

Research on Teaching Design of Art Fundamentals in Industrial Design Majors Based on OBE (Outcome-based Education) Concept

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ABSTRACT

The teaching reform in colleges and universities based on the OBE (Outcome-based Education) concept is mainly applied in applied majors and disciplines such as engineering education and higher vocational education, reflected in two levels of specialty construction and classroom teaching. In terms of specialty construction, it mainly involves the reform of talent cultivation mode and curriculum system, while in terms of classroom teaching, it mainly involves specific course design and teaching mode reform. The "art fundamentals" course is one of the compulsory courses for industrial design majors in universities, which plays an important role in cultivating students' abilities in industrial design related art creation, expression, and communication. This article explores teaching methods suitable for industrial design professional art basic courses from four aspects: course objectives, teaching content, teaching design, and course evaluation, based on the OBE teaching philosophy and the current teaching and learning situation of art basic courses in colleges and universities.

Keywords: *Art fundamentals, OBE concept, Teaching design.*

1. INTRODUCTION

With the continuous expansion and enrichment of modern curriculum concepts, the art fundamentals of industrial design can be regarded as a purposeful, organized, planned, and rich content practical course aimed at cultivating students' visual art thinking. However, there are some problems with the traditional teaching mode of art fundamental courses, such as being too mechanical and rigid, subjective and one-sided in teaching evaluation, which leads to a lack of interest and motivation among students in art fundamental courses, especially for industrial design majors with weak art foundations, it is difficult to achieve the expected teaching results. The output-oriented OBE education philosophy first clarifies the professional abilities and qualities that students should possess after learning through the curriculum, and then designs the teaching objectives, content, and methods of the curriculum in reverse, with the core orientation of "student-centered, output-oriented, and continuous improvement" throughout the process. Student-

centered is a student-centered curriculum that organizes and implements teaching to achieve the goal of talent cultivation; Output-oriented, emphasizes the evaluation of the quality of talent cultivation based on the professional core knowledge, abilities, and emotional values required by graduation requirements and career needs, and the learning outcomes obtained by students through course learning; it is necessary to continuously improve, evaluate the entire process of the course based on the characteristics of the discipline and the general framework of the profession, and continuously optimize, adjust and improve the course assessment system. Therefore, based on the OBE concept, the research on the teaching design of industrial design professional art fundamental courses has proposed corresponding improvement strategies, which is of great significance for adapting to the cultivation of industrial design professionals.

2. THE CHARACTERISTICS AND SIGNIFICANCE OF THE COURSE

The art fundamental course is one of the compulsory courses for industrial design majors, with a dual attribute of theory and practice. Its main purpose is to lay the foundation for other professional courses and cultivate students' abilities in painting, modeling, conceptualization, and design. This course has the following characteristics and significance:

2.1 Professional Compulsory Course

The "National Standards for Teaching Quality of Undergraduate Majors in Ordinary Higher Education Institutions for Mechanical Engineering" propose to place greater emphasis on the integration of student knowledge and abilities, and to strengthen the cultivation of students' design, innovation, and engineering technology application abilities. This means that design innovation is the key to the development and survival of design majors, and the foundation of art is a necessary process for cultivating students from thinking to seeing and then to presenting physical objects, as well as a necessary path for cultivating design talents. The course can enable students to master product painting skills and innovative design methods through teaching related basic knowledge, aesthetic knowledge cultivation, creative cultivation, and related course practice; At the same time, through the analysis and practice of cultural connotations and aesthetic elements, this course can gradually infiltrate the concept of aesthetic education, and make students lay a solid foundation in their painting ability and literacy. In this way, after completing this course, students will be able to possess the basic qualities and abilities required to engage in industrial design work.

2.2 Practical Course

The art fundamental courses include both theoretical knowledge and related skill training, including quick expression of creativity, hand drawn product renderings, etc. Students are required to possess certain abilities in painting, shaping, conceptualization, and design. The ability of painting and modeling mainly includes the visual expression of the basic form of objects, the ability to imagine, adapt, decorate, and paint objects; Conceptual ability refers to the ability to explore cultural connotations, extract thematic elements, and conceptualize formal beauty such as color,

shape, and composition in product design; Design ability is the comprehensive practical ability of an industrial designer to create beauty using rich materials, different methods, and clever ideas. The art fundamental courses should highlight the characteristics of industrial design, combine art knowledge and skills in practical application in industrial design, and cultivate high-quality industrial design talents. In this way, after completing this course, students can apply the knowledge and skills they have learned to express their ideas and design products.

2.3 Laying the Foundation for Other Courses

The art fundamental course is a leading course in the entire talent training program for industrial design majors. Its main goal is to master the basic knowledge of painting, the rapid expression of object forms, and the real-time display of product creative ideas. It is an indispensable component of subsequent professional courses, such as in the course "Design Procedures and Methods", creative rapid expression is based on the art fundamental courses. The art fundamental courses provide students with a visual way of thinking and expression, enabling them to better understand and apply other professional knowledge, such as engineering graphics, materials and technology, mechanical principles, etc. At the same time, art fundamental courses also provide students with an aesthetic way of feeling and creating, enabling them to better grasp and apply other professional skills, such as model making, computer-aided design, product display, etc.

3. THE PROBLEMS IN CURRENT COURSE TEACHING

Focusing on the reform perspective of art fundamental teaching in design majors, it was found that there is a lack of teaching reform perspectives that focus on student situations. In terms of course teaching, there are problems such as deviation between course objectives and social needs, disconnection between course content and practical needs, emphasis on skill learning and lack of innovative cultivation, and unclear role of course evaluation in promoting learning through exams.

3.1 Deviation Between Course Objectives and Social Needs

The course objectives are the starting point for school curriculum design and implementation, and are set around the goals of professional talent cultivation. Therefore, the course objectives need to be targeted towards the social and professional needs of talent cultivation. Through research on art fundamental courses at different levels of colleges and universities across the country, it was found that over 80% of art fundamental courses are targeted at traditional painting, mainly cultivating the perception and appreciation ability of art fundamental elements such as modeling, sketching, and sketching, without specific positioning based on professional characteristics and career needs.

3.2 Disconnection Between Course Content and Practical Needs

The selection of course content is the core focus of course teaching, which is directly related to the effectiveness of teaching. In course design, it is necessary to consider the "why" and "what should be" in the course. However, through research, it was found that the content selection of most art fundamental courses in colleges and universities is "general", such as drawing from cubes to polygons and then to plaster statues, without developing different course content according to professional needs, and without developing relevant practical content based on the background of industrial design students.

3.3 Lack of Innovative Cultivation in Teaching Design

Skills are the foundation of abilities, and abilities can lead to a deeper level of qualitative improvement in skills. The art fundamental courses cultivate students' painting skills, allowing them to easily draw creative sketches for product design after mastering the painting skills, in order to cultivate the ability of industrial design professionals. After investigation, it was found that the current art fundamental courses in colleges and universities mainly adopt a single teaching method of teacher teaching student learning (practice), and the curriculum design strengthens the training of basic modeling copying memory. There is a problem of more copying and less innovation, and a lack of cultivation of imagination and creativity. There is little appreciation and interpretation of the creative background, content, and style of art works,

neglecting the aesthetic education function that art courses should have. Students only meet the requirements of "how to draw" and "what to draw" in art course learning, which leads to students feeling that art courses are dull and boring, ultimately resulting in students only mastering basic painting skills and lacking comprehensive abilities in art practice and innovation.

3.4 The Course Evaluation Having a Not Significant Effect of Promoting Learning Through Exams

The evaluation of art fundamental courses usually adopts the form of examination, which usually involves painting evaluation or submitting painting assignments. The evaluation plan is mostly based on 50% of the usual grade and 50% of the final grade, and the final evaluation score is obtained. Firstly, the evaluation content is limited to the paintings or handicrafts learned each semester, and the evaluation content is single, which cannot fully present the comprehensive literacy of students throughout the process; Secondly, the evaluation criteria focus on the mastery of realism, copying, memory, presentation effect, and completion in painting, without setting a detailed and intuitive evaluation system for the comprehensive qualities of imagination, innovation, and method application in painting; Thirdly, the evaluation content is arbitrary and fails to correspond with the course objectives and graduation requirements. The evaluation system should also consider how to promote students' continuous learning and ability development.

4. COURSE IMPROVEMENT STRATEGIES

Based on the OBE philosophy of "student-centered, results-oriented, and evaluation-driven improvement", combined with the ability requirements of industrial designers, this study focuses on exploring teaching reform in the areas of goal determination, content selection, teaching design, and course evaluation of art fundamental courses.

4.1 Course Objective Setting Incorporating OBE Concepts

OBE is an educational philosophy that is learner-centered and results-oriented, emphasizing that all students can learn and achieve success. By controlling the conditions for success, schools can

nurture new successes. The design of OBE courses is a reverse design process that starts from the course objectives. This stage is the starting point of course teaching, usually located in the curriculum setting stage of training plan formulation. Its main role is to guide the training objectives and achieve graduation requirements based on graduation requirements. To truly achieve the course objectives, it is necessary to consider them in conjunction with other elements as an organic component of a complete teaching system, and to refine and control each aspect of teaching layer by layer, ultimately aligning with evaluation standards.

Under the OBE concept, the goal setting of art fundamental courses in colleges and universities should follow the following principles:

First, the course objectives should be clear, specific, measurable, achievable, and reflect the knowledge, skills, and attitudes that students should possess after completing the course. Based on the OBE concept, this article proposes the following three course objectives for the art fundamental courses:

- Systematically mastering the basic knowledge of art and cultivating students with a solid foundation in art: This goal requires students to understand and apply basic theories of art, including color, composition, perspective, light and shadow, etc., to be proficient in mastering various artistic expression techniques and materials, such as pens, etc., and to be able to appreciate and analyze works of different styles.
- Mastering the rules of form and expression techniques, and applying them comprehensively to product sketch drawing: This goal requires students to be able to apply modeling rules and expression techniques to express their design ideas in the form of sketches, can choose appropriate design language and expression methods based on different product types and functional requirements, and to be capable of reflecting the product's morphological features, structural details, material texture, etc. in the sketch.
- Cultivating students' creativity and ability to value beautiful things: This goal requires students to be able to unleash their imagination and creativity, and propose novel, unique, and valuable design solutions, can pay attention to the problems and needs that exist in the social and cultural environment, and seek solutions to

beautiful things, and to be capable of demonstrating one's passion and sense of responsibility towards beautiful things.

Secondly, the course objectives should be consistent with career and graduation requirements, reflecting the core competencies that students need to possess in their future work. Based on the OBE concept, this article proposes the following three professional and graduation requirements for the art fundamental course objectives:

- Understanding relevant theories: This requirement asks students to be able to master the basic theories of art and industrial design, including aesthetics, design history, design methods, ergonomics, etc., and be capable of applying relevant theories to analyze and evaluate one's own and others' design works, and propose reasonable suggestions and improvement plans.
- Being skilled in design, and being able to express design creativity in real-time: This requirement requires students to be able to conduct research, analysis, conceptualization, scheme selection, and other design processes based on different design themes and goals, can use quick presentation methods such as sketches to present one's design ideas clearly, accurately, and vividly, and to be capable of effective design communication and presentation based on different occasions and objects.
- Having passions for industrial design: This requirement demands students to develop a strong interest and enthusiasm for industrial design, and to pay attention to the development dynamics and cutting-edge trends of industrial design, as well as having a profound understanding and respect for the social values and professional ethics of industrial design, and being able to actively participate in practical activities and competition projects in industrial design, continuously improving one's professional level and innovation ability.

Thirdly, the course objectives should have hierarchy and coherence, reflecting the learning outcomes that students should achieve at different stages. Based on the OBE concept, this article proposes the following three levels of course objectives for the art fundamental course:

- Basic level: The curriculum goal of this level is to enable students to master the basic knowledge and skills of art, laying a solid foundation for subsequent product sketch drawing. This level of curriculum includes courses such as color studies, sketching, etc.
- Application level: The curriculum goal of this level is to enable students to master the rules of design and expression techniques, and to comprehensively apply basic knowledge and skills of art to draw product sketches. This level of courses includes fundamentals of design, presentation techniques, product sketches, etc.
- Innovation level: The curriculum goal of this level is to cultivate students' creativity, the ability to value beautiful things, and stimulate their love for industrial design. This level of courses include creative methods, product innovation, and beautiful things.

The goal setting of university art fundamental courses that incorporate the OBE concept is a systematic and orderly process that requires considering student learning outcomes from multiple perspectives and levels, and using them as guidance for course design and teaching implementation. By setting the goals of art fundamental courses under the OBE concept, the quality of education can be improved and excellent talents can be cultivated to meet the needs of future society.

4.2 Results-oriented Teaching Content Setting

As a hand drawing course in an engineering major, the course design needs to focus on considering the learning situation, teaching situation, and social development needs to formulate the course content. This course is divided into four modules:

The first module, based on the results of line training, is a consciousness training module, which is the only way for painting to get started from zero to primary;

The second module, based on the achievements of basic painting knowledge, belongs to the method training module. Understanding and mastering the basic knowledge related to painting through the method training module is the basis for rapid and quasi expression of subsequent product design;

The third module, based on the results of theme innovation, belongs to the practical exercise module. During the practical exercise, it is necessary to master the expression of various innovative forms, and lay the foundation for the form expression of subsequent professional courses;

The fourth module, integrating ideological and political education into the entire curriculum, aligns the course with ideological and political theory courses during the teaching process, aiming at strengthening moral education and cultivating people, and training design professionals with patriotism and noble beliefs.

4.3 Teaching Design That Integrates Multiple Teaching Methods

This course adopts various teaching methods and practical approaches:

The first is to rely on information-based learning tools. Teachers can make full use of information technology and use hand drawn boards or tablets to help students draw with auxiliary tools, creating a diverse learning environment. This teaching method can enhance students' creativity and imagination, allowing them to freely express their personality and style during the drawing process. At the same time, it can also cultivate students' information literacy and technical abilities, enabling them to become familiar with and master the use of various drawing software and tools.

The second is to create three-dimensional learning scenarios. Combining professional characteristics, teachers can use 3D modeling and rendering software such as Rhino, Keyshot, C4D, etc., to restore the real product form and lighting environment of classroom teaching cases, and create a three-dimensional learning scene for students. This teaching method can improve students' professional level and practical ability, allowing them to master the basic principles and skills of 3D modeling and rendering in simulating the real product design process. At the same time, it can also cultivate students' aesthetic ability and sense of beauty, allowing them to experience the connotation and expression of beauty while observing and analyzing product forms and light and shadow environments.

The third is to carry out demonstration teaching activities. Based on the characteristics of the course, teachers can explain demonstration teaching and expand students' thinking through analogies. In case studies, teachers should select the current hot topics

and needs that students are concerned about to stimulate their interest. For example, they can choose listed products such as Huawei Mate60 and iPhone 15 to discuss and analyze their constituent elements, composition relationships, and color design with students. Focusing on problem analysis before, during, and after practice, teachers can conduct peer evaluation and teacher-student discussions on design works, promoting mutual learning between teachers and students. This teaching method can improve students' theoretical level and thinking ability, allowing them to apply the knowledge they have learned to solve practical problems after listening to the teacher's explanations and demonstrations. At the same time, it can also cultivate students' innovation and communication abilities, allowing them to break through traditional thinking patterns, propose novel design solutions, and effectively communicate and provide feedback with teachers and classmates when selecting cases of interest for creation.

The fourth is to integrate continuity teaching ideas. Practice emphasizes the application of results. Combined with the follow-up and peer training of courses, teachers and students should jointly promote the application of practical results with peers, laying the foundation for the output of follow-up results. For example, when the theme of insect biomimetics is set up for creative drawing in course practice, the simple three-dimensional forms are required to be created in the form design course. This teaching method can improve students' comprehensive and collaborative abilities, allowing them to apply their design works to other related courses after completing practical tasks, forming a complete design project. At the same time, it can also cultivate students' learning and autonomous abilities, allowing them to learn from each other, help each other, and promote each other when collaborating with classmates in other courses, improving their design level and quality.

4.4 Building a Multi-perspective Curriculum Evaluation System

The curriculum evaluation of art fundamentals focuses on building a multi perspective evaluation system with diversified evaluation methods, multi-dimensional evaluation subjects, and multi-level evaluation content as the main body

The first is to adopt diversified evaluation methods, including regular assignments, mid-term exams, final exams, and final product displays. Each evaluation method has clear evaluation

criteria and weights, which not only assess students' mastery of theoretical knowledge but also their level of application of practical skills. At the same time, emphasis is also placed on the cultivation and assessment of students' creativity, innovation, aesthetic ability, and other qualities.

The second is to adopt a multi-dimensional evaluation subject, including teacher evaluation, peer evaluation, self-evaluation, etc. Each evaluator has a different perspective and focus, which can provide students with objective and fair feedback and suggestions, as well as stimulate their motivation to actively participate and improve themselves. At the same time, it also promotes communication and interaction between teachers and students, as well as between students.

The third is to adopt multi-level evaluation content, including knowledge level, skill level, attitude level, etc. Each level has different indicators and requirements, which not only reflect the educational goals of this course for art fundamental knowledge and skills, but also reflect the educational goals of this course for art thinking and emotions. At the same time, it also reflects the integration and penetration of ideological and political education and humanistic literacy education in this course.

5. THE EFFECTIVENESS OF CURRICULUM REFORM

Starting from standardizing course objectives, the reform of art fundamental courses should focus on designing course content based on course objectives, enriching teaching content through teaching methods, and using evaluation methods to correspond to an effective cycle of course objectives. Through curriculum reform, not only can it solidify students' professional knowledge foundation and enable them to master painting and innovative design abilities, but also can it enhance the teaching level of teachers through mutual learning and teaching.

5.1 Establishing a New Teaching Mode System

The art fundamental courses are based on the perspective of students, based on real teaching problems, and combined with the OBE teaching philosophy, to form a new teaching mode of art fundamental courses with industrial design professional characteristics.

- The reconstruction of teaching content has stimulated students' interest in painting and led them from non-professional to professional; The courses complement each other, making professional learning more systematic and holistic; At the end of the course, through the course portfolio, students can intuitively feel the progressive relationship of course content arrangement, changes in outcomes, and areas where they need to strengthen and improve.
- Innovation in teaching design, through current information technology means, allows students to integrate into the learning of the curriculum in the most intuitive and efficient way. At the same time, traditional teaching methods are optimized by combining professional characteristics, and in the selection of teaching cases, students' interests are combined to turn ordinary classrooms into hobby oriented classrooms.
- Innovation in assessment and evaluation, evaluation is no longer just about teacher evaluation, but also includes student peer evaluation, evaluation of other course teachers, and evaluation of enterprise personnel, with a four-fold evaluation. This can not only improve students' abilities in self-evaluation and mutual evaluation, but also increase their participation and sense of responsibility, and enable them to receive feedback and suggestions from various aspects.

5.2 Cultivating Students with Excellent Comprehensive Qualities

The teaching reform and practice of the art foundation course in the industrial design major should adhere to the concept of "student-centered". Through the practice of a new teaching mode system, it can effectively solidify the professional foundation of students, making them not only familiar with the relevant theories of art foundation, but also able to accurately express their thoughts through painting. It can also cultivate the ability to express design creativity through what they see and learn, which has been widely praised among students and employers. By organizing course works exhibitions, works are turned into gifts, igniting students' interest in learning, enhancing painting skills and aesthetic experiences; By relying on the curriculum, students in Neosoft Institute Guangdong have won multiple level awards in the second National SKETCH Original Handdrawn Design Competition for College Students, and their

outstanding drawing skills in professional club recruitment posters reflect the growth and practice of students.

5.3 Improving the Teaching Level and Educational Philosophy of Teachers

The reform and practice of teaching art fundamental courses in industrial design is not only beneficial for students, but also for teachers. Through reform practice, teachers should constantly update their teaching content and methods, improve their teaching level and effectiveness. At the same time, teachers should constantly reflect on their educational philosophy and goals, to enhance their sense of educational responsibility and mission. In addition, teachers should also communicate and collaborate with teachers of other related courses, forming a good teaching and research atmosphere and team spirit.

6. CONCLUSION

Based on the OBE concept, the teaching reform of the basic art courses in industrial design majors focuses on results oriented approach, discovers practical problems based on learning situations, and continuously improves course objectives, content, teaching methods, and assessment systems to cultivate new applied talents suitable for industrial design majors. The curriculum reform has important practical significance and value in generating new teaching models, cultivating students with one specialty and multiple abilities, focusing on the cultivation of aesthetic education and the acquisition of literacy.

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