Bringing Culture to Life: A New Direction of Online Education Empowered by the Metaverse

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Abstract

Reviewing the epidemic situation in the past three years, due to the impact of COVID-19, online education has developed rapidly, while the defects of traditional online education are also exposed. It lacks the "temperature" of face-to-face teaching, and the common problems of low learning enthusiasm and insufficient classroom interaction are becoming increasingly serious, thus demonstrating an urgent need for excellent online education. With the proposal of the concept of metaverse, "metaverse and education" breaks the limitations of time and space, utilizes virtual reality technology and group social networks to provide immersive experiences, and provides a new direction for future education development. This article starts from the perspective of empowering online education in the metaverse, and focuses on constructing a new generation of online education model - immersive online education - by analyzing the characteristics and historical online education models of the metaverse.

Keywords

Metaverse Education; Immersive; Virtual Reality; Educational Models.

1. Introduction

1.1. Current Situation of "Metaverse and Education" at Home and Abroad

At present, promoting the transformation of educational informatization and openness is a common understanding in the international education field. Professor Byrenson from Stanford Virtual Human Interaction Laboratory believes that education is one of the "killer" application scenarios in the metaverse. Domestic internet giants are making efforts in the metaverse, with Baidu's "Xirang" and Tencent launching a virtual digital humanoid multimodal human-machine interaction system. NetEase has also fired the first shot in the "metaverse". As early as the concept of the metaverse in 2021, the idea of virtual and real symbiosis had already been mentioned, and Qian Xuesen translated it into "spiritual realm" in 1990, meaning "immersing oneself in the realm". Virtual reality is the main supporting technology of the metaverse. With the continuous maturity of technology, the metaverse has been applied in the field of education. The first virtual reality high school in the world, the University of California, Berkeley, has established an online campus in My World, and Morehouse College in the United States has also established an immersive virtual laboratory. In addition, the theme of integrating the metaverse with education in China has also been on the rise. In addition, the plan of "metaverse and education" has also been put on the rise in China. Central China Normal University marks the first year of the education metaverse, which is the ultimate form of integration between the two subjects of teachers and students and the technological object.

1.2. Research Significance

After just experiencing a series of inconveniences caused by the global outbreak of the epidemic to various student groups, the advantages of "metaverse and education" have gradually emerged, combining education with the Internet, making long-distance interactive learning possible for people. With the continuous progress of blockchain, digital twins, simulation

technology, and other technologies, the concept of "metaverse and education" has provided a reference for the new development direction of educational basic planning, and has provided new possibilities for the future development of online education. This technology not only fills the gap between teacher and student spatiotemporal separation in online education, but also provides a good learning atmosphere for individual students by constructing a learning space parallel to the physics learning space, characterized by the fusion of virtual and real environments, and promoting the development of higher-order thinking. Immersive "embedded" learning can solve problems such as loneliness and low learning efficiency during learning; In addition, the vast platform it builds also expands users' social range, enhances their sense of experience, and brings users a sense of immersive experience. Compared to ordinary online education and face-to-face education, immersive education breaks people's conventional awareness of the low efficiency of online education and the problem of information asymmetry between teachers and students; And compared to offline teaching, it has more convenient implementation space and lower labor costs. The virtual and real integration education environment shaped by technology makes learning gamified, with scenes and experiences, making immersive learning like "addicted to games"[2]. This series of characteristics make immersive learning superior in presentation methods, explanation depth, time and space span, and connectivity.

2. Technical and Theoretical Analysis

2.1. Theoretical Research on the Empowerment of the Metaverse to Bring New Directions to Education

2.1.1. In Terms of Physical Education

The problems that exist in physical education, such as incomplete or inadequate management systems, and uneven classroom experience among students, can be solved through immersive online education. Firstly, high-quality immersive online education can enable school administrators to have a more comprehensive understanding of campus information. On the immersive online education platform, the classroom and learning situations of teachers and students will be truthfully recorded through online platforms. Managers can use this information to develop and improve corresponding management systems in a timely manner, and supervise the implementation of projects through network technology, Reduced management costs. Secondly, an immersive learning experience can bridge the boundaries between inside and outside the classroom. It has a vast amount of information, allowing students to search for the necessary information through the platform for independent learning and research, develop innovative and creative abilities, improve their own abilities, and reduce the possibility of some students losing interest in learning due to poor classroom experience or information blockage.

2.1.2. In Terms of Online Education

The demand framework for the new infrastructure standard for teaching informatization needs to be constructed from four aspects: digital base, goal guidance, system specifications, and application scenarios. Immersive education can improve the problems of uneven network information, scattered information, and large gaps between various types of data in online education. The metaverse, through its powerful technological means, can help users search for information faster and easier; Besides.

2.2. Application of Metaverse Technology

In order to achieve complex functions and realistic environments in immersive education, and provide users with high-quality experiences, the educational metaverse requires technologies

such as interaction technology, Internet of Things technology, artificial intelligence technology, blockchain technology, and so on[3]. Here, we will describe two basic technologies.

2.2.1. Interactive Technology

Interactive technology is a key technology in immersive education that provides users with immersive learning and enables communication between different individuals, mainly including hybrid reality, holographic projection, brain computer interface, and somatosensory technology[3]. By integrating virtual and real environments through technology, expanding the boundaries between reality and blurring virtual and display, we provide users with a realistic learning environment and a real teacher-student interaction experience.

2.2.2. Internet of Things Technology

The Internet of Things technology refers to the collection of any physical or process information that may need to be monitored by various sensors, achieving ubiquitous interconnection and intelligent perception between people and things, as well as between things. The Internet of Things technology enables the construction of a parallel educational metaverse in the real world, which is the foundation for its mutual integration[3]. By using this technology to construct a natural and social environment that maps between the virtual world and the real world, it provides an environmental foundation for immersive education, enabling the educational metaverse to achieve virtual and real symbiosis, as well as the foundation for the coexistence of teachers, students, and all things.

3. Building a New Model for Online Education

3.1. Metaverse Empowerment Online Education Application Scenarios

The integration of the metaverse and education breaks the limitations of traditional online education in terms of time and space. Through technological innovation, virtual reality technology is introduced into online education scenarios, providing immersive teaching to improve the quality of online education, and creating a new model of online education. The relationship between learners will not be fragmented due to the construction of the online education space in the metaverse. On the contrary, simulating virtual reality scenes through spatial construction will generate a closer interconnection process[1].

Traditional online education has a single scene atmosphere, a relatively dull teaching method, and a lack of effective teacher-student interaction, often resulting in students' aversion to learning and insufficient efficiency. Metaverse and Education has achieved diversification of educational scenarios by constructing different educational scenarios through technologies such as artificial intelligence, data analysis, and VR, and selecting the most suitable scene atmosphere according to educational background needs. An immersive atmosphere can give students a sense of immersion, which helps to stimulate their learning enthusiasm and improve the quality of education. In the virtual world, social relationships will be further strengthened, and character personalities may change. Each ID user can try to change their communication and dating style in the metaverse classroom.

Through the metaverse, online education can adopt the AI digital cloud classroom model. Users can be generated into virtual digital humans and create their own virtual digital human image through AI technology, immersing themselves in the charm of metaverse education. In addition, the platform needs to leverage technology to continuously update special system auxiliary tools, improve teacher-student interaction, and keep learning fun.

3.2. Research on the New Generation Online Education Model

The emergence of the first generation of internet technology has broken the traditional mode of education and made online education possible, enabling people to sit by their computers and

conduct face-to-face learning through video. However, the time and space of its education are limited, and mobile learning cannot be achieved. With the continuous development of network technology, mobile networks have gradually become mainstream, and mobile network tools such as smartphones and tablets have realized the desire to learn anytime and anywhere. Through continuous technological innovation, 5G, VR, and digital twin technologies currently interweave virtual and reality, creating a lifelike virtual world. Immersive online education empowered by the metaverse has become a new direction for future development. The new generation online education model refers to an immersive online education model created by the integration of the metaverse and education. This model has six major features: standardization, intelligence, specialization, diversification, decentralization, and collaboration[2].
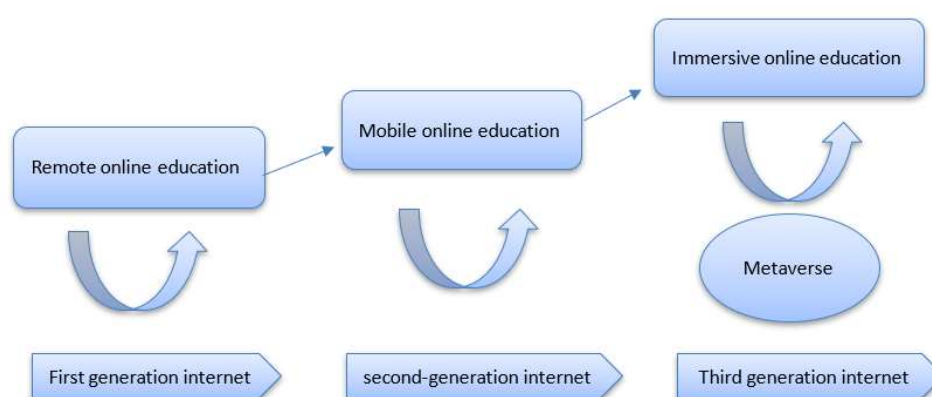

Figure 1. Online education replacement diagram

Role and scenario design are the underlying architecture of the model. Each ID has a virtual digital human image, which can be designed according to one's own situation to experience a "second life" different from the real world. Courses can be designed with specific scenarios, creating an immersive atmosphere through the shaping of stories to enhance learners' enthusiasm. For example, red spirit courses can use virtual reality technology to reproduce the scene of revolutionary predecessors crossing snowy mountains and grasslands, allowing learners to immerse themselves in the revolutionary significance it contains.

The designer of the incentive mechanism is the center of the model. You can establish rankings such as Dragon Tiger List and Top 100 List among users who are different from each other through a point system. Learners can earn points through tasks such as sharing learning experiences, participating in online educational tests, and knowledge competitions to improve their ranking and stimulate user engagement and focus. In addition, it is necessary to bridge the value chain between the real world and the virtual world, and the points and rankings of the virtual world will be recognized by the real world to obtain corresponding value.

The final mechanism design is the sea stabilizing needle of the model. Metaverse education needs to create an intelligent mechanism. Design different learning difficulty and scoring mechanisms by analyzing the behavior of different users. Teaching according to Confucius' aptitude, sharing content that scholars may be interested in through big data analysis, and arranging courses with different difficulty levels by assessing scholars' learning abilities.

4. Summary and Outlook

In the metaverse, people can have multiple identities and roles, and engage in learning, socializing, shopping, and more in both the real and virtual worlds. Metaverse education is only

a part of this content. Immersive online education greatly enhances the driving force and engagement of learning, and rich online education resources enable users to capture the necessary information and improve their own abilities through the virtual world. However, the virtual world cannot completely replace the real world. The two are symbiotic and integrated. People can use the virtual world to compensate for the shortcomings of the real world, obtain information that is not easily available in the real world, and then apply it in the real world. The metaverse education system can break regional restrictions and information barriers, bring more opportunities for more scholars, and make the process of online learning more interesting.

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