

# *Research on Environmental Design Teaching Model Based on the Concept of Ecological Sustainable Development*

Lu Qiao, Yuan Shi, Zhuowen Guo\*, Yuting Mao, Xifan Deng

Urban Construction Engineering Department, School of Wenhua College, Wuhan, Hubei 430074,  
China

\*Corresponding author's email: 9808245@qq.com

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**Abstract:** The lack of a complete conceptual cognition and the establishment of an operational method system for environmental design teaching. Based on the requirements of ecological sustainable development, it is pointed out that environmental design professional education should take the environmental design concept of ecological sustainable development as the core idea of teaching. From the macro level, the holistic and systematic requirements for teaching reform are to build the concept of sustainable development as a systematic project. Through the integration of traditional engineering courses and the combination of open and integrated design, we can cultivate professionals with ecological design awareness and design capabilities.

## 1. Introduction

A series of environmental problems<sup>[1-2]</sup>, such as the energy crisis<sup>[3]</sup>, resource depletion<sup>[4]</sup> and climate deterioration<sup>[5]</sup> caused by the continuous growth of the global population and the rapid development of human beings, have deeply felt the unprecedented threat to the living environment. People began to realize that “human beings have only one earth”. Only by properly handling the relationship between human survival and sustainable development<sup>[6]</sup>, and striving to achieve the coordination of human society, economy and environment can make human history continue. The report of the 19th National Congress of the Communist Party of China clearly stated that “increase the protection of ecosystems”, “implement important ecological system protection and restoration projects”, and “improve the quality and stability of ecosystems”. Ecosystems have the following distinct characteristics: ancientity, diversity, complexity, regionality, volatility, and vulnerability.

Based on these backgrounds, the idea of protecting the environment, the harmonious coexistence of people and the environment has become more and more popular among people. The idea of “ecosustainable development” has gradually become the common pursuit of mankind and has become the theme of humanity in the 21st century. As an application-oriented discipline centered

on the construction of an ideal habitat, environmental design<sup>[7]</sup> strengthens the design concepts and design methods for ecological sustainable development in its professional education, and creates a future environmental designer with a conscious ecological design idea, which is an important meaning.

Some concepts and knowledge of ecological design have been introduced into the teaching of environmental design in China. Many successful cases abroad are also well known to teachers and students. However, due to the lack of comprehensive understanding and understanding of ecological design ideas, and the lack of in-depth interpretation and analysis of excellent ecological architecture and ecological environment design examples, it is difficult for students to integrate ecological design ideas with specific designs in the design of the project. It is common to write ideas such as eco-design and sustainable development as a hollow idea or slogan into the design description, or simply imitate the external form and material choice of some cases. The application of ecological design techniques seems to become a fashion embodiment, rather than the inevitable result of rational analysis and comprehensive evaluation combined with regional ecological characteristics and project actual conditions. The deeper reason behind this phenomenon is that the ecological design ideas and concepts are not truly integrated into the teaching system. The traditional environmental design teaching concepts and teaching models have been unable to adapt to the teaching requirements under the new situation. Therefore, it is necessary to reflect on and reform the teaching system and model of environmental art design from the following aspects.

2. Taking the ecologically sustainable development of environmental design as the core idea of teaching

Before the industrial revolution, humans' design of the living environment focused more on the laws of form, philosophy, culture, and aesthetics, and less on architectural science and technology. The industrial revolution has brought about the great development of the city. Modern scientific thinking, new materials and new technologies are also constantly integrated into the environmental design. The relationship between environmental art and technology is more closely linked. Along with the process of rapid urbanization, the functions and connotations of the social, economic, and cultural levels carried by the urban environment are becoming more and more abundant, and the urban problems and environmental crises facing it are becoming more and more serious. In this context, the field of environmental design has also expanded, and more attention has been paid to how environmental design is coordinated with regional cultural environment and human spiritual needs, how technology affects and affects the overall environment, and ecological balance and sustainable development problem. It can be seen that the design concept of ecological sustainable development has become one of the basic principles followed by environmental design, and it should also become one of the core ideas of environmental art design education.

Taking the environmental design concept of ecological sustainable development as the core idea of teaching is to help students establish the environmental concept of ecological sustainable development in teaching, and guide students to take the environmental sustainable development as the design concept throughout the whole design process. For example, in the interior environment design, we should fully realize that the interior design is not only the design of style and taste, but also the environmental design of "health". In the landscape design, we should comprehensively consider the history, social culture and ecological environment of the design area, rather than stacking landscape elements or depicting a beautiful plane pattern. In order to establish the environmental design concept of ecological sustainable development, students should also be aware of the impact of the design and construction of the artificial environment on the overall ecological environment system, and learn how to obtain the maximum function and environmental benefit with the least resources and the least environmental damage.

## 2. Integrating Traditional Engineering Technology Courses Around Design Courses

Although environmental design is an interdisciplinary subject integrating science, art, engineering and technology, for a long time, there has been a phenomenon of “emphasizing form and neglecting technology” in environmental design education in China. In recent years, the curriculum system of environmental art design has been reformed and explored in many aspects, but the education of Environmental Science (Agronomy, botany, ecology, etc.) and Engineering Technology (materials, construction, structural construction, etc.) has not been given due attention. Even if some related courses have been set up, they are mostly based on classroom theory teaching, occasionally interspersed with one or two on-site visits, so that students can establish some perceptual knowledge, but how to combine these engineering technology knowledge with design is rarely involved. The serious disconnection between the teaching of technology course and the teaching of design course restricts the students' exploration and innovation of sustainable environmental design.

In view of this problem, we can start from the reform of the curriculum system, with the ecological sustainable design curriculum as the core, and integrate the traditional engineering technology curriculum. On the one hand, carry out comprehensive ecological quality education to let students understand the general ecological knowledge, environmental protection thought and ecological ethics knowledge, and cultivate good ecological awareness; on the other hand, combine the engineering technology courses such as building structure, building environment, decorative materials and structure, and focus on the curriculum design topics of different types and depths, systematically and comprehensively. This paper introduces the knowledge of ecological thought and ecological design, analyzes the successful cases of ecological architecture and ecological city design, helps students understand the design guiding ideology behind these cases, and can be flexibly used in the design practice. In terms of design expression, students are required to draw node details reflecting ecological design according to the requirements of design depth, so as to truly combine technical knowledge with design scheme.

### 4. Reform the teaching mode of design course and emphasize the openness and integrity

For a long time, the mode of “master with apprentice” has been the main teaching mode of design courses, and also the main way for students to learn design methods and design knowledge. In the process of teaching, design teachers teach design theory, design method and personal design experience and skills to students through one-to-one teaching, while teachers of other technical courses often do not directly participate in the teaching of design courses. This kind of closed teaching method is easy to lead to the focus of the final design results on the spatial form, modeling skills and surface quality, while ignoring the technical characteristics and integrity of environmental design, which also limits the students' attempts and exploration of new structures, new materials and new technologies.

In fact, environmental design based on the idea of ecological sustainability is a whole design process, which needs strong support of technology. Therefore, it is necessary to reform the teaching mode of design course, change the closed type to the open type, and establish the teaching mode of organizing and mobilizing teachers of other technical specialties to participate in the design course. Design topics can be selected with the theme of sustainable development, such as adaptive reuse design of old buildings, protection and renewal design of historical areas, energy-saving building design and solar energy utilization. In order to design such comprehensive projects, students must participate in and complete a series of work from social investigation, base environment analysis, functional layout, spatial planning, form design to detail processing, applicable technology selection, etc., which will help to cultivate students' understanding of the integrity of ecological sustainable design. When making design tasks and objectives, students, especially senior students, are required

to embody certain energy-saving design in their own plans and have certain depth in technical design. For example, in terms of climate, lighting, structure, materials and other aspects, teachers of engineering technology courses can provide targeted guidance and actively participate in the evaluation of the final design results. If necessary, you can also arrange lectures on a specific topic to focus on solving the common problems encountered by students.

In addition, it is very important to strengthen the close relationship between classroom teaching and design project practice to cultivate students' ecological sustainable design ability. On the one hand, the school can establish cooperation with design institutes and design companies, so that students have more opportunities to go out of the campus and participate in the design of actual projects. Through practice, let students understand the latest design concept, design method, new material and new process of environmental art design major; experience the collaborative cooperation between different types of work, understand the whole process of design project operation, which is very helpful for students to adapt to the requirements of practical work as soon as possible in the future. On the other hand, we can hire experienced designers to participate in classroom teaching or hold lectures, broaden students' horizons and improve students' comprehensive design ability.

### 3. Conclusion

How to cultivate the environmental designer with the concept of ecological sustainable development and design ability is the historical mission of environmental design education, but also a new topic. It is necessary to fundamentally change the concept of professional education, reform the teaching methods, and constantly explore and innovate in practice, so as to summarize the teaching system and training objectives suitable for their own schools pattern.

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### References

- [1] Boudh S., Singh J.S., *Pesticide Contamination: Environmental problems and remediation strategies*. In: Bharagava R., Chowdhary P. (eds) *Emerging and Eco-Friendly Approaches for Waste Management*. Springer, Singapore, 2019.
- [2] Yu X., Sharma V. K., Li H., *Environmental Antibiotics and Antibiotic Resistance: From Problems to Solutions*. *Frontiers of Environmental Science & Engineering*, DOI:10.1007/s11783-019-1137-0
- [3] Yao X., Yu Q. B., Han Z. R., Xie H. Q., Duan W. J., Qin Q., *Kinetic and experimental characterizations of biomass pyrolysis in granulated blast furnace slag*, *International Journal of Hydrogen Energy*, 2018, 43(19), 9246-9253.
- [4] Kuhn C. E., Baker J. D., Towell R. G., Ream R. R., *Evidence of localized resource depletion following a natural colonization event by a large marine predator*. *Journal of Animal Ecology*, 2014, 83, 1169-1177.
- [5] Wolf, D., Kolb, T., Alcaraz-Castaño, M. et al., *Climate deteriorations and Neanderthal demise in interior Iberia*. *Scientific Reports*, DOI:10.1038/s41598-018-25343-6
- [6] Fang C., Cui X., Go L., Bao C, et al., *Modeling regional sustainable development scenarios using the Urbanization and eco-environment coupler: case study of Beijing-Tianjin-Hebei urban agglomeration, China*. *Science of The Total Environment*, 2019, 689, 820-830.
- [7] Gu X., D., Luo L. L., Chen H. B., *Environment design methods based on the affordance mechanism*. *Journal of Beijing Forestry University (Social Sciences)*, 2017, 16(4), 14-20.