

# Innovation and Implementation of Museum Interactive Three-dimensional Learning Model Based on WeChat Platform

Bing zhang<sup>1</sup>, Shiqiang pan<sup>2,\*</sup>

<sup>1</sup>Qilu Ceramic Glass Science and Art Museum, Qilu University of Technology, Jinan, 250300, China

<sup>2</sup>Art design college, Qilu University of Technology, Jinan, 250300, China

\* The Corresponding author

**Keywords:** 3D innovation; WeChat platform; deep learning; virtual space

**Abstract.** Based on the WeChat platform, a new model of three-dimensional and interactive visits to museums was established. By proportionally constructing the three-dimensional virtual space of the exhibits in the museum, visitors can enjoy the exhibits from any direction, greatly expanding the knowledge and information involved, breaking Limitations of display space. This new model using the equipment to scan, research, and organize the exhibits' material and process information, and provide them to visitors to appreciate and learn. The development of the museum's visit mode is interactive and diversified, which fully mobilizes the subjective initiative of visitors and realizes the deep learning experience of the visit.

## 1. Introduction

In recent years, people's demand for spiritual culture has been increasing day by day. With the colleges and universities attaching importance to aesthetic education for college students, the museum, as a learning platform for college students, has profound experience in enriching college students' spiritual and cultural life, enhancing college aesthetic education, and strengthening college students' cultural self-confidence influences. Frank Oppenheimer, a famous American scientist, educator and psychologist, put forward in 1969: "The value of the objects exhibited in museums is not reflected in their own materials and structures, but depends on how audiences observe, discover, and feel it. [1] At the end of the twentieth century, the United States took the lead to formally establish the museum's Internet system. [2] With the popularization of smartphones, France has launched two mobile phone apps. Exhibits are displayed on mobile devices. [3] Both the American Museum of Natural History and the National Central Museum of Korea have used two-dimensional codes in the museum to enable users to scan the two-dimensional code to obtain detailed information of the collection when visiting. [4]

Beginning in 1998, the national and provincial museums such as the National Museum, the Palace Museum, and the Capital Museum of China have successively established digital information systems for cultural relics in their collections, forming a complete digital database. [5] The above shows that future museums are Moving towards the Internet, through the proportional construction of the three-dimensional virtual space of the exhibits in the museum, based on the WeChat platform The establishment of a new model of interactive learning in museums for three-dimensional visits will allow visitors to break the restrictions of the exhibition space and make the mode of museum visits diversified, which is also the correct direction to follow the trend of the times.

## 2. Key Technologies

### 2.1. System framework

The 3D design innovation visit of the museum exhibits relies on the WeChat platform to sort out the process value and aesthetic value of the exhibits through modern 3D drawing and video production software, and remodel and innovate. It is mainly divided into two aspects: First, the relevant information of the exhibits is imported into the 3D modeling software (Rhino). According

to the relevant information of the exhibits, a three-dimensional stereogram of the exhibits is produced. An analysis of the process characteristics of the exhibits leads to the intrinsic value of the exhibits. On the other hand, through the arrangement and collection of the exhibit information, it excavates its aesthetic value and artistic value, and through the comparison of eastern and western aesthetics, it can deepen the learning of exhibits. The overall system flow chart is shown in Figure 1.

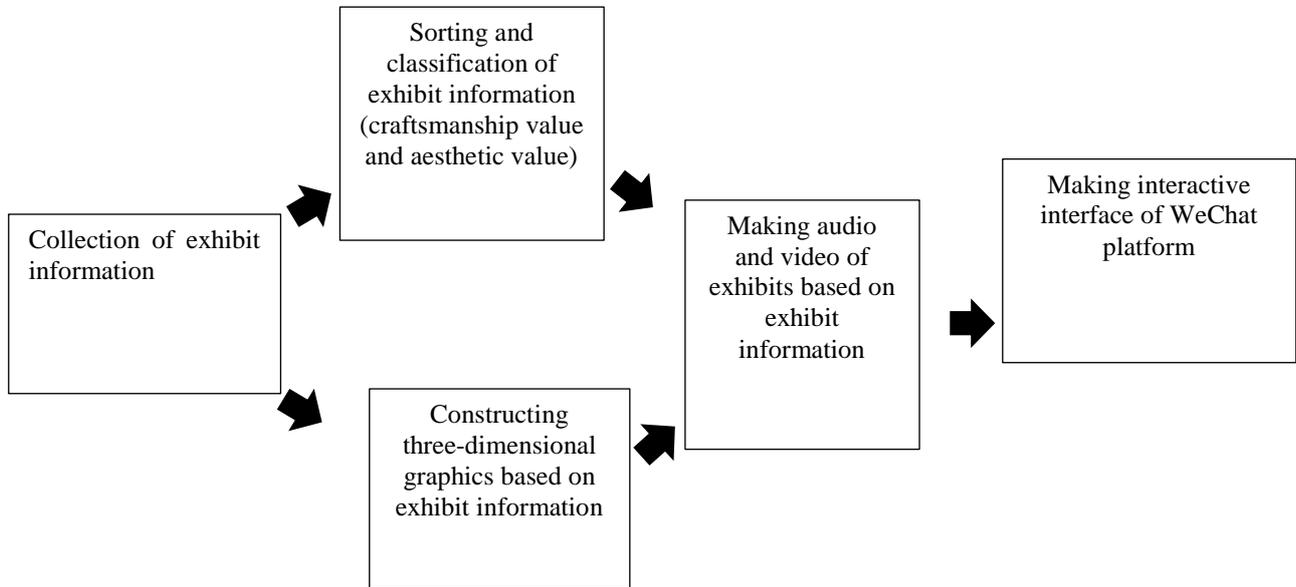


Figure 1. Overall system flowchart

This system is based on the reading and identification of QR code information on the WeChat platform, and based on the working principle of the information transmission and response of the exhibits, the overall design and architecture are shown in Figure 2. The QR code is scanned to obtain the access information of the exhibits. The mobile client sends access information to the system service desk. The help desk retrieves the relevant information of the exhibits from the database according to the relevant information of the QR code and sends it to the client. Records are sent to the background. Statistics of related visit information are collected in the background. The background administrator organizes the visit information and feedback information of the exhibits.

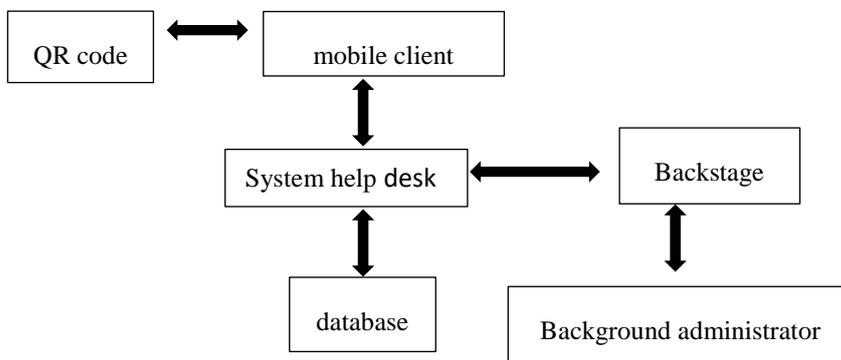


Figure 2. Overall system framework

## 2.2. Collection and arrangement of exhibit information

The collection of museum exhibit information is a key component of 3D effect production of exhibits. The collected exhibit information is divided into two categories: process information and cultural information.

The exhibits in the museum are valuables, so it is necessary to use AR technology to collect the three-dimensional information of the exhibits in the museum. At the same time, the process

information of the exhibits in the hall is collected and arranged, and the process value of the exhibits is analyzed and evaluated. Then, inspect, collect and organize the cultural information of the exhibits. The cultural value of the exhibits is extremely important for visitors. Therefore, the cultural value of the exhibits needs to be fully explored. It is mainly organized from the background, the regional characteristics, the color, composition, and the significance of the exhibits.

### 2.3. 3D productions of exhibits

By collecting the process information of the exhibits and using Rhino software to reshape the exhibits 1:1, taking the Mei bottle as an example, as shown in Figure 3, through a three-dimensional perspective, you can observe the process information of the exhibits in all directions. When visitors visit the museum, they can compare the three-dimensional dynamics of the exhibits with the actual objects, so that the visitors can feel the exhibits and the visual context of the museum in a strong cultural atmosphere, and at the same time enhance the appeal of the exhibits to the audience.

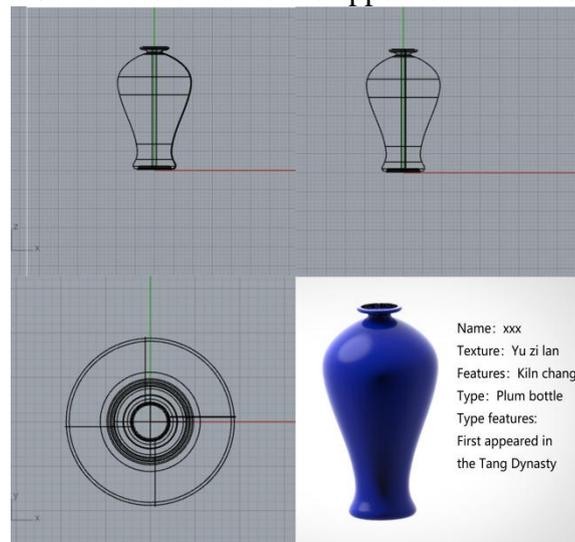


Figure 3. 3D rendering of the caviar blue plum bottle

### 2.4. WeChat platform display of exhibit information

The two-dimensional code can store picture information, and can quickly jump to the designated link page by scanning the two-dimensional code, and can realize the playback of multimedia information. Use X-ray fluorescence spectrometer, X-ray diffractometer, scanning electron microscope and other instruments to scan and arrange the materials and process information of the exhibits and provide them to professionals for viewing, such as measuring, analyzing, and obtaining The results are shown in Table 1, Table 2, and Table 3.

Table 1. Physical properties of blue caviar and glaze

Body			Glaze	
Apparent porosity/%	Bulk Density/(g/cm <sup>3</sup> )	Water absorption/%	Melting temperature coefficient/K	Theoretical firing temperature/°C
11.34	2.74	3.72	0.154	1385

Table 2. Chemical element composition of Yuze blue porcelain/wt%

category	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	CaO
body	0.26	1.08	21.32	71.12	2.14	3.39	0.37
glaze	0.39	0.92	14.13	67.53	1.23	4.63	12.31

Table 3. Glaze color and design characteristics of caviar plum bottle

Glaze characteristics	Design Features
<p>Yuze glaze is a new type of glaze with spherical texture successfully developed by Shandong Siyuan based on the research of ancient peacock blue glaze and peacock green glaze. It breaks through the past. The glaze is polygonal cracking, and it is creatively developed into a spherical opening that is closer to the caviar. A thick three-dimensional spherical caviar pattern is evenly densely distributed in the thick and shiny glaze layer. The texture is delicate and uniform, like the sapphire crystals, such as the depth of the blue sea, beautiful.</p>	<p>The Mei bottle is traditional famous porcelain. The Mei bottle is a bottle with a small mouth, short neck, rich shoulders, thin bottom, and round feet. It is named after a small mouth that can only be inserted into plum branches. Due to its slender body, it was called a "jingjing" in Song Dynasty. It was used as a container for wine. Its shape was pretty and pretty. The combination of caviar blue plum bottle with special technology.</p>

Through direct observation and in-depth understanding and learning of exhibits, visitors can directly and timely obtain effective information about exhibits, so as to gain a deep understanding of their favorite exhibits. During the entire visit, visitors grasp the initiative of the entire visit, deepen the depth and extension of the visit, so as to learn the cultural information, process information and design information behind the exhibits, and achieve self-help visits, active understanding and in-depth The effect of learning can better learn traditional cultural knowledge, understand design characteristics, truly integrate art into life, and integrate learning into visits.

### 3. Conclusion

This paper proposes an innovative three-dimensional interactive learning model for museums based on the WeChat platform, which collects and organizes the information of the exhibits, and displays the technological and cultural values of the exhibits separately. By constructing the three-dimensional virtual space of the exhibits in the museum, visitors can visit the exhibits from any direction. The experimental results show that this new way of visiting can arouse the enthusiasm of the visitors, strengthen the interaction between the exhibits and the visitors, and allow the visitors and the exhibits to communicate with each other in a simple way. Compared with the traditional visiting mode, the initiative of visiting Handed over to the visitors, fully mobilized the visitors' subjective initiative, and realized the deep learning experience of the visit.

### References

- [1] Wu Aiyun. Construction of Classical Books Museum under the Background of Internet + — Taking Classical Books Museum of Jilin Province as an Example [J]. Journal of Library Science, 2019, 447 (04): 62 + 75-77.
- [2] He Jiayi. Research on museum digital display system based on WeChat platform [D]. 2017
- [3] Yang Fan. On the Development and Marketing of Cultural Products in Museums: Taking the British Museum and Louvre Museum as Examples [J]. Journal of the Palace Museum, 2013 (04): 19-27 + 158.
- [4] Tian Ye. Preliminary Study on Digital Museum in China [D]. Jilin University.
- [5] Niu Peixin. Research on Taiyuan Taishan Digital Museum [D] .Shaanxi University of Science

and Technology, 2012.

[6] Yan Yun. Research on Digital Exhibition and Display Technology in Museums [J]. *Literary Life, Literary Theory*, 2015 (8): 276-277.

[7] Liu Shijie. Design and Application of Mobile Learning Based on WeChat Public Platform [D].

[8] Murthy I S N, Niranjana U C. Component wave delineation of ECG by filtering in the Fourier domain[J]. *Medical & Biological Engineering & Computing*, 1992, 30(2):169-176.s

[9] Boulenger G A. Catalogue of the Lizards in the British Museum (Natural History)[J]. *Nature*, 2009, 32.

[10] Myers C W. Herpetofauna of the Yutajé-Corocoro Massif, Venezuela: second report from the Robert G. Goelet American Museum-Terramar expedition to the northwestern tepuis[J]. *Bulletin of the American Museum of Natural History*, 2009, 261(May 2001):1-85.

[11] Suarez A V, Tsutsui N D. The Value of Museum Collections for Research and Society[J]. *BioScience*, 2004, 54(1):66-74.

[12] Graham C H, Ferrier S, Huettman F, et al. New developments in museum-based informatics and applications in biodiversity analysis[J]. *Trends in Ecology & Evolution*, 2004, 19(9):0-503.