics and Education Management, Pavlo Tychyna Uman State Pedagogical University, Ukraine. WoS Researcher ID: E-9523-2019



research and experimental work, we singled out the leading factors of the actualization of the ideas of artificial intelligence as an educational and entertainment toolkit in the modern theory and practice of training students of higher education.

**Keywords:** Artificial Intelligence, edutainment, higher education, virtual teacher, virtual reality, neural networks.

## Introduction

Nowadays, there is an active improvement and updating of the created unique, potentially innovative digital systems in engineering, which process information, and apply the results of this information processing to promote the improvement of innovative digital systems in today's educational space. It is precisely such fantastic advanced projects that approach the capabilities of human intelligence and are actively becoming a reality today. Artificial Intelligence is an element of the modernization of the education system, the development of Society 4.0, taking into account modern achievements, and mastering the latest practices by teachers (Shyshkina & Nosenko, 2023). We emphasize that the use of Artificial Intelligence significantly increases the productivity of educational activities. In global practice, particularly in education, the share of using machines and programmed systems instead of humans is constantly increasing due to pandemics, economic benefits, natural disasters, military conflicts, etc. Over time, this trend may lead to a partial or complete replacement of a person as a teacher due to the rapid development of Artificial Intelligence and information and communication technologies. But, the advantage is that, if used correctly, such technologies in higher education expand the possibilities of research, human abilities, learning, and teaching (Kulieshov, 2022).

So, today, Artificial Intelligence systems open up new opportunities for teaching and learning in higher education, but they are not yet ready to completely replace teachers. Edutainment in higher education, that is, education in the form of a game, in an entertaining format, a game mechanism, motivates students of higher education to pass educational tests, perform creative tasks, better navigate the studied material, and understand complex topics. Edutainment in higher education is appropriate in any class and guarantees the quality of the educational space precisely in the game format to

викладача. Під час дослідно-експериментальної роботи ми виокремили провідні чинники актуалізації ідей штучного інтелекту як освітньо-розважального інструментарію в сучасній теорії та практиці підготовки здобувачів вищої освіти.

**Ключові слова:** штучний інтелект, едютейнмент, вища освіта, віртуальний викладач, віртуальна реальність, нейронні мережі.

master the basics of literacy and develop critical thinking. Therefore, the issue of Artificial Intelligence as an edutainment toolkit in higher education requires careful analysis and research from an academic point of view.

Traditional approaches to the information activity of higher education institutions have lost their effectiveness and can no longer meet modern requirements. New approaches, new concepts of digital transformation of higher education institutions are needed. Approaches that will allow to combine all the processes of creation and use of software and information tools for the construction of digital universities. Therefore, an urgent scientific task arises, which consists in the development of methods and models of digitalization of higher education institutions based on artificial intelligence.

In the article, we considered the following main aspects: the content of the concept of Artificial Intelligence and the need for its application in the educational space; types and directions of artificial intelligence; the importance of edutainment in higher education and the main principles that should ensure the implementation of the task of "Edutainment" technology; Artificial Intelligence as a toolkit of edutainment in higher education; functions of Artificial Intelligence in higher education; the use of Artificial Intelligence functions for edutainment in higher education in the United States to improve human skills and abilities; the importance of edutainment in education; a new direction in the development of artificial intelligence, and edutainment in higher education – the involvement of virtual reality and the use of video lessons with a virtual teacher; stages of creating a teacher's avatar; neural networks for creating a variety of content in classes in institutions of higher education.

**Purpose of the article.** To show the significance of Artificial Intelligence as an edutainment toolkit in higher education.

### Literature review

As a specific scientific phenomenon, Artificial Intelligence as a toolkit of edutainment in higher education was studied by scientists in various contexts of psychological and pedagogical research, thanks to which the place and role of Artificial Intelligence in the system of sciences was substantiated, the specificity of the conceptual and conceptual apparatus of Artificial Intelligence as a toolkit of edutainment in higher education was characterized.

S. Kulieshov's (2022) research on the development of an Artificial Intelligence system, which significantly increases the productivity of educational activity and analysis of its opportunities for learning and teaching in higher education in the USA, is interesting and significant. Such a trend in the educational space, thanks to the rapid development of Artificial Intelligence and information and communication technologies, may eventually lead to the replacement of a person as a teacher. Based on Artificial Intelligence and a neural network, O. Kaliuzhna (2023) developed approaches that have great prospects for improving teaching in higher education (using personalization in combination with comprehensive access databases, and adaptive learning environments, supporting the development of critical thinking. D. Borysenko (2023) attaches particular importance to the creation of adapted digital platforms to the combination of Artificial Intelligence and virtual reality for in-depth professional training of specialists. The scientist highlighted the trending directions of achievements in the development of artificial intelligence, showed their prospective implementation possibilities, and trends in the development of Artificial Intelligence and digital transformation.

Many authors emphasize that one of the most important components of the development of modern information technologies is the creation and use of artificial intelligence systems. The demand for such technologies is growing rapidly. Scanning and text recognition systems are actively being developed and implemented; urgent problems of creating computer dictionaries of national languages, machine translation from one language to another, etc. This is primarily related to the development of the global Internet information network and the

increase in the level of computerization of management of all spheres of human life. Artificial Intelligence as a toolkit of edutainment in higher education is considered by O. Zahorodnia, A. Vornachev & M. Horiunova (2022). In particular, they offer functions performed by Artificial Intelligence in the study of disciplines: measurement of learning progress, personalization, easy integration, and motivation. Scientists define edutainment as a necessary component of effective learning through the use of various forms of work and interactive methods of the educational process – "taking into account the psychological needs of students through traditional and electronic books, music, films, educational games, computer and video games, electronic simulators, encyclopedias, web-quests, wikis, and blogs", which are necessary for an effective educational globalization space. I. Sukhopara & M. Tymoshchuk (2021) show the advantages of educational, exciting, cognitive, and emotional technology of edutainment for the modern educational process, which requires dynamic forms of teaching and leads to satisfaction, and active independent work of education seekers. O. Hrytsiuk, V. Chernenko & L. Maksimova (2021) considered the possibilities and features of edutainment in computer science classes, investigated the state of implementation of edutainment in educational institutions, developed recommendations for the introduction of game practices into the educational process.

So, we see that Artificial Intelligence as a toolkit of edutainment in higher education has been studied by scientists in various contexts of psychological and pedagogical research (the specificity of the conceptual and conceptual apparatus of Artificial Intelligence is characterized, the role and place of Artificial Intelligence in the system of sciences is substantiated, the toolkit of edutainment in higher education is shown). The implementation of edutainment in the educational process of a higher school will contribute to the reduction of psychological tension and can significantly increase the motivation of students of higher education, and their cognitive activity to study the subject.

Scientists A. Valencia Tafur & R. Figueroa Molina (2023) consider the issue in their article the scientific production on the impact on education of technologies related to Artificial Intelligence.

Sanabria-Navarro, Y. Silveira-Pérez, D. Pérez-Bravo & M. de-Jesús-Cortina-Núñez

(2023) Emphasize that the application of AI in education worldwide has increased dramatically with its importance growing at an increasing rate. The objective of this research is to bibliometrically analyze applications of AI in contemporary education. The systematic literature review of recent works employed a mixed approach using quantitative and qualitative methods. It was inferred by the authors that AI is revolutionizing education by offering personalized and efficient solutions to improve students' learning. One of the main conclusions of this research is that in contemporary education, students are one of the groups that are most affected by AI. Troncoso Heredia, M. O., Dueñas Correa, Y. K., & Verdecia Carballo, E. (2023) draw attention to Artificial intelligence is capturing the attention of the community in general and the scientific community in particular, based on all the potential it has to facilitate certain processes of daily life. Hence, the objective of this article is focused on evaluating how artificial intelligence has impacted teaching, learning and the areas of administration and management of education. Artificial intelligence is capturing the attention of the community in general and the scientific community in particular, based on all the potential it has to facilitate certain processes of daily life.

However, the rapid dynamics of the development of the world market of information technologies in the conditions of globalization formed a scientific problem regarding the development of artificial intelligence in education. Highlighting global threats and challenges along with the need to develop international, regional and national regulatory measures for the development of the world market of information technologies is an urgent task of today's scientific research.

Analyzing scientific works in the field of artificial intelligence in the conditions of globalization, it should be noted the limited attention of the authors to the global problems of artificial intelligence in educational institutions, which determined the choice and focus of the topic of our article.

### Methodology

The methodical concept of the study is aimed at ensuring the effectiveness of student training with the help of artificial intelligence: a complex of didactic and methodological support (diagnostic, educational and methodological, monitoring, technological), aimed at the

realization of the set goals and objectives, raising the educational level. education seekers, the choice of forms and methods that were aimed at implementing and ensuring the process of improving educational services and the quality of education.

The following methods were used in the article:

- theoretical: concretization, synthesis, analysis, systematization, comparison, generalization of the provisions of the materials of psychological, philosophical, and pedagogical studies to substantiate the identified factors of actualization of the practical value and theoretical significance of Artificial Intelligence as a toolkit of edutainment in higher education, for quality training of students of higher education and its modernization, as well as revealing the specifics of Artificial Intelligence as a toolkit of edutainment in higher education; comparative analysis of educational-scientific and educational-professional programs; analysis and generalization of materials of higher education sites, educational and methodological support of institutions of higher education to clarify the manifestation of the real state of application of Artificial Intelligence in the process of training students of higher education;
- empirical: diagnostic conversation, questionnaires, interviews with the aim of revealing the degree of awareness of the subjects of higher education of the goals, essence, significance of the methods of implementing Artificial Intelligence as a toolkit of edutainment in higher education during the organization of specialist training; psychological-pedagogical observation of management methods, methods of interaction, management of educational activities of higher education students, analysis of the content of independent tasks with the aim of fixing the applied means of Artificial Intelligence as a toolkit of edutainment in higher education, revealing changes in their acquisition of information culture as an important professional new formation of the personality; a pedagogical experiment during the modernization of the training of higher education applicants based on the application of an innovative approach, by introducing Artificial Intelligence as an edutainment toolkit in higher education;
- methods of mathematical statistics – for processing the empirical facts obtained in

the process of the experiment, checking the effectiveness of the experimental work.

The research was carried out in 2 stages.

At the first stage, an analysis of the experience of institutions of higher education with the use of elements of Artificial Intelligence as a toolkit of edutainment in higher education was carried out, the purpose and strategy of the research were identified, the scientific apparatus was specified, the scientific problem of the introduction of Artificial Intelligence as a toolkit of edutainment in higher education was identified, an analysis of scientific literature was carried out;

At the second stage, an experiment was conducted to reveal the current state of training of higher education seekers based on the introduction of Artificial Intelligence as an edutainment toolkit in higher education, the obtained results were summarized, and general conclusions were formulated.

The total sample size is 208 subjects. When forming the sample, the criteria of meaningfulness, representativeness, and equivalence were taken into account. The sample was formed by random selection using the technical procedure for calculating the selection step.

The reliability and validity of the obtained results, the objectivity of their assessment was ensured by the methodological soundness of the initial positions and the qualitative mechanism for evaluating the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

To assess the homogeneity of experimental and control data, statistical processing was performed using MS Excel and SPSS (Statistical Package for Social Science).

As a result of the research, we obtained the following results. Out of 208 higher education students surveyed, 177 have already used at least one of the Artificial Intelligence tools as an edutainment toolkit in higher education in the last 6 months. 76% of higher education students have used Artificial Intelligence at least once, and more than half of them had a positive interaction experience. Every second respondent believes that Artificial Intelligence will change the educational process of higher education in the coming years; therefore, respondents indicate that they use Artificial Intelligence services in

their activities to create homework tests, prepare for classes, practice, and monitor knowledge.

The study proved the importance of using Artificial Intelligence as an edutainment toolkit in higher education and showed that Artificial Intelligence is an essential technology for education, which is not measured by the criteria of useful or harmful, good or bad; everything depends on who and how they use them and keep in focus the important role of the future highly qualified modern specialist.

## Results and discussion

### 1. The content of the concept of Artificial Intelligence and the need for its application in the educational space.

Among the main modern innovation trends in the educational space is the involvement of Artificial Intelligence as a tool for edutainment in higher education. It is a property of engineering systems, and not even a technology, to involve acquired experience in education, it is a kind of educational model in the education system, that can improve, adapt, and process large amounts of information based on improved approaches and mechanisms.

"Artificial Intelligence is a set of automatic methods and means of purposeful processing of information (knowledge) by the experience gained in the process of learning and adaptation when solving all kinds of intellectual problems" (Zahorodnia et al., 2022). "The involvement of Artificial Intelligence in professional education is the creation of personalized training for future specialists, which includes modern learning strategies, takes into account the individual differences of each student and the peculiarities of professional training for each field, the specification and use of big data resources, the use of adaptive tools and constant control over achievements of participants in the educational process" (Borysenko, 2023).

### 2. Types and directions of artificial intelligence.

There are two types of Artificial Intelligence – weak and strong.

Weak, involves the possibility of performing a narrow list of tasks. For example, these can be mobile applications Siri and Google Assistant for voice control, which provide voice commands to the operating system provide an opportunity to receive a clear, understandable answer, and

perform certain educational functions to ensure quality education.

Strong Artificial Intelligence is aimed at performing any task that a person needs to perform, however, such an Artificial Intelligence system has not yet been created, but developments in this direction are constantly being carried out (Kuchai, 2021; Viktorova et al., 2021).

### **3. The importance of edutainment in higher education and the main principles that should ensure the implementation of the task of "Edutainment" technology.**

Edutainment in higher education is important. It is defined as digital content that combines entertainment and educational elements, providing audience information with the most simplified analysis of events (Kuchai et al., 2020).

Tasks from the "Edutainment" technology must comply with three principles (connection between theory and practice, accessibility and consistency):

- to achieve the principle of connection between theory and practice, it is recommended to provide the educational process with dialogic communication and the study of practice-oriented topics. Research and problem-finding tasks are an effective means of connecting practice and theory. There can be real-world examples supplemented by theoretical problems;
- the principle of accessibility ensures that the material is presented from simple to more complex, provides for the correspondence of the age of the student to the difficulty of the tasks;
- the principle of consistency requires bringing the system of knowledge to a high level, therefore it is necessary to return to the studied material and consider new topics based on it.

Edutainment in education involves learning taking into account the psychological needs of students of higher education through computer and video games, music, films, e-books, educational games, network versions of museum exhibitions, electronic simulators, wikis, encyclopedias, blogs (Zahorodnia et al., 2022).

### **4. Artificial Intelligence as a toolkit of edutainment in higher education.**

Complex computer systems use machine learning algorithms in the educational space. They serve higher education learners of all types of abilities and are involved to some extent in the human educational processes and complex processing tasks used in higher education learning and teaching using the toolkit of edutainment in higher education. The importance of using such systems in the educational space stimulates the giants of the IT industry, Apple and Google, and encourages them to invest heavily in projects to create new forms of artificial intelligence.

The role of Artificial Intelligence in education is to expand the educational process, and to improve human thinking because education is not a technology-oriented solution, but an exclusively human-centered activity.

Teaching future specialists to work with Artificial Intelligence systems is the main task of higher education institutions because it is Artificial Intelligence that provides the opportunity to use sources of information, and manage them, and therefore is a tool with a large number of possibilities, which is a relevant issue for the modern world, because the Internet has a large impact on society, includes many media tools for shaping public opinion and combines a huge number of information repositories (Kulieshov, 2022).

### **5. Functions of Artificial Intelligence in higher education.**

Let's find out what functions Artificial Intelligence can perform in higher education:

- 1) automation of repetitive or basic actions – automated evaluation for testing with filling in gaps and choosing answers of higher education applicants;
- 2) detection of shortcomings and gaps in the educational program – with the help of, for example, a system such as Coursera (e-learning platform), it is possible to notify about wrong answers of a large number of higher education applicants or problems of students' assimilation of material on a certain topic;
- 3) personalization of educational platforms – Artificial Intelligence uses adaptive educational programs, edutainment in higher education, and software taking into account the individual needs of students of higher

education to create an educational environment. Personalization ensures the completion of educational tasks of varying complexity and at one's own pace; data analysis of higher education applicants and their comparison with the parameters of other higher education applicants. The more data the Internet user transmits about himself, the more personalized the content of the training program will be.

- 4) virtual tutors – artificial intelligence-based tutoring systems using edutainment tools in higher education;
- 5) new ways of interacting with educational information – higher education students gain new opportunities for research with the introduction and development of new technologies;
- 6) feedback channel for teachers and students of higher education – Artificial Intelligence systems using edutainment tools in higher education can monitor the progress of students of higher education and notify teachers about their possible problems;
- 7) new dynamics with teachers – since Artificial Intelligence is becoming more and more integrated into the education system, using edutainment tools in higher education, teachers can supplement classes with tasks with variable solutions;
- 8) new ways for training, recruitment, and support – through intelligent data collection, the Artificial Intelligence system can provide recommendations and information to improve the lives of higher education applicants and the work of higher education institutions themselves;
- 9) reduction of social and academic pressure – an environment is created for students of higher education where they do not feel pressure, but are equal co-organizers of the educational environment, comparing themselves with their colleagues.
- 10) accessibility of education – in combination with an Internet connection, software, Artificial Intelligence systems, and support allows higher education seekers to study at any time and from anywhere in the world (Goddard, 2020);
- 11) motivation – involves the study of any material from a practical point of view, where the result is visible from the first execution of the task. It is important during training not to forget about game elements that inspire higher education students to master professional skills in the long term;
- 12) measuring the progress of the educational field – makes it possible to track the progress of a higher education student in the

development of reading, pronunciation, and writing skills;

- 13) easy integration provides the future of Artificial Intelligence in the field of education through customized products, but it is worth considering the data privacy policy (Zahorodnia et al., 2022).

## 6. The importance of edutainment in education.

Acquaintance with new game technologies, distribution, and generalization of best game experience, creation of a safe and interesting environment in education, which ensures the constructive development of a student of higher education is the main task of modern higher education. It is edutainment that allows students of higher education to be taught constructive communication skills, to reduce tension in the socio-cultural development of students, and to preserve the culture of their communication. Game practices in the field of education turn on involuntary attention, with the help of which students remember educational material better (Hrytsiuk et al., 2021; Kulieshov, 2022).

Quite controversial in education is edutainment, one of the global educational trends, which is education in the form of a game, in an entertaining format. The game mechanism greatly motivates students of higher education to complete independent tasks, pass educational tests, understand complex topics, and facilitate orientation in the studied material. Educators advise developing critical thinking and mastering the basics of financial and educational literacy precisely in the game format. For students of higher education, it does not matter how the information is presented, the main thing is that it does not turn into a dead dogma. Web quests, science parks, book trailers, animated educational videos, and emoji stories are powerful tools for learning it. An important essence of edutainment is a story with the integration of games and learning and entertainment elements in a language that is understandable and accessible to students. The main message of edutainment in education is "Learn by playing!". And Artificial Intelligence is a toolkit of edutainment in higher education. Modern technical means make a student's sense of satisfaction synonymous with learning. But edutainment requires a restructuring of the mental thinking of both higher education students and teachers, for whom it is difficult to understand that it is also possible and necessary to "play" in higher education institutions (Pedrada, 2022).

Edutainment has absorbed all the best from such fields of knowledge as psychology (communicative theories); pedagogy (pedagogical principles); and informatics (modern communication and information technologies) (Shetelya et al., 2023). Scientists consider edutainment broadly, considering it a type of educational process that is not only related to the entertainment mechanism but also takes into account other processes (Stratan-Artyshkova et al., 2022). For example, entertainment is only the first stage of using edutainment, and the ultimate goal of the educational process of higher education is passion for the subject, sustained interest in education (Aksakal, 2015).

#### **7. A new direction in the development of artificial intelligence, and edutainment in higher education – the involvement of virtual reality and the use of video lessons with a virtual teacher.**

For a high-quality educational process that improves visualization and learning productivity, there is a new direction in the development of artificial intelligence, and edutainment in higher education – involving virtual reality. The use of virtual reality in a new-level educational environment, where real professional situations are simulated with a large number of probabilities, makes each task unique, and the educational situation as realistic as possible both in the visual context and procedurally. In the process of innovative didactic design, the use of Artificial Intelligence for the teacher demonstrates the new potential of the main advantages and opportunities of the virtual environment. This approach traditionally creates virtual classrooms, and online rooms with digital support, where the teacher is only a supervisor. In institutions of higher education, using artificial intelligence, projects have been developed that create conditions for the organization of the base, the formation of new educational scenarios, for a new model of cardinal interaction, which combines variations that are combinatorial for all possible implementations with the addition of the main properties – diversity, volume, truthfulness, and speed (Borysenko, 2023).

Higher school practitioners have proven that technical achievements in the educational process, such as digital laboratories, VR glasses, and virtual classes are impressive. But they play a supporting role. Because only university teachers create a culture that energizes and motivates higher education students, their position and role in the group of students is

constantly changing, but it is necessary in education (Pedrada, 2022).

Today, new approaches and means of the educational process are needed, which are capable of reorganizing higher education institutions in the era of Education 4.0 development (Polishchuk et al., 2022).

#### **8. Avatar and virtual teacher. Stages of creating a teacher's avatar.**

The difference between a virtual teacher and an avatar is that the avatar, during lectures, is a "representative" of the teacher. During consultations, the virtual teacher explains the material in video materials, when he presents the image of the teacher in a virtual form.

Creating a teacher avatar has several stages and is a complex process.

The first stage is the development of the avatar concept, which involves determining the characteristics of the avatar, its functionality, appearance, etc. For example, an avatar can have the possibility of interactive communication with students and can be created in the form of an abstract character or a real teacher.

The second stage is the creation of an avatar model in an educational institution. For this, special programs are used, which ensure the creation of a 3D model of the avatar and adjust its animation and appearance. Necessary for this stage is the development of an interface that allows higher education students to interact with the avatar.

The third stage is integration into the educational system of the avatar. For this, it is important to configure interaction with other elements of the avatar system (with text chat, drawing board, etc.).

The fourth stage is the optimization and testing of the avatar. The stage provides conditions for conducting testing in the real conditions of the educational process for the workability and effectiveness of the avatar; allows you to eliminate possible errors; and performs optimizations that contribute to the improvement of avatar performance (Bozhko, 2023).



### 9. Neural networks for creating a variety of content in classes in institutions of higher education.

Artificial Intelligence as an edutainment toolkit in higher education has revolutionized our approach to higher education.

Neural networks are also a popular tool in the education industry, providing the ability to analyze vast amounts of data and recognize patterns.

We will give examples of the use of different neural networks in classes at a higher school:

- 1) word embedding: a type of neural network that transforms words based on their context in the text into numerical vectors. This technique was used by analyzing the common use of certain words in the text to identify themes in the literature;
- 2) mood analysis: the use of neural networks in higher education provides for mood analysis, which makes it clear how the teacher uses syntax and diction, conveys emotions (sadness, joy, fear, anger), provides for the use of machine learning algorithms to classify the emotional tone of written texts;
- 3) transfer of style: neural networks are used to transfer style between genres, and different literary works;
- 4) designation of authorship: in cases where it is difficult to determine the author of the work due to anonymous publication or there is no information about authorship; analyze linguistic features; to determine authorship with sufficient accuracy, it is worth applying neural networks to solve this problem by using a dictionary and sentence structure.

These examples demonstrate the versatility of neural networks when applied in higher education. In general, the introduction of such technologies as Artificial Intelligence into higher education contributes to better understanding among students of higher education, at the same time ensuring trends in the involvement of students in making more informed decisions regarding the choice of educational material, etc. (Kaliuzhna, 2023).

### 10. Experimental study.

To clarify the importance of Artificial Intelligence as a tool of edutainment in higher education, we revealed the meaning of the concept of Artificial Intelligence and proved the

necessity of its application in the educational space. Types (weak and strong), directions, and functions of Artificial Intelligence are considered; the importance of edutainment in higher education and its main principles are revealed. Artificial Intelligence is presented as a toolkit of edutainment in higher education and the importance of using Artificial Intelligence functions for edutainment in US higher education to improve human skills and abilities is shown. The need for a new direction in the development of Artificial Intelligence is shown – the involvement of virtual reality and the use of video lessons with a virtual teacher. The significance of the avatar and virtual teacher in the educational process is revealed. The stages of creating a teacher's avatar and the role of neural networks in creating a variety of content in classes at higher education institutions are shown.

Artificial Intelligence as an edutainment toolkit in higher education has revolutionized our approach to higher education.

### 11. Organization and main stages of research.

The research was carried out in stages.

At the first stage, an analysis of the experience of institutions of higher education with the use of elements of Artificial Intelligence as a toolkit of edutainment in higher education was carried out, the purpose and strategy of the research were identified, the scientific apparatus was specified, the scientific problem of the introduction of Artificial Intelligence as a toolkit of edutainment in higher education was identified, an analysis of scientific literature was carried out;

At the second stage, an experiment was conducted to reveal the current state of training of higher education seekers based on the introduction of Artificial Intelligence as an edutainment toolkit in higher education, the obtained results were summarized, and general conclusions were formulated.

### 12. Empirical facts obtained during research and experimental work.

During the research and experimental work, we singled out the leading factors of the actualization of the ideas of Artificial Intelligence as an edutainment toolkit in the modern theory and practice of training students of higher education, including:

- affirming the priority of the concept of continuous education as a modern

anthropocentric paradigm, which is based on the humanistic idea of the necessity and expediency of lifelong learning, because it should become a natural part of life at any age;

- the rapid development of Artificial Intelligence as a purposeful and specially organized process of socio-cultural production of the personality through the implementation of educational and informational activities outside and within the boundaries of higher education, implementation of educational services and programs;
- social recognition of the achievements of Artificial Intelligence as a toolkit of edutainment in higher education, which reveals the regularities of organization, design, and support of the learning process of the student of education, taking into account his educational needs and age characteristics, capable of self-actualization, self-realization, and self-development.

As a result of the research, we obtained the following results.

Out of 208 higher education students surveyed, 177 have already used at least one of the Artificial Intelligence tools as an edutainment toolkit in higher education in the last 6 months. 76% of higher education students have used Artificial Intelligence at least once, and more than half of them had a positive interaction experience.

Every second respondent believes that Artificial Intelligence will change the educational process of higher education in the coming years; therefore, respondents indicate that they use Artificial Intelligence services in their activities to create homework tests, prepare for classes, practice, and monitor knowledge.

In classes, Artificial Intelligence is actively used by teachers from exact disciplines (physics, computer science, mathematics), and humanities – history, English language, literature, etc.

What was interesting during the experiment was that there was a dependence: the shorter the teacher's work experience, the more active he is in using Artificial Intelligence as a tool for edutainment in higher education.

Is an example of artificial intelligence in the first place in terms of popularity was a tool such as ChatGPT – a service that is the most popular among teachers and students. The level of

knowledge about Artificial Intelligence as an edutainment toolkit in higher education is somewhat higher among students (81% of respondents) than among teachers (75% of respondents).

The second example of artificial intelligence in education is according to the level of popularity, the tool of Artificial Intelligence as an edutainment toolkit in higher education from the project "Na Urok" is in second place among the respondents. 58% of the interviewed teachers know about this service, and the level of knowledge among students is 45%. Both teachers and students of higher education are much less aware of such well-known international Artificial Intelligence services: Stable Diffusion, Bard Google, Grammarly, Midjourney, and Notion AI. It is interesting that those teachers who are familiar with the topic of Artificial Intelligence as an edutainment tool in higher education are not in a hurry to involve students of higher education in the use of technology. 37% of teachers involved students of higher education in using Artificial Intelligence as an edutainment tool in higher education, and 52% only plan to do so in the future.

When answering the question of the questionnaire about the desire to advise technology to students of higher education, 11% of the interviewed teachers do not plan to advise students to use Artificial Intelligence in education. Some of these interviewed teachers say they are skeptical of AI technology because of its imperfections.

They claim that Artificial Intelligence in training currently cannot replace a person in conscious decision-making or the creative process, and it is also not fully capable of knowing the context of the task that it is offered to solve; Artificial Intelligence sometimes makes mistakes: it provides data that may contain inaccuracies or may no longer be relevant, makes elementary logical errors, also Artificial Intelligence will indicate inaccurately or most often will not indicate the source of information, and the message to the source is very important for research work.

On the other hand, higher education seekers, for the most part, see a great benefit in using Artificial Intelligence as an edutainment tool in higher education. 89% of higher education graduates have used Artificial Intelligence in higher education at least once, and a third of these respondents do so at least weekly. Also, about 40% of respondents indicate that they used

Artificial Intelligence as an edutainment toolkit in higher education during classes. According to respondents, artificial intelligence, in most cases, helps them to systematize information, generate ideas for creative works, and quickly search for and summarize material.

Individual respondents, in the questionnaires, anonymously admitted to using Artificial Intelligence tools for writing (for preparing tasks from humanitarian disciplines). However, for this purpose, the respondents who were interviewed rarely use Artificial Intelligence tools in higher education.

The study proved the importance of using Artificial Intelligence as an edutainment toolkit in higher education and showed that Artificial Intelligence is an essential technology for education, which is not measured by the criteria of useful or harmful, good or bad; it all depends on who and how they use them and keeps in focus the important role of a highly qualified specialist who will have the opportunity to learn constantly, use Artificial Intelligence and develop throughout his life.

Artificial Intelligence affects the work of teachers and students of higher education and creates new professional challenges for them.

Educators have come close to the moment when Artificial Intelligence as a tool of edutainment in higher education, based on its knowledge and verification of learned material, can teach others, and not only learn itself. Already today, ChatGPT flawlessly prepares tests for self-checking, comments on the mistakes made by the student, and strictly evaluates the answers of students of higher education.

## Conclusions

The role of Artificial Intelligence in education is to expand the educational process, and to improve human thinking because education is not a technology-oriented solution, but an exclusively human-centered activity.

Teaching future specialists to work with Artificial Intelligence systems is the main task of higher education institutions because it is Artificial Intelligence that provides the opportunity to use information sources, and manage them, and therefore is a tool with a large number of possibilities, which are an urgent issue for the modern world.

Today, new approaches and means of the

educational process are needed, which are capable of reorganizing higher education institutions in the era of Education 4.0 development.

The main advantage of the development of such an education system is the use of video classes with a virtual teacher, which helps to diversify the explanations of infographic objects, draw the attention of students of higher education to the important points of the lecture, qualitatively improve the online learning process, and use the avatar of the teacher with the possibility of creating an attractive and interactive educational environment. The teacher's avatar provides higher education students with real-time support and individual assistance; it is used to create interactive classes, with the help of Artificial Intelligence for edutainment in higher education helps students better understand the material; and makes it possible to reduce the cost of education from an economic point of view.

To clarify the significance of Artificial Intelligence as a tool of edutainment in higher education, we revealed the meaning of the concept of Artificial Intelligence and proved the necessity of its application in the educational space. Types (weak and strong), directions, and functions of Artificial Intelligence are considered; the importance of edutainment in higher education and its main principles are revealed.

Artificial Intelligence as an edutainment toolkit in higher education has revolutionized our approach to higher education.

The study proved the importance of using Artificial Intelligence as an edutainment toolkit in higher education and showed that Artificial Intelligence is an essential technology for education, which is not measured by the criteria of useful or harmful, good or bad; it all depends on who and how they use them and keeps in focus the important role of a highly qualified specialist who will have the opportunity to learn constantly, use Artificial Intelligence and develop throughout his life.

We see further research in the clarification of new approaches and means of the educational process, which are capable of reorganizing higher education institutions in the era of Education 4.0 development.

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