



Research on Metaverse Multi-person Linkage Using Mobile Edge Computing Based on Extended Reality Under the Immersive Experience of Zhijiang Peace Culture Memorial Hall

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Abstract. This study aims to deeply explore the impact of mobile edge computing based on extended reality technology on the multi-person linkage of the Zhijiang Peace Culture Memorial Hall under the immersive experience. In the part of research background and significance, it discusses the rise of the application of XR technology in the field of culture and education, emphasizing the importance of education on the history of revolution and its value in the social sense. Then, it expounds the core topic of this research aimed at integrating XR technology with education on the history of revolution, and presenting visitors with more realistic and immersive historical scenes by creating an immersive experience of multi-person linkage. The use of these technologies enables visitors to transcend time and space barriers, directly participate in historical events, and deeply appreciate the intrinsic value of red culture. In order to achieve multi-person linkage, this study adopts mobile edge computing technology to ensure that multiple visitors can realize real-time interaction in the virtual scene and jointly build a collective experience of the Metaverse. This research has achieved positive results in the fields of XR technology application, education on the history of revolution, and mobile edge computing. It provides a useful reference for the modernization and upgrading of the Zhijiang Peace Culture Memorial Hall, and also provides a new paradigm for the cultural promotion of multi-person linkage experience in Metaverse.

Keywords: Metaverse · Immersive Experience · Extended Reality · Mobile Edge Computing · Education on the History of Revolution

1 Introduction

1.1 Research Background and Significance

In today's digital age, the integration of information technology and cultural heritage presents unprecedented possibilities. The Zhijiang Peace Culture event, as an important historical node in China's War of Resistance Against Japanese Aggression, represents the Chinese people's indomitable spirit of resistance and historical victory. However, traditional display methods are difficult to achieve satisfactory results in small places, limited budgets, and limited flow of people. This prompts us to think about how to use modern technology, especially extended reality (XR) technology, to reinterpret history and create a more immersive experience. An immersive cultural and educational experience.

History is a window of time, which can connect us to the past and feel the years full of glory and tears. However, the passage of time makes historical events gradually blurred, especially for the new generation. In this context, we need a new way to convey history, so that people don't just understand it through words and pictures, but participate in it personally and resonate with history.

Immersive formats are an emerging model to promote the high-quality development of the digital cultural industry. During the "14th Five-Year Plan" period, the Ministry of Culture and Tourism issued the "Opinions on Promoting the High-Quality Development of the Digital Cultural Industry" in November 2020, emphasizing "promoting the transformation of existing cultural content into immersive content and enriching virtual experience content. Support Cultural relics units, scenic spots, etc., use cultural resources to develop immersive experience projects, develop digital exhibition halls, virtual scenic spots and other services. Guide and support the application of virtual reality, augmented reality, drones and other technologies in the cultural field, and develop holographic interactive projection, UAV performances, night light and shadow shows and other products." Zhijiang was approved to become the 307th International Peaceful City in 2021 and Hunan's first International Peaceful City. Zhijiang Peace Culture records the history of China's Anti-Japanese War and the great victory of the World Anti-Fascist War, and demonstrates the charm of human peace culture.

The Zhijiang Peace Culture Memorial Hall is a well-known education on the history of revolution scenic spot in China. It is an important carrier of Zhijiang's peaceful culture and has important patriotic educational significance. The old revolutionary site is the main site, and the exhibitions in the museum tend to be in the traditional mode. These publicity methods lack attractiveness and the flavor of the times in terms of atmosphere creation, connotation expression, interactive experience, etc., and it is difficult to deeply touch and shock people's hearts. Coupled with the continuous impact of the 2020 new crown pneumonia epidemic, the domestic cultural and tourism industry, including Zhijiang, has been hit hard [2]. Therefore, it is urgent to promote the deep integration of Zhijiang peace culture and high technology, actively explore digital forms, and tell the story of Zhijiang famous city at home and abroad.

The development based on immersive experience in foreign countries is relatively mature. The immersive experience was first proposed by Zwaan [3], which are respectively online immersion (somatosensory equipment, VR equipment, etc.) and offline immersion (virtual projection), which are mainly used in situational theme parks., medicine [4], cultural attractions [5] (Christos, 2020), archeology [6] (Kyrilitsias, 2021), learning [7] (Tsivitanidou,2021), etc., but there are very few studies on the immersive experience of domestic red culture.

The digital construction of red culture in my country started relatively late, but in recent years it has gradually become the focus of continuous attention from academia and industry. In the high-tech interactive exhibition “Riverside During the Qingming Festival 3.0” launched by the Forbidden City in 2018, the famous painting “Riverside During the Qingming Festival” that spanned thousands of years was vividly presented in front of the audience, bringing immersive experience to the audience and setting off a new era based on immersive experience. The upsurge of research on the digital innovation path of red culture. Search the keyword “immersive experience + culture” through HowNet, and there are 57 journal papers published in 2021 alone.

Cao Yue et al. [8] (2018) believe that in an immersive environment, people themselves become a medium, the boundaries of time and space are eliminated, and the interaction between body and technology, senses and media will continue forever. Yu Wan [9] (2019) believes that museums, as places of cultural exchange, are the second classroom for conveying culture and realizing multi-directional exchanges. Lei Bo [10] (2018) proposed that VR images have the effect of “immersive experience” and “human-computer interaction”, and it is necessary to be introduced into local red cultural propaganda, but did not involve the introduction of details; Chang Rui [11] (2021) believes that not only virtual reality, but also digital collection, preservation, management, restoration, reproduction, display, and inheritance of red cultural resources can be carried out with the help of computer technologies such as image, graphics, sound restoration, and augmented reality.

Therefore, with the application of technologies such as virtual reality, augmented reality, 5G+4K/8K ultra-high-definition, drones, and AI in the construction of digital culture, products such as holographic interactive projection, drone performances, and night light and shadow shows have brought audiences A powerful and immersive experience. The more visitors are immersed in the experience of red culture, the more conducive it is to accept the baptism of red culture at a deeper level, and the more they will praise and be proud of the innovation, development, protection and inheritance of my country’s red culture from the bottom of their hearts.

Extended reality technology, as the intersection of virtual and reality, can create a brand new display platform for us. Through AR technology, virtual elements can be integrated with the real world, allowing historical scenes to unfold in front of your eyes; VR technology can bring users into the virtual world, allowing them to be in the vortex of history; and MR technology goes a step further, combining virtual and real elements cleverly combined to create a wonderful interaction. These technologies provide us with a brand new way of displaying and conveying history, allowing people to experience and feel history in person, not just through traditional display and narrative.

This thesis will focus on how to use these advanced XR technologies, especially in the case of small places, low costs, and small crowds, to restore the Peace Culture of Zhijiang into a metaverse multi-person linkage experience. We will discuss how to choose suitable technologies and devices, design interactive content for different groups of people, and how to use mobile edge computing to improve experience. Through this research, we hope to inject new life into the inheritance of red culture and make history shine more dazzlingly against the backdrop of modern technology.

1.2 Extended Reality

Extended reality (XR) technology, as a major breakthrough in the field of information technology, has created a brand new reality experience for us. It presents users with rich interactions and perceptions by integrating the virtual world with the real world. Under the framework of XR technology, we often involve various technical modes such as augmented reality (AR), virtual reality (VR) and mixed reality (MR), which cross and integrate virtual elements and the real world to varying degrees, creating an amazing experience.

Mobile edge computing (MEC) is a new distributed computing method based on mobile communication networks, which can provide faster and more reliable computing capabilities for XR technology. MEC provides IT service environment and cloud computing capabilities by deploying general-purpose servers near the network access side, aiming to further reduce latency, improve network operation efficiency, improve service distribution and transmission capabilities, and optimize and improve end-user experience.

For example, in the Zhijiang Peace Culture Memorial Hall, MEC can be used to support the application of AR, VR and MR technologies. It can quickly process a large amount of data and transmit the results to the user's device in real time, so that the user can get a smoother and more realistic experience. Additionally, MEC can help with goals such as traffic optimization, enhanced physical security, and cache efficiency.

First, augmented reality (AR) technology extends the boundaries of human perception by superimposing virtual content onto real environments. Through smartphones, tablets or AR glasses, users can see virtual images, text or animations on the background of the real world, making learning and experience richer and more vivid. For example, in the Zhijiang Peace Culture Memorial Hall, AR technology can be used to combine historical scenes with the actual display area, so that visitors can see the virtual surrender ceremony in a real location, enhancing their immersion and participation.

Second, virtual reality (VR) technology is a more in-depth experience. By wearing a VR headset, users are fully immersed in the virtual environment, as if they were there. In the Zhijiang Peace Culture Memorial Hall, the use of VR technology can bring users into the historical scene at that time, allowing them to experience the atmosphere and tense situation at that time in 360° without dead ends. This immersive experience allows users to have a deeper understanding of historical events and generate stronger resonance.

Finally, mixed reality (MR) technology organically combines virtual elements with real environments. Through devices such as AR glasses, users can see virtual objects interact with real scenes, creating a sense of fusion reality. In the Zhijiang Peace Culture Memorial Hall, MR technology can be used to allow tourists to have dialogues with

virtual historical figures, or interact with virtual historical scenes, making the visit more lively and interesting.

In short, the combination of mobile edge computing under the framework of XR technology provides users with strong support and enables users to obtain a better experience. With the continuous development of MEC technology, we have reason to believe that XR technology will achieve more brilliant achievements. In short, the application of XR technology has injected new vitality into the inheritance and education of cultural heritage. It breaks through the limitations of traditional display methods, allowing history to be presented to people in a more vivid way, allowing people to feel and experience history in person. In the case of small places, small costs, and small crowds, using different forms of XR technology, we can make the Zhijiang Peace Culture Memorial Hall an attractive virtual place, bringing visitors a profound experience of education on the history of revolution.

2 Application of Extended Reality Technology in Zhijiang Peace Culture Memorial Hall

In a small place like Zhijiang, with limited resources and few people, the traditional display methods may not be able to achieve satisfactory results. However, with the help of extended reality (XR) technology, we can restore the historical scene of the Peace Culture of Zhijiang in a new way, so that visitors can experience that exciting historical moment more personally.

First, we can consider using Augmented Reality (AR) technology to provide visitors with an interactive, convenient and easy-to-use experience. Visitors only need to use their smartphones or wear AR glasses to see virtual historical scenes in the Zhijiang Peace Culture Memorial Hall, such as the scene of the surrender ceremony and the scene of the battle. Through the display of mobile phone screens or glasses, tourists can see the superposition of virtual elements in the real environment, making history more concrete and sensible, and enhancing the fun of visiting.

Second, virtual reality (VR) technology can provide students and tourists with more immersive learning and experience. By wearing a VR headset, visitors can enter a completely virtual historical world, as if traveling through time. In the Zhijiang Peace Culture Memorial Hall, we can create realistic historical scenes, allowing visitors to feel the atmosphere and tension at that time. This immersive experience can stimulate stronger emotional resonance among visitors and enable them to understand the significance of historical events more deeply.

In addition, the application of mixed reality (MR) technology can also bring visitors a unique experience. Through devices such as AR glasses, virtual elements can interact with real scenes to create wonderful interactive effects. In the Memorial Hall of the Peace Culture of Zhijiang, MR technology can be used to display virtual historical figures, so that tourists can talk to them and understand their stories and emotions. This kind of interactivity can increase the sense of participation and curiosity of visitors, making the visit more interactive and interesting.

In the Zhijiang Peace Culture Memorial Hall, extended reality (XR) technology can provide an extremely attractive experience in a technical and targeted manner, bringing

visitors back to the historical moment of the victory of the Anti-Japanese War and deeply feeling the charm of red culture.

Application of Augmented Reality (AR) in Restoration of Virtual Historical Scenes: Augmented Reality (AR) is a technology that integrates virtual information with the real world. It captures images of the real world through a camera and superimposes virtual information on the images, enabling users to see virtual information in the real world.

In the Zhijiang Peace Culture Memorial Hall, we can use smart phones or AR glasses and other devices to watch the restoration of virtual historical scenes by scanning specific display items. For example, when visitors scan an exhibit of a surrender ceremony, AR technology will show a virtual surrender ceremony on their devices, including historical figures, ceremony process, etc. Such an application not only highlights the technicality, but also enables visitors to experience historical scenes immersively in a real environment, enhancing the sense of participation.

The application of virtual reality (VR) to interact with historical figures: Virtual reality (VR) is a three-dimensional space environment simulated by a computer. It enables users to immerse themselves in and interact with virtual worlds through devices such as head-mounted displays.

In the Zhijiang Peace Culture Memorial Hall, we can allow visitors to enter a completely virtual historical environment and interact with virtual historical figures by wearing VR headsets and other equipment. For example, tourists can have a dialogue with the military generals at that time to learn about the tactics of the war and the stories behind it. This virtual interaction highlights the technicality, while providing visitors with the opportunity to have direct contact with historical figures, making history more immersive.

Multiplayer and historical role-playing in mixed reality (MR): Mixed reality (MR) is a technology that merges the virtual world with the real world. It captures images of the real world through a camera, and adds virtual information and objects to the images, enabling users to see and interact with virtual objects in the real world.

In the Zhijiang Peace Culture Memorial Hall, we can see virtual historical figures in real scenes through AR glasses and other equipment, and participate in historical role-playing with other tourists. For example, tourists can play different roles such as anti-Japanese soldiers and local people, interact with other tourists, and jointly restore the situation of historical events. This combination of multiplayer linkage and role-playing highlights the technology and enhances the interactive experience and deep participation of visitors. Figure 1 below is a schematic diagram of the construction and processing process of the Metaverse of the Zhijiang Peace Culture Memorial Hall.

Support and real-time interaction of mobile edge computing technology: Mobile edge computing is a technology that distributes computing tasks to network edge devices (such as AR glasses, smartphones, etc.). It can reduce data transmission delay and ensure the smoothness of real-time interaction.

In the Zhijiang Peace Culture Memorial Hall, mobile edge computing technology plays an important role in the context of multi-person linkage. For example, in historical role-playing, tourists can interact with other tourists in real time, solve problems together, and experience a more realistic historical situation.

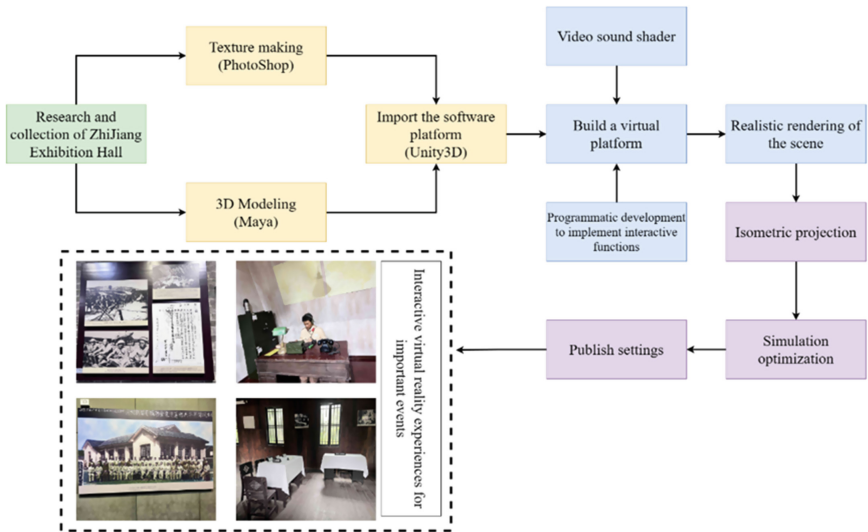


Fig. 1. Schematic Diagram of the Construction and Processing Process of the Metaverse of the Zhijiang Peace Culture Memorial Hall

To sum up, under the background of Zhijiang, a small place, low cost, and small flow of people, through the precise application of technologies such as augmented reality (AR), virtual reality (VR) and mixed reality (MR) in Zhijiang Peace Culture Memorial Hall, combined with the support of mobile edge computing technology, can bring visitors a more in-depth and interactive education on the history of revolution experience. This kind of targeted technical application can not only meet the expectations of visitors, but also bring new vitality and attraction to the Zhijiang Peace Culture Memorial Hall.

3 Metaverse Education Integration: Education of Revolutionary History by Multiplayer Linkage

Using extended reality (XR) technology, education on the history of revolution linked by multiple people can be deeply displayed in a highly targeted and technical way in the Zhijiang Peace Culture Memorial Hall, allowing visitors to have a deeper understanding of the history of the Anti-Japanese War and the spirit of red culture.

Therefore, it is an important topic to adapt to the development of the times and social needs to explore the talent training teaching system that integrates metaverse and teaching.

With the launch of the Chinese version of CC2020, the competency model has been understood and familiarized by more and more Chinese computer education experts and university teachers. Problem-solving skills are gaining widespread attention. Taking the current top-notch plan launched by the Ministry of Education as an example, the cultivation of students' abilities is very important in the process of cultivating top-notch talents. Similarly, the cultivation of basic abilities for ordinary students in the process of cultivating top-notch talents is similar and indispensable. And now, with the rapid

development of society and economy, it is particularly important whether students have the comprehensive competence of “knowledge, skills, and conduct”. Based on this, we designed a talent training teaching system that integrates Metaverse and teaching [12].

- (1) In terms of knowledge dimension requirements, for top students in the computer field, the knowledge they learn is often multidisciplinary, so it is very important to have a multidisciplinary knowledge structure. For ordinary students in the computer field, the knowledge they learn is often professional, so it is very important to have a solid professional basic knowledge. At the same time, metaverse teaching under the extended reality technology can also provide students with a diversified knowledge acquisition platform, allowing students to get in touch with more professional-related knowledge fields in the virtual world, such as computer networks, software engineering, artificial intelligence, etc. Expand students’ knowledge horizons and professionalism.
- (2) In terms of skill dimension requirements, top students in the computer field are expected to reach Bloom level 5 or 6 in cognitive skills, that is, they can form their own judgments on knowledge content, have their own unique viewpoints, and put forward new ideas solution. The cognitive skill level of ordinary students in the computer field is expected to reach Bloom level 3 or 4, that is, to be able to use knowledge content to solve problems, and to have certain analytical and application skills.

In order to improve students’ ability to solve complex engineering problems, metaverse teaching under extended reality technology can be used to allow students to experience different scenarios and tasks in the virtual world, and cultivate students’ innovative thinking and practical ability through immersive interaction and collaboration. Students can simulate the construction and maintenance of hardware in the principle of computer composition in the metaverse, for example, using tools and materials in the metaverse to realize basic components such as memory, registers, and arithmetic units, or to build different logic circuits and instruction systems. Students can also use the programming language and environment in the Metaverse to implement various data structures and algorithms, and deepen their understanding through concrete demonstrations.

- (3) From the perspective of the moral dimension requirements, any deficiencies in any of the 11 moral elements of top-notch students may form obstacles to his knowledge learning and skill improvement, resulting in unsuccessful cultivation of top-notch students. In this sense, the cultivation of top-notch students has higher requirements for the shaping of competence than other students. To sum up, top-notch students in the field of computer science need to have a broad multidisciplinary knowledge structure, a strong sense of innovation and ability, and a high comprehensive quality of conduct.

In terms of moral dimension requirements, ordinary students should also have a certain level in the 11 moral elements, but they don’t have to be perfect like top students. In this sense, the cultivation of ordinary students has relatively lower requirements for the shaping of competencies than top-notch students. However, metaverse teaching under the extended reality technology can also provide students with an opportunity to cultivate their moral quality, so that students can also abide by

rules and morals in the virtual world, and cultivate students' sense of responsibility, cooperation spirit and self-discipline ability.

For example, students can participate in community building and public welfare activities in the Metaverse, or communicate and interact with people from different cultural backgrounds in the Metaverse. To sum up, ordinary students in the computer field need to have a deep knowledge structure in the major, better problem-solving ability, and higher basic moral qualities. The brief design of the talent training teaching system of "Metaverse and Education Integration" is shown in Fig. 2 below.

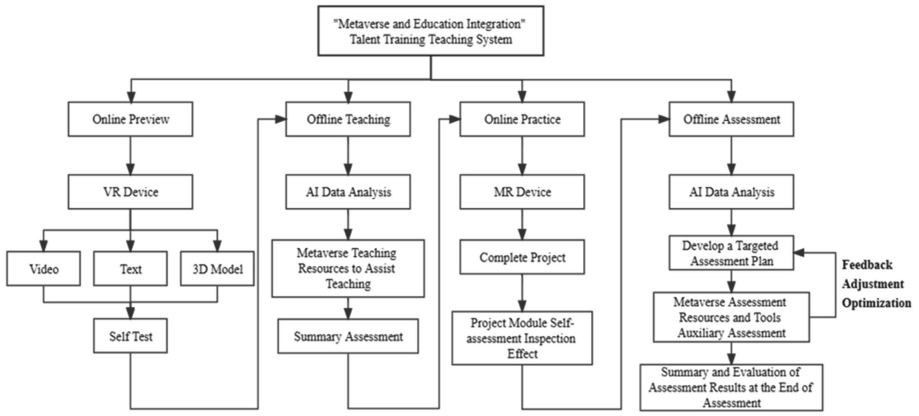


Fig. 2. Brief Design of the Teaching System Process of "Metaverse and Education Integration" Talent Training

The competency model has played an active role not only in the cultivation of top talents, but also in other computer professional fields such as high-performance computing [13]. China's computer education is developing rapidly, and at the same time, the internationalization of education is gradually showing a global trend. All countries are actively promoting the internationalization of higher education in order to cultivate more international talents [14]. The international competitiveness of China's computer talents is also constantly inclusive. Finding the most suitable computer science education training program for the audience we serve is our mission to continue our career, and it requires the joint efforts of computer science educators.

Taking the education on the history of revolution in the Zhijiang Peace Culture Memorial Hall as an example, the main teaching content is decomposed based on the Bloom model [15]. Traditional classroom teaching has problems such as too abstract concepts, repetitive and rigid content, and single evaluation methods [16]. However, in this era of vigorous development of artificial intelligence such as data sharing, digital twins, and ChatGPT, classroom teaching should reflect individualization and diversification as much as possible., discretization and other features, here, we divide the Bloom model into four layers, the first layer is memory and understanding; the second layer is application and analysis; the third layer is synthesis and evaluation; the fourth layer is design and innovation. Combined with the characteristics of extended reality XR

technology, different metaverse teaching interaction methods are designed for different groups of people in the education on the history of revolution in Zhijiang Peace Culture Memorial Hall. This paper designs VR and MR respectively for the content of education on the history of revolution and the metaverse under the characteristics of extended reality (XR) technology. Different application scenarios of AR and AR, and explore the differences between the three in course feedback, interaction methods, display effects, and usage scenarios [17]. The specific frame design is shown in Fig. 3.

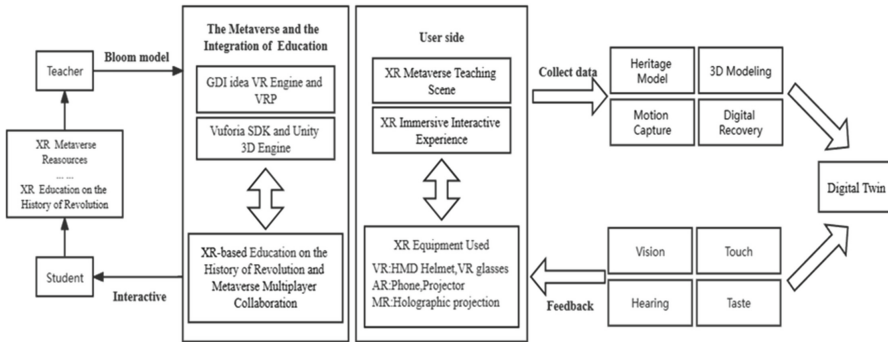


Fig. 3. The Design and Operation Framework of the “Metaverse and Education” Talent Training Teaching System.

(1) Education on the history of revolution based on VR and MR interaction

With XR technology as the core, the Zhijiang Peace Culture Memorial Hall Metaverse is established, and the “extended reality-oriented” hybrid teaching mode is adopted to integrate the Bloom model with the hybrid teaching structure under the BOPPS mode. Students or various tourists enter through XR equipment. Metaverse conducts self-directed learning before class, and demonstrates abstract concepts through extended reality (XR) technology design. For example, based on the 3D engine Unity3D, the three-dimensional simulation is used to display abstract concepts. By adding Manheng ideaVR engine and VRP, the three-dimensional data of the computer composition structure can be added to the immersive VR and MR interactive systems, breaking the inherent abstract concepts and enabling students to immerse themselves in learning. A level of memorization and understanding.

In addition, in virtual reality, tourists can play the roles of different historical figures and participate in education on the history of revolution activities with other tourists. Every historical figure has its own stories and emotions, and tourists will share these stories in the interaction, deeply feeling the emotional connotation of red culture. Through role-playing interactions with other tourists, tourists can gain a deeper understanding of the background and values of different historical roles and experience the diversity of red culture.

Through virtual reality technology, visitors can also participate in virtual historical lectures and discussions. Different virtual historical figures will share their experiences and beliefs to visitors as speakers, and then visitors can ask real-time

interactive questions about the speech content. This real-time interaction strengthens tourists' awareness of the core value of red culture, and at the same time technically creates an experience of interacting with historical figures.

(2) Educational applications based on MR equipment and AR scenarios

This paper designs an immersive experience-based XR technology-based meta-universe education on the history of revolution platform, aiming to improve the teaching quality and effect of computer composition principles courses. The platform uses digital twin technology to build a virtual model of the Zhijiang Peace Culture Memorial Hall, allowing students or tourists to interact and practice online in an immersive environment through mixed reality (MR) equipment. The platform also uses 3D motion capture technology to collect and analyze students' behavior and expression data, providing teachers (trainers) with visual and quantitative teaching evaluation and feedback tools.

In the metaverse, through AR glasses, visitors are divided into different groups, each representing a different army. They will participate in the anti-Japanese military battle simulation in virtual reality and experience the battle scene at that time. With the help of the real-time interaction function of AR glasses, different teams can cooperate to formulate strategies, pass orders, and experience the tension of the battle in the virtual environment. This highly technical and highly targeted multiplayer linkage experience allows tourists to better appreciate the tenacity and heroism of red culture.

Tourists participate in a series of story puzzle games based on historical events in groups, and obtain clues and hints through AR glasses. Different teams need to cooperate to solve puzzles and gradually reveal the truth of historical events. In the process of solving puzzles, visitors will deeply explore the background, causes and effects of historical events, as well as the core values of red culture. This highly targeted and highly technical multi-person linkage experience has improved tourists' awareness and understanding of historical events and red culture.

To sum up, under the background of Zhijiang, a small place, low cost, and small flow of people, education on the history of revolution through multi-person linkage, combined with the precise application of extended reality (XR) technology, and the support of mobile edge computing technology in Zhijiang Peace Culture Memorial Hall It can create a highly personalized, highly technical, high sense of participation, rich learning experience and a deep understanding of the history of the Anti-Japanese War and the spirit of red culture for tourists. This targeted application of technology will enable visitors to gain a deeper understanding of the history of the Anti-Japanese War and red culture, and enhance their sense of participation and learning experience. Metaverse, as an emerging technological and cultural phenomenon, has had a profound impact on the field of education and change. Metaverse provides an immersive, realistic and creative learning environment for education, allowing learners to experience different scenes and roles across time and space, acquire more knowledge and skills, and develop more comprehensive literacy and abilities.

4 Technology and Equipment Selection

In the process of applying extended reality (XR) technology to the Zhijiang Peace Culture Memorial, the choice of technology and equipment is crucial. We need to comprehensively consider cost, user experience and technical feasibility to ensure that the display effect can meet the expectations of visitors to the greatest extent.

First, we can leverage existing devices such as smartphones and tablets as tools for augmented reality (AR). By developing an applicable APP, tourists can use their own devices to watch virtual historical scenes and achieve a relatively low-cost interactive experience. This method is relatively convenient for tourists and does not require additional equipment investment.

Second, head-mounted virtual reality (VR) devices can provide a more immersive experience, especially for student groups. Set up a VR experience area in the Zhijiang Peace Culture Memorial Hall, so that students can wear headsets and enter virtual historical scenes. In order to reduce costs, we can choose to use cheap mobile VR devices, such as smartphone-based VR headsets, to provide realistic historical restoration.

In addition, for augmented reality (AR) glasses, a more realistic and virtual fusion experience can be provided. AR glasses superimpose virtual elements on the real environment, allowing users to see virtual historical scenes in reality. While the cost of AR glasses may be higher, they can provide a more immersive feeling, enhancing the visitor's sense of interaction with virtual elements.

Mobile edge computing technology also plays an important role in this process. Mobile edge computing can transfer computing tasks from central servers to edge devices, reducing transmission delays and improving user experience. This is especially important for XR applications that require real-time interaction. For example, in a multi-person linkage scenario, it can ensure smoother interaction between visitors.

To sum up, the choice of technology and equipment should fully consider cost, user experience and technical feasibility. By making full use of devices such as smartphones, tablets, VR headsets, and AR glasses, combined with mobile edge computing technology, we can achieve a high-quality XR experience in the Zhijiang Peace Culture Memorial Hall, bringing visitors a more in-depth and immersive history feel.

This study analyzed interview data from more than 1,000 registered students who completed the entire survey. The content of the survey includes the following aspects: What do you think of XR with multiplayer linkage, What is your opinion on the importance of inheriting the education on the history of revolution, Do you think the XR experience of multi-person linkage can increase the fun and interactivity of the visit, etc. As shown in Fig. 4.

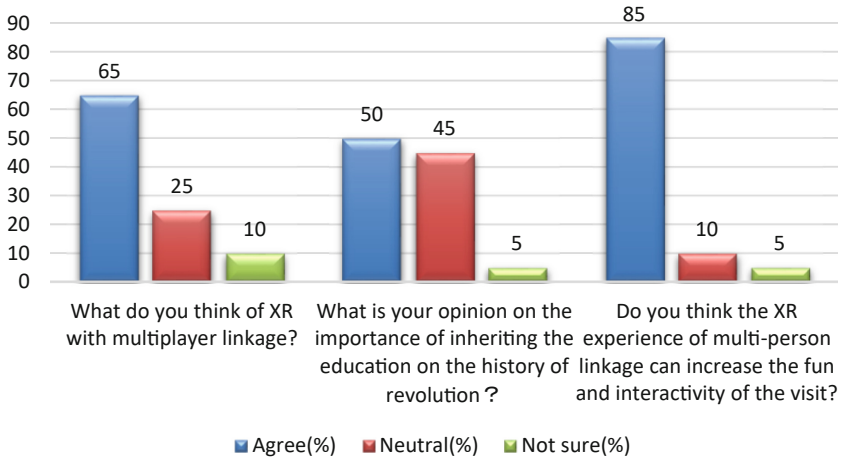


Fig. 4. Statistical analysis chart of user will survey data.

5 Conclusion

This paper aims to explore how to use extended reality (XR) technology to realize the mobile edge computing experience of multi-person linkage in the Zhijiang Peace Culture Memorial Hall in a small place, low cost, and small flow of people. Through the detailed discussion on the science popularization of XR technology, its application in the Memorial Hall of the Peace Culture of Zhijiang, multi-person education on the history of revolution, and the selection of technology and equipment, we have drawn the following conclusions:

In the context of the current rapid development of information technology, extended reality (XR) technology has injected new vitality into the inheritance and education of cultural heritage. Diversified XR technologies such as AR, VR, and MR have created a new way of perception and interaction for us, restoring historical scenes and enriching the visiting experience.

As a small place, the Zhijiang Peace Culture Memorial Hall can restore the historical scenes more vividly by using different forms of XR technology to meet the visiting needs of different groups of people. AR technology can combine virtual elements with the real world to create an intuitive virtual experience for tourists; VR technology can bring users into the virtual world to deeply experience historical situations; MR technology combines virtual and real elements to enhance interaction experience.

The education on the history of revolution mode of multi-person linkage creates a metaverse environment through XR technology, enabling tourists to participate in the restoration of history together in the virtual space, which strengthens the sense of interaction and participation. For different groups of people, personalized XR content design enables students to participate deeply, and tourists can interact with virtual characters, which enhances the attractiveness and depth of history education.

In terms of technology and equipment selection, we can choose smartphones, VR headsets, AR glasses and other equipment based on cost and user experience, combined with mobile edge computing technology, to bring high-quality XR experience to visitors. Mobile edge computing (MEC) is a new distributed computing method based on mobile communication networks. It provides an IT service environment and cloud computing capabilities by deploying general-purpose servers close to the network access side. MEC aims to further reduce latency, improve network operation efficiency, improve service distribution and transmission capabilities, and optimize and improve end-user experience.

To sum up, through this research, we can see that the combination of mobile edge computing and extended reality (XR) technology in the Zhijiang Peace Culture Memorial Hall creates a richer, deeper, and more interactive historical experience in the context of a small place. In the future, with the continuous advancement of technology, we are confident that we can further improve the display effect and user experience, and inject more vitality and charm into the inheritance of red culture.

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