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Research on Teaching Quality Evaluation System for Experimental Class with Industrial Design Specialty-Innovation Integration Under the OBE

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Abstract

With the in-depth advancement of new engineering education, the talent training model for industrial design faces new challenges. Based on the OBE (Outcome Based Education), this paper constructs a teaching quality evaluation system for a experimental class with the industrial design specialty-innovation integration. This system is student-centered and learning outcome-oriented, emphasizing process-based and diversified evaluation, which aims to enhance the quality of industrial design talent cultivation.

Keywords

OBE; Industrial Design; Specialty-Innovation Integration; Experimental Class; Teaching Quality Evaluation.

1. Introduction

The industrial design specialty has experienced rapid development but currently faces several challenges. These challenges include uneven quality in talent cultivation, insufficient innovation capabilities and a disconnect from industry needs. Traditional talent training models contain several flaws. These models often center around teachers rather than students, prioritize theoretical knowledge over practical experience, rely on single evaluation methods, and lack adequate innovation and entrepreneurship education. Because of these limitations, these models cannot meet the current demands for industrial design professionals. Educators must urgently reform these traditional training approaches and establish a new framework. This new framework should place students at the center, focus on learning outcomes, and emphasize both practical abilities and innovation skills.

OBE (Outcome Based Education) represents an educational philosophy that focuses on student learning outcomes. This approach emphasizes that the ultimate goal of education is to help students achieve specific learning results rather than simply completing coursework[1]. The OBE encompasses several core elements. These elements include student-centeredness, learning outcome orientation, backward design principles and a commitment to continuous improvement. Educators apply the OBE to engineering education reform in several ways. They establish clear graduation requirements, build curriculum systems that support these requirements, transform teaching methods and tools, create diverse evaluation systems, and continuously enhance teaching quality[2]. The industrial design specialty at Liuzhou Institute of Technology has made significant progress in educational reform in recent years. The institute has implemented an experimental class teaching model based on the OBE, and has continuously refined its teaching quality evaluation system throughout this implementation process.

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2. Specialty-Innovation Integration Model for Industrial Design Under the OBE

Under the guidance of the OBE, Liuzhou Institute of Technology has built an industrial design specialty-innovation integration experimental class model that reflects five main aspects:

First, the institute has established clear training objectives. The industrial design specialty at Liuzhou Institute of Technology serves socialist construction and regional socioeconomic development. The program produces well-rounded graduates with comprehensive abilities in moral, intellectual, physical, aesthetic and labor aspects. These graduates fulfill the needs of design, management and service sectors within regional automotive transportation, mechanical equipment, intelligent industries and information industries. Students who complete this program can effectively manage industrial design, service design, information design, and related design and management responsibilities. These graduates demonstrate excellent professional technical abilities, strong communication and teamwork skills, robust innovation and entrepreneurship capabilities, refined aesthetic sensibilities, comprehensive information literacy, solid humanities and scientific knowledge and thorough professional qualifications.

Second, the institute has implemented curriculum system optimization, a project-driven approach, as well as ideological and political education integration. This model incorporates innovation and entrepreneurship education into the professional curriculum and creates specialty-innovation integration course modules. For example, the curriculum combines innovative design thinking, design methods, and real-world innovation and entrepreneurship cases. Faculty members use project-based teaching methods with actual design projects that allow students to develop their innovation abilities and practical skills. One example involves the use of 3D scanning and reverse engineering technologies in cultural and creative product design projects. Faculty members also embed ideological and political elements within professional courses to foster students' social responsibility and professional ethics. In the Enrollment Education course, for instance, instructors guide students to examine the social impact of design through case analysis.

Third, the institute has introduced teaching method innovations through two main approaches: blended online and offline instruction, and a studio system with mentor guidance. This model utilizes both online resources and traditional classroom settings with various teaching strategies such as flipped classrooms, case analyses, and group discussions to enhance student engagement and interaction. The studio system follows professional studio practices where experienced mentors guide students through real-world projects to develop their design abilities and creative thinking skills.

Fourth, the institute has reformed its evaluation system by combining process and summative assessments with outcome-oriented evaluation. Instructors use diverse evaluation methods that assess both learning processes and final outcomes to provide comprehensive feedback on student achievement. Course assessments focus on students' abilities to apply theoretical knowledge to design practice and encourage students to produce innovative design solutions through experiments, field research, data collection and other methods.

Fifth, the institute has established industry-education integration and collaborative education. The program features a three-integration collaborative training model that connects specialty with innovation, teachers with students and industry with education[3]. This approach eliminates traditional boundaries between courses and disciplines, and uses design thinking as its foundation to create a design thinking+ curriculum. Industry partners actively participate throughout the talent cultivation process, including course design, practical instruction and project evaluation, which ensures that graduate skills align closely with industry requirements.

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The industrial design specialty at Liuzhou Institute of Technology works with numerous local companies to develop appropriate outcome assessment methods.

This model creates an interconnected and cohesive curriculum system within the industrial design talent training program. The result is a comprehensive training framework for industrial design students, improved communication between students, faculty and industry partners, and better alignment between graduate capabilities and market demands[4].

3. Construction of Teaching Quality Evaluation System for Experimental Class with Industrial Design Specialty-Innovation Integration Under the OBE

Liuzhou Institute of Technology has established a separate branch within its talent training program for the experimental class curriculum in industrial design. This initiative provides students who have an interest in innovation and entrepreneurship with both a platform and opportunities to study relevant knowledge and create practical outcomes[5]. The platform aligns with the university's student development programs, including technology projects, college student innovation and entrepreneurship initiatives that complement this experimental class. Students can engage in innovation and entrepreneurship activities according to their individual needs. Prior to implementation, faculty members discussed the operational aspects of the experimental class and developed a comprehensive teaching quality evaluation system. This system includes specific evaluation objectives, principles, standards, methods and feedback processes to help students understand their learning goals clearly.

3.1. Evaluation Objectives

The evaluation objectives for the teaching quality evaluation system in the experimental class at Liuzhou Institute of Technology follow the OBE. These objectives focus on the core principles of student-centered approaches, outcome-oriented goals and continuous improvement, with clear overall and specific targets. The system assesses students' achievements in professional knowledge, practical abilities, innovation skills and entrepreneurial awareness. Evaluation feedback enables continuous teaching improvements and optimizations to the curriculum, content and teaching methods. This approach helps students clarify their learning objectives, enhances their interest in learning, strengthens their independent learning capabilities and supports their comprehensive development.

3.2. Evaluation Principles

The evaluation system adheres to these principles to ensure scientific validity and effectiveness:

(1) Student-centered: The system prioritizes students' learning experiences and outcomes, emphasizing their central role in the educational process.

(2) Learning outcome-oriented: Students' learning outcomes form the core evaluation focus, with all assessment activities designed around expected learning results.

(3) Emphasis on process evaluation: The system monitors students' learning journeys and developmental progress, focusing on dynamic assessment throughout the learning process.

(4) Diversified evaluation: Multiple assessment methods and evaluators ensure comprehensive and objective evaluations.

(5) Operability: All indicators and methods must be practical, implementable and scalable.

3.3. Evaluation Indicator System

The indicator system represents the central component of the evaluation framework[6]. Liuzhou Institute of Technology has developed a scientific and logical indicator system based on the training objectives for the experimental class. The evaluation system consists of two

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indicator levels. The first level contains five aspects: professional knowledge, practical ability, innovation capability, entrepreneurial awareness and comprehensive quality. The second level further specifies the first-level indicators, such as assessing professional knowledge through design theory, design methods and design expression.

3.4. Evaluation Standards

The system includes specific evaluation standards for each second-level indicator, as illustrated in this Table 1:

Table 1. Evaluation Standard

No.	Evaluation Indicator	Evaluation Standard
1	Professional Knowledge - Design Theory	Examines students' mastery of design history, design principles and related knowledge
2	Practical Ability - Design Research	Assesses students' capabilities in user research and market analysis
3	Innovation Capability - Innovative Thinking	Evaluates students' abilities to create novel, unique and valuable design solutions

3.5. Evaluation Methods

The faculty employs diverse evaluation methods that combine both process and outcome assessments[7]. Process evaluation examines several aspects of student performance: their classroom participation and discussion enthusiasm, their completion of assignments that demonstrates knowledge mastery and application abilities, and their project contributions and teamwork capabilities. Summative evaluation focuses on three key components: final examinations, graduation designs and student-submitted materials for innovation and entrepreneurship projects. Instructors for each course implement various assessment approaches based on the specific course characteristics. These approaches may include student self-assessment, peer evaluation, teacher assessment and industry professional feedback.

3.6. Evaluation Result Feedback and Improvement

Feedback and improvement processes form essential components of the evaluation system that drive continuous teaching quality enhancement. Administrators provide timely evaluation results to students, teachers and administrative departments. This feedback helps students understand their academic progress, enables teachers to refine their instructional methods, and assists administrative departments with educational management optimization. Faculty members analyze the evaluation results to identify teaching deficiencies, make curriculum adjustments, enhance teaching content and improve instructional techniques to achieve ongoing quality improvements.

The teaching quality evaluation system for the experimental class under the OBE places students at its center and focuses on learning outcomes. The system prioritizes both process-based and diversified assessment approaches. Through scientifically sound evaluation indicators and methodologies, this system enhances teaching quality continuously and ultimately achieves the goal of producing high-quality industrial design professionals[8].

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4. The Significant Importance of the Teaching Quality Evaluation System for Experimental Class with Industrial Design Specialty-Innovation Integration

4.1. Meeting the Needs of New Engineering Education and Improving Talent Cultivation Quality

New engineering education programs emphasize the development of versatile professionals with innovative thinking, entrepreneurial mindsets and practical skills. A well-designed teaching quality evaluation system guides experimental class instruction toward these priorities, focusing on students' innovation abilities, practical competencies and entrepreneurial awareness. This approach enhances overall talent development quality and satisfies new engineering education requirements.

4.2. Promoting Specialty-Innovation Integration and Educational Reform

Specialty-innovation integration represents a critical trend in industrial design professional development. A comprehensive teaching quality evaluation system incorporates innovation and entrepreneurship education throughout all professional education components. This integration promotes deep connections between specialized knowledge and innovation, driving educational reform toward more profound developments.

4.3. Evaluation to Promote Construction and Development of the Experimental Class

The teaching quality evaluation system serves both as a verification tool for instructional effectiveness and as a guide for the teaching process. Educators use evaluation results to identify experimental class teaching weaknesses and implement timely improvements, which supports the overall construction and development of the experimental class program.

4.4. Providing Scientific Basis and Improving Talent Cultivation Programs

The teaching quality evaluation system offers a scientific foundation for the development and enhancement of experimental class talent cultivation programs. Educators analyze evaluation results to understand student achievement levels, make curriculum adjustments, enhance teaching content and improve instructional methods. These improvements create more scientifically sound and effective talent cultivation programs.

4.5. Promoting Teacher Development and Teaching Quality

The teaching quality evaluation system encourages faculty members to reflect on their instructional practices and make continuous improvements. This system enhances their teaching abilities and professional skills. Teachers receive valuable feedback that highlights both their strengths and weaknesses, allowing them to implement targeted changes and elevate the overall quality of their instruction.

4.6. Strengthening Students' Independent Learning Awareness and Learning Outcomes

A well-designed evaluation system helps students establish clear learning objectives, increases their motivation and develops their self-directed learning skills. When students participate in the evaluation process, they gain immediate insights into their academic progress. This awareness enables them to modify their study approaches and achieve better learning results.

4.7. Achieving School-Enterprise Cooperation and Resource Sharing

The evaluation system incorporates assessment components from industry partners, which strengthens collaboration between educational institutions and businesses while facilitating

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resource sharing. Industry professionals who participate in the evaluation process provide practical recommendations that align experimental class teaching with real-world requirements. These partnerships also create additional hands-on learning opportunities for students.

5. Conclusion

The teaching quality evaluation system for experimental class with the industrial design specialty-innovation integration effectively captures both the instructional process and student achievements. This system demonstrates significant scientific validity and practical utility. Future development should focus on refining the evaluation indicators, industry partnerships, and enhance both curriculum content and teaching methodologies. These improvements will help produce more innovative design professionals who meet contemporary societal needs.

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