

Research on Immersive Dining Space Design Based on New Media Digital Technology

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Abstract—At present, which is not accompanied by the development of science and technology to meet people's spiritual needs, especially the research on diversified immersive dining experience. Under the working environment of enterprise digital transformation, new media digital technology should be infiltrated into the catering industry to create an immersive catering space design. According to the design characteristics and actual cases of immersive space, this paper understands the current situation of catering space design, and explores the design method of immersive catering space, which can not only break the single presentation mode of traditional catering space, but also greatly awaken people's five senses and six senses experience of immersive catering space.

Keywords-immersion; New media; Dining space design

1 INTRODUCTION

The basic function of the restaurant only guarantees to provide meals and corresponding services, which is obviously derailed from the development of society, economy and technology. The integration of new media digital technology into space makes immersive experience play an important role in various fields. Immersion is a new experience produced by the blending of new media, digital technology and culture, which breaks the "traditional circle" of dining space and actively guides and stimulates the current audience's own spiritual needs. Immersive catering space design expands a new direction for the future development of catering industry, and its forward-looking and challenging nature determines that it occupies a place in contemporary and future design trends.

2 IMMERSION CONCEPT

The theoretical source of immersion design "immersion theory" is also known as "flow theory". This theory was put forward by American psychologist Mihaly Csikszentmihalyi in 1970s, and it is characterized by high concentration of attention, filtering out other irrelevant information, and devoting themselves to the situation and atmosphere, which makes participants feel happy and satisfied psychologically [1]. Entering the immersion state first comes from the audience's concentration on the activities. According to the information expression of the constructed immersion space, attention will be focused and practical interaction activities will be carried out, which will lead to positive enjoyment of psychological

feelings and sensory feelings, and then advance to the consciousness level to bring deep participation of spirit and feelings.

The spiritual and emotional satisfaction brought by practical activities will have a negative effect on the practical interaction activities of the audience. In order to prolong this state, the audience will continue the practical interaction activities and keep immersed.

3 NEW MEDIA DIGITAL TECHNOLOGY

Using the immersion theory, designers use digital media technologies such as 3D holographic projection technology, virtual reality technology (VR), augmented reality technology (AR) and mixed reality technology (MR) as media, and create a specific realm according to the spatial orientation. First, they focus people's attention to achieve sensory and behavioral immersion, and then produce positive and positive emotional experiences according to the interaction of activities.

4 DINING SPACE

According to the analysis of the present situation of dining space, it can't accompany the development of science and technology to meet the audience's requirements for dining behavior experience and spiritual perception. Compared with the previous dining space design, simple dining chairs and green plants build a space that can complete food enjoyment. In order to have a higher attendance rate, individual dining shops ignore the rational layout of the space.

Based on the penetration of new media digital technology in all areas of life, the design of dining space has a new position and function. New media digital technology is a great weapon to solve the audience's problem of dining environment, so the concept of dining space with immersive experience as its design focus came into being.

5 IMMERSIVE DINING SPACE

5.1 Performance of immersive dining space

In the era of "online celebrity Flow" and without violating the functional attributes of catering space, we pay attention to the application of new media digital technology in space and design catering space into a place with rich cultural heritage and strong visual impact. On the one hand, it can better attract the audience for consumption for catering operators. On the other hand, it can better meet the spiritual consumption needs of the audience.

When entering the immersion state, the design of space environment affects the first step of people's immersion. Whether they can enter the immersion state or not, the creation and interaction of space environment is very important.



Figure 1. Ephemera Flash Restaurant in Paris(Source: RED user sharing)

For example, the Ephemera Flash Restaurant in Paris (as shown in Figure 1) is an immersive restaurant with the theme of "Under the Sea". Through 4k laser projector and VR (Virtual Reality) and AR (Augmented Reality) new media digital technologies, Ephemera has created "immersion". From the vegetation and marine life on the floor, table and ceiling, a large area of marine elements, it has extensively covered the visual field of the audience. With the matching design of sound, light and electricity, the immersion has been strengthened again. Under the immersive experience of being in the underwater world, creative and artistic exquisite dishes bring the audience's five senses (sense of respect, nobility, security, comfort and pleasure) and six senses (sense of sight, hearing, touch, smell, taste and perception) to an unprecedented peak while enjoying the delicious food, which can be said to be redeveloping the delicious food. Of course, there is no doubt that the food, art, taste and perception are the highest.

5.2 The significance and value of the design of immersive dining space

The immersive experience design of dining space is based on social and economic development and personal spiritual needs. In the contemporary society, where scientific and technological changes promote great changes in dining style, it can not only meet the basic physiological consumption demand, but also meet the higher level spiritual experience consumption demand [2]. According to the traditional thought, visual experience only plays a decorative role in restaurant selection and dining experience, and can even be ignored. However, the design of immersive space swept through, and on the basis of ensuring that the created environment is consistent with the dishes, it created an interactive immersive space, which met the consumption needs of people's basic physical and spiritual experiences, and pushed the catering visual experience to a new height. Because of this, the immersive experience is quietly changing and affecting the whole catering space experience.

6 DESIGN STRATEGY OF IMMERSIVE RESTAURANT SPACE

6.1 Identification of consumer groups

To develop immersive experience, we must pay close attention to the needs of the younger generation, especially grasp the trend of "millennials" such as "post-80s", "post-90s" and "post-00s" entering the cultural consumption market on a large scale. According to the report of "Innovative Britain", immersion is an industrial group that is loved by young people and most likely to stimulate their imagination. In view of this, developing immersive technologies and products for young people has become the common choice of more than 2/3 professional companies [3]. The catering business should clearly recognize its own positioning, lock in the audience range and determine the market share.

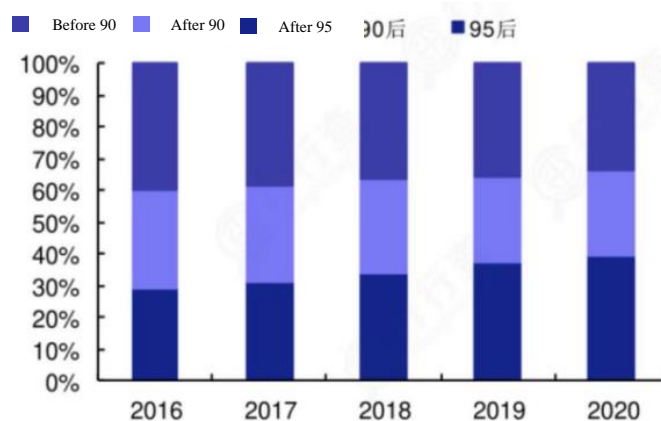


Figure 2. Age group of catering consumption(Source: China Chain Store & Franchise Association, Essence Securities Research Center)

Based on data analysis of the age group of food and beverage consumers, a questionnaire was sent to students in universities to understand their perception of and demand for immersive dining spaces. The questionnaire was developed in terms of whether they were aware of immersive restaurants, the extent to which they aspired to immersive restaurants, and the important factors in choosing immersive restaurants.

In order to further understand the cognition and demand of consumer groups for immersive catering space, this paper adopts the method of questionnaire, and sends electronic questionnaires to students in colleges and universities. The survey objects are mainly students born in the 1990s. The questionnaire was conducted from the aspects of whether there is an understanding of immersive restaurants, the degree of desire for immersive restaurants, and the important factors for choosing immersive restaurants.

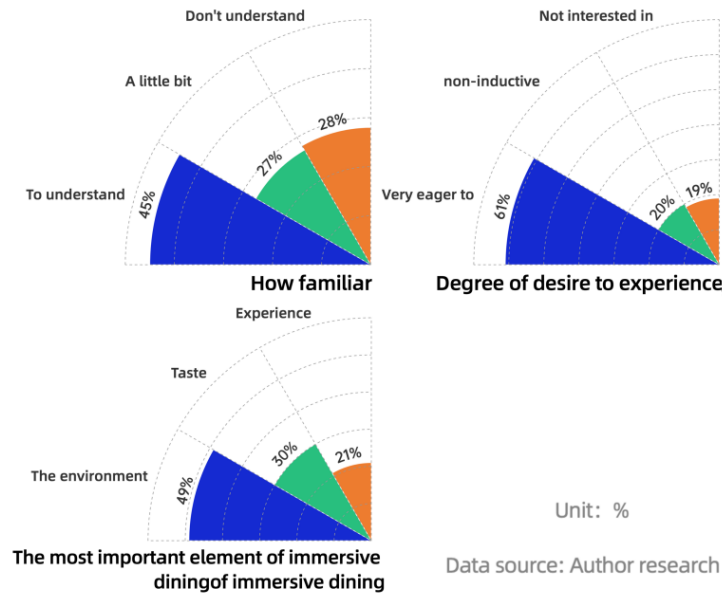


Figure 3. Questionnaire data(Source: Author's own)

According to the survey results (as shown in Figure 3), the number of people who know about immersive restaurants accounts for 45%, the number of people who have heard about them accounts for 27%, and the number who do not know about them accounts for 28%; The yearning degree of immersive restaurant was 61%, 20% and 19% for yearning, respectively. The important factors for choosing immersive restaurants include dining environment, dining taste and dining experience, which account for 49%, 30% and 21% respectively. The survey data shows that the majority of students are not new to immersive restaurants and are extremely enthusiastic about them, and they consider the dining environment to be the most important factor in choosing an immersive restaurant, which shows that immersive restaurants have great momentum in the future.

Immersion Restaurant should Combined with the actual situation of restaurants, we should publicize and drain the factors that affect the audience's choice, such as the characteristics of marketing dishes, dining environment, etc., so as to further expand our original market and achieve a two-way relationship between the audience's psychology and the marketing of catering shops. Thereby achieving the effect of attracting more audiences to shop and eat.

6.2 The theme of giving soul to immersive experience

6.2.1 Determination of immersion theme

Efficient expression of immersion theme is the primary task of immersion experience dining space design, which lays the business atmosphere of the whole dining space, and at the same time provides a highly recognizable theme restaurant image for the audience, thus stimulating consumption, and it plays a positive role in enhancing the cultural and spiritual connotation of dining space [4]. The immersed soul of the theme design is the expression of emotion, attitude

and values. All new media digital technologies should actively build this main line of sound, light and electricity for design.

The establishment of immersion theme should be market-oriented, so that the immersion experience generated by new media digital technology will have a market and be accepted by the public. If it deviates from the market, the immersive experience may not resonate with the audience, and it is difficult to produce physical and mental pleasure and spiritual enjoyment. Even the immersive restaurant will not appear in the audience's list of choices.

6.2.2 Immersive theme expression



Figure 4. Sheraton Xixi Restaurant Satingfa Restaurant, Hangzhou(Source: Official official account)

Immersive theme expression is not limited to single expression, but also can be diverse. Single expression is more conducive to information expression and concept transmission, and the audience can get a more specific and comprehensive immersion experience.

For example, the Sating French Restaurant in Xixi Sheraton Hangzhou (as shown in Figure 4) chooses a single expression, takes the Song Dynasty as the background, and narrates the visit of the envoys of the French Campe Dynasty during Song Gaozong's reign, wearing a bright red curtain in front of the Hanfu window, and the elegant goblet reflects the dense light into the eyes of the audience in Hanfu, and the lingering court music echoes in the ears. From time to time, NPC (non-player character) in the restaurant in Song Dynasty. Under this circumstance, the audience gradually immersed themselves in Chinese culture, and their sense of honor and ritual rose, which made people immersed in the Song Dynasty's French meal. The combination of Chinese and Western culture was a novel experience.

As for the pluralistic expression, all kinds of information can't be accepted by the audience's senses with high precision, which may lead to the interference, confusion and conflict of narrative integration of different themes, thus affecting the immersive experience. Therefore, under the pluralistic way, we should pay special attention to the connection and transformation of information transmission.

7 TECHNICAL BASIS OF IMMERSIVE RESTAURANT EXPERIENCE

Immersion relies on 3D holographic projection technology, VR, AR, MR and other technologies as carriers (as shown in Figure 5), and with the progress of new media digital technology, it has entered an advanced stage, providing a guarantee for high-quality dining experience. In the process of audience's immersive reality experience, with the blessing of new media digital technology, people's imaginative thinking power is opened, and at this time, the audience moves from reality perception to virtual world.

Table 1 Immersion relies on technology carriers (Source: Author's own)

Technical carrier	Virtual degree	Perception
3D holographic projection	Part real, part virtual	Make a clear distinction between virtual and real
Virtual Reality	All of the virtual	Make a clear distinction between virtual and real
Augmented Reality	Part real, part virtual	Explicitly in the virtual state
Mixed Reality	Part real, part virtual	The ideal state cannot distinguish between the virtual and the real

7.1 3D holographic projection technology

Through computer and projection technology, 3D holographic projection is gradually popularized in front of the public in the form of three-dimensional. The principle of 3D holographic projection is very simple, that is, virtual imaging is realized by the interference and diffraction of light. 3D holographic projection technology is the creative use of immersive experience, and it is the key to construct immersive space. In the process of creating immersive dining space design, ambient light plays an important role in the creation of specific territory of dining space. Grasping the law of light perception, the narrative elements required by the theme of the restaurant can be mapped to high fidelity to the maximum extent, and the images mapped to the ground, dining table and ceiling can break the static state of dining space, expand the three-dimensional sense of dining space, endow plane objects with new rhythm and provide more limited dining space.

7.2 VR, AR, MR

In the design and construction of immersive dining space, MR technology is more closely related to the future VR virtual reality technology and AR technology, and more attention is paid to the seamless integration between the real world scene and the future virtual world.

7.2.1 Virtual reality technology (VR)

VR technology is an audio-visual simulation system that can create and experience virtual worlds. It uses computer and artificial intelligence to generate a simulation environment, and it is an interactive simulation system of three-dimensional dynamic scene and entity behavior with multi-source information fusion [5]. The virtual digital picture brought by VR improves the authenticity of users' visual, auditory, tactile experience and other senses. With its own characteristics of "immersion", VR technology constantly stimulates our infinite spatial imagination, redefining the boundary between the real world and the fictional world.

VR technology can transform the virtual dining scene of virtual restaurant into reality that ordinary audience can feel personally in virtual dining space, and it is the fusion of sensory experience reality and virtual. VR technology is a new and independent form with interaction. With the support of this technology, the audience's body and mind can interact, participate and appreciate in the dining space, and at the same time, they can also become creators.

7.2.2 Augmented reality (AR)

Virtual and digital in AR virtual reality technology are added to naked-eye reality, which enhances users' strong visual sense of reality in two virtual time tunnel with different dimensions. Under the AR technology, in the design of immersive dining space, the characteristics of real material such as shape, texture and color are integrated with the design thinking. The highly reduced and finely processed virtual imaging will protect the audience from other interference, and the audience will get information in the fastest time and immerse themselves in the virtual space, and feel the same feelings as the reality in the virtual space.

7.2.3 Mixed Reality (MR)

It is another brand-new technology that integrates VR technology and its further development with AR technology, and enables digital virtual world to coexist with virtual physics and real physical world, and finally can truly experience real-time interaction. MR first virtualizes the virtual objects in reality, then superimposes them in a virtual world space, and on the basis of comprehensive integration of digital virtual world technology, traditional physical virtual technology and real world technology, builds a relatively complete three-dimensional visual virtual environment. Such a two-way information transmission way that can feed back information between its content and users has been established, which is superior in realizing the display effect and the interactive experience of real feeling and real time.

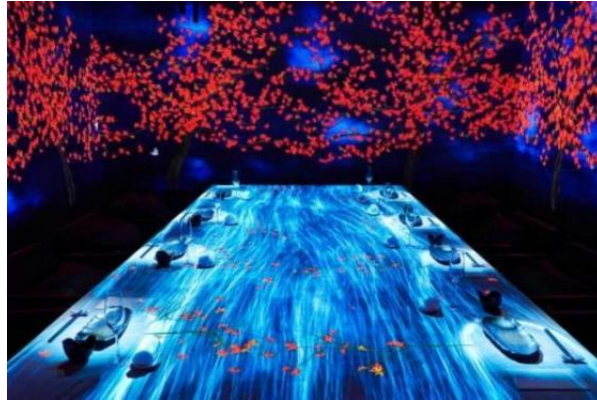


Figure 5. Flower Dance Impression Art by teamLab "Art Sensory Restaurant"(Source:TeamLab official website)

For example, Shenzhen "Flower Dance Impression -Art by teamLab" Art Sensory Restaurant (as shown in Figure 6) is the only teamLab top art installation in China. The restaurant has faded from the same decoration style, and the whole wall and dining table are composed of projection screens. The application of MR light and shadow technology and sound creates perfect interaction, creating a truly digital immersive restaurant.



Figure 6. Cuisine "River and Sashimi"(Source:TeamLab official website)

Cuisine and utensils, the key to light and shadow interaction between audience and restaurant, each dish has its own unique picture scroll. When enjoying "River and Sashimi" (as shown in Figure 7), the trickling river and the blooming maple leaves are projected through interactive holography, and light, shadow and sound instantly appear on the curtain of the dining table. At this moment, the vessel separates the water flow like a pillar, and the MR light-shadow interaction technology will change the vessel movement accurately according to the audience. This is a perfect cross-border collision between new media digital technology, art and food. The audience who are in the feast of senses and taste can achieve the unity of human and environment, feel the healing of the soul and feel the blooming of thinking.



Figure 7. Changsha "Super Wenheyu"(Source: RED user sharing)

For another example, Changsha's "Super Literary Friends" (as shown in Figure 8), with the theme of restoring Changsha's urban culture, selects the elements representing Changsha's urban culture through the cooperation of new media digital technology, and builds and restores Changsha's urban life in 1980s. The creation of "Super Wenheyu" has been favored by people. In the peak season, people want to experience the charm of old Changsha, and the reservation number even reaches five digits. It can be seen that the catering space design with immersive experience as the core brings spiritual enjoyment to the audience, but also brings great economic benefits to the operators.

8 CONCLUSIONS

The digital transformation of catering space should follow the pace of the times. The design of immersive catering space not only uses new media digital technology to interact with new experience spaces and ways, but also takes the audience's physiology and psychology as the starting point and the foothold to satisfy the all-round feelings of oral, abdominal and audio-visual. Immersive dining space design broadens the expression form of new media digital technology, plays the role of the hub between people and technology, and provides infinite possibilities for the transformation of traditional dining space design.

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