Research on the Application of BIM in Environmental Art Design

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Abstract—The work of environmental art design involves multi-disciplinary fields. At the same time, we also need to complete multiple tasks such as information statistical processing, three-dimensional model construction, real-time scene simulation, and drawing construction drawings. Traditional two-dimensional design technology has been unable to meet the actual needs of environmental art design work. With the continuous development and maturity of BIM technology, it can provide a new structural system and information integration platform for environmental art design work. In this way, not only data information such as material properties and building structure can be highly integrated, but also the view frame can be accurately simulated and analyzed, and real-time scenes can be presented intuitively. In order to make the drawing of construction drawings more accurate and reasonable, BIM technology should be actively used to comprehensively improve the quality and level of environmental art design.

1. Introduction
Building Information Modeling (BIM) technology is a new model technology developed based on advanced technologies such as computer technology and network information. It has the characteristics of visualization, simulation, and high integration of information. With the development and improvement of BIM technology, its application fields are also expanding. Environmental art design is an emerging discipline that integrates the design of the architectural space environment in the way of art design. The subject areas involved are very wide, and we need to comprehensively apply multi-disciplinary theoretical knowledge. At the same time, we need to fully grasp various information and data in the design work, so as to complete the tasks such as three-dimensional model construction and construction drawing. Therefore, we need to actively introduce and use BIM technology on the basis of two-dimensional design methods. We should build an information platform through BIM technology and establish a database to achieve a high degree of integration of multi-disciplinary information. Meanwhile, we can also use BIM technology to achieve 3D modeling and simulate real-time scenes. In order to optimize the environmental art design plan, make the design plan more reasonable, improve the quality of environmental art design, and achieve the goal of promoting the level of environmental art design in China.

2. Basic Concept Analysis

2.1. Overview of Environmental Art Design
The so-called environmental art design is the integrated design of the indoor and outdoor spaces of the building in the way of art design, which is a comprehensive practical art subject. It has extensively designed theories in the fields of environmental behavior, environmental ecology, architectural engineering, and design. In the practice of environmental art design, the texture, shape and color of the walls, columns, doors and windows, ceilings, and ground of the building's indoor and outdoor spaces are treated with artistic means such as enclosures. Through the use of design elements such as ornaments, lighting, and home furnishings, as well as the reasonable configuration of sculptures, flowers, plants, and other small items, the architectural space environment can present an atmosphere with different style characteristics. So as to meet people's aesthetic needs on the basis of ensuring the realization of the indoor and outdoor space functions of the building [1]. Environmental art design is an emerging discipline in China, which takes architectural indoor and outdoor space environment and living facilities as the main design objects. With the development of this discipline, its design objects have gradually developed in the direction of large-scale architectural unit environment, overall interior and exterior spaces of buildings and even urban overall environmental design. Therefore, people have higher and higher requirements for design technology, and traditional two-dimensional design methods can no longer fully meet the actual needs of environmental art design work.

2.2. Overview of BIM Technology

2.2.1. Analysis of the Basic Meaning of BIM Technology

The so-called BIM technology is Building Information Modeling, which mainly constructs three-dimensional models based on building data information, and realizes information sharing and communication on the basis of highly integrated data information. It can not only calculate and analyze the physical characteristics and full life cycle of construction projects according to industry standards, but also provide reference for project design and planning, construction and operation and maintenance decision-making, so that the value of the project can be comprehensively improved [2]. With the development of BIM technology, its application fields are also expanding, and it has become an important design method in environmental art design work. Software such as Revit with BIM technology can virtually simulate and visualize environmental art design schemes. This can not only improve the accuracy of drawing construction drawings, but also effectively improve the quality and efficiency of environmental art design work. As a result, the use of BIM technology for environmental art design has become an important development direction in the field of environmental art design. The application of BIM technology can be seen in Figure 1.

![Figure 1. Schematic Diagram of the Application of BIM in Environmental Art Design](image-url)

2.3. The Application and Development of BIM Technology in Environmental Art Design

On an international scale, the United States and other Western countries have used BIM technology in the field of environmental art design earlier, and have formulated relevant specifications and templates. BIM technology has been effectively applied in the environmental art design of many architectural projects. China started relatively late in the use of BIM technology for environmental art design. However, with the promulgation of relevant national policies to promote the development of the construction industry, BIM technology has become one of the key links of development. Especially as
China proposes that the proportion of prefabricated building decoration should reach 20% in 2020, and should reach the development goal of more than 50% in about 2025. BIM technology has become the technical basis for the integration of data and information for fabricated decoration. As a result, BIM technology has broad application prospects in China's environmental art design [3].

3. Analysis of Application of BIM in Environmental Art Design

3.1. Analysis of the Main Functions of Building Information Modeling Technology (BIM) in Environmental Art Design

3.1.1. BIM Technology can Realize Visual Presentation Function

Modern architectural forms continue to develop in the direction of diversification and complexity. In consequence, people's requirements for the level of environmental art design and the accuracy of drawing construction drawings are constantly increasing. It is difficult to ensure the smooth progress of project construction using traditional two-dimensional design methods. Because BIM technology can visually present the design plan through 3D modeling, it can make designers and construction units and other project participants more intuitively understand the environmental art design plan [4]. Using BIM technology, environmental art designers can intuitively understand architectural construction and environmental art design effects, discover problems in the design plan in time and make corresponding adjustments. In the meantime, they can also enable the construction unit to accurately design intent, grasp the key points of construction, improve the construction schedule, and shorten the construction period. The owner can also use the BIM model to share information resources, making project management more scientific and efficient.

3.1.2 BIM technology can Promote Coordination Between Different Special Projects

Environmental art design is a comprehensive work involving many fields, which requires data support and coordination from multiple departments and special projects. The application of BIM technology can not only realize the efficient integration of various data information, but also provide a platform foundation for the communication and coordination of all parties. This is conducive to the coordination and unity of all items, so that the environmental art design plan is more in line with the actual situation. It has high rationality and feasibility, which is conducive to the overall improvement of the quality and level of environmental art design.

3.1.3 BIM Technology can Simulate Scenes

Because BIM technology has a virtual simulation function, it can simulate environmental art design schemes. In this way, it can help designers understand the links that cannot be tested and practiced in reality, and thus can provide a reliable reference for the adjustment and optimization of the design plan. Simultaneously, BIM technology can also carry out simulation experiments according to the environmental art design plan to verify and analyze the feasibility and rationality of the design plan [5]. Otherwise, engineering cost control is also an important content that must be considered in environmental art design work. The simulation function of BIM technology can also realize the effective control of the project cost, which plays an important role in the realization of project benefits.

3.1.4 BIM Technology can Highly Integrate Various Data Information

BIM technology can realize parametric design. In environmental art design work, we can use BIM technology to record in detail the structural form and material attribute information of building soft or hard decoration. At the same time, we can also draw construction drawings on the basis of 3D model construction, which can effectively improve the accuracy and efficiency of drawing construction drawings.
3.1.5 BIM Technology can Provide A Technical Foundation for the Conversion of Environmental Art Design Results

The use of BIM technology in environmental art design work can make full use of its functional characteristics to integrate various data information such as building construction, furniture and related equipment specifications. This can not only improve the quality of space design through the standard modulus method, but also eliminate the barriers between environmental art design and construction practice, which is conducive to the accurate transformation of design results into industrial products.

3.2. Application of BIM in Environmental Art Design

3.2.1. How BIM is Used in Environmental Art Design

Traditionally, in the environmental art design work, we mainly rely on CAD and other two-dimensional design techniques to design the flat elevations and cross-sections of the building's indoor and outdoor spaces, and then use 3Ds Max and other software to make three-dimensional renderings. This design method is not only difficult to achieve effective integration of modern complex building space environmental data information, but also cannot visually present the design plan, and is not conducive to the drawing of construction drawings and project management. Compared with traditional technology, BIM technology can not only provide important technical support for solving these problems, but also can effectively improve the level and quality of environmental art design. The database constructed using BIM technology can highly integrate different building material attribute information, scene information, and various facilities and other building data information. In the meantime, it can provide convenience for data query, call, improvement and update, and environmental designers can conveniently retrieve and query the materials and specifications of personalized building materials or decorative materials during design. Besides, based on the BIM model, various tables can be drawn conveniently and provide technical support for the optimization of environmental art design schemes and the control of project cost budgets. Environmental art designers can use BIM technology to fully understand the building data, complete the space planning and the formulation of the schedule. Moreover, they can use BIM technology to improve the accuracy of detailed drawing design, and adjust the design data accordingly according to the material cost budget. In this way, the linkage modification of all design related links can also be realized. What’s more, when the designer modifies the specification or position of a component in the indoor and outdoor space of the building, the BIM 3D model can automatically dynamically adjust the 3D view and the corresponding elevation and section according to the design modification information. BIM technology can be visually displayed through its visualization function, so that environmental art designers can understand the overall design effect after modification in time.

3.2.2. Analysis of the Advantages of BIM Technology in Environmental Art Design Compared with Two-dimensional Design

Compared with traditional two-dimensional design methods, three-dimensional collaborative design based on BIM technology has significant application advantages in environmental art design work. It can use its information platform to strengthen coordination and communication between different disciplines, and use BIM three-dimensional models to realize collaborative design. Environmental designers can not only use the BIM model for simulation analysis, and timely discover the unreasonable points in the design plan, but also can easily modify and adjust the three-dimensional model, and obtain the coordination of other related special projects. Traditional two-dimensional design technologies such as CDA are difficult to integrate with technologies such as CAM and CAE, but the use of BIM technology makes it possible. The use of BIM technology can reduce the probability of errors in the environmental art design process. It can perform collision checks in the BIM model and find and analyze errors and omissions. It effectively avoids the cost and waste of resources caused by traditional two-dimensional design methods that cannot be checked for errors during the design process. Simultaneously, the use of the BIM model not only facilitates the
modification and adjustment of the design plan, but also realizes the linkage adjustment of all related links, which greatly reduces the difficulty of design adjustment. Because BIM technology has strong directness and three-dimensional characteristics, it can intuitively visualize the effects of environmental art design through the components of the BIM model. This has changed the limitation of traditional two-dimensional design methods that can only rely on indirect platform diagrams or projection methods to display design effects. Moreover, BIM technology should be able to directly complete the drawing of two-dimensional drawings based on three-dimensional models, while construction drawings or three-dimensional axonometric drawings cannot be directly obtained from traditional two-dimensional drawings. Otherwise, the use of BIM technology can also realize the digital transfer of links from design schemes to project construction management and later operation and maintenance through the in-depth development of BIM models. In this way, the environmental art design service can be extended to the entire life cycle of the project, which greatly increases the added value of environmental art design. What's more, the application of BIM technology eliminates the barriers between the environmental art design link and engineering construction practice, improves the overall engineering sense of the environmental art design scheme, and realizes the effective combination of design and construction. The use of BIM technology in environmental art design work can also effectively solve the problem of indoor and outdoor spatial layout of buildings. This allows designers to more intuitively understand the effects presented by the design scheme, and greatly improves the quality and efficiency of environmental art design.

3.2.3. Analysis of BIM Application Practice in Environmental Art Design

With the continuous deepening of the application of BIM technology in the environmental art design work practice, many projects have adopted BIM technology in the environmental art design. Let's take the environmental art design of a cultural and artistic center as an example. The cultural and artistic center not only has a complicated interior layout structure, but also involves many electromechanical equipment. This puts forward a great adjustment to the environmental art design, and traditional design methods cannot meet the actual needs of the project's environmental art design. Therefore, we decided to use BIM technology for this environmental art design. In design practice, environmental art designers use BIM technology to construct various professional models, and use the collaborative function of BIM technology to assemble different professional models, making it a platform basis for effective communication between different majors. At the same time, environmental art designers make full use of the visualization function of BIM technology to intuitively display the design plan of the building's interior space, and also intuitively present data information such as the location and layout of various electromechanical facilities and HVAC equipment. All relevant majors can use the BIM model to confirm or modify their associated information. This greatly improves the synergy of environmental art design, and improves the rationality and feasibility of the overall environmental art design. Simultaneously, environmental art designers also made full use of Ecotect and Autodesk and other tool software in the design of the project, and conducted in-depth demonstration and analysis of building performance. This further optimizes the total plan of the building space environment and provides a reliable data basis for the analysis of different design plans for nose drops. Besides, the environmental art designers also actively used professional software such as Revit in the BIM system when deepening the design of the construction drawings of the project. Compared with traditional Auto CAD software, it can construct three-dimensional models more efficiently and accurately, and provide convenience for data integration processing and drawing construction drawings. Through the use of professional software such as Autodesk and Vault in the BIM technology system, the whole process control of the artistic design data information and design process of the project environment is realized. This not only improves the data integration effect and the feasibility and rationality of the environmental art design plan, but also gives full play to the advantages of BIM technology in the environmental art design work, making this environmental art design effect meet the project requirements.
4. Conclusion

BIM technology is a new building model technology with a high level of information technology. In the meantime, it has a visualization function, which can construct a three-dimensional model and perform virtual simulation and intuitive display of design effects. In addition, it may provide a platform foundation for data integration and sharing and communication of different professions. As a result, using BIM technology in environmental art design work can not only achieve a high degree of integration of complex data and information, but also use the visualization function of BIM technology. BIM technology uses three-dimensional modeling for intuitive display, which effectively improves the rationality and feasibility of environmental art design, and promotes a significant improvement in the quality and efficiency of environmental art design. Environmental art designers should strengthen the research and application of BIM technology, and give full play to the advantages of BIM technology in environmental art design work. In this way, the level of environmental art design can be continuously improved, thereby promoting the modern development of the field of environmental art design in China.

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