



# Virtual Simulation Project Analysis of Shandong Traditional Handicraft Manufacturing "Jinan Black Pottery" Based on "Ideavr" Platform

Bei Han<sup>\*a</sup>, Yu Niu<sup>a</sup>, Jing Yang<sup>a</sup>, Jilin Qin<sup>a</sup>

<sup>a</sup> Shandong Institute of Commerce and Technology, Jinan City, China, CN 86-0531-86335169

\* Corresponding author: 1781549211@qq.com

**Abstract.** This project is a VR education virtual simulation system creatively developed based on "ideaVR" platform. The experimenter enters the Jinan black pottery virtual simulation system and takes the four parts of the intangible cultural heritage protection policy, the origin of Longshan culture, folk handicraft production, and the development of cultural and creative industries as the main line of creative planning of the virtual simulation system. In the multi-dimensional virtual environment, through diversified teaching links, the multi-angle teaching experience of Shandong handmade "Jinan black pottery" is realized. The project will contribute to the inheritance and promotion of Shandong's handmade intangible cultural heritage culture and the development of cultural and creative industries. Its main education service groups are cultural museums, popular science education in primary and secondary schools, and popular science education for intangible cultural lovers. This paper will elaborate the "Jinan black pottery" virtual simulation system from three aspects: creative design, production process and function realization.

**Keywords:** Handmade in Shandong, black pottery in Jinan, virtual simulation system, non-legacy culture.

## 1 Introduction

China is a multi-ethnic country. In the 5000 year history of Chinese civilization, it has accumulated an incomparably profound cultural heritage. It is the crystallization of the wisdom of the people of all ethnic groups for generations. They have great cultural and social values. In 2013, according to the data released by the World Heritage Committee of the United Nations Scientific, educational and cultural organization, China has 45 world cultural heritages, becoming the second largest country in the world after Italy. How to protect the treasures of Chinese culture? How can we make the ancient Chinese civilization glow with vitality and pass it on from generation to generation? How can the means of communication of Chinese civilization keep pace with the times and improve people's awareness of intangible cultural heritage protection? It is an urgent problem to be solved. This project will take the intangible cultural heritage of Shandong

handmade "Jinan black pottery" as an example to produce a virtual simulation teaching system to help protect, inherit and spread China's intangible cultural heritage.[1]

## **2 Project background**

### **2.1 Origin of Longshan Culture**

China's plastic arts began with pottery, the invention of pottery materials and the use of pottery products are the needs of the continuous progress of human culture, and are also the inevitable outcome of the development of economy and productive forces in a certain historical period. In the history of China, the prosperity of pottery was in the Neolithic age. In 1928, Mr. Wu Jinding, a famous scholar, discovered the existence of Jinan black pottery in the investigation of ancient relics and named it "Longshan culture". Because it is characterized by black pottery, it is also known as "Black pottery culture". It is considered to be the most valuable discovery after "Yangshao culture" characterized by colored pottery. In 1961, the State Council of the people's Republic of China announced it as a national key cultural relics protection unit.

### **2.2 History of black pottery in Jinan**

4,600 years ago, black pottery appeared in the homes of nobles, which was the symbol and embodiment of identity at that time. Because of its rare quantity and exquisite craftsmanship, black pottery has become a ritual instrument in large-scale sacrifice. As an important symbol of China's localization, Longshan black pottery inherits "Dawenkou culture" on the top and "Yueshi culture" on the bottom. It is an important archaeological culture in Haidai area of the lower Yellow River and one of the earliest human civilizations of the Chinese nation.

### **2.3 Current status of black pottery in Jinan**

Intangible cultural heritage is the common treasure of all mankind and the crystallization of generations of wisdom of people of all ethnic groups. However, with the acceleration of urbanization, more and more intangible cultural heritage is being impacted, "Jinan black pottery" is no exception. There are practical problems such as outdated content and form, destruction or loss of physical objects and materials, lack of successors, and low social group awareness. This is not conducive to the dissemination, inheritance, protection and development of black pottery culture. Therefore, the protection of intangible cultural heritage brooks no delay, and the innovation and survival of intangible cultural heritage are imminent.[6]

### 3 Project planning

According to the current situation of the black pottery culture mentioned above, the project will design and produce the "Jinan black pottery" virtual simulation system according to the following three aspects.[2][3]

#### 3.1 Popularize the culture of intangible cultural heritage and improve the people's awareness of intangible cultural heritage protection

China is a multi-ethnic country. Different nationalities, because of their different living environment and customs, form different cultural characteristics, form different cultural plates, and produce different non-material cultural forms. The non-material cultural heritage is a "Cultural gene" of a nation. According to the relevant data published by the Ministry of Chinese Culture in 2010, there are nearly 870,000 non-material cultural heritage resources in China, including traditional oral literature and the languages used as carriers. Traditional art, calligraphy, music, art, medicine, calendar, folklore, etc. To this end, this project will take the policies related to the non-material cultural heritage at home and abroad, as well as the science and technology of non-legacy resources in China as the starting point to raise the awareness of non-legacy protection and national pride.[4]

#### 3.2 Linear Narration Enables the Dissemination of Non-Heritage Culture

The project adopts the visual representation of historical crossing to create a historical scene of the origin of Longshan culture before 2500 BC for the experienter. Based on the correct historical and cultural development timeline, the development process of black pottery historical and cultural products is comprehensively, objectively and accurately described by narrative expression, supplemented by task driven teaching methods, the learning process of Longshan cultural form is promoted as a whole, and the sense of substitution and immersion of the experienter is strengthened.

#### 3.3 Open Teaching Mode Helps Inheritance of Non-Heritage Culture

In this project, the traditional skills learning module is integrated into the linear story telling process, and the diversified teaching mode of "simulation + entertainment + practice + evaluation" is adopted to carry out the innovative inheritance teaching of the traditional skills of "Jinan black pottery". In the simulation environment, reproduce the birthplace of ancient black pottery, understand the characteristics of pottery and understand the human environment; In the game entertainment, the teaching form of "customs clearance task card" is adopted to learn the production process and process of "Jinan black pottery", and the evaluation link is added to increase the interest and practical training of learning. At the same time, it also provides an exploration teaching link with a high degree of freedom for the experienter. The experienter can choose "Customs clearance task" according to his personal learning situation. Let the experienter

fully understand Longshan culture, feel the cultural charm, understand the craftsman spirit, and enhance the cultural confidence of contemporary Chinese people. [5]

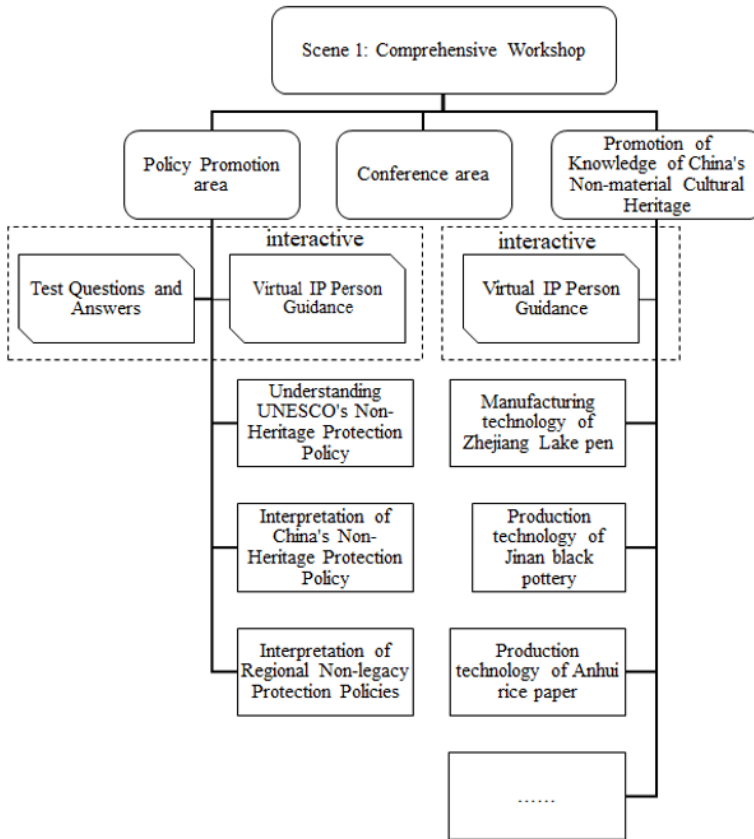
## **4 Project implementation**

This project is mainly composed of four parts (three scenarios), namely, the non-heritage cultural protection policy, the origin of Longshan culture, the production of folk crafts, and the development of cultural and creative industries. Following the policy interpretation cultural publicity technological explanation promotion and development of creative design route, the teaching of "Longshan culture" is carried out from multiple angles, in many directions and at many levels. It will bring new direction and vitality to the inheritance and development of "Longshan Culture", enable users to truly experience and feel the charm of Longshan Culture, and make more people pay attention to "Longshan Culture".[6][7]

This is detailed in the sequence of scenarios presented by the project.

### **4.1 Comprehensive Workshop**

As a theoretical part of this project, the virtual simulation of the Seminar scenario of non-material cultural heritage helps the Experiencers understand the non-legacy protection policies at home and abroad and the local non-legacy cultural resources in China. This scene has three areas: conference area, policy promotional area and promotion of knowledge of China's non-material cultural Heritage. The specific creative plan is shown in Figure 1.



**Fig. 1.** Creative planning of comprehensive seminar room

The policy promotion area and China's intangible cultural heritage knowledge promotion area are the main exhibition areas. In the policy promotion area, the form of dialogue with virtual characters is used to explain the UNESCO, China and regional intangible cultural heritage protection policies respectively, and the answer test link is added to improve the policy awareness of the experienter.

The conference area belongs to the auxiliary exhibition area, which is mainly used for virtual simulation of the conference environment. When you enter the rest area, you can trigger noisy audio interaction and set off the scene atmosphere.

In China's intangible cultural heritage knowledge promotion zone, through the introduction of virtual characters, you can learn about representative local intangible cultural resources, including Jinan black pottery, Anhui Xuan paper and other folk production techniques. And then it is introduced into the subsequent scenes to learn Jinan black pottery comprehensively and systematically, as shown in Fig. 2.



Fig. 2. Comprehensive discussion room

## 4.2 Longshan Culture Museum

Build a virtual Longshan Culture Museum scene to tell the origin of Longshan culture. Longshan culture is a kind of cultural heritage in the late Neolithic era and an important historical evidence for studying the Shang culture in the era of bronze and stone tools. This scene has a display area, a collection area and an exhibition area, so that the experimenter can learn the origin of Longshan culture and understand the development of Chinese civilization while experiencing the extreme beauty of black pottery culture.

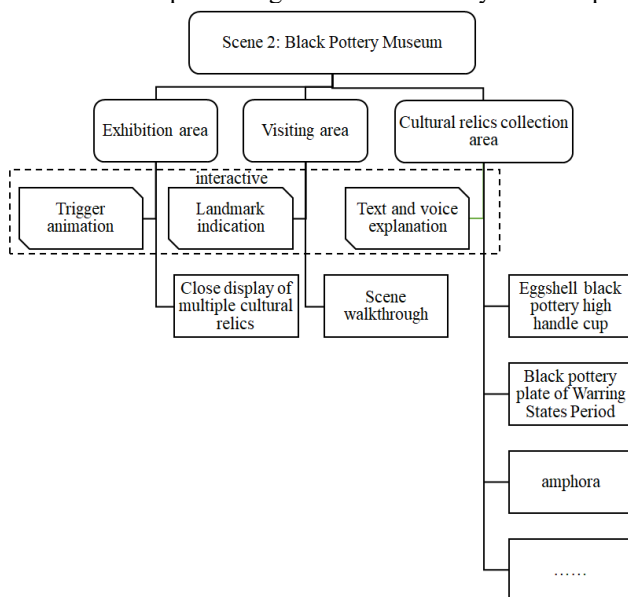


Fig. 3. Creative planning of Longshan Cultural Museum

The exhibition area is a roaming area, where visitors can watch the indoor exhibits along the landmarks; The display area is equipped with a trigger, and the experienter can open the exhibition box after touching it. The black pottery exhibits are displayed in 360 degrees of rotation, as shown in Fig. 4.



**Fig. 4.** Exhibition area

In the collection area, under the guidance of the virtual characters, click the button on the exhibition shelf to view the detailed introduction of relevant cultural relics. At the same time, there is also an invisible door in this scene. Click on the invisible door to cross the time tunnel and enter the virtual simulation of the historical scene of the origin of Longshan culture 2500 BC. Let the experienter enter the black pottery art, experience the charm of black pottery and understand the cultural essence in the collision of modern and historical, as shown in Figure 5.

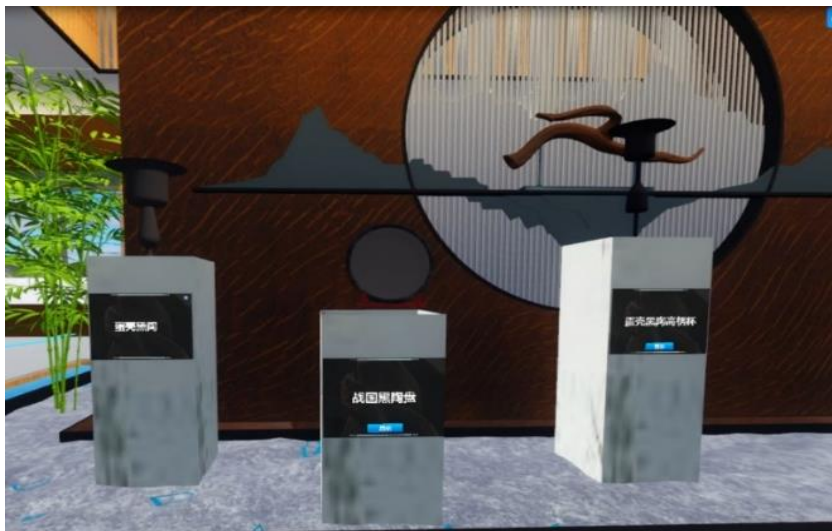
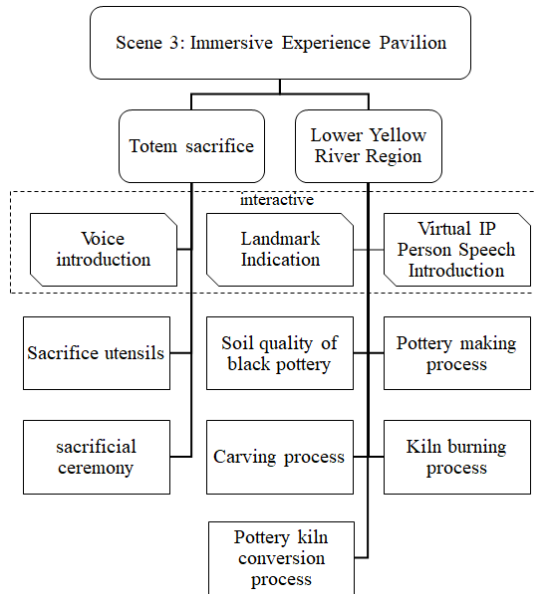


Fig. 5. Collection Area

### 4.3 Immersive Experience Pavilion

The immersive experience hall includes two scenes. First, according to archaeological experts' findings in the cultural relics excavation site, black pottery vessels are related to people's totem worship or sacrifice at that time, representing people's status and mainly used as sacrificial vessels. In order to restore the real history, the virtual simulation sacrificial scenes of people in 2500 BC were built to tell the origin of black pottery culture, thus stimulating the interest of the experiencers in cultural exploration; Second, according to records, most of the Longshan cultural sites are mainly distributed in the Shandong Peninsula, that is, the lower reaches of the Yellow River. In particular, the eggshell black pottery folk handicrafts in Jinan area are the most representative. To this end, the scene of the lower reaches of the Yellow River was set up, and the whole process of four parts, namely, black pottery soil → pottery making process → carving process → firing process → chemical change of glaze caused by high temperature flame in the kiln, was explained from the dimension of Shandong handmade Jinan black pottery. Improve the awareness of the experiencers and help protect and inherit the intangible cultural heritage of Longshan Culture.





**Fig. 6.** Creative planning of immersive experience Hall

In the experience area of totem worship, through the guidance of virtual characters, you can see and experience the ancient sacrifice scenes, drag the sacrifice ceramics - egg shell black pottery to the position of the totem, then you can watch the whole sacrifice process and understand the role of black pottery gifts in the sacrifice. As shown in Figure 7.



**Fig. 7.** Ancient sacrifice

The high temperature flame in the kiln causes the glaze to undergo chemical changes. In the experience area of the lower reaches of the Yellow River, through the guidance of landmarks, first of all, understand the soil characteristics of black pottery, which is delicate and viscous, and rich in a large number of mineral elements; Secondly, I went to the pottery making workshop and systematically learned the pottery making processes such as mud kneading → blank making → blank trimming → carving and polishing → firing → chemical change of glaze due to the high temperature flame in the kiln. In the pottery kiln transformation part, I particularly explained the formation of black pottery, as shown in Figure 8-11.



**Fig. 8.** Soil characteristics



**Fig. 9.** Mud kneading process



**Fig. 10.** Pottery carving process



**Fig. 11.** Firing

Finally, the experienter will return to the scene of Longshan Culture Museum, and the virtual character will tell the experienter the importance of the protection, inheritance and dissemination of modern intangible cultural heritage, Quoting the important instructions of the general secretary "The excellent traditional Chinese culture created and continued by the Chinese nation over thousands of years of history is the root and soul of the Chinese nation. The cultural self-confidence built on the inheritance of more than 5000 years of civilization is a more fundamental, extensive and profound self-confidence. " As the conclusion of this project, it can enhance the cultural self-confidence and national pride of the experienter.

## **5 Project implementation feedback survey**

In order to master the specific implementation of the "Jinan Black Pottery" virtual simulation system, the team uploaded the "Jinan Black Pottery" virtual simulation system to the cloud space for a trial run of 6 months. The project questionnaire was designed to track and investigate the function, color, interface design, interaction technology, immersion and other aspects of the product. During this period, 100 questionnaires were

issued and 89 valid questionnaires were recovered. The specific feedback survey results are as follows.

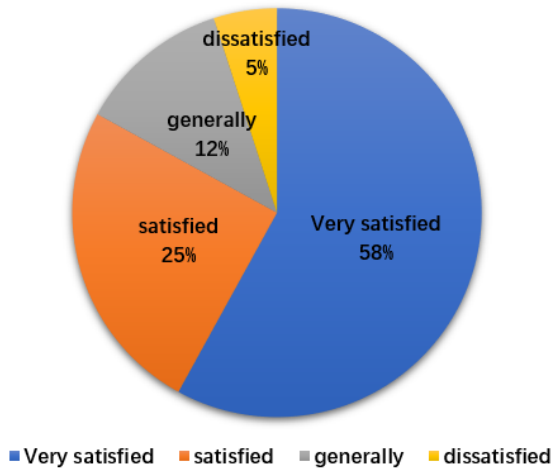


Fig. 12. Statistical Chart of User Satisfaction

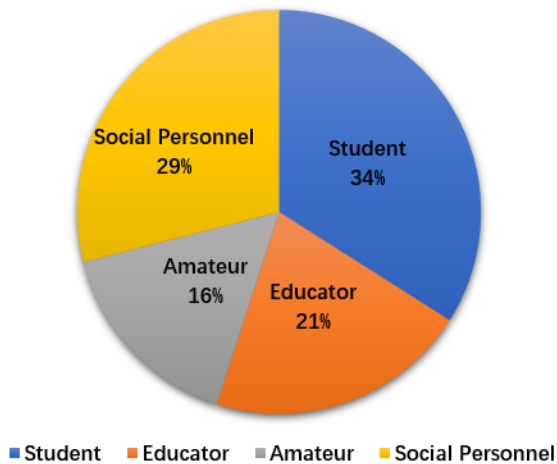


Fig. 13. Use population statistics

According to the above research data analysis, the virtual simulation system of Jinan Black Pottery has the features of friendly interface, strong immersive experience, rich teaching content and entertainment teaching links compared with the general "VR+" teaching system. It creates a teaching environment of 2500 B.C. for the experienter, and a high degree of freedom of entertainment-based learning task, which makes the abstract handicraft vivid and reduces the learning difficulty greatly. Increased interest in learning. At the same time, the system also integrates Longshan culture, totem culture

and human culture into the teaching process, and comprehensively helps the inheritance and dissemination of regional non-legacy culture.

## 6 Conclusion

The virtual simulation teaching system of "Jinan black pottery" has a complete teaching structure, progressive teaching links, interesting teaching forms and entertainment in one body. It has built an integrated teaching form of "teaching, learning and doing", centered on non-religion and narrated a well-structured Longshan cultural story for the experiencer with linear narrative method, which integrates policies, regulations, history, and entertainment. Many teaching elements, such as culture, have changed people's traditional understanding of black pottery in Jinan, improved the popularity of Longshan culture, and increased national pride.[8][9]

The main educational service groups of this project are history museum science education, primary and secondary science education, black pottery traditional handicraft enthusiasts science education, etc. At the same time, this project also pays attention to the extensibility and openness. Following this project, other non-legacy projects can be expanded and developed mainly according to the needs of non-legacy cultural inheritance and dissemination. With the help of 5G equipment, the "China Non-legacy Cloud Exhibition Hall" will be created to let more people know and love China's non-legacy culture, and to help protect, inherit and develop China's non-legacy culture.

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