

Design and Application of Virtual Reality Technology in Facebook Culture Communication Game

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Abstract:

With the rapid development of science and technology, virtual reality (VR) provides new possibilities for cultural transmission. The purpose of this article is to explore how these advanced technologies can be used to design an interactive game aimed at spreading Facebook culture in China. Through an in-depth analysis of the development status of Facebook culture at home and abroad, combined with the unique advantages of VR technology, this paper proposes an innovative game design scheme aimed at breaking cultural barriers, attracting young groups, and promoting the international dissemination and understanding of Facebook culture. Face-changing technology has been incorporated into the game design to enhance the immersion and participation of players and achieve deep cultural communication. At the end of the article, this paper will use the modeling scene of scene 3 as the experiment scene, and randomly investigate five people to score the roaming experience, detailed experience and immersion feeling of the scene, and summarize the advantages and disadvantages of the game scene.

Keywords:VR; face-changing technology; gesture recognition; facebook culture; game design

1. Introduction

Facial makeup, as an important element in Chinese traditional opera culture, carries rich historical and cultural connotations. In China, facial art is not only well known by the majority of opera lovers, but also gradually integrated into all aspects of modern life, showing a diversified development trend. And with the deepening of globalization, Chinese Facebook culture has gradually moved to the world and become an important bridge for international cultural

exchanges [1,2].

In recent years, facial art has made remarkable progress in inheritance and innovation. On the one hand, the old generation of artists passed the traditional facial painting technique from generation to generation through oral teaching; On the other hand, young artists combine modern aesthetic and technical means to innovate facial makeup, so that it is more in line with the aesthetic needs of contemporary people [3].

Internationally, China has demonstrated the charm of

Facebook art to the world by holding various international cultural exchange activities, such as performances, exhibitions, and educational programs [4]. These activities not only deepened foreigners' understanding of Chinese opera culture, but also promoted the international spread of facial makeup art. For example, Zhao Nan's presentation of Peking Opera facial mask culture to Chinese and foreign guests at the Lunar New Year Reception of the Ministry of Foreign Affairs in 2024 is a vivid case of the international spread of Chinese opera culture. In the digital age, social media and digital platforms have become important channels for cultural transmission. Chinese Facebook culture shows its unique charm to global users in the form of pictures and videos through social media platforms such as Facebook, Instagram and TikTok [5,6].

Although Facebook culture has been widely spread and recognized at home and abroad, its development still faces many challenges. Due to cultural differences, foreigners may have certain obstacles in understanding and appreciating Chinese Facebook culture. With the development of The Times, some young people may lack sufficient interest and understanding of traditional culture, resulting in a serious brain drain.

Under the background of globalization, cultural exchanges are becoming more and more frequent, but how to effectively spread and carry forward traditional culture is still an urgent problem to be solved. Facial makeup, as the treasure of Chinese traditional opera culture, has rich historical value and artistic charm. Therefore, this paper proposes to use modern technology VR technology to design a Facebook cultural communication interactive game, in order to achieve a wider and deeper cultural communication effect.

2. Related Work

On April 20, 2021, French game studio InnerspaceVR released Maskmaker, a VR adventure game designed around masks, on steam. Maskmaker is an adventure game that revolves around "making masks", in which players create masks by searching for mask blueprints and exploring eight biomes. In the mask workshop, players will be able to carve masks, paint them and decorate them with shells, feathers, flowers and other ornaments. When the player successfully makes a mask, he can wear the mask to enter the corresponding biome to explore. In order to explore the eight biomes, players will start as mask apprentices and grow into a mask master by searching for mask blueprints and ornaments between different regions, and uncover the true identity of the master who taught you mask making skills. The game cleverly combines the mask with the crossing door, and the setting of the mask crossing is

very attractive. However, the game did not make a big splash after its release, and most of the players were old customers accumulated from the team's previous games. After analyzing the game's levels and sessions, This paper found that most of the players were moving around, the rest of the gameplay was one-dimensional, and the lack of a clear storyline and cultural themes that were not communicated were all reasons for the game's unpopularity [7].

On September 6, 2019, the independent research project result of China Art Science and Technology Research Institute "VR shadow play interactive experience game software" made shadow play, an ancient art, re-enter the public's vision in a more popular way among young people with the help of virtual reality technology [8]. When the experienter puts on VR glasses, he «crosses» to the shadow play «Tian Ji horse race», and the characters, horses and chariots in the traditional shadow play are presented in front of his eyes. After the experienter puts them on the «curtain», and then selects one of the three horses from their upper, middle and lower horses, and jumps on the horse, they can compete with the historical King of Qi Wei in the virtual reality environment. This vr interactive game can intuitively make the public feel the real experience of passing through, and is a positive help for experiencing the story of the characters behind the shadow play, but the experience of a single riding game is too short, and the monotonous content is easy to make people forget.

3. Game Design

Combined with the above cases, this paper analyzed their respective interaction characteristics and proposed a game idea, allowing players to explore different facial masks in the vr world and travel back to ancient times to explore the character stories behind facial masks and experience the connotation of Facebook culture at a deeper level.

3.1 Story Design

Many years later, when player entered the cultural barren era, grandfather died unexpectedly. After many years of wandering, Player returned to my old house to collect my grandfather's relics. Player found the design drawing of the mask on the bedroom table, which has basically been lost now, so Player painted the unfinished mask according to the design drawing. Player stood in the land of the third century, and Player was shocked to see how different things were before me, and then began journey of discovery.

For example, Player am dressed as Zhuge Liang's page boy, and they are on the wall of the city, and the enemy is about to invade the city, and player have to solve puzzles

to guide the protagonist to do the right behavior in order to defend the tower. Player took off the mask and went back to the bedroom, found another design drawing, and finished the mask according to the drawing and started another journey. Finally, he returned to reality and found that every time he crossed, he was experiencing grandfather's past.

3.2 Control

The game consists of three scene modes. Players need to play the role of grandpa's grandson in the bedroom (scene 1) to collect pieces of design drawings to draw a mask, wear the mask to the stage (Scene 2) to recall the performance of the characters in the play, and after the completion of the backtracking into the era of Facebook characters (scene 3) to explore and help the Facebook characters guide the story. After completing the story of a Facebook character, you can choose to create freely with the mask model. In the game operation, the quest3 virtual reality headset worn by the player has a gesture recognition function, which can directly click on the command "pick up", "put on", "take off" and so on through gestures, and can also move the collected pieces in the decryption process, and switch the face pattern with a specific gesture.

3.3 Modeling Scene

The player is born in his grandfather's bedroom (Scene 1), creates a mask by looking for pictures in the room, and then goes on stage wearing the corresponding mask (Scene 2) to recall dramatic memories. After the backtracking is complete, touch the light point to enter the corresponding historical fantasy (Scene 3), immerse yourself in the scene, interact with the characters, decrypt and collect important items, and finally remove the mask and return to the bedroom to reveal the secret behind the fantasy. The game style adopts the unique color style of facial makeup, integrates the cultural elements of ancient and modern China and abroad, and shows the diversity and inclusiveness of facial makeup culture.

The bedroom is grandpa's room, which is basically built with geometry in 3dsmax, and then some rugged small items, such as: golden statue, are modified by the editor a little, and finally the completed model is imported into unity and pasted with prepared material balls to avoid the problem of model import missing materials. The main color of the overall scene is warm brown, so that the player can adapt to the initial stage of exploration, the scene is composed of Western houses and Chinese accessories, metaphor of the combination of Chinese and Western, but also guide the player to see the decoration based on make-up style is the focus. The bedroom scene design is shown

in Figure 1.



Fig. 1. Scene 1 (Photo/Picture credit : Original)

After putting on the mask, the player will switch to Scene 2, the theme of this scene is the stage, in 3dsmax software, this paper first built the basic framework of the stage with geometric figures. Using basic geometry and splines to build the crowns, costumes, and some embossing objects needed for the drama, it is then converted into edgeable polygons in the modifier, modifying the detailed parameters using extrusion, smoothing, symmetry, capture, etc., and finally building a scene composed of wooden platforms, costumes, and accessories (Figure 2). The style of the stage scene is slightly different from the bedroom scene, but since the focus is on the drama on stage, the overall color of the scene is brown and warm to highlight the changes on stage [7].



Fig. 2. Scene 2 (Photo/Picture credit : Original)

Finally, in order to achieve the effect of spreading culture, the main purpose is to let foreigners who know nothing about it know the story of the characters behind Facebook culture from the game, so the construction of Scene 3 is a completely independent world, which should fully conform to the contemporary environment of historical figures. Therefore, when making this scene, this paper adopted the design of traditional Chinese dark red walls and warped eaves, and used ancient Chinese elements such as red lanterns and incense burners in the scene (Figure 3).

In 3dsmax, the uneven round model with many folds at the edges is realized by turning function, and the brick tile of the eaves is first bent by one tile and then achieved by stacking form, the effect is as follows [3].



Fig. 3. Scene 3 (Photo/Picture credit : Original)

3.4 Interaction Design

In drama culture, there are generally five categories, namely, Sheng, Dan, Jing, Mo and Chou [1]. Thus, five mask models are hidden in the bedroom scene, each representing five categories. Players need to find five mask models hidden in the bedroom, collect design pieces to unlock the face pattern, and finally pick up the brush, by waving the corresponding mask model to draw the full face pattern (Figure 4).

When the player collects the design drawing, he can use the gesture recognition function of the virtual reality headset to pick up the action to obtain the pieces of the design drawing, and finally put all the pieces together into a complete design drawing (Figure 5).

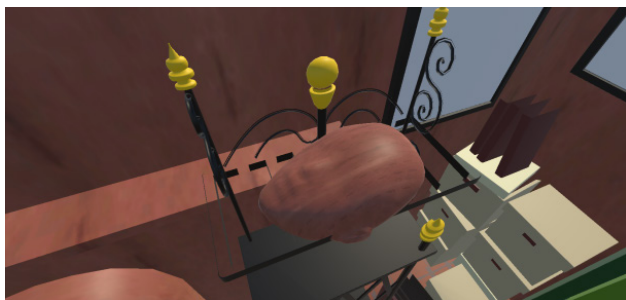


Fig. 4. Mask model hiding place (Photo/ Picture credit : Original)



Fig. 5. Design drawing stash (Photo/Picture credit : Original)

On the mask model represented by each type, this paper used a face-changing technique to unlock different faces of the same type on the mask model through specific gestures. For example: the player has collected the Sheng type design drawing and mask model, just pinch the two points in front of the mask and slide to the right, the Sheng type mask will have two facial patterns alternate. Such gesture interaction design simulates the waving of hands and changing faces in the drama of changing faces, allowing players to achieve an immersive feeling with realistic gesture simulation, allowing players to actually change faces, which can bring players a more intuitive cultural experience (Figure 6 and figure 7).



Fig. 6. Unpainted face mask (Photo/Picture credit : Original)



Fig. 7. Painted face mask (Photo/Picture credit : Original)

In the face mode switching, the quest3 device's gesture recognition function realizes the accurate capture and recognition of the player's hand movements. By recognizing

finger movements such as bending and stretching, players can make precise pattern choices in the virtual reality environment. Gesture recognition system can recognize users' simple gestures in real time [4]. The method of realizing gesture function mainly relies on the tracking system on the headset. Quest 3 can track gestures through 4 tracking cameras and 1 depth sensor, so as to achieve accurate gesture operation function. When using, the player does not need to rely on the gamepad, and can directly interact with the interface using hand movements. In addition, in order to realize the gesture function, this paper used the Hand Grab Pose Tool in Interaction SDK to record grasping gestures of grabable objects, and created customized grasping gestures through recording gestures, which could be saved and applied to objects to realize gesture interaction. Finally, the player can paint freely on the completed mask.

4. Experiment & Result

4.1 Experimental Setup

Scene 3 was selected for the experimental test, and 5

people were randomly selected from the crowd to walk in Scene 3, and scored respectively from the three aspects of roaming experience, scene meticulousness and scene substitution feeling. The testers need to choose a score from 0 to 10 points.

4.2 Indicator Analysis

As can be seen from the statistical index data in Table 1, the average value of scene substitution perception is high, the average value of scene meticulousness is low, and the average value of roaming perception is average, but the range is the largest. It can be seen that the visual rendering of the scene effect needs to be refined; The richness of scene roaming still needs to be improved, and a large range value also indicates that there are certain individual differences in the results, so it is necessary to expand the sample range to determine the content of richness in the later stage. In the end, the best feedback is the sense of immersion in the scene, and the all-ancient simulation gives the player a real sense of time travel.

Table 1. Statistical index

index	Wandering sensation	Scene detail	Scene substitution sense
1	6	5	7
2	6	3	6
3	3	4	6
4	6	4	7
5	7	5	8
Average	5.6	4.2	6.8
Range	4	2	2

In order to explore the reasons for the low score, this paper conducted in-depth interviews with players on their comments on various aspects, and found that players were affected by the detail rendering when roaming and exploring the scene, such as the color matching and brightness of the tower, the texture effect of small models such as incense burners, the simulation effect of the Tengman [5,6], and the types of grass vegetation, etc., and they were affected by these influences and discounted the sense of representation in the scene when roaming. Below are some roaming experience and detailed renderings of Scene 3 (Figure 8 and figure 9).

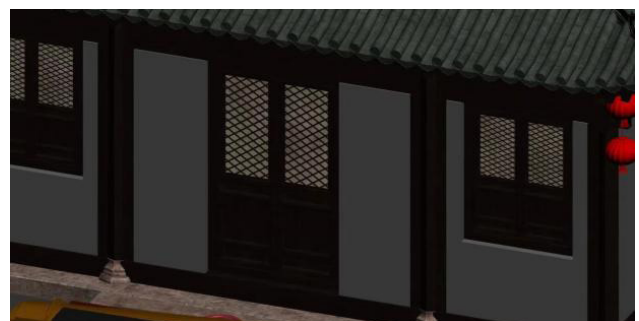


Fig. 8. Scene 3-Top view of city wall-2 (Photo/ Picture credit : Original)



**Fig. 9. Scene 3-Exterior scene of city wall
(Photo/Picture credit : Original)**

4.3 Strengths and Weaknesses

The main purpose of this game is to allow players to experience the story of the Facebook characters immersive through the form of virtual reality games, so that players with the understanding of the characters to create their own Facebook decryption and creation of interactive games.

Games about cultural types are often inconsistent in the integration of gameplay and cultural communication, especially the innovative design of the theme of Facebook culture is more rare. This game makes a combination of Facebook and mask as a passing medium, improving the creativity of the game, and the creation of such games is also a design supplement for the Facebook culture games on the market. However, the authority and integrity of the art style and the story of the game need to be improved.

5. Conclusion

In today's digital age, the traditional cultural inheritance mode should also be updated. For the wider cultural communication, games are absolutely indispensable as a medium. From the perspective of VR games, the transmission of Facebook culture can be significantly enhanced. Facebook is not merely a social platform; it embodies a rich cultural tapestry, encompassing personal narratives, artistic expressions, and patterns of social engagement. By leveraging VR technology, participants can engage with the self-presentation of art on Facebook and delve into the stories of historical figures associated with the platform, which constitutes the essence of Facebook culture. For instance, a VR game based on Facebook culture might immerse players in a virtual historical setting where they

interact with renowned historical Facebook users, gaining insights into their life contexts and the legacies they have left behind on social media. Experimental feedback underscores the significance of integrating Facebook culture with VR games for cultural inheritance. This integration not only appeals to younger generations but also aids in their understanding and appreciation of cultural elements that may otherwise be difficult to grasp due to temporal and spatial distances. Through highly immersive experiences, participants are able to form emotional connections with cultural content, deepening their comprehension and engagement.

In summary, the fusion of Facebook culture with VR technology not only fosters the creation of novel and engaging cultural products but also paves a new path for the transmission of both traditional and contemporary cultures. This approach not only contributes to the preservation of cultural heritage but also facilitates cross-cultural exchange, making it easier for individuals from various backgrounds to access and appreciate the world's rich and varied cultural landscape.

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