

DIGITAL AVATARS AS A DRIVING FORCE FOR THE TRANSFORMATION OF THE GLOBAL ECONOMIC SPACE

ЦИФРОВІ АВАТАРИ ЯК РУШІЙНА СИЛА ТРАНСФОРМАЦІЇ ГЛОБАЛЬНОГО ЕКОНОМІЧНОГО ПРОСТОРУ

The article examines the phenomenon of digital avatars as a powerful factor in the transformation of the global economic space in the context of the digitalization of society. The aim of the research is to identify the economic potential of digital avatars as a new type of intellectual asset capable of scaling educational, management, and commercial services. The relevance of the topic is determined by the need to rethink the role of digital technologies in the formation of new markets and employment models. The methodological basis of the research consists of systemic, comparative, and structural-functional approaches, as well as the method of economic analysis. As a result, it has been established that digital avatars not only change the structure of educational and labor processes but also form new vectors for the commercialization of knowledge, contributing to the development of the knowledge economy. The practical value of the article lies in the possibility of using the conclusions obtained to develop strategies for the digital transformation of higher education, create innovative business models, and assess the investment attractiveness of the EdTech segment.
Keywords: digital avatar, digital economy, digital university, intellectual capital, digitalization, EdTech, economic transformation.

У статті досліджено цифрові аватари як один із ключових чинників трансформації глобального економічного простору в умовах стрімкого розвитку цифрових технологій. Метою роботи є обґрунтування економічної природи цифрового аватара як нового інтелектуального активу, здатного створювати додану вартість у межах цифрової економіки, зокрема у сфері вищої освіти. Актуальність теми зумовлена зростаючим впливом цифрових технологій на моделі виробництва, передачі та комерціалізації знань, що призводить до появи нових ринків, бізнес-моделей і форм зайнятості. У фокусі дослідження – аватари, які функціонують як цифрові агенти, інтегровані в освітній, управлінський і корпоративний простір, і репрезентують синтез людського інтелекту, штучного інтелекту та цифрових інтерфейсів. Методологічно дослідження ґрунтується на міждисциплінарному підході, що включає методи економічного аналізу, контент-аналізу цифрових ринків, системного і порівняльного аналізу. У роботі використано структурно-функціональний підхід до аналізу ролі цифрових аватарів у системі економічних відносин, а також метод екстраполяції для виявлення потенційних сценаріїв розвитку ринку аватарів у глобальному вимірі. Проведений аналіз дозволив виявити, що цифрові аватари не лише сприяють автоматизації та персоналізації освітніх послуг, а й формують підґрунтя для експорту цифрового освітнього продукту, розвитку ринку EdTech, розширення ринку праці за рахунок нових професій і загального підвищення продуктивності людського капіталу. У результаті дослідження встановлено, що цифрові аватари поступово перетворюються на стратегічний економічний актив, який університети та інші освітні інститути можуть використовувати для масштабування освітніх програм, зниження собівартості навчання, розширення аудиторії та диверсифікації джерел фінансування. Виявлено, що цифрові аватари сприяють формуванню нової інфраструктури цифрової економіки знань, де знання стає реплікованим товаром, а викладач – носієм не лише інтелекту, а й цифрової репрезентації. Практична цінність роботи полягає у можливості застосування її висновків для стратегічного планування цифрової трансформації університетів, оцінки економічної ефективності інвестицій в EdTech, а також для розробки політики підтримки інтелектуального капіталу як основи економічного зростання в умовах цифрової доби.
Ключові слова: цифровий аватар, цифрова економіка, цифровий університет, інтелектуальний капітал, діджиталізація, EdTech, економічна трансформація.

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Problem statement. In the current conditions of digital transformation of the global socio-economic space, education increasingly acts not only as a public good but also as a strategic resource for the development of the knowledge economy. At the same time, the rapid development of digital technologies, in particular artificial intelligence, virtual and augmented reality, leads to the emergence of new forms of educational interaction, among which digital avatars occupy a special place. Universities, as key institutions for the production of knowledge and the formation of human capital, are increasingly integrating such technologies into the educational

process, which necessitates an analysis of not only the pedagogical but also the economic aspects of such implementation.

Digital avatars, as embodiments of intellectual content in the form of personalized virtual agents, have the potential to radically change the structure of educational service provision, funding models, and the scaling of educational content. In this context, it is particularly important to study their impact on the formation of new market segments in the EdTech sector, the transformation of the higher education economy, the commercialization of intellectual capital, and the development of digital ecosystems. Despite

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the growing attention to the technological side of digital avatars, the economic effects of their use in the context of the digital economy remain insufficiently studied, which determines the scientific novelty and practical significance of this research.

Analysis of recent research and publications. In modern scientific literature, the topic of digital avatars in higher education is mainly explored in the context of the digital transformation of educational systems, the knowledge economy, and the development of the EdTech market. In particular, relevant analytics on the development of the global digital avatar market are presented in the Precedence Research report, which details forecasts until 2034, market volumes, and its structure [1]. The SNS Insider material provides an assessment of the dynamics of digital avatars in various fields, including education [2], and the Grand View Research report describes geographical segments of development, in particular the market in the Asia-Pacific region [3]. PR Newswire highlights data from MarketsandMarkets on the growth of the avatar market in education, projected to reach \$5.93 billion [4].

G. Kortemeyer, N. Dittmann-Domenichini, and K. Merki study students' educational outcomes depending on the forms of participation in lectures – online, hybrid, and traditional [5]. R. Garg analyzes the integration of generative artificial intelligence into higher education and the potential risks or benefits of such integration [6]. Some researchers consider the prospects of using scaffolding as a tool for individualizing and humanizing education in the context of Industry 5.0 [7].

The NAFSA report provides official estimates of the economic impact of digital exports of educational services in the US [8], and HolonIQ characterizes the dynamics of venture financing in the EdTech sector based on a global annual report [9]. TechCrunch uses the example of Synthesia to illustrate investor interest in platforms for creating AI videos with avatars [10]. A. Krap et al. study the impact of digital solutions on the transformation of management approaches and the structure of intellectual capital in educational organizations [11]. Education Week analyzes the ethical challenges of applying AI in education, in particular the issue of teacher substitution [12].

At the same time, domestic scientific discussion focuses mainly on general aspects of the digital transformation of education, while the economic assessment of digital avatars as assets and drivers of the EdTech market remains insufficiently researched. This analytical vacuum determines the relevance of further study of this topic.

Task statement. Considering the rapid development of the digital avatar market, their active implementation in higher education, and the formation of new business models in the digital economy, the main objective of this research is to conduct an economic

analysis of the role of digital avatars as an intellectual asset capable of creating added value, ensuring the scalability of educational services, and generating revenue for universities and the state. It is necessary to study the economic effect of introducing avatars into the educational process, assess the possibilities of their commercialization, investment attractiveness, and impact on the knowledge economy and the market for educational services.

The objective also involves identifying trends and consequences of using digital avatars to transform employment in the education sector, the structure of intellectual capital at universities, and the formation of new market segments in the EdTech sector.

Presentation of the main research material. An important indicator of the development of any technology is the degree of maturity of the relevant market. In this context, the global technology market is seen as an international area of economic activity associated with sustainable, systematic commercial transactions involving the purchase and sale of technological solutions and services, as well as the formation of resilient business models focused on their integration into various sectors of the economy and areas of public life.

Historically, the global market for digital avatars has developed relatively recently, but today it demonstrates a high level of economic activity and steady growth. Digital avatars have become an important tool within the global digital economy, significantly transforming the principles of economic relations and models of interaction in many sectors, among which higher education occupies a special place.

The current stage of development of the digital avatar market is characterized by rapid growth in volume and expansion of the scope of technology application. According to Precedence Research, in 2025, the global AI avatar market is estimated at USD 9.78 billion, and by 2034, it is projected to grow to USD 118.55 billion with a compound annual growth rate (CAGR) of 31.95% (Figure 1) [1].

A significant part of this growth is associated with the active introduction of digital avatars in higher education, where they are used to personalize the learning process, automate administrative services, and create a virtual educational environment.

The main geographical segments that currently account for the largest share of the digital avatar market in education are North America, the European Union, and countries in the Asia-Pacific region [2;3]. These regions are actively implementing digital tools to increase the competitiveness of their universities, attract students from other countries, and create modern, open, and flexible learning models adapted to the requirements of the digital society.

The key players in the digital avatar market in education are global technology corporations such as Meta Platforms, NVIDIA Corporation, Microsoft Corporation,

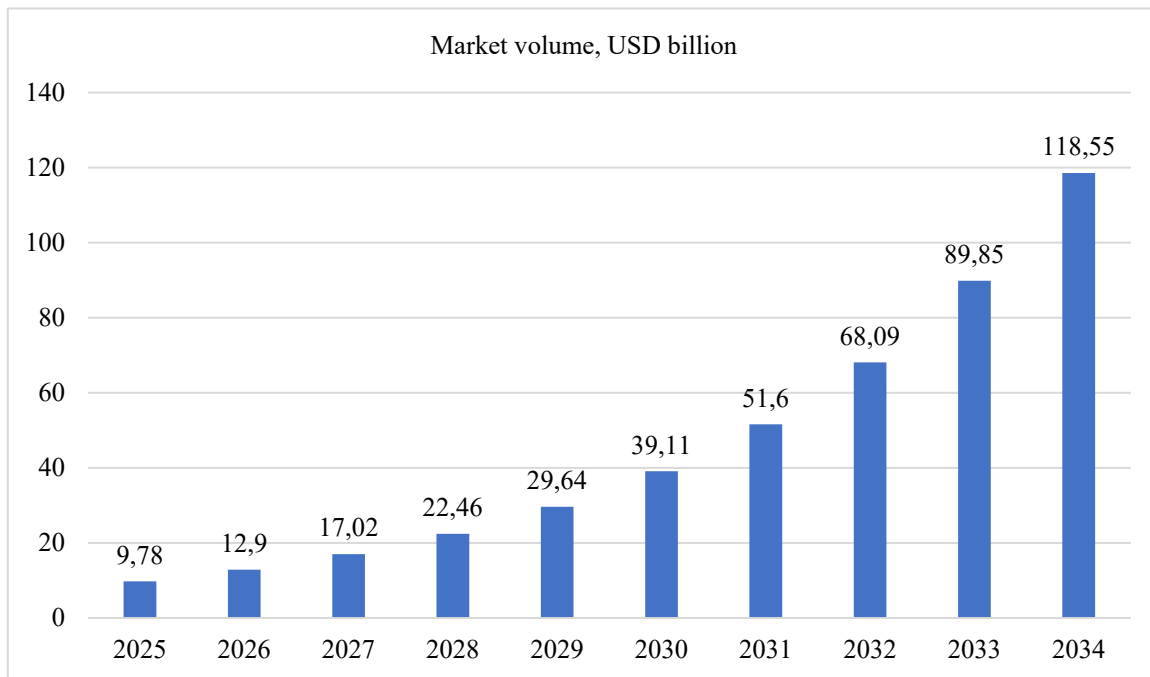


Figure 1. Volume and development forecast for the global AI avatar market for 2025–2034

Source: compiled by the author based on data [1]

Epic Games, Unity Technologies, as well as specialized startups actively working in the EdTech industry. These companies are the developers and suppliers of the most innovative solutions, creating technological platforms, software products, and tools for integrating digital avatars into the educational space.

Assessing the volume and forecasting the development of the digital avatar market in education is a complex analytical task that requires comprehensive consideration of many factors: technological trends, political conditions, institutional capabilities, and cultural characteristics. Despite certain differences in their forecasting approaches, analytical agencies are unanimous in their conclusions regarding the further sustainable development of this technological segment. According to current estimates by MarketsandMarkets, the education segment will be one of the leaders in the consumption of digital avatars, growing from \$0.80 billion in 2025 to \$5.93 billion in 2032 [4].

It is worth noting that digital avatars in higher education are not only an innovative teaching tool but also an important economic factor in the digital knowledge economy. Universities are increasingly creating virtual teachers – digital twins of real teachers or artificially created characters based on AI – to expand their learning audience and optimize costs. Such an avatar can give lectures or consultations online to an unlimited number of students around the clock, scaling the educational process far beyond the boundaries of traditional classrooms. Today, the key value of digital avatars lies in unprecedented resource savings

and process optimization: institutions do not need to spend significant funds and time on repeated lectures, video shooting, or teacher training each time – once created, an avatar always “makes contact” professionally and without additional costs [5, p. 66].

The experience of leading universities shows that combining human intelligence and avatars can achieve synergy. For example, research at Emory Business School (USA) found that courses developed by human experts but voiced and presented by avatars yielded better results among students than purely automated or traditional course teaching [6]. This shows that avatars are capable of successfully conveying content, and therefore, institutions can save time and money when people generate content and digital assistants broadcast it to students.

In other words, the university gets the chance to “replicate” the best lectures of its professors through digital twins, while reducing the workload on staff and the cost of conducting classes. At the state level, the introduction of digital avatars into education can have a significant macroeconomic effect. First, avatars expand access to quality education, which in the long term increases the overall intellectual capital of the nation. Government digitalization strategies increasingly include education as a priority: the transformation of the education system through process automation, data analytics, and online services is seen as a necessary condition for the development of other socio-economic spheres [7].

Thanks to avatars, universities can serve more students (including those from remote regions or other

countries) without a proportional increase in budgets – in fact, the cost of education per student is reduced. For example, virtual teachers provide continuous access to knowledge 24/7 for anyone who wants it, regardless of where they live, thereby reducing barriers to education. The result is a more educated workforce that fuels the knowledge economy. After all, the modern knowledge economy relies on education, knowledge, and human capital being transformed into productive assets or business products that can be replicated, sold, and exported for profit.

The commercialization of educational content using digital avatars represents a new model of economic activity in higher education, where intellectual products take on the characteristics of transnational digital assets. By creating personalized avatars for conducting online courses, teachers not only expand their audience reach but also contribute to the formation of new sources of knowledge monetization. This approach is already being implemented in practice: according to official estimates, the online education sector in the US generates billions in profits each year through the sale of digital educational programs to foreign students, strengthening the country's position as a global leader in the digital export of educational services [8].

For countries such as Ukraine, the development of educational services exports through digital platforms could become a new niche in the global market. Thus, the introduction of avatars contributes to the scaling of education, the development of human capital, and could become a source of additional income in the knowledge economy.

At the global level, digital avatar technology in education is already generating new business models and rapidly growing EdTech markets. According to analysts, the global market for AI avatars (digital virtual people powered by artificial intelligence) was worth around \$7–9 billion in the mid-2020s and could grow to a staggering ~\$118 billion by 2034 [4]. This demonstrates how rapidly digital educational products based on intellectual content are transforming into full-fledged commercial services. In the field of education, this is manifested through the active growth of startups and platforms that implement avatar-based learning.

New business models include, for example, “teaching as a service”: a university or company can license its avatar teacher to other institutions or directly to students. Marketplaces are emerging where educational avatars (whether copies of well-known lecturers or fictional AI tutors) are rented out to conduct courses or training sessions. Companies also use avatars for corporate staff training, creating virtual instructors for specific skills. This is forming a new sector of services at the intersection of education and IT. It is no coincidence that venture investors are actively financing projects in this field: in 2021, global investment in EdTech reached a record ~\$20 billion, tripling the pre-pandemic level [9].

In 2023, British startup Synthesia, which develops a platform for creating AI avatars and is already used for educational videos, attracted \$180 million in investments with a company valuation of \$2.1 billion [10]. Such examples confirm that avatars have become an economic asset into which significant capital is being invested with the expectation of future returns. In fact, a digital avatar can be seen as a product of intellectual property that contains knowledge and teaching methods and can create added value through repeated use. For universities, this opens up opportunities to monetize their intellectual capital: those institutions that are the first to create high-quality digital copies of their best teachers or unique courses will be able to sell access to them worldwide.

A related market for services is also being formed, ranging from studios specializing in the development of high-quality educational avatars to consulting firms that help educational institutions integrate these technologies into their business models. Thus, a new EdTech ecosystem is emerging, where avatars are a separate commercial direction, from the sale of software licenses for the avatar platforms themselves to student subscriptions to personal AI tutors.

The digitization of universities is radically changing the structure of their intellectual capital. As noted by A. Krap et al., the introduction of digital technologies (in particular avatars, AI systems, and electronic platforms) reduces the share of purely human knowledge while increasing the structural and innovative capital of the institution [11]. Intellectual potential, which was previously personalized in the teaching activities of individual specialists, takes on a material form in the digital educational environment in the form of digital resources: educational platforms, dynamic content databases, virtual interfaces, and digital avatars. Educational institutions that strategically manage such resources gradually form their own intellectual assets, which become the basis of their position in the global education market. The shift in emphasis from the traditional authority of the teaching staff to the institutional capacity to produce and distribute digital educational content defines a new model of reputational and economic capital for the digital university.

In economic terms, this means a better return on investment in knowledge: a single university-developed curriculum, implemented with the help of an avatar, can simultaneously teach thousands of students and generate revenues that significantly exceed the traditional class-based learning model. The return on investment in such technologies also looks attractive – due to scaling, the effect of implementing avatars grows non-linearly. It is no coincidence that recommendations are emerging for higher education institutions to apply an investment approach to digital transformation – to evaluate the implementation of educational platforms, avatars, and AI solutions as an investment in the long-term financial stability and development of the institution.

In other words, the costs of creating digital avatars are seen as strategic investments in improving the quality and scale of educational services, which will subsequently pay off by attracting more students and new sources of funding (online courses, corporate training projects, etc.).

It is also worth noting that the universalization of educational avatars inevitably changes the role of human teachers and the structure of employment in the education sector. A logical question arises: Will digital teachers replace live teachers? Most experts agree that the human factor remains irreplaceable, although the nature of a teacher's work is changing. Routine functions – reading similar lectures, checking standard assignments, providing basic consultations – are increasingly being automated by artificial intelligence. Instead, teachers will be required to demonstrate more creativity, emotional intelligence, mentoring, and scientific work. As Professor P. Stone, a researcher of the future of AI, figuratively noted, the work of a teacher will not disappear, but it will change: human intuition will always be needed – even with automated programs – to notice where a student is struggling and tailor the course to their needs [12].

Thus, avatar bots can become assistants to teachers, taking on a typical part of the learning process, while teachers focus on individual student support, critical thinking development, and new content creation. On the other hand, a new segment of employment is developing: specialists are needed to develop and support avatars, methodologists for digital courses, and educational data analysts. Vacancies are already appearing for positions such as AI developer of educational avatars, AI model trainer for education, virtual learning experience designer, and so on.

Traditional teachers also require professional development to learn how to collaborate effectively with AI assistants in the classroom. In general, experts predict not a reduction but a redistribution of jobs: some roles will be transformed, new employment opportunities will arise in the EdTech sector, and the number of live teachers may decrease only where their shortage is currently compensated for by digital solutions (for example, in remote regions or mass training in basic skills). At the same time, more effective training through avatars can reduce the time it takes to train specialists and increase their productivity in the workplace, which also indirectly affects the labor market and the economy.

Conclusions. Digital avatars in higher education have become a rapidly growing phenomenon at the intersection of technology and economics. In the context of the digital economy, they act as an economic asset – an intellectual product capable of scaling educational services and generating added value and revenue. The economic effect of introducing avatars manifests itself at various levels: universities gain increased efficiency and new sources of funding, the

state gains growth in human capital and the development of educational services exports, and the global market gains the emergence of a new high-tech sector with billions in turnover. New business models are emerging in EdTech, where knowledge is sold in the form of digital avatars and personalized AI tutors. Knowledge is becoming a reusable product, which significantly enhances the role of education in economic development.

At the same time, the successful realization of this potential requires a deliberate strategy: investment in digital infrastructure, support for teachers in mastering AI technologies, and regulation of ethical and legal aspects (copyright on avatar content, protection of student data, etc.). With the right approach, digital avatars in education can become an important driver of the knowledge economy, providing both a qualitative leap in learning and tangible economic returns for universities and society as a whole. This is one example of how digital technologies are transforming a traditional industry (education) and creating new opportunities for economic growth in the 21st century.

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