Edu-Metaverse: Internet Education Form with Fusion of Virtual and Reality

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ABSTRACT
The arrival of the Metaverse era provides the possibility for the development of Edu-Metaverse. The Metaverse integrating big data, artificial intelligence, blockchain and other digital technologies can provide individuals with an open and inclusive learning space and teaching space, triggering a new education and teaching reform. Based on this, the paper first defines the educational attributes of the Metaverse, then introduces the application scenarios of the Edu-Metaverse, and finally analyzes the risks faced by the Edu-Metaverse. According to the above, the paper proposes a multi-agent collaborative development strategy: strengthening top-level design at the government level, optimizing resource allocation at the enterprise level, and raising safety awareness at the individual level.

Keywords: *Edu-Metaverse, fusion of virtual and reality, multi-agent collaborative support.*

1. INTRODUCTION

In 2021, mankind will enter the first year of the Metaverse. Tech giants such as Microsoft, Samsung, and ByteDance have successively deployed the Metaverse. A large amount of capital rushed into the Metaverse field. The arrival of the Metaverse era provides the possibility for the development of Edu-Metaverse. At present, the Edu-Metaverse is still in its infancy, and exploring its future application scenarios and development strategies has become a cutting-edge topic. To this end, this article will conduct in-depth discussions around the following questions: How does the educational attribute of the Metaverse present? What are the main application scenarios of the Edu-Metaverse? What risks does the Edu-Metaverse face? How should it develop in the future?

2. THE EDUCATIONAL ATTRIBUTES OF THE METAVERSE

Education is an important application scenario of the Metaverse [1]. The Metaverse contains rich educational attributes and is highly compatible with education in many aspects. Exploring the application form of Metaverse in education and its technical implementation has important theoretical and practical significance for promoting the new infrastructure of education and building a good education ecology in China.

Edu-Metaverse can be understood as the educational application of the Metaverse. It creates digital identities for the participants or organizers of teaching activities such as teachers and students [2]. With the help of emerging information technologies such as VR/AR/MR, Digital Twin, IoT and Blockchain, it builds formal and informal teaching places in the virtual world, allowing teachers and students to interact in it [3]. Edu-Metaverse breaks through the limitations of the physical world in terms of scenarios, and retains the value of real educational activities, enabling participants to meet both real and virtual teaching needs. It has three characteristics: social interaction, diversity and openness, and high immersion [4].

3. THE APPLICATION SCENARIOS OF THE EDU-METAVERSE

3.1. School Education

The Edu-Metaverse breaks the time and space boundaries of traditional physics teaching places. The traditional classroom has become an open and shared learning space. Teachers can flexibly create teaching places and teaching situations according to the teaching content. For example, a physics teacher can build a physics laboratory for simulating electromagnetic phenomena, a geography teacher can create a geography

laboratory for observing geographical features, and a Chinese teachers can create corresponding cultural scenes. Experiential and situational teaching can not only enable students to obtain a more authentic and immersive learning experience, but also cultivate students' independence, autonomy and creative spirit. At the same time, the Edu-Metaverse expands the educational field of schools. Schools and students can carry out virtual extracurricular activities and teaching practices through virtual museums, libraries, museums, science and technology museums, etc., which enriches students' learning content and learning methods, and achieves students' comprehensive and healthy development.

3.2. Family Education

Edu-Metaverse also provides new ideas and directions for family education, and promotes the construction of the family education guidance service system. On the one hand, based on artificial intelligence technology, blockchain and other technologies, Edu-Metaverse comprehensively scores students' usual homework, exams, key behaviors, etc., and forms an overall credit record, which can help parents better understand students' learning status and provide more convenient guidance for students' learning behavior. At the same time, it also promotes communication between parents and teachers, and promotes home-school cooperation [5]. On the other hand, Edu-Metaverse supports student-centered teaching including gamification teaching, personalized teaching and situational teaching, and offers interdisciplinary education such as maker education and STEM education, helping students break the shackles of traditional disciplinary thinking and achieve interdisciplinary in-depth learning.

3.3. Social Education

Since the epidemic, the combination of Metaverse and virtual learning community has become a hot spot. A complete virtual learning community has essential elements such as identity, social etiquette, learning and interaction. Being in this environment will enable community members to gain a stronger sense of community participation and promote interaction between members. Taking Sloodle as an example, Sloodle' s virtual community is very prominent. It integrates Moodle' s learning management system with Second Life' s games to realize the combination of metaverse and virtual learning community. Metaverse technology has also begun to be applied in public places such as museums, science and technology museums, libraries, etc., to help present some objects that are not easy to display realistically to bring visitors a more realistic visiting experience, or to build an embodied and holographic environment to increase learning immersion and experience of learners [6]. The VR/AR technology in the Edu-Metaverse is also widely used in the field of vocational education, helping to carry out some difficult or dangerous experiments and training. On May 29, 2021, at the 29th online academic conference of the Asian Society for Cardiovascular and Thoracic Surgery (ASCVTS), Seoul National University Hospital used the XR platform to live broadcast a surgery. Precision OS has released the world' s first fully interactive VR platform, which allows surgeons to simulate surgical procedures and improve their diagnosis and treatment level.

4. THE RISKS TO THE EDU-METAVERSE

4.1. Absence of Top-level Design

At present, the relevant documents issued by our country are only programmatic documents for the overall development of the Metaverse, and there is no top-level design plan for the Edu-Metaverse platform system, digital resources, network security, etc. There is also no systematic planning and clear development goals for the application of the metaverse in the field of education. Additionally, some well-known companies at home and abroad have begun to shift from social platforms, video games and other industries to the research and development of Edu-Metaverse related products, and Edu-Metaverse is facing broad development prospects. However, the relevant market mechanisms and industry standards are currently lacking. This is an urgent need to formulate relevant standards, regulate and monitor all participants, and seize the initiative in the development of the Edu-Metaverse industry.

4.2. Inadequacies of Theoretical and Applied Inquiry

At present, the design of Edu-Metaverse products in China is oriented by software development and use, and lacks systematic and scientific educational theoretical support. Relevant products need to be further combined with educational theory for curriculum innovation to enhance their practice orientation. At the same time, many products of Edu-Metaverse only stay in the simple demonstration stage, and the teaching content of the course is relatively simple, which cannot meet the learning needs or teaching needs of the participants. It is necessary to further strengthen the in-depth excavation of the course content. In addition, China has made great progress in the underlying supporting technologies of the Edu-Metaverse, but there are still many flaws and loopholes, such as the low level of avatars, the insufficient popularity of 5G networks, and the high threshold for dedicated hardware applications. The optimization and promotion of related products still has a long way to go.

4.3. Ethical Value Risk

4.3.1. Ethical Hazard

Metaverse empowers education makes the platform system increasingly complex, and unpredictable ethical and moral risks may arise in the system. First of all, the data and information of each participant are easily leaked and sold. How to protect the privacy of individuals in the Edu-Metaverse has become a prominent challenge that must be faced [7]. Secondly, the types of data in the platform system are diverse and the sources of information are complex. It is difficult for participants to identify the authenticity of the information, which can easily lead to a crisis of trust. Thirdly, the Edu-Metaverse is highly immersive and interactive, and learners face the risk of "addiction". This issue also needs to be paid great attention. Eventually, the question of whether the Metaverse can have the right to education and to whom the relevant responsibilities belong remains to be further discussed [8].

4.3.2. Educational Value Bias

The Edu-Metaverse is a teaching field built on algorithms. From the individual level, the algorithm guides and controls the entire learning scene. If there is an educational value deviation in the algorithm design, it will have a significant impact on the learner's values and personality improvement in the Metaverse field. The orientation of the law will also cause participants to accept homogeneous information, which is not conducive to the development of their creative thinking and divergent thinking, and kills the participants' individuality and characteristics. From the social perspective, deviations in individual values and worldviews in the Edu-Metaverse will eventually result in deviations in the values of the entire society, causing serious social problems.

4.4. Capital Manipulation Risk

The Edu-Metaverse is considered to be able to narrow the education gap because of its openness and inclusiveness, but it is worth pondering whether the Edu-Metaverse under the manipulation of capital can promote education equity. On the one hand, the production materials in the Edu-Metaverse are in the hands of major platforms, and there is no unified standard. Algorithmic black boxes, algorithmic exploitation and information asymmetry may further exacerbate the digital divide among participants, and users are in a passive position [9]. On the other hand, there are differences in the capital owned by different regions and strata. The profit-seeking nature of capital leads to different learning resources and services enjoyed by capital owners in the Edu-Metaverse, further widening the gap between disadvantaged learners and advantageous learners. In short, at present, the Edu-Metaverse will inevitably involves economic systems such as the currency market and the commodity market, and the risk of capital manipulation of education caused by it needs to be solved urgently.

5. FUTURE PROSPECTS OF THE EDU-METAVERSE

5.1. Government Level

The government is an important driving force for strengthening top-level design and system construction, leading the development direction of the Edu-Metaverse. In the first place, the government should pay attention to the coordination between departments such as finance, industry and information technology, and network information, so as to form a joint effort. In the next place, the government needs to establish evaluation standards and technical standards for the Edu-Metaverse, establish ethical behavioral norms, and solve the problems of algorithmic exploitation and information cocooning. Thirdly, the government should strengthen the overall planning and guidance of different regions, promote the balance and coordination of various regions, and form a well-structured, safe and efficient Edu-Metaverse system to achieve a balanced development of the Edu-Metaverse. Lastly, the government should strengthen the overall planning and guidance of different regions, promote the balance and coordination of various regions, form a rationally structured, safe and efficient Edu-Metaverse system, and realize the balanced development of the Edu-Metaverse [10].

5.2. Enterprise Level

Firstly, all Metaverse companies should speed up the research and development of the underlying supporting technologies for Edu-Metaverse, make up for technical loopholes, and provide accurate services. Secondly, the whole chain management of data resources ought to be implemented, and the pre-event, in-event and post-event supervision mechanisms should be improved, so as to exert the supervision effect. In addition, communication between companies should be strengthened to realize the co-construction, co-governance and sharing of information. At the same time, the company should strengthen cooperation with educational institutions, schools, etc., to better understand the application status of Metaverse in the field of education, and reduce the ethical issues that may arise in application scenarios. What' more, schools and educational institutions should re-discuss the management model and teaching strategies of the Edu-Metaverse, develop relevant educational theories, and enrich teaching content and practice.

5.3. Individual Level

The public should enhance their awareness of network security and property protection, adhere to green and scientific Internet access, and prevent excessive addiction to virtual space. When personal data is found to be used in illegal situations, individuals should dare to take up legal weapons to protect themselves and earnestly safeguard their own interests.

6. CONCLUSION

The Metaverse contains rich educational attributes, which can empower education in various scenarios such as schools, families and society. However, China's research on the application of the Metaverse in education is still in its infancy. The Edu-Metaverse faces risks such as lack of top-level design, ethical value constraints, insufficient application exploration and capital manipulation. Thus, based on multiple perspectives, this paper proposes a development strategy of multi-agent collaborative support including the government, enterprises, and individuals. Through the forward-looking analysis of the above problems, this paper provides some references and inspirations for promoting the Metaverse empowerment education, realizing the digital transformation and intelligent upgrading of education. Ultimately, this is conducive to the construction of a benign education ecology under the background of high-quality development of education.

AUTHORS' CONTRIBUTIONS

Wu Jingting conceived the idea and designed the study. All authors wrote the paper and revised the manuscript.

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