

The Practical Model of Public Art Participation in Community Aesthetic Education under the Digital Background

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Abstract: Digital technology has changed the inner logic of public art participation in community aesthetic education. Traditional community aesthetic education is limited by fixed carriers and an indoctrination mode at a particular time and place; digital technology can add interactivity, programmability and distributed existence to public art, spread aesthetic information everywhere at all times, and thus extend aesthetic education into an ongoing experience in people's daily lives. The three steps in this paper are theoretical correlation, communication mechanism and integration model. Research on the Bidirectional Expansion of Digital Attributes in Public Art in the Context of Community Aesthetic Education and the Paradigm Shift in the Mode of Reception from Physical Perception to Virtual Presence. Explore the Channels of Perception, Paths of Adaptation and Creation for the Aesthetic Community formed by Interactive Interfaces, Algorithmic Distribution and Asynchronous Co-presence. It will also be a Digital Twin with an organisation, a chain of cross-media stories, dynamic feedback adjustment and regulation, etc. Research has shown that the direction of digital community aesthetic education is no longer a one-way output; rather, it is a responsive and co-evolutionary system, and at the core of this system is a fluctuation in the supply and demand for aesthetics in the community.

Keywords: Digital Background, Public Art, Community Aesthetic Education, Digital Twin, Cross-media Narrative, Adaptive Regulation

Introduction

Digital technology is changing the form of public art and the basis for organising community aesthetic education. The traditional model is based on fixed works of art and people's consciousness, and its way of reception is generally one-way and static. With the spread of information in recent years, many people have become busier and more distracted by various activities at different times. With the help of digital technology, many kinds of public art have been created, and thus more people in the community have had the opportunity to learn about beauty. Systematic studies of the internal correlation, communication path and integration logic of the two are needed in theory. This paper will examine how digital attributes have expanded the concept of community aesthetic education, find the channels for perception and adaptation in the mode of communication, build a general framework for resource topology and adaptive regulation, and thus offer an organised system of explanation for community aesthetic education in the digital era.

1. Theoretical Correlation between Public Art and Community Aesthetic Education in the Digital Era

1.1 Expansion of the Connotation of Community Aesthetic Education by the Digital Attributes of Public Art

New functions of digital technology have added interactivity, programmability and distribution to public art, and thus the problems of traditional public art related to physical carriers and one-way communication have also been solved. Public art in communities is no longer limited to the traditional forms of fixed sculptures and murals; now, aesthetic information is being spread in daily life through various means, such as sensors, projection mapping, mobile terminals, and so on. Embedding methods extend the occurrences of aesthetic education from a single viewing occasion to continuous experience

in daily life and thus change the indoctrination logic of community aesthetic education from one based on fixed time, place and content.

Therefore, the connotations of community aesthetic education will be extended in two ways. First, digital public art can be created with the active participation of the public, and various aesthetic responses will be produced; thus, aesthetic education will change from passive reception of existing works to active participation in the co-creation of meaning. Second, with the help of network protocols, various parts of the community can be connected to create cross-regional aesthetic dialogues and expand the scope of community aesthetic education from physical neighbourhoods to virtual spaces. Expansion does not refer to the addition of new media; rather, it is a restructuring of the element structure of aesthetic education that has blurred the boundaries among creators, works, recipients and spatial environments, thus enhancing the adaptability and generative capacity of community aesthetic education.

1.2 Reconstruction Logic of the Aesthetic Education Function of Community Space in Digital Media

The aesthetic education function of traditional community spaces is based on the visual order of the form of buildings, landscape arrangement and public facilities, and its mode of operation is mainly static perception and indirect suggestion. With the help of digital media, community spaces have become programmable interactive environments, and various works of art can be displayed dynamically on walls, floors, public screens, and even in sound fields. Therefore, the trigger for the aesthetic education function is no longer a fixed work of art, but rather the flow of information in the space and the real-time interaction activities among residents; thus, the space itself becomes an active carrier of the process of aesthetic education^[1].

The three links in the logic of reconstruction are: First, there is the reconstruction of spatial cognition; Second, digital public art is used to add virtual superimpositions or augment reality; Third, people are inspired to see their daily lives in a new way out of aesthetic curiosity. The second level is the reconstruction of functional temporality; that is, different digital art contents can be shown in the community area at various times according to the aesthetic education needs of different social activities in the morning, afternoon and evening, thus achieving temporal differentiation of functions. Third, there is a reconstruction of participation relations. Now we can gather people's impressions, voices and mobile phone usage data on the digital public art they have interacted with, use this information to update the aesthetic education parameters of the area, and thus change this space from a "container for indoctrination" to a "field of co-creation". The three stages of the reconstruction work together to form a new model for the aesthetic education function of community areas and will no longer be carried out separately.

1.3 From Physical Perception to Virtual Presence: The Paradigm Shift in the Reception Mode of Aesthetic Education

Physical perception is based on displacement, gaze and how close we are to a place in the world; thus, its aesthetic reception is immediate, embodied and unrepeatable. New forms of aesthetic education have been introduced for the public in the digital age via virtual reality, augmented reality and telepresence technology. Virtual Presence does not need to be in a particular place; rather, through appeals to the senses and interactive responses, a sense of beauty can be created in the virtual world. Therefore, people will be able to participate in the community's aesthetic education classes more easily at any time and in any place.

The first reason for modifying the model is that the generation logic of aesthetics has been changed. The basis of the foundation for perception is the actual distance and material texture of the work from one's body; virtual presence is created by modifying all kinds of sensory information in a digital model and through one's own actions. The recipients of the community aesthetic education can enter the virtual community space of public art from any end point, join in aesthetic activities as avatars, and even communicate with other recipients from different places and at different times in real time. Therefore, there is no longer a distinction between "audience" and "work", and an unbroken "participant-environment" has been created. At the same time, virtual presence still has embodied attributes; motion-sensing devices, spatial audio and tactile feedback are employed to put the body at the centre of the aesthetic experience, and only the material boundary of the body needs to be crossed by digital information. It does not need to be learned by physical sensation; it can also be used to learn about aesthetics in a different way and expand the opportunities for participation in community

aesthetic education.

2. Communication Mechanism of Community Aesthetic Education via Public Art under the Intervention of Digital Technology

2.1 Interactive Interfaces and Immersive Experience: Perceptual Channels of Digital Public Art

Interactive Interfaces are the technical links that connect digital public art with the community, and they determine how effectively the aesthetic education information in the artwork system can be received by people's senses. Many kinds of interactive interfaces are employed in communities, such as touch screens, motion-sensitive detectors, voice-operated devices, mobile applications, etc. These interfaces are not passive carriers of information; they are also sensitive to responses, feedback modes and operating logic, and thus they affect how much the residents are moved by the art. If the interface can sense the path of movement or voice commands of people in real time and change the content of digital art according to this information, then the perception channel will be improved from one-way reception of sight and sound to a closed-loop perception-action cycle, extending the continuity of aesthetic attention and creating a sense of participation^[2].

An Immersive Experience is the result of the combined functions of many senses. All kinds of senses can be stimulated by high-definition projection, sound fields, tactile vibration feedback, changes in ambient temperature and other ways of experiencing digital public art. In this case, people's normal sense of place is temporarily blocked, and they are led by the perceptual rules of digital art. The power of the immersive effect depends on how well all the senses are coordinated and consistent; if there are any differences or delays among them, people will lose the sense of immersion. Now that we can accurately adjust the perception channel of the public with digital public art, we will spread community aesthetic education silently, without words or text; instead, we will directly affect the residents' sense of aesthetics by changing their sensory experience.

2.2 Algorithmic Distribution and Community Cultural Genes: A Precise Adaptation Path for Aesthetic Education Content

Organize the collected and organized data of people's aesthetic behaviour by the algorithm, and then present the public art content in an organized manner for different people or groups. At the same time, during the course of community aesthetic education, an algorithm will also collect behaviour data on when residents live together and how often they interact, etc. Based on the above model, the content will be labelled as public art, and it will be determined which type of digital work is displayed at a particular time and in a specific place. It is not to be considered a "fixed display" of traditional public art, but rather has been given the attribute of change and can be adapted more easily to the aesthetic demands of the public.

A good way is to use an algorithm to compute the features of the community's cultural genes. Community cultural genes are a stable system of aesthetic ideas, symbols and perception habits that have been formed by a group of residents over a long period of cohabitation. For example, if the community is generally fond of nature and a slow life, then more weight will be given to distributing digital public art works with such features. It is not that we need to meet people's demands; rather, by slightly deviating from expectations, we can create a sense of aesthetic defamiliarisation and offer a new kind of pleasure. The main direction of the special adaptation path is to keep the good balance between the stability of community cultural genes and the demand for newness in aesthetic education.

2.3 Asynchronous Co-presence and Emotional Bonding: The Creation of the Community Aesthetic Community in Remote Participation

Asynchronous co-presence is a type of perception in which different people are at different times but are still sharing the same aesthetic experience or aesthetic space through digital public art. In the past, community aesthetic education had to bring all the residents to one place to create a sense of unity. Digital public art has been used to achieve this end; a work of public art can be repeated for seven days, and different residents will experience it at various times; the system will save the operation record, comments or generated artistic variations, and these can be viewed by later visitors. Later, one can observe the results of the interaction among the previous participants and feel the sense of co-presence over time. Asynchronous co-presence does not need to be based on the collection of real-time group

data for community aesthetic education; instead, it will gradually form an ongoing aesthetic conversation^[3].

Emotional connection is based on the idea of asynchronous co-presence. The digital public art system can collect data on people's emotions during the viewing of works of art (such as heart rate sensors, facial expression recognition, active ratings, etc.) and then display this emotional information visually on public screens in the community. When a resident finds out that another resident had the same emotional reaction to the same work of art three days ago, an unspoken emotional bond is formed between the two. The bond does not need to be put into words or expressed directly; rather, it is formed through the shared emotional experience of a work of art. As more and more people have joined in, these unexpressed emotional links have gradually formed a community aesthetic culture; it is a relatively loose but authentic group structure based on aesthetic resonance and mediated by digital public art. The generation logic of this community offers a new way for social support to the aesthetic education of communities in the digital age, and it is not a physical meeting place.

3. Integrated Model of Community Aesthetic Education Based on Digital Public Art

3.1 The Topological Network of Community Aesthetic Education Resources in the Digital Twin Framework

A Digital Twin of the real environment in the community will be created to collect live data and build a virtual world that is very close to life in the actual community. Based on the above, the resources of public art in the community, such as permanent works, temporary exhibitions, architectural interfaces, natural landscapes, aesthetic features created by residents, etc., will be organised as data units and tagged, retrieved and recombined. All of them have metadata, such as location coordinates, shape descriptions, interaction attributes and historical access information, so they can be regarded as digital asset libraries for aesthetic education resources. The two maps will show the distribution and unevenness of aesthetic education resources in the community that are difficult to quantify^[4].

Construct the topology network of aesthetic education resources in a Digital Twin, and based on the data units mentioned above, the movement paths, gaze trajectories and interaction behaviour of residents in both the virtual and real environments are taken as edges to form a dynamic resource association structure. A typical attribute of a topological network is that the weight of a link between two nodes is not constant but rather depends on the frequency of participation by residents in artistic activities. When a resident clicks on the detailed information of a public artwork in the virtual mirror, a weighted connection is added between the node of that public artwork and the node of the resident's preference. When many residents have the same way of using the aesthetic education resources, clusters will also form around the nodes of these resources. Topology Network does not have an old hierarchy for resource division; thus, all kinds of resources can be freely combined and used together to provide more options and flexibility for the aesthetic education of communities than are available in physical spaces.

3.2 The Chain Generation of Community Aesthetic Experience Driven by Cross-media Narrative

Cross-media narration is the spread of the same aesthetic idea through all kinds of platforms and in various forms of media to create new intertextual relationships. In the context of community aesthetic education, the main story of a digital public artwork can be shown simultaneously on outdoor screens, mobile apps, wearable devices and soundscape installations, and each media version is not only the original but also presents different narrative fragments in line with the characteristics of that medium. All the parts of the same story can be found in different forms and at various times and places, and thus a whole work of art is gradually created. Through all sorts of channels, these works have been widely spread and the experience of art has reached people all over the world.

A chain is a set of such aesthetic experiences that have been accumulated over a long time. When a resident sees the preview area of a digital public work on their mobile phone, they will be motivated to create something beautiful. Then, when the resident sees the whole projection of the same series of works in the community square, they will be in a good mood. Then, the resident will see the interpretations and secondary creations made by other residents in the community forum and be impressed by them. Finally, the resident can actively participate in a new round of creation for the narrative and become a reproducer of aesthetic education. Each link in this chain is based on the experience of the previous link, and at the same time, it also offers cognitive and emotional support for

the following link. Chain generation for the narrative turn in cross-media aesthetic education creates a series of linked experiences with internal logic, and it has increased both the length and the scope of the impact of aesthetic education^[5].

3.3 Adaptive Regulation Model for the Effect of Community Aesthetic Education Based on Dynamic Feedback

Collect and analyse the behaviour data of students in the community's aesthetic education system to build an intelligent feedback mechanism. The above data show the frequency of residents' contact with public art, how long they stay, the types of activities, emotional responses and spontaneous sharing behaviour. Collect the above data from the sensor network and terminal logs, then combine all the different types of information at this place to obtain quantitative indicators of the aesthetic education response. Not only are there no longer the need for regular questionnaires and external evaluations, but changes in the condition of the recipients during the course of aesthetic education can also be observed in real time, and frequent feedback can be obtained.

With the changing circumstances of the environment, the adaptive regulation model will adjust the content of aesthetic education according to all sorts of needs of the students. The model has an aesthetic sense and a regulation algorithm; if it finds that the popularity of interaction for a public work of art has dropped significantly or the average dwelling time is shorter than the set period, it will assume that there is a mismatch between the current content and the aesthetic expectations of the public and automatically trigger content replacement, optimisation of the interactive interface, or adjustment of the speed at which the narrative is presented. At the same time, if a particular type of work arouses strong emotions and is frequently shared, the model will increase the distribution weight of similar works or extend the display time of these works. Do not be rigidly bound by the rule stipulated in the rules; instead, through machine learning, one can continuously learn the response patterns of the community aesthetic education system and adapt in line with changes in community cultural genes. The first goal of the adaptation and regulation model is to change the form of organisation for community aesthetic education from a one-way output to a responsive co-evolutionary system so that it can meet the changing aesthetic needs of the community and avoid dictation by external forces^[6].

Conclusion

Research on the Operating Logic of Public Art Participation in Community Aesthetic Education in the Digital Age from the Perspective of Theoretical Correlation, Communication Mechanisms and Integration Models is carried out in this paper. Based on the above studies, digital attributes can solve the problems of physical carriers and one-way communication in public art; thus, the concept of community aesthetic education is changing from "reception of established works" to "participation in co-creation of meaning", the function of aesthetic education in space is shifting from passive giving to active negotiation, and the mode of reception has been extended to include a parallel path of virtual presence. The Form of Communication should be to create interactive Interfaces and immersive Experiences that form a closed-loop perception-action cycle; algorithmic distribution can dynamically adjust the content of aesthetic education according to the cultural genes of the community, and asynchronous co-presence and emotional bonding can generate a community aesthetic culture based on aesthetic resonance. The resource topological network at the level of the integration model in the digital twin framework is unhierarchical, cross-media narratives drive the chain generation of aesthetic experience, and an adaptive regulation model based on dynamic feedback has been added to improve the responsiveness and co-evolutionary ability of the aesthetic education system. Based on the above results, more studies will be carried out in the future to explore the differences in the effects of aesthetic education for digital public art among various types of communities and their moderating factors in more detail; multimodality will be added to provide a more precise quantitative analysis of the effect of aesthetic education, and the mechanism of interaction between the virtual aesthetic community and the structure of the physical community will be investigated; adaptive algorithm models for community aesthetic education will be developed, and the response characteristics of these models to different cultural genes will be tested in simulation environments. The progress in the above areas will further strengthen the theoretical system and technological foundation for public art participation in community aesthetic education in the digital age.

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