



Historical and Cultural Exhibition of Shaanxi Museum Based on Virtual Reality Technology

Zhongjie Shen*

Xijing University, Shanxi, China

*shenzhongjie_vip@sina.com

Abstract. Today, with the development of new technology, the way we use museums to display history and culture has changed. It has gradually shifted from offline to online. At present, the online exhibition of the museum has integrated virtual reality technology, which is not only innovative in technology, but also innovative in perception. The way of telling stories is more diversified, and the use of virtual reality technology has reconstructed the various forms of cultural display in the museum. Through the analysis of visual display data, perceptual data analysis, and finally form perceptual validity data. Finally, the best way to obtain the museum's historical and cultural display in the virtual reality environment is obtained.

Keywords: Shaanxi Museum; historical and cultural dissemination; VR technology

1 Introduction

The use of VR technology to display online museums has just started. There are many museums in Shaanxi, and traditional online exhibitions can no longer meet the needs of the audience. In the new era, Shaanxi Museum should use new technologies to spread history and culture, so that more people can immerse themselves in the atmosphere of history, feel the development of history and the value of cultural relics, find new entry points for communication, and continuously expand and deepen the communication of museum culture. Through such practices, expand the cultural communication scope of Shaanxi Provincial Museum and enhance the cultural communication influence of Shaanxi Provincial Museum.

2 Problems and exploration

2.1 An overview of the spread of VR culture in Shaanxi Museums

There are 330 museums in Shaanxi Province. The distribution of Shaanxi museums is shown in Figure 1. The number ranks fourth in the country. It is responsible for the dissemination of Shaanxi history and culture. Offline museums use VR history and

cultural communication technology is advanced and the visual effect is good, but the content form still needs to be improved. In addition, with the development of 5G technology, the research on VR history and cultural communication in online museums will be more and more in-depth. At present, offline museums use VR for historical and cultural communication as a stand-alone form, which is less restricted, with rich content and smooth interactive effects. However, the online museum VR history and culture communication forms are mostly displayed in the form of panoramic pictures, and the hot button navigation is used to jump to other scenes for display. Interactivity and audience experience are less effective [1]. The display of the entire culture and cultural scene is incomplete, and the storytelling and historical events have poor effect of occurrence and restoration. At present, strengthening the form, content and realization of VR historical and cultural communication in online museums is the key to the development of online museums.



Fig. 1. Distribution map of Museums

2.2 The Dilemma of Cultural Communication of Shaanxi Museums in the VR Environment

Today, with the rapid development of digital technology, the offline communication of VR tends to be mature in terms of effect and technology, but the situation of VR history and cultural communication in online museums is more difficult (as shown in Figure 2). First of all, in the technical link, the technical methods used in the development of the museum VR system, if all the scenes in the process of online communication are displayed by 3D models, the communication will be stuck and the user experience will be poor. If the development is all in the form of panoramas, the visual effects and interaction will be poor, and the embedding of videos will also increase the load of the system.

Secondly, if the scene is not real enough, there will be deviations in the restoration of historical culture in the communication of historical culture, and there will also be deviations in historical understanding in the process of users accepting and learning culture. The audience will be in a passive position, and will also be in a passive position [2]. The development and innovation of VR historical and cultural dissemination brings obstacles. Third, online communication requires guidance and technical train-

ing for some elderly audiences to slowly accept it. In the communication of VR history and culture, it is necessary to find a breakthrough point to give full play to the advantages of online museums, and form a combination of online and offline methods to communicate history and culture. It is necessary to deeply study the new ideas and methods of VR cultural communication in online museums, and at the same time provide ideas to solve the new media communication dilemma faced by online.

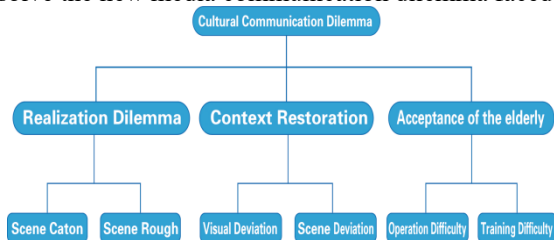


Fig. 2. The dilemma of cultural communication

2.3 Influencing factors of cultural dissemination in Shaanxi museums under the VR background

The influencing factors in the process of museum VR culture dissemination include audience factor, museum scene exhibition display factor, and museum VR culture dissemination path factor. By studying the influencing factors of museum culture dissemination, the influencing factors are gradually removed or weakened, so as to improve the use of VR culture dissemination by museums. Effect.

1) Audience factors in the influence of VR cultural communication in museums.

First of all, considering gender, age, education level, occupation and other aspects, after research and analysis, people under 20 years old and over 60 years old have certain barriers to mastering new technologies. Through the analysis of different age groups, it is found that the VR cultural dissemination crowd is mainly between 20-60 years old (as shown in Figure 3). the acceptance of new technology and education and occupation are closely related. In the display design process of the whole system, the operation ability and acceptance ability of the audience should be considered to minimize the operation steps and provide technical assistance to the audience with weak acceptance ability. Some groups will refuse to use new technologies. In the system design, the guidance operation before browsing can be added, and at the same time, the fun and interactivity of scene browsing can be increased, and the interactive mode of the game and the browsing operation of the system can be combined. The research on the user's perception and acceptance level found that when users contact the virtual reality display system, the perceived ease of use is considered, and when the system interaction is easy to accept and quickly master, they can move to the next level of operation, the usefulness of the second-level perception[3].in the virtual scene can have more harvest, through the scene immersion can perceive the historical and cultural context, the historical relics left in the development of history. You can also get the cultural derivative products you want through the immersion of the scene. In the

immersion of the virtual scene of the museum, you can connect the cultural products with the payment to complete the sales transformation of the products. In the scene, you can add some digital products to the collection of the mobile phone. Folder, let virtual products and real products combine to form a new mode of cultural communication and product promotion. In the scene immersion, it can also be converted from the second level to the third level. The minimum cost and willingness of perception. In the whole scene perception, the items in the scene should be displayed in detail, so that they can directly touch people's hearts and experience the audience. When the degree reaches a certain height, the audience can voluntarily complete the conversion of the product.

Influence of elements on scene composition

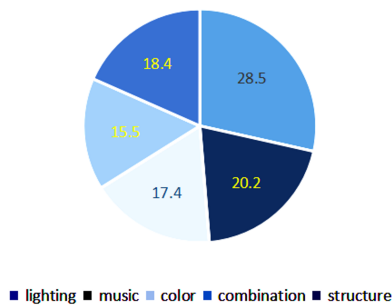


Fig. 3. Distribution of audiences

2) Factors to be considered in the exhibition display factors of the museum scene.

(i) Highly restore the atmosphere of historical scenes.

At present, most museums have virtual scene display projects, but few of them are highly restored and refined. A high degree of scene restoration is crucial to the attraction of audiences and the effective dissemination of culture, and it is also a key part of the entire project to meet expectations. The design of the entire scene should have a sense of substitution, a sense of progression, and the effect of attracting layers. While depicting the details of the entire scene, more consideration should be given to the historical and cultural propaganda attributes of the people or cultural relics in the scene. Through the people or cultural relics, the culture and spiritual outlook at that time can be seen, and the historical and cultural connotations must be deeply excavated in the character creation [4]. In this way, the purpose of maximizing publicity can be achieved. In the construction of the scene, the overall color matching and lighting effects should also be considered. The use of color can cause changes in the audience's emotions in the narrative of the story, and the development trend of the entire story changes. It is very important to create a lighting atmosphere in the entire scene. It is necessary to fully consider that the time and space changes of the scene will affect the lighting changes (as shown in Figure 4). Different scene spaces and motion routes will match different lighting effects. The atmosphere is more accurately ren-

dered through the combination of cold and warm, light and shade. In the entire virtual scene, different lighting applications express different cultural communication content. The application of lighting can focus more on the attention of the audience, enlarge the display of the scene, form a strong visual impact, and highlight the core content of the scene.

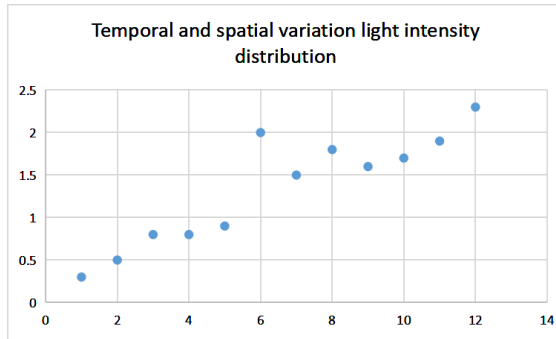


Fig. 4. Change light intensity dist

(ii) Ingenious combination of cultural relics to form a narrative.

The display of cultural relics in the scene pays attention to the correlation of time and space, and at the same time, it is necessary to break the constraints of time and space, connect cultural relics in different time periods through stories, comprehensively highlight the development characteristics of a certain period, and enhance the readability of cultural relics. There are many types of cultural relics displayed in the virtual space of the museum. How to enable the audience to form a visual communication chain through the combination of cultural relics or space, and at the same time combine the atmosphere and narrative of the entire virtual space. Promote narrative through the atmosphere, and resonate with the audience through the narrative. When the narrative can really touch people's hearts, the virtual environment you are in is very important. The application of lighting in the environment, the application of background music, space color matching, the combination of space cultural relics and the construction of space structure should be considered (as shown in Figure 5). The ultimate goal of the virtual reality environment allows you to immerse yourself in it and feel the emotional touch that the environment brings to you, gradually affecting people's hearts and virtual reality. The formation of the real environment must be the unity of the mental domain and the visual domain, so that the characteristics of the virtual reality environment can be brought into play.

VR Museum Culture Communication audience distribution

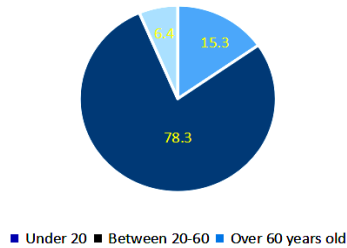


Fig. 5. The influence of elements on the scene composition

(iii) Path of VR cultural dissemination in museums.

Exploring the rapid development of the Internet Online communication is called the main position and the main path. The Internet has become an indispensable environment in people's life. Online learning and socializing are not new content. Embedding the virtual environment into the Internet has become a new The form of communication is a new form of communication after short videos. In the use of virtual reality for cultural and cultural communication in museums, it is necessary to seize new forms and opportunities, and organically combine the display of cultural relics in the virtual reality environment of museums with Internet technology to form a powerful form of communication, based on different communication perspectives. Innovate the form to promote the efficient dissemination of museum history and culture. Online dissemination through virtual reality is the macro path. In the process of historical and cultural dissemination, more emphasis is placed on the content of the micro path. The visual communication path, the mental communication path, and the cognitive acceptance communication path belong to the micro path. content. The visual communication path completes the visual impact and influence of the museum exhibits, from visual cognition to influence and then to people's hearts. When the narrative expression of the scene is obtained in the heart, the conversion of the obtained information is related to the cognition of each audience. The goal of virtual reality dissemination in museums is the degree of cognitive acceptance and the useful information of cognitive acceptance.

2.4 Innovations in Museum VR History and Culture Communication

1) Innovation based on the perspective of audience communication.

We can use the Internet platform to spread the history and culture of Museum virtual reality, convey the historical and cultural information of museum collections to the audience, and improve the effect of Museum History and culture communication. In order to comprehensively improve the museum's cultural dissemination and collection display level, it should be closely integrated with the Internet for dissemination. Adding a data analysis program to the virtual reality system can quickly analyze the

age, hobbies, origin. Cultural Communication provides an improved sample reference. In the new era, museums use virtual reality to spread history and culture. They should provide better cultural communication services for young people, strengthen their national identity and cultural self-confidence, have a positive impact on young people's hearts, and improve their cultural accomplishment. Based on the characteristics of young people's love for new technologies and their ability to accept quickly, museums can add animation game content in the dissemination of VR history and culture to attract young people to immerse themselves in it and subtly feel the historical knowledge and spiritual connotations contained in cultural relics [5]. At the same time, the museum has also become an educational platform for schools, which can carry out online tour activities, provide online virtual tour space for young people in the network environment, break the limitations of time, space and venue, and effectively play the role of museums in cultural communication.

2)Innovation based on the perspective of museum cultural dissemination.

In the communication of museum history and culture, virtual reality technology can be combined with other technologies, such as artificial intelligence, data processing technology, Internet of Things technology, to provide the audience with a virtual display space for cultural relics, so that the audience can be immersed in the scene of cultural relics display, to gain an in-depth understanding of history and culture. Audiences in different regions can interact in the virtual environment, discuss relevant knowledge of cultural relics in the environment, and experience various virtual services of the museum. Traditional museum cultural dissemination is bound by time and space, and it is impossible for the audience to watch it anytime, anywhere. In the case of the highly developed network, this shackle has been broken, and the form of cultural communication has been effectively innovated. There are some special collections in the museum, which cannot be met with the audience due to storage conditions or damage. In order to meet the viewing needs of the audience, a new display mode can be formed based on the combination of Internet information technology and virtual reality technology. At the same time, the use of online exhibitions can also quickly solve the practical problem of insufficient museum space, which will help museums reduce operating costs, improve communication effects, and improve the overall cultural communication level of museums.

3)Innovation based on the perspective of museum cultural and creative communication.

The combination of museum history and culture dissemination and cultural and creative design can innovate from the perspective of cultural and creative design and dissemination, thereby promoting the dissemination of museum history and culture. Through the analysis of the museum's culture and unique characteristics in the early stage, the representative exhibits are determined, the historical and cultural connotation and its own value are deeply excavated, combined with modern cultural and creative products, and the cultural and creative products are used as the communication carrier to complete the museum's history and culture. target of dissemination. For

example, the custom lipstick of the Palace Museum is to use the cultural heritage of the Palace Museum as the creative source, creatively design modern commodities, endow modern commodities with cultural value, and promote cultural dissemination. Excellent cultural and creative products endow the cultural essence of the museum and can become the cultural spokesperson of the museum. When the audience is watching, they will deepen their absorption of history and culture while understanding the history and culture. Cultural and creative products have played a positive role, becoming the link between the audience and the museum, making the museum's history and culture spread wider and have a longer impact. In the era of rapid development of the Internet, more people have access to museum cultural and creative products. Museum cultural and creative products can be quickly liked and purchased by audiences. Cultural and creative products promote cultural communication between audiences and museums, and provide museum cultural dissemination. more possibilities. With the passage of time, the number of cultural and creative products developed by Shaanxi Museum is increasing (as shown in Table 1). It will become a new breakthrough in the cultural dissemination of museums.

Table 1. Number and types of cultural and creative works in Shaanxi Museum

year	Cultural and creative quantity	Cultural and creative types	Number of Museums
2018	420	30	260
2019	480	45	287
2020	540	56	296
2021	600	82	310

4) Perception research experiment.

Perceived usefulness through the analysis of test results (Table 2). ($\lambda=0.228$, $t=4.693$), perceived ease of use ($\lambda=0.238$, $t=3.389$), perceived immersion ($\lambda=0.556$, $t=7.515$) has a significant positive impact on tourists' behavior intention, that is, H1, H2 and H7 are established, and perceived ease of use has a significant positive impact on perceived usefulness, that is, H3 is established, perceived immersion ($\lambda=0.182$, $t=3.534$) has a significant positive impact on perceived entertainment, that is, H8 is established. But perceived Entertainment ($\lambda=0.006$, $t=0.094$) has no significant positive impact on tourists' behavior intention, and the perceived cost ($\lambda=-0.086$, $t=-1.128$) has no significant negative impact on tourists' behavior intention, and perceived cost has no significant negative impact on perceived usefulness, that is, H4, H5 and H6 are not tenable.

Table 2. experimental results

Hypothesis	Estimate	S.E.	C.R.
H1	0.228	0.049	4.693
H2	0.238	0.07	3.389
H3	0.437	0.106	4.106

H4	0.006	0.065	0.094
H5	-0.086	0.076	-1.128
H6	-0.083	0.049	-1.713
H7	0.556	0.074	7.515
H8	0.182	0.052	3.534

3 Conclusion

The advantages of museums using VR for historical and cultural dissemination are obvious. The reason why there is no large-scale application at present is that there is a dilemma in application. Through a series of innovations, the dilemma in dissemination can be solved, and the cultural dissemination of museums can develop more rapidly. As a traditional form of cultural exchange, virtual reality pays more attention to tolerance and sustainability. In the process of cultural communication, culture and history can be more vividly displayed. The display form of virtual reality has obvious advantages, and the depth and value of application can be expected in the future.

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