

Exploration of Practice Teaching Reform Based on Outcome-Based Education Concept: Taking Environmental Design Major as an Example

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Abstract: The concept of OBE (outcome-based education) is more focused on designing and implementing teaching activities around expected learning outcomes than the traditional teaching model and enhancing the quality of education through clear and measurable learning outcomes, which has led to profound changes in the field of education. However, environmental design practice teaching faces a series of challenges in the implementation of the OBE concept, including the complexity of the assessment system, personalized learning and creative learning, and over-reliance on quantitative assessment. Therefore, in order to further deepen the professionalization of the OBE concept, we have conducted research on the design education practice models at home and abroad, explored the practice teaching models and their applications such as project system, studio model, practical internships, and technology-driven interdisciplinary integration, and took the practice innovative teaching models of Stanford d.school and Rhode Island School of Design (RISD) as examples to explore the characteristics of the curricula, cultivation modes, and the development of the environmental design professional practice teaching model. The characteristics of OBE and RISD are discussed to provide a global vision and local contextual reference for the practice teaching reform of environmental design majors.

Keywords: Outcome-based education (OBE) concept; Practice teaching system; Teaching reform; Environmental design

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1. The challenge of outcome-based education concept in design education

The OBE (outcome-based education) concept, as a learning outcome-oriented and driven education model, emphasizes that the ultimate goal of education is to achieve specific and measurable learning outcomes. Different from the traditional content-centered education model, the OBE concept pays more attention to the expected outcomes of learning, requires teachers to design and implement teaching activities around the expected learning outcomes, and emphasizes the measurement and assessment of outcomes to ensure the quality of education ^[1]. The assessment methods are closely related to the intended learning outcomes, not only focusing on students' memorization of knowledge but also emphasizing students' skill development and practical application. Therefore, although the OBE concept has significant advantages in improving the quality

of education and ensuring that students acquire the necessary skills, the implementation of the OBE concept faces a series of challenges in the environmental design majors where practical teaching occupies a certain proportion, and where comprehensive design competence is taken as a core qualification, which is manifested in the construction of the assessment system, the flexibility and personalized learning, and the over-reliance on quantitative assessment.

1.1. Assessment system construction

The design and implementation of the assessment system of the OBE concept requires educators to make comprehensive consideration of teaching content, methods, and assessment tools to ensure that all aspects serve the realization of learning outcomes and that educational activities pay more attention to the actual performance and growth of students, rather than just the process of completing the teaching program. As the environmental design profession involves multiple assessments of students around comprehensive design skills, especially when the assessment involves soft skills such as critical thinking, design thinking, or teamwork, the issue of subjectivity is more prominent, and standardization and quantification of assessment becomes more difficult. Therefore, designing an effective and fair assessment system becomes an important task in the implementation process.

1.2. Flexibility and personalized learning

The environmental design profession usually involves the integrated design of space, environment, architecture, landscape, and other fields, and its practice is often highly complex, involving numerous variables and stakeholder needs. With the emergence of new technologies and materials, the practice and research in the field of environmental design continue to evolve, the spectrum of knowledge is interdisciplinary, and effective design solutions often require the integration of architecture, engineering, environmental science, sociology, and other disciplines, while also taking into account cultural, environmental, and social sustainability. In summary, the need for flexibility and personalized learning in the environmental design profession stems from the characteristics of the discipline and the requirements of future careers. However, the OBE philosophy is prone to focusing too much on predefined learning outcomes and neglecting personalized and exploratory learning in the educational process. Excessive standardization may limit teachers' pedagogical innovation and reduce flexibility in responding to students' individual needs. Therefore, flexible and individualized educational strategies need to be explored and implemented to meet the learning needs of students and the practical characteristics of the subject.

1.3. Over-reliance on quantitative assessment

The over-reliance of the OBE philosophy on measurable learning outcomes may lead to the neglect of the experience of exploration, innovation, and failure in the learning process during the development of comprehensive design skills. Over-emphasis on outcomes may lead to utilitarianism in education, e.g. over-attention to short-term learning outcomes may neglect the development of critical thinking, ethical judgment, and long-term learning ability. Since the study of environmental design is not only the accumulation of knowledge, it is more important to cultivate students' creative thinking and environmental spatial quality problem-solving skills, and the development of these abilities is often closely related to exploratory learning and practical experience ^[2].

Therefore, in order to achieve the reform goals, the OBE concept needs to be implemented both in maintaining the original advantages while making appropriate additions and deepening the needs of environmental design majors, in order to better adapt to the diverse needs of the educational reality. In

addition to balancing process and outcome, encouraging innovation and failure, developing non-quantitative competencies such as critical thinking, ethical judgment, teamwork, and leadership, and providing personalized learning paths, the education system should be flexible enough to allow students to customize their learning paths according to their own characteristics and needs due to the differences in each student's interests, learning styles, and career goals, while at the same time focusing on faculties such as long-term goals and lifelong learning. Furthermore, in order to face challenges such as the complexity of assessment systems, limitations on personalized learning, and over-reliance on quantitative assessment, it is necessary to broaden the depth of vision at the early stages of reform. Identifying and exploring educational models of design practice globally and conducting extensive research will enable educational exploration to draw inspiration and experience from international practice, as well as to understand the focus of adapting and implementing OBE concepts in different cultures and education systems, thus contributing to the continuous optimization and innovation of educational models.

2. Practice teaching mode for art and design majors

In environmental design majors, practice teaching plays a crucial role, which greatly promotes the integration of theoretical knowledge and practical application by placing students directly in the environment of actual operation and field experience. Practical teaching methods not only include traditional laboratory operations and case studies, but also extend to a variety of forms such as project-based learning, site visits, simulated environmental design, interdisciplinary collaborative projects, and internships. In particular, the field of environmental design is not only limited to the interior of the classroom, but also often involves interaction with real-world environments and spatial experiences, such as through community design projects, sustainable development practices, or collaborative design workshops with the industry, in which students can apply their own design concepts to specific environments to solve real-world problems.

Currently, the mainstream practice teaching models in art and design programs include project-based learning, studio models, problem-based learning, case-based teaching, practical internship models, and technology-driven interdisciplinary integration. These models promote students' professional growth and skill development through their respective methodologies. Among them, project-based learning and problem-based learning focus on the design and implementation of projects around complex problems, cultivating active learning, problem-solving, teamwork, and critical thinking; studio mode and practicum mode simulate real professional environments, emphasizing individual creativity and practical skills, and allowing students to apply theoretical knowledge through project design and hands-on practice; case study teaching deepens the connection between theory and practice by analyzing cases, and laboratory practice verifies the connection between theory and practice, and real-world experience is provided through simulation and role-playing as well as field trips; technology-driven mode focuses on the use and exploration of new technologies, such as digital design, 3D modeling and printing, etc., and encourages students to make use of modern technological tools and software to carry out innovative design, while at the same time promotes the fusion of design with the humanities and the social sciences, emphasizes the socio-cultural significance of design and encourages interdisciplinary collaboration, such as integration with other disciplines like engineering, business, or the arts, to promote the holistic development of students and interdisciplinary collaboration, emphasizing the socio-cultural significance of design. Each mode is selected and adapted according to the characteristics of the discipline and the learning objectives. Particularly in fields such as environmental design, which requires a high degree of innovation and practical skills, the combination of multiple practice teaching modes can effectively

enhance students' professional skills and comprehensive quality.

3. International experience with practical teaching models

3.1. Problem-driven interdisciplinary project-based teaching: Stanford University d.school

The d.school at Stanford University, known as the Hasso Plattner Institute of Design at Stanford, is an educational institution dedicated to teaching design thinking and innovation methods. d.school aims to solve complex problems through Design Thinking ^[3] and to drive the advancement of technology, business, and society. Design Thinking is at the core of d.school's teaching and research, which focuses on user experience, encourages observation and empathy, and emphasizes rapid prototyping and iteration as well as teamwork ^[4]. In the d.school, the process of design thinking is condensed to include the key steps of empathy (understanding the user), definition (the problem), divergent thinking (idea generation), prototyping (rapid production of testable models), and testing (gathering feedback for improvement).

As an example, Design for Extreme Affordability, a course offered to graduate and undergraduate students in the Spring 2024 semester, is designed for students who are passionate about social impact and want to design products and services that address global poverty by working with resource-poor communities. The program is offered jointly by the College of Business and the College of Engineering and hosted by the d.school, the project-based experience creates an environment in which students can learn to design products and services that change the lives of the world's poorest citizens, and where students will work directly with course partners and the communities they serve to address real-world poverty; Redesigning Finance is for students who are passionate about social impact and want to address global poverty by working with resource-poor communities. Redesigning Finance incorporates systems that run counter to design thinking but have a significant impact on design thinking, using the financial cost planning of products, programs, and solutions as the underlying logic of design; Designing for Extended Realities explores and experiments with state-of-the-art XR (extended reality) technologies such as virtual reality, augmented reality, mixed reality, and meta-universes, and through hands-on design thinking, rapid prototyping, and critical discussion, students will learn how to utilize XR technologies to create real value for people and society; the same semester also offers programs such as Design for Play, The Design of Data, Negotiation by Design: Applied Design Thinking for Negotiators, Designing with Machine Learning, and more than ten other courses.

In terms of course offerings, d.school provides courses of interest to students of all majors, without setting a threshold for specialization. Instead, it condenses the core values of design and places them in many complex real-world problem situations that have blurred professional boundaries, so that students can break through the limitations of their majors and explore inter-disciplinary solutions based on the specific problem situations. This model breaks through the boundaries of traditional disciplines and overcomes the limitations of a single discipline in solving complex problems.

At the same time, the d.school offers courses and workshops covering entry-level to advanced design thinking practices, and students participate in real-world projects with corporations, nonprofits, and government agencies ^[5], practicing interdisciplinary learning and collaboration through high-density and intense practice ^[6], with programs bringing together students and faculty from engineering, business, medicine, the humanities, and a variety of other fields, to solve real-world problems under the framework of design thinking. This cross-disciplinary collaborative model encourages students to think and solve problems from multiple perspectives outside their areas of specialization, and the d.school has not only impacted the field of education, but has also had a profound effect on business, social innovation, and public policy.

3.2. The studio model: Rhode Island School of Design

The studio model is essentially similar to the “apprenticeship system.” Although there are strong traces of the handicraft era, on the one hand, it is because the boundaries between classes are blurred and it takes a long time to continue to create an environment as a classroom. On the other hand, it is driven by project resources to promote the creative process of project organization and development, therefore, this model has certain advantages for art and design majors. Rhode Island School of Design (RISD), as a world-renowned art and design college, is concerned about its studio model, which emphasizes students’ learning through practice, and emphasizes practice and creation, i.e., “learning by using.” Students spend most of their time in the studio doing practical work and creating, a learning style that encourages students to explore and express their creative ideas through hands-on practice. At RISD, each student receives close guidance and personalized feedback from a mentor. This one-on-one or small-group mentoring helps students develop a deeper understanding of the principles of art and design while encouraging them to develop their own unique style and perspective. RISD encourages students to learn and collaborate across disciplines, and the studio model is not limited to a single field of art or design but also includes integrations with other fields such as science and technology, sociology, and environmental science. This interdisciplinary exposure broadens students’ horizons and promotes the development of creative thinking. At the same time, teaching at RISD also emphasizes the importance of critical thinking and reflection. The studio model encourages students to critically analyze their work, to understand the concepts and processes behind it, as well as the significance of the work in a broader social and cultural context. Through this unique studio model, RISD fosters creativity, professional skills, and critical thinking, enabling its graduates to excel in the field of art and design.

4. Revelation of practice teaching reform of environmental design major

Through the revelation of international experience, we put forward a few targeted references to the practice teaching reform of environmental design under the concept of OBE, aiming to provide ideas and directions for the future development of the major and discipline.

- (1) Problem-driven interdisciplinary integrated practice teaching mode: Structured and modularized professional knowledge base, condensed with the cross-coordination between different disciplines of the problem scene. Structuring and modularizing the knowledge of different disciplines facilitates the interdisciplinary team to quickly access and utilize the relevant knowledge according to the needs of problem-solving, accurately define the problem, and identify which disciplines need to be integrated with the knowledge and skills in the problem-solving process.
- (2) Interdisciplinary cooperation platform: Based on the school-based disciplinary settings and disciplinary strengths, we establish a platform that promotes collaboration among experts and team members from different disciplines, able to discuss problems, share knowledge, and coordinate actions together. The platform can be based on a physical workspace or a virtual collaborative environment.
- (3) Integration of OBE concepts and disciplines to create a supportive environment: Clarifying curriculum outcomes based on interdisciplinary environments to create a learning culture of openness, collaboration, and exploration that encourages innovative thinking and interdisciplinary perspectives. Designing interdisciplinary curriculum frameworks that integrate core content and critical skills from different disciplines to ensure that instructional activities are organized around intended learning outcomes.

The environmental design program is facing transformations and challenges in today’s world of increasingly changing technology and information. The development of emerging technologies, the

diversification of social needs, and the popularization of the concept of sustainable development have all put forward new requirements for the education model in the field of environmental design. The reform and innovation of practical teaching, as a key link in the cultivation of high-quality design talents, is particularly important. The traditional mode of theoretical teaching has made it difficult to meet the comprehensive needs of students for knowledge and skills, and a teaching system that pays more attention to practice and is able to combine with the latest developments in the industry is becoming an urgent need.

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