

An Educational Strategy for the Integration of Interdisciplinary Knowledge in Environmental Design

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ABSTRACT

The environmental design is facing more and more complex challenges, which require designers to have a diversified knowledge structure and a wide range of problem-solving abilities. Therefore, the environmental design education needs to integrate interdisciplinary knowledge in order to train designers who can adapt to the needs of a rapidly changing society. This paper analyzes the needs and challenges of interdisciplinary knowledge integration in the current environmental design education, and discusses how to effectively implement the educational strategy of interdisciplinary integration, so as to promote the all-round development of students and improve their abilities of innovation and practical application.

KEYWORDS

Environmental design; Interdisciplinary knowledge integration; Educational strategy; Innovative education

1 Introduction

With the rapid development of technology and the increasing complexity of social and environmental issues, the educational trend of environmental design is obviously inclined to the integration of interdisciplinary knowledge, including the field of art design, as well as multiple disciplines such as science and technology, humanities, ecology and social sciences. Current environmental issues, such as the sustainable development of urbanization process, humanized design of public space and application exploration of new materials, require designers to have a broader knowledge background and stronger problem-solving ability. This demand has driven educators to rethink and design curriculum structures to better accommodate this interdisciplinary model of education. However, the integration of interdisciplinary knowledge faces many challenges, such as the limitation of curriculum design, the lack of interdisciplinary background of teaching staff and insufficient interdisciplinary learning motivation of students, which restricts the professional development and talent training.

2 The Importance of Interdisciplinary Knowledge in Environmental Design

2.1 Promote Innovative Design Thinking through Knowledge Integration

The integration of knowledge provides a broader thinking platform for designers. Environmental design education integrates the knowledge of physics, ecology, sociology and the latest scientific and technological achievements into design thinking by adopting an interdisciplinary learning

mode. When environmental designers consider building materials and structures, they can apply the mechanical analysis of physics or ecological principles to optimize the sustainability of the design, so that the design solution is not only aesthetically high, but also forward-looking and innovative in terms of technological and ecological compatibility. At the same time, the integration of interdisciplinary knowledge can effectively promote the formation of innovative design thinking^[1]. In essence, design thinking is a strategy to solve problems. Taking urban planning projects as an example, designers need to consider socio-economic factors, residents' behavior habits and the sustainability of urban ecology. At this time, the knowledge of disciplines such as psychology, economics and ecology can provide new perspectives and solutions for the design, and promote the innovation of design thinking.

2.2 Enhance Students' Ability to Solve Complex Design Problems

In the actual design process, traditional design education focuses on the architectural aesthetics and structural safety, but in modern society, the design must consider energy efficiency, material recycling, and how to adapt the social development and cultural contexts more comprehensively. In the interdisciplinary learning model, knowledge of environmental science, sociology and the latest technological developments is integrated, and students learn this knowledge to more fully evaluate the impact of design solutions and propose more innovative and forward-looking design solutions. On the other hand, in the process of interdisciplinary knowledge learning, students can apply the knowledge learned from different disciplines to the analysis and solution of practical problems. For example, psychological knowledge can help students better understand the needs and behaviors of users, and information technology knowledge can enable them to use modern technology to improve the efficiency and interaction in design.

3 Barriers to the Interdisciplinary Integration in Environmental Design

3.1 Limitations of the Curriculum

The education system has long emphasized the in-depth cultivation of professional knowledge, and ignored the necessity of connection and integration with other disciplines. The curriculum of environmental design still follows this model, and focuses on the teaching of internal technical and theoretical knowledge, while in the design practice, designers need to use sociology, psychology, ecology and other multidisciplinary knowledge to solve practical problems. The lack of interdisciplinary perspective in curriculum system makes it difficult for design majors to cope with complex environmental design tasks after graduation. At the same time, the barriers between disciplines are still significant in many educational institutions, and each discipline has its own independent system and evaluation criteria. Such structural isolation makes it difficult for each discipline to effectively communicate and share resources in the design and update of course content^[2]. The uneven allocation of educational resources further exacerbates this problem, which not only limits the comprehensiveness and foresight of the curriculum content, but also restricts the opportunities for students to develop interdisciplinary thinking and innovative ability in the learning process.

3.2 Insufficient Interdisciplinary Background of the Teaching Staff

The prevailing academic evaluation system in higher education tends to reward research achievements in deep and narrow subject areas. The academic promotion, financial support and

professional recognition of teachers are directly related to their research depth and achievements in specific disciplines. Therefore, for the sake of career development, teachers will choose to focus on their own original research field, thus ignoring the communication and cooperation with other disciplines, which affects the innovation and implementation of interdisciplinary teaching content. At the same time, although the current educational reform emphasizes the importance of interdisciplinary integration, the mechanism for the effective interdisciplinary training of teachers is not yet sound. Many educational institutions lack systematic strategies to support teachers' learning and research in other disciplines, and also lack measures to motivate teachers to go out of their comfort zone to explore new knowledge.

3.3 Insufficient Motivation of Students for Interdisciplinary Learning

In the educational process of environmental design, due to the emphasis of course content setting and the fact that educators seldom emphasize the practical needs and long-term significance of interdisciplinary integration in teaching, students mainly focus on the learning of core professional courses such as architectural design principles and urban planning. The understanding and recognition of how to integrate this knowledge with other disciplines such as social sciences, environmental sciences, or emerging technologies is relatively weak for students. It leads to students lacking a proactive interest to learn interdisciplinary courses and being unwillingness to invest the necessary time and energy to master them. The interdisciplinary learning requires students to expand new knowledge on the basis of original subject knowledge and to effectively connect and apply different knowledge systems, which is a high challenge for students^[3].

4 Corresponding Education Strategies of Interdisciplinary Knowledge Integration

4.1 Construct Interdisciplinary Curriculum System

The construction of interdisciplinary curriculum system should be innovated in the design of curriculum content to realize the integration of knowledge between disciplines. Specifically, a comprehensive course combining architecture, ecology and sociology can be set up so that students can systematically understand the social structure, ecological balance and technological innovation while learning environmental design. At the same time, the combination of practice and theory is emphasized. Teachers can adopt case study and project-driven teaching methods to enable students to apply interdisciplinary knowledge in real or simulated design, so as to deepen their understanding of and ability to deal with complex design problems^[4]. Higher education institutions also should encourage teachers to participate in interdisciplinary research projects to feed teaching with research results and constantly update and enrich curriculum content, so as to ensure that teaching activities are forward-looking and applicable.

4.2 Strengthen Interdisciplinary Training of Teaching Staff

Educational institutions should consider interdisciplinary competence as one of the important criteria for teacher recruitment and evaluation, and give preference to candidates who have a multidisciplinary background or who have demonstrated a strong interest in interdisciplinary teaching. On this basis, the career promotion path of teachers is linked to their interdisciplinary teaching and research performance, and special interdisciplinary teaching awards are set up to provide additional career incentives for teachers who have outstanding performance in interdisciplinary curriculum design and teaching, so as to cultivate the ability of teachers in

multidisciplinary integration and innovation. Besides, educational institutions need to provide teachers with continuous and diversified interdisciplinary training opportunities. Experts in ecology, social sciences and technology can be invited to co-develop interdisciplinary courses related to environmental design and provide practical application cases for students to learn how to translate theoretical knowledge into innovative solutions to practical design problems.

4.3 Enhance Students' Interest and Ability in Interdisciplinary Learning

Educators should design and implement curricula that incorporate multidisciplinary perspectives, so that students are exposed to ecology, sociology, psychology, technological innovation, and other fields while learning about environmental design. In this regard, the concept of ecological sustainability can be introduced into the urban planning curriculum, so that students can learn not only how to design functional Spaces, but also understand how to create environmentally friendly urban layouts. This intersection of knowledge can significantly increase students' interest in the curriculum and stimulate their motivation to explore the links between different disciplines. At the same time, we should also pay attention to the innovation of teaching methods and adopt the project-driven learning mode. Under this model, students are encouraged to use teamwork to solve interdisciplinary design problems, which can not only improve students' practical ability, but also exercise their teamwork and communication skills^[5].

5 Conclusion

The analysis of this paper shows that effective interdisciplinary education strategies can greatly improve the teaching quality and students' practical ability. Specifically, the construction of interdisciplinary curriculum system enables students to deal with more complex environmental design problems. At the same time, strengthening the interdisciplinary background and teaching ability of the teachers can ensure the depth and breadth of the teaching content, and better guide the students to think creatively and critically. Stimulating students' interest in interdisciplinary learning helps students adapt to changing design needs. Therefore, the continuous optimization of these educational strategies will be the direction of continuous attention and efforts in the field of environmental design education in the future.

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