

Architectural Design Teaching Based on the Concept of Green Building

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Abstract: Under the current situation of resource shortage and environmental deterioration, green building is one of the important measures to realize energy conservation and emission reduction in the construction industry, and also an important aspect to achieve social sustainable development. However, it often backfires in the practical promotion and application at present, and the lack of systematic evaluation index system and comprehensive evaluation method is one of the main reasons for the lack of systematic evaluation index system and comprehensive evaluation method in the design scheme decision-making period, which has an important impact on the quality of green building projects. The purpose of this paper is to study the teaching of architectural design based on the concept of green building and to provide appropriate Suggestions for the teaching of architectural design. Based on the basic meaning and principles of green building design and the definition of design scheme evaluation, this paper extends the meaning of green building design scheme evaluation. On the basis of analyzing the purpose and criterion of comprehensive evaluation of green building design scheme, this paper summarizes the basic theories and methods of green building design teaching research, so as to provide a boost for architectural design teaching.

1. Introduction

In the middle and later part of the 20th century, with the rapid development of human economy and society, the crisis of environment and natural energy has become increasingly serious. The energy consumption of buildings has accounted for 30% of the average energy consumption of human society. Therefore, people gradually begin to re-examine the close relationship between building people, buildings and the natural environment [1-2]. Green building is an inevitable result of realizing renewable and sustainable development of architecture [3-4].

Green building incentive is of great significance for promoting the development of green building. However, it lacks a systematic review of existing knowledge. Through a systematic review, Olanipekun Ayokunle and Olubunmi summarized the common theme of green building incentive studies. Olubunmi and Olanipekun Ayokunle found that the general research fields of green building incentive are incentive classification, the effectiveness of incentive in promoting the development of green building, the criticism of the implementation of current green incentive and the strategies to improve the incentive of green building [5]. High indoor environmental quality (IEQ) must be maintained to create a healthy built environment for occupants. The purpose of Wei, Wenjuan is to analyze how and to what extent indoor air quality (IAQ) as a subset of IEQ is taken into account in the global green building certification. Therefore, 31 green building certifications from 30 countries all over the world have reviewed the indoor air quality requirements [6]. As the sustainability of building works has become a major concern for building professionals, the government has developed a number of different green building rating systems to ensure that building works are designed and built using strategies designed to minimize or eliminate environmental impacts. In the United States, although the energy and environmental design (LEED) green building rating system has been widely accepted as a national standard for sustainable building design, the assessment of green buildings is challenging and time-consuming due to its complex process [7].

Based on the research on architectural design teaching under the concept of green building, this paper proposes the construction principles and strategies of green building design [8]. With the reality of our country, to build the corresponding design scheme evaluation standard system, able to timely and accurately according to the requirements of project construction is put forward to relevant design requirements, to strengthen the associated with green building standards unified coordination and connection between the relations, which is beneficial to combined with teaching practice, enhance students' understanding of teaching [9-10].

2. Proposed Method

2.1. Green Building

The basic features of green buildings mainly include the following: first, resource conservation, including building energy conservation, land conservation, water conservation and material conservation. Buildings naturally consume a large amount of natural resources in the whole process of design and construction. Second, protect the environment and reduce air pollution. In the process of the initial construction and implementation of green engineering building, special attention should be paid to the long-term protection of the indoor environment to minimize the adverse impact on the indoor environment. Third, the total life cycle. Green building project implementation and operational management must first give full consideration to the green building of the year and use life cycle, from the design phase of the project planning and construction, the construction project delivery started running cycle environmental benefits, economic benefits, each cycle stage management of project owner and participants to communicate each other optimization combination management.

2.2. Teaching of Architectural Design

At present, in the field of civil engineering of higher education in our country, the green building theme involves architecture, civil engineering, landscape architecture, urban and rural planning, materials science and engineering, management science and engineering disciplines, respectively, in the field of how to promote building green performance has carried on the beneficial exploration and attention, but not a discipline with green building design as the core to carry out teaching and research activities, colleges and universities in the teaching of green design is still confused. The training goal of traditional architecture is to impart the theory of architecture based on "function and form" to students, while the design theory and method of green building pay more attention to technical measures on the basis of "function and form".

3. Experiments

3.1. Experimental Background

Green building mainly refers to use in all kinds of building all life cycle, maximum efficiency to save resources, reduce the pollution of building environment and life for modern people to provide efficient, healthy and comfortable living space, green building construction technology attaches great importance to energy saving, environmental protection and high efficiency, low consumption, economy is one of the important methods of realizing the sustainable development. Therefore, green building design under the background of architecture design professional talent training to promote the health of green construction in our country although has important guiding significance to the sustainable development, only by new teaching methods of the green building related pattern innovation and teaching reform, to the construction development of our country develop more innovative professional talents for the future.

3.2. Research Process

A design competition with the theme of green building concept was held among students majoring in architectural design in a university. Group planning and design of no less than 15 single

buildings in a given area of competition land is carried out to reflect the integration of building groups and environment and meet the needs of rural lifestyle. Monomer rural residential building design, covers an area of 150 square meters per family (including the inner courtyard), rural housing for 1-2 layer and a building area of 100-120 square metre, door model the design to meet the daily use as the basis, should include at least the following space: 1, 3 bedrooms, living room, kitchen, storage room, toilet, auxiliary and so on. The height of rural housing should be 3 meters. The competition requirements are shown in Table 1.

Table 1. Competition design requirements

Competition topic	The construction demand of settlement of farmers and herdsmen in new rural communities		
Competition purpose	Learn about green building	The competition content	To plan and design a cluster of not less than 15 individual buildings within a given competition site
Site design	Design the site according to the current situation of the site	Green design	The solar energy area is calculated according to the level of per capita electricity consumption
Achievement expression achievement	Includes six A1 drawings and a design note		

4. Discussion

4.1. Research and Analysis of Architectural Design Teaching Based on the Concept of Green Building

As shown in Figure 1, the difference between the concept of green building and the traditional concept lies in the awareness of energy conservation of materials, and the concept of sustainable development runs throughout the architectural design. In the design process, instead of purely applying the knowledge of architectural design, we should combine the green concept, analyze the location of the site, and understand the local living culture, customs and habits. This design project is located in A village in A province, which is the seat of the township government. It has rare biodiversity, geological diversity and landscape diversity. At the same time, it is also the dividing point between the central plains culture and the Tibetan culture, which contains profound historical culture, kunlun culture, religious culture and ethnic culture. Starting from the natural climate conditions of the local used local meteorological data parameters, using Ecotect analysis software, analyzed the biological climate, wind environment, rizhao, discussed, including wind, sunlight, precipitation, temperature and humidity, the influence of natural climate elements of building, and from the building energy-saving potential, the passive energy saving measures of the direction of the green building design and carried out the possibility, let the students master the analysis tool with the help of computer ability to rationally to carry out the green building design.

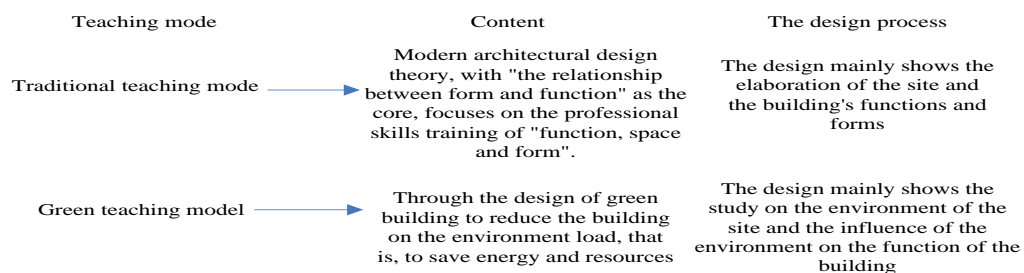


Figure 1. The difference between traditional building mode and green building design

The design object of this competition is mainly independent high-rise residence, whose main functional building form and structure are relatively simple, and the architectural design engineering technology is not difficult. On top of this, using the study of the green building design method, to determine, and make some corresponding design through adjustment can ensure the construction in the future relative rationality, let the students fully understand and master the basic design principle of the green building design, can guide the student to the green building design is not reasonable to think and to relative rationality of design work process are analyzed. Through a variety of ways for students to participate in professional competitions, students' awareness of engineering design and application of green buildings can be cultivated, and their ability of engineering design and application of green buildings can be improved. Early design the first to use intelligent computer for habitable region environmental conditions such as natural sunlight, ventilation, heat measurement analysis, rationally analyze the habitable building orientation, layout, size, shape, height, space organization, such as performance index, to our country the basic function of traditional habitable buildings as a design and structure form of basic research technique, based on the design performance index area livable research on green building design.

As shown in Figure 2, in this competition, students' evaluation of their own works and students' cognition of architectural design have changed. Through the competition, students can have a deeper understanding of the teaching concept of green building. Contest design fully mobilize the students' ability of autonomous learning and the team cooperation, use of extra-curricular time to integrate the various disciplines resources, geographical, multi-disciplinary, multi-level ways to promote the students of different professional, different disciplines exchanges and cooperation between each other, stimulates the student to own the communication ability and team cooperation spirit, also arouse the enthusiasm of the students.

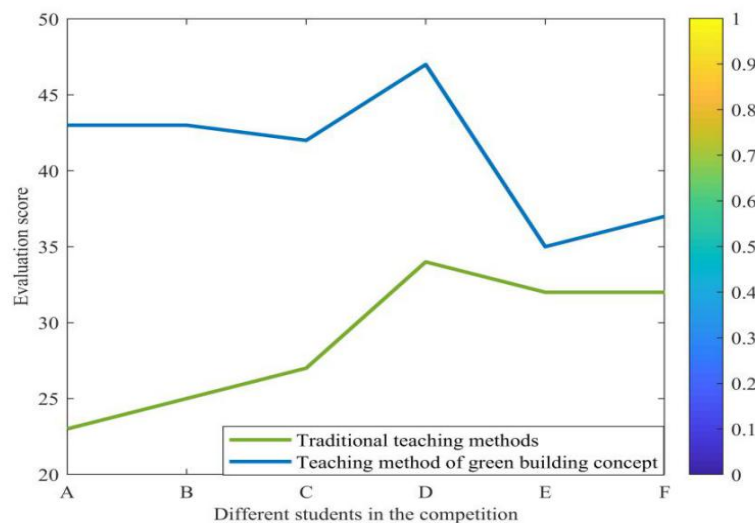


Figure 2. Students' cognition of green building concept

In the early stage of the process design of the competition, the division of labor needs to be reasonable, and the time points and nodes need to be grasped clearly. In the design before the exchange cooperation in the process of cooperation projects, although the students assume their respective different landscape design process of cooperation, but they whole not only make the learning of western green residential building design related professional knowledge, understand the local green regional cultural features, applying western landscape design of green residential building technique with traditional Chinese using the technique of phase organic combination of the green building design. Through theoretical study in the early stage of process design, team members had a discussion on the process design of the proposal. For green housing construction planning design practice of the school students, and focusing on the green residential architectural design technology to carry on the design of the school students, comprehensive architectural design scheme of each other, applying technical measures about the design of green residential buildings in

residential architectural design scheme, let students to communicate to understand each other between, through the mutual discussion finally reached consensus on the design.

4.2. Suggestions on the Teaching and Research of Architectural Design Based on the Concept of Green Building

With the rapid development of social economy, the construction industry has also developed rapidly, and the development of building functions tends to be integrated, environment-friendly and diversified. In order to satisfy the integration, environmental protection and diversification of building functions, the high level of building technology has been gradually developed and applied. For the teaching of traditional architectural design major, the high level of architectural technology in its content is relatively slow to update, and students' lack of practical knowledge of architectural technology makes students need to conduct a new round of learning of architectural technology when entering the society for employment, which seriously hinders the development of China's construction industry.

The teaching of green building design should be integrated into the teaching of traditional architectural design. In the teaching of architectural design, it is necessary to pay attention to the progressive integration of multiple levels, and the design teaching of students should be simple to progressive. In this process, the mutual development of architectural design art and construction technology should be achieved, so as to achieve the goal of combining art and technology. The multi-level progressive teaching is mainly for progressive teaching. The first grade is mainly for teaching the concept and understanding of architectural design, cultivating students' awareness of building environmental protection and concept of sustainable development, and teaching students the basic knowledge of green building. In the second year, I mainly taught the teaching of passive space design, and taught the basic principles and applications of passive design technology used in architectural design. In the third grade, we mainly taught the introduction of active technology, the combination of passive technology and equipment energy saving technology, and the utilization of renewable resources. In the fourth grade, the teaching is mainly the integration of thematic and technical application, and the teaching of sustainable development urban construction strategy is carried out according to the students' architectural thematic design content. The fifth grade teaching is mainly the students' graduation project, through the students design projects to integrate through the concept of green building design. This progressive process can effectively make students from simple to deepen the transition, and then all aspects of learning green building design concept.

Conclusion

Based on the concept of green building, this paper studies the teaching of architectural design. By comparing the traditional teaching method with the teaching method under the concept of green building, this paper summarizes the methods that are more conducive for students to integrate into the concept of green building. Then, by participating in the energy-saving design competition, students' design awareness and theoretical knowledge of green buildings are improved, so that students can master the design concept and design techniques of green buildings different from traditional architectural design, and students' ability of teamwork is cultivated.

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