An Empirical Study and Effect Evaluation of Installation Art and Computer Interactive Technology in Public Space

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Abstract. As a new art in the 20th century, installation art has developed into one of the most important mainstream art forms by the end of the 20th century. It has formed a three-pillar situation together with easel painting and media art in the three major contemporary art exhibitions in the world. In People's Daily life, more and more people are exposed to some new digital technologies and service platforms such as the Internet of Things. The use and popularization of these advanced digital technologies indicates that a new technological revolution has quietly come to people's lives[1]. In recent years, the rapid development of virtual reality (VR) and augmented reality (AR) technologies has not only completely transformed the interaction mode, but also created new opportunities in the art and entertainment industry. These technologies have brought a disruptive update to people's lives and creative activities, revealing endless possibilities. The continuous development of science and technology has greatly accelerated the innovation of artistic creation, especially the combination of computer technology and installation art. With the continuous integration of science and technology and art, people are full of expectations for the art works brought by this integration in the future, and believe that the installation art in the future can combine the cutting-edge computer technology to create more influential and attractive works.

Key words: installation art, computer interactive technology, public space

1 Introduction

Installation art originated in the early 20th century and was heavily influenced by Cubism and Dada, as artists began to experiment with pushing the boundaries of traditional art forms and working with ready-made and everyday objects. It emphasizes the close connection between art and life, as well as the interactivity between the viewer and the work. It lies in conveying emotions and themes through the combination of objects, Spaces and forms, breaking the inherent boundaries of art and providing the audience with a multi-dimensional artistic experience. The development of installation art not only enriches the forms of artistic expression, but also broadens the ideas and space of artistic creation. With the rapid development of Chinese society, new media video installation art has developed into the most forward-looking and representative expression mode in contemporary art with the help of rich information technology and multiple digital media.

In recent years, the application cases of computer interaction technology in public space of installation art are increasing day by day, injecting new vitality into urban landscape and

public space. With the use and popularization of new digital technologies and service platforms such as web2.0, 3G and Internet of Things, digital technology has provided strong technical support for public art to realize new functions and roles. As a part of public art, digital public art is developed from public art. Its performance is more colorful than traditional public art. The diversified media and all-round sensory presentation make digital public art a feast[2] for the public. For example, digital art wall, intelligent sculpture, immersive experience area, these application cases show the extensive application of installation art and computer interactive technology in public space, which not only enhances the aesthetic value of public space, but also enhances the interaction and connection between citizens and the city.

2 Integrated application of installation art and computer interactive technology in public space

2.1 Types of computer interactive technology and its application in installation art

Cognitive scientist Roger Schank noted that "human beings are born to understand stories, not logic"[3], and with the development of multiple interactive technologies, the application of interactive installation technology in the exhibition has become more and more diverse. The variety of computer interactive technologies is rich and varied, and has been widely used in installation art. The computer interaction technology and its application in installation art are:. Vocal cord electric signal interaction technology; Eye tracking technology; .electric touch technology, especially virtual reality (VR) and augmented reality (AR) 3D technology, which uses VR to create immersive experiences that allow viewers to dive into virtual worlds created by artists; AR superimposes virtual information on the real environment to enrich the level of the work; The Internet of Things technology realizes the real-time interaction between the works and the audience through sensors and smart devices. These technologies not only enrich the expressive force of installation art, but also enhance the audience's sense of participation and experience, providing more possibilities for artistic creation.

2.2 Analysis of specific application cases

Case 1: Micro Nature

Micro Nature, created by Chinese artist Guo Feixiang, is an installation art piece that incorporates interactive computer technology. The work uses a high-precision microscope and interactive projection system to enlarge and project tiny living bodies in nature onto a screen, enabling viewers to observe their ecological environment and life characteristics up close.

In MicroNature, the application of digital technology not only enables the magnification and projection of tiny living beings, but also enables the viewer to explore the mysterious world of these living beings through gesture control through interactive design. By touching the screen or gesture recognition devices, the audience can control the magnification of the projection, the direction of movement, etc., so as to have a deeper understanding of the form, structure and habits of these tiny living beings.

Case 2: The Rain Room

Rain Room is an interactive art installation by artists Christoph Bailey and Wolfgang Fratz.

The work uses advanced sensors and computer programs to achieve the effect of the viewer walking in the rain without getting wet. When the audience enters the rain room, the sensors will capture their position and movement trajectory in real time, and the direction and speed of raindrops will be controlled by the computer program to ensure that the audience will not get wet during the walk.

This work not only shows the innovative application of computer interactive technology in installation art, but also allows the audience to deeply feel the perfect combination of technology and art through interactive experience. In the process of participating in the work, the audience can not only enjoy the unique art experience, but also feel the convenience and fun brought by digital technology. This practice of integrating digital technology into installation art not only enhances the artistic appeal and interactivity of the works, but also opens up a new way for the development of installation art.

3 Empirical research

3.1 Specific technical introduction

When we analyze the methods and effectiveness of combining art and interactive computing technology in public Spaces, we must carefully consider two main technical directions. First, the artistic creation process is key, which involves the selection of appropriate materials and the planning and execution of artistic projects. Secondly, the introduction of interactive computing technology is another core aspect, which often involves the use of various types of sensors, the development of interactive interfaces, and the effective management and analysis of the collected data. Such integration of art and technology not only enhances the interactivity of public art works, but also greatly enriches their aesthetic value.

3.2 Experimental process and data collection

Table 1 Construction and arrangement of experimental environment

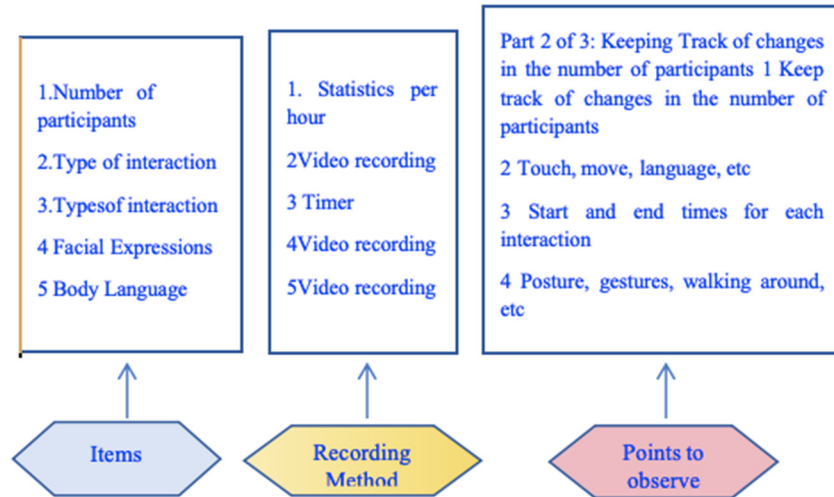| Projects	Description
Lab site	Downtown square
Art installations	"Interactive Light and Shadow Sculpture"
Computer Interactive system	Contains sensors, projectors, and interactive software
Environmental layout	Observation area is provided to ensure that participants' interaction is not affected

Figure 1 Recording and observation of participants' interactive behaviors

Table 2 Real-time collection and preliminary processing of data

Type of Data	Collection method	Initial disposal
Frequency of interaction	Automatic system recording	Summarize every hour to generate charts
Interactive success rate	Automatic system recording	Calculate percentages and identify problem spots
Participant feedback	Questionnaire survey	Summarize and analyze, extract key words
Technical performance data	System logs	Identify outliers and analyze performance bottlenecks

3.3 Data analysis and interpretation of results
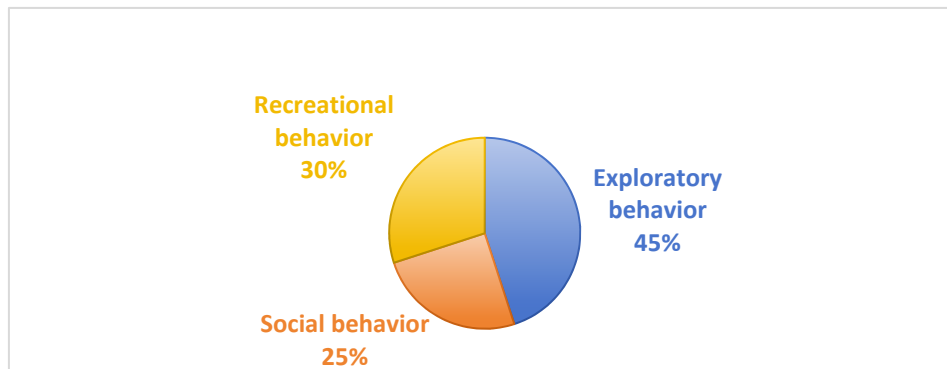

Figure 2 Analysis of participants' behavior patterns

3.4 Interaction effect evaluation

<p align="center">Table3   Evaluation of interaction effect</p>

Metrics	Numerical value	Participants' willingness to interact with installation art was high and the interaction frequency was moderate.
Interaction frequency	3 times/person	The longer duration of each interaction indicates that the participants have maintained their attention to the work for a longer period of time.
Duration of interaction	5minutes/time	Most of the interactions can be carried out successfully, and the integration of the installation art with the interactive technology of the computer works well.
Success rate of interaction	90%	Participants showed a high willingness to interact with installation art and a moderate frequency of interaction.

3.5 Analysis of the impact of installation art and computer interaction technology on the atmosphere of public space

First, the vitality of space has been significantly improved. According to the layout of the environment in Table 1, behavior records in Figure 1, and preliminary data processing in Table 2, the number of participants has been significantly increased by 20% through the introduction of installation art and computer interaction technology into the public space. This shows that this innovative art form can effectively attract and gather people, inject new vitality into the public space, and enhance the liveliness and interaction frequency of the space.

Secondly, the artistic atmosphere is significantly enhanced. The introduction of installation art works not only adds unique artistic elements to the public space, but also significantly enhances the artistic atmosphere of the space. According to the data interpretation in Figure 2, the creation of such an artistic atmosphere stimulated the participants' attention and discussion on art, and the amount of discussion on art-related topics increased by 50%. Although nearly half of the audience still engaged in exploratory behavior. But the change further proves the artistic value and influence of installation art in public space, adding a new color to urban culture.

Third, interactive experience significantly improved The combination of installation art and computer interactive technology has brought participants an unprecedented interactive experience. Participants are able to participate more deeply in the art works and interact with the works in real time, and this enhancement of interaction greatly enhances the participants' sense of participation and experience. According to our satisfaction survey, the score increased to 85 out of 100, a significant improvement that attests to the successful application of installation art and computer interaction technology in public Spaces, bringing a more pleasant and satisfying experience to participants.

4 Effect evaluation

4.1 Evaluation of the attractiveness of installation art and computer interactive technology in public space

By combining modern interactive technologies and art installations, public Spaces have

become more active and innovative. This combination creates a dynamic interactive environment in which artworks become dynamic entities capable of interacting with the audience. The works cut across age and cultural boundaries and appeal to people of all backgrounds.

This study aims to analyze how effective the introduction of art works and computer interactive technology in public Spaces is. According to Table 3, the research shows that most people show strong interest in this novel form of art display and are willing to participate in it. By recording the frequency and feedback of their interaction with art, it is evident that this form of art works has won wide praise from the public and effectively improved the audience's interaction level. As the research deepened, we noticed that integrating art and technology into public places not only enhanced the vitality of these areas, but also enhanced the effect of art transmission and improved the quality of interaction between people.

4.2 Participants' satisfaction and feedback analysis

In order to comprehensively evaluate the effectiveness of the project, we collected the opinions of participants in various ways, including questionnaire survey and face-to-face interview. Through these methods, we gained insight into users' views on the integration of art and computer technology. This innovative approach to combining significantly enhanced the user experience, earning a satisfaction rating of up to 85 out of 100. In addition, we discussed in detail users' acceptance of the technology, their preferences, and their suggestions for improvements. Through this feedback, we can gain a deeper understanding of the impact of installation art in public Spaces, as well as the public's expectations and acceptance of such interactive technologies.

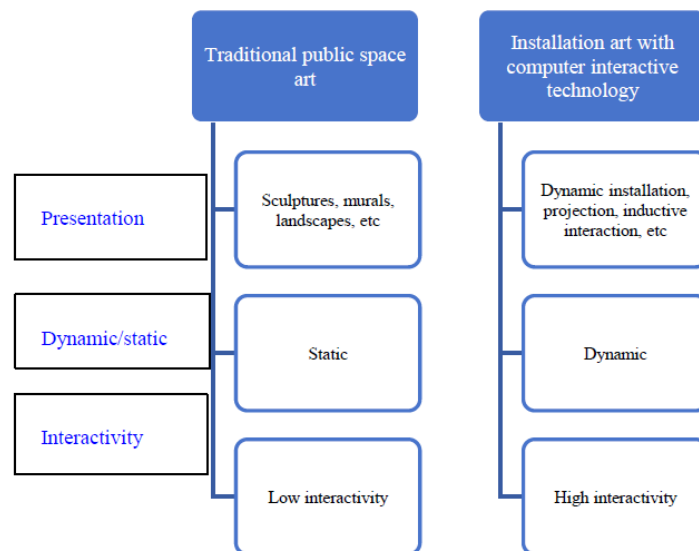## 4.3 Comparative analysis with traditional public space art forms
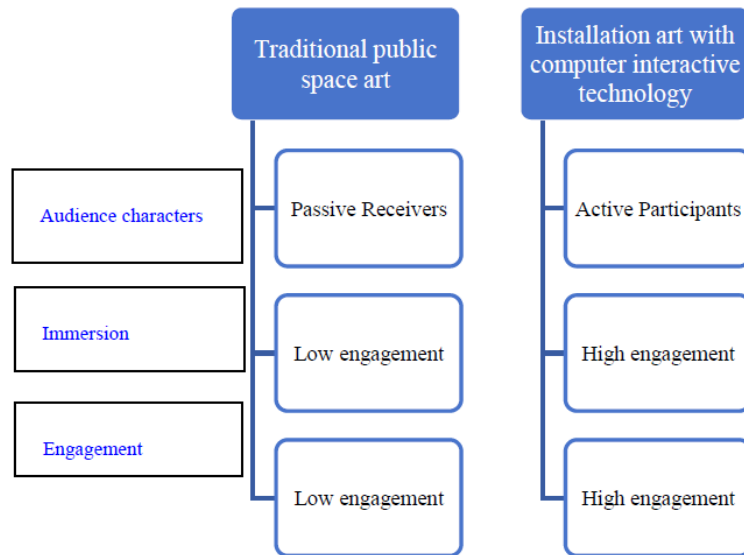

Figure 3: Comparison of artistic expressions

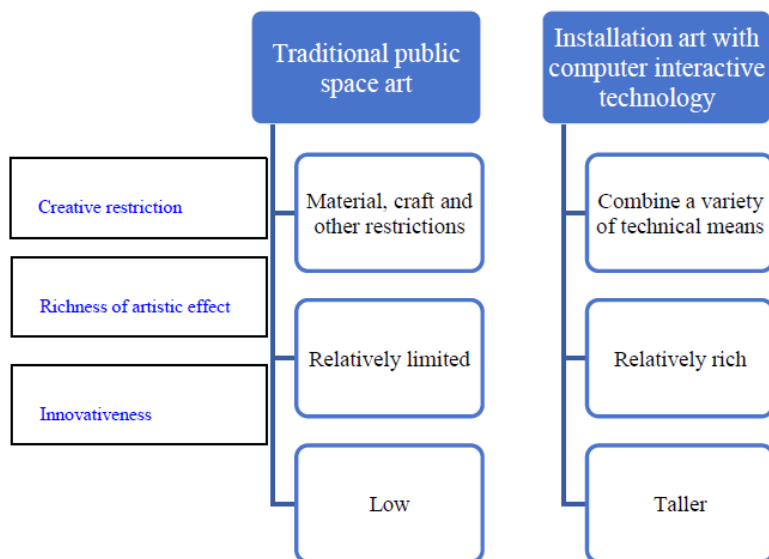**Figure 4:** Comparison of audience engagement

Figure 5: Comparison of flexibility and innovation in artistic creation
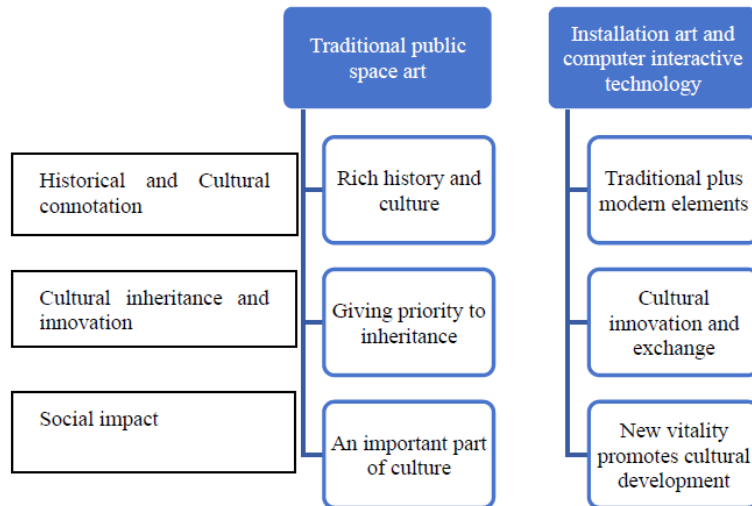
Figure 6: Comparison of social impact and cultural inheritance

5 Conclusion and Prospect

5.1 Summary of research conclusions

As shown in Figure 3-6 above, the empirical study of installation art and computer interactive technology in public space reveals a series of eye-catching conclusions.1. Innovation of art form; 2. the improvement of audience participation; 3, the expansion of space function; 4. the integration of technology and art 4. the improvement of social influence and value. In general, the empirical study of installation art and computer interactive technology in public space proves that this new art form has great potential and value, which can bring new artistic experience and cultural value to public space, and also make positive contributions to the development and progress of the city.

Using this strategy, the attraction of public space can be effectively improved, and more residents can be attracted to participate actively. By organizing innovative and interactive art exhibitions, people can be encouraged to stop and experience, thereby enriching the cultural life of the city. Such initiatives not only enliven public areas, but also help to increase citizens' understanding and interest in the value of art and culture.

Science and technology are driving innovation in the arts. By integrating multiple sensory elements such as sight, hearing and touch, emerging technologies have significantly enhanced the public's artistic perception and aesthetic experience. [4]Modern interactive art installations have brought audiences a more immersive engagement experience, enhancing their understanding and emotional resonance with the works.

As Reih Nakasu said, "It is necessary to study interactive technology and to develop and realize highly anthropomorphic communication by integrating communication technology and interactive technology"[5]. Through the integration of installation art and computer interaction

technology, the innovative vitality of urban culture has been promoted, and the further development of the industry has been driven. This technology gives artists and designers a broader space for creation, and effectively promotes the prosperity and development of cultural and creative industries.

5.2 Research contributions and implications for public space design

After a detailed investigation of the application of installation art and computer interaction technology in public places, it is found that these advanced technologies have greatly enhanced the charm and functionality of public space. The combination of modern art installation and interactive technology increases the activity and attraction of the place, and also improves the overall quality of the public art environment by creating innovative and interactive art works. This integration of art and technology encourages the viewer to take a more active part in the interaction of the environment, thus making the public space more engaging[6]. The diversity of installation art and the intelligent application of computer technology have jointly promoted the innovation of public space design and stimulated the creativity of designers. With the help of these high-end technologies, designers can create space designs that are both artistic and highly interactive. In addition, the combination of art and technology not only deepens the public's awareness of the cultural value of public art, but also enables the public to feel the intrinsic meaning of culture and art more deeply by providing more opportunities for interaction and participation, and enhances the public's sense of belonging and identity to public space.

To sum up, the empirical research of installation art and computer interactive technology in public space still has broad room for development. Future research should focus on the deep interactive relationship between technology and culture and society, improve data collection and analysis methods, and pay attention to the sustainability and long-term impact of technology, so as to promote continuous progress and development in this field.

5.3 Limitations of the study and future research directions

Although the empirical research of installation art and computer interactive technology in public space has achieved remarkable results, there are still some limitations, which also provides important inspiration for future research directions.

First of all, the current research mainly focuses on technology application and effect evaluation, and there is insufficient research on the deep interactive relationship between technology and social and cultural background. Future studies can further explore how installation art and computer interactive technology integrate with different cultural and social backgrounds, and how they affect public behavior and cognition.

Secondly, the data collection and analysis methods of empirical research still need to be further improved. At present, the traditional methods such as questionnaire survey and observation method are mostly used in the research. In the future, more diversified data collection methods can be explored, such as the use of sensors, big data analysis and other technical means to obtain more comprehensive and in-depth data support.

In addition, the sustainability and long-term impact of interactive technology between installation art and computer is also one of the limitations of current research. Future studies

could focus on the long-term effects of these technologies in public space, and how to achieve a harmonious symbiosis between technology and environment.

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