

Research on the Teaching Reform of Art Design Major Courses Taking "Industrial Design Methods and Procedures" as an Example

Chunlin Yu¹ Leichi Yuan^{2,*} Bo Mu²

¹ *Wuchang University of Technology, Wuhan, Hubei 430223, China*

² *Wuhan Institute of Technology, Wuhan, Hubei 430205, China*

*Corresponding author. Email: 10091402@wit.edu.cn

ABSTRACT

The research on the teaching innovation reform is based on the analysis of the current teaching status and learning condition. The pain points in the course teaching of "Industrial Design Methods and Procedures" are the basic points of teaching reform and innovation, and the root causes of the problems are deeply analyzed. This paper takes the problem as the orientation, takes the "two natures and one degree" as the standard, conducts according to the four goals of job requirements, training goals, graduation requirements and course goals, and adopts the goal-oriented reverse design idea for teaching innovation design. Finally, through the analysis of innovative ideas of course teaching reform, the situation and effect of problem solving are explained.

Keywords: *Industrial Design Methods and Procedures, Course reform, Integration of competition and teaching, School-enterprise cooperation.*

1. INTRODUCTION

Course is the core element of talent training. China proposes to establish the "two natures and one degree" standard, namely, high-order nature, innovative nature and degree of challenging, for the establishment of golden courses. The so-called "high-order nature" is the organic integration of knowledge, ability and quality, which is to cultivate students' comprehensive ability and advanced thinking to solve complex problems. The so-called "innovative nature" means that the content of the course reflects the leading-edge character and epochal character, the teaching form presents advanced and interactive nature, and the learning results possess exploratory nature and individuation. The so-called "degree of challenging" means that the course has a certain degree of difficulty, and requires a jump to get it. It has higher requirements for teachers' lesson

preparation as well as students' after-school study.

"Industrial Design Methods and Procedures" is the core course of major of product design. Through the study of this course, the aim is to enable students to master the correct design concepts and innovative design thinking methods, including the entire design process and methods including planning, research, conceiving creativity, analysis, expression and evaluation, improve students' speculation, creativity and expressiveness in the whole process of product design, strengthen their understanding of product design, and improve their ability to discover, analyze, judge and solve problems.

This course requires teachers to pay attention to the systematicness and integrity of course knowledge. In terms of teaching methods, a step-by-step teaching method is adopted before class, focusing on the expansion and development of pre-class knowledge. During the class, it is based on the project task-driven teaching method, enhances the effect of intensive lectures through case teaching, and pays attention to the degree of knowledge mastery. After class, the team teaching method is adopted to promote learning

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through competitions, and the application and internalization of knowledge is also emphasized.

In teaching, teachers pay attention to increasing the proportion of case teaching, and the analysis of typical cases should be highlighted in text teaching materials and auxiliary teaching materials. At the same time, teachers arrange necessary group discussions in class to give students an atmosphere of exposure to reality and discussing actual product design. At the same time, students are required to have strong logical thinking ability and product analysis ability, be familiar with design specifications and proficiently use product design methods and procedures.

Through the study of this course, students need to develop the following professional qualities:

- Training students to master correct design methods and design principles.
- Through the analysis of the macro and micro environment and the market, students understand the development status and prospects of industrial design.
- Training students to master the entire design process including planning, research, conceiving creativity, analysis, expression and evaluation.
- Through the case, students analyze user needs, understand the market orientation, clarify the direction of product design positioning, master the product design evaluation principles, and can independently complete the whole process of product design in accordance with processes and methods.
- Cultivating students' ability to study product design and development trends.

Through this course, students need to be cultivated with the following non-professional qualities:

- Having a good sense of teamwork and communication skills;
- Developing a serious and responsible learning attitude and meticulous work style;
- Having good oral expression skills.
- Having strong sense of innovation, quality, standard service and industry ethics.

2. PAIN POINTS IN THE TEACHING OF "INDUSTRIAL DESIGN METHODS AND PROCEDURES" AND COUNTERMEASURES

2.1 Poor Learning Atmosphere and Initiative, and Lacking the Sense of Substitution for the Project

For the purpose of completing the course tasks, students lack the enthusiasm for active learning. As far as the time allocation of this course is concerned, half of the time is spent on theoretical teaching. The theoretical part focuses on learning the entire design process of industrial design from planning, research, conceiving creativity, analysis, expression and evaluation. The mastery of basic theoretical knowledge can't really be applied to specific projects. The teaching and practice links are prone to be out of touch. In addition, most of the courses are practiced with virtual projects, and the knowledge related to design process mastered by students can't be systematically and completely implemented. As time goes on, students' interest in learning is worn down, they feel that the learning of theoretical knowledge is boring, and their motivation to learn decreases. The design level of excellent students can't be improved, and students with weak levels give up on themselves, affecting the overall teaching effect.

In terms of teaching innovation concepts and teaching ideas, teachers pay attention to the cultivation of knowledge and skills in the class, introduce real enterprise projects from lesson preparation, and synchronize the teaching content of each teaching unit with real enterprise projects (see "Table 1"). The sense of substitution and accomplishment of students' subject research is enhanced, thereby enhancing learning interest and motivating students' learning initiative.

Table 1. Synchronization table of teaching content and actual project progress of the enterprise

| Teaching units | Teaching content | Synchronous teaching progress of enterprise projects |
|----------------|--|--|
| Unit 1 | Overview of industrial design methods and procedures | Enterprise real project introduction |
| Unit 2 | Product design procedure | Accepting the project, making a plan |
| Unit 3 | Design research and methods | Project research, problem analysis, market positioning, feasibility analysis |
| Unit 4 | Design ideas and methods | Project creative stage, technical specifications |
| Unit 5 | Design description, expression and product design case | Project design expression stage, evaluation, quality control |

2.2 The Project Case Lacks a Sense of Real Experience and Systematicness and Can't Be Presented in Class in the Later Stage of the Design Process

Due to the lack of practical experience and the limitation of teaching conditions, the traditional course teaching mostly adopts the linear operation process of virtual projects or cases, aiming at completing the teaching tasks, causing students to misunderstand product research and lack innovative thinking. In terms of teaching content, teachers can only complete the planning, research, conceiving creativity, analysis and expression in the design process relatively completely.

As for the later stages of the design process including testing, experience, prototype production, start of production, market introduction, etc., due to the limitations of teaching conditions, teachers can't truly present them in class. Students lack real feelings, have lower expectations for project results, and have no sense of accomplishment.

In terms of innovation, teachers focus on synchronizing teaching content with enterprise projects. In the later stages of the design process including testing, experience, prototype production, start of production, and market introduction, the project will be tracked in real-time after class. Synchronizing with the actual project of the enterprise can provide real-time feedback on the progress of the project, and enhance the sense of participation and accomplishment of students. Due to the longer period involved in the later stages of the process, especially for links of start of production and market introduction, at this stage, teachers extend the class of "Industrial Design Methods and Procedures" to enterprise field visits and professional internships. This can not only make up for the limited teaching problems in the later stages of the class design, but also enhance the purposiveness and pertinence of student investigations. On the basis of being student-oriented, it has also achieved the goal of talent training in accordance with the four standards of job

requirements, training goals, graduation requirements and course goals.

2.3 Insufficient Course Teaching Resources and Lacking Epochal Character and Leading-edge Character

The teaching resources and textbooks used in the course can't be updated in real time, lacking epochal character and professional leading-edge character. This results in students' learning of processes and methods confined to the theoretical content in class, and the design process and design principles are mechanically applied. Students don't know how to use the design process and methods flexibly in a way that keeps pace with the times and draws inferences about other cases from one instance.

Outside of the course, teachers focus on the cultivation of students' creative ability. First, after class, teachers form a learning team across grades to use the professional qualities of senior students to drive lower-grade students and expand students' sensitivity to professional leading-edge knowledge. The layout form of homework after class focuses on expanding the topic of various authoritative competitions in practice and enriching the subject direction in the topic selection of course homework. In this way, the practical projects in class are synchronized with the enterprise, and the professional topics after class are combined with competition hot spots and leading-edge information.

2.4 The Course Ideological and Political Content Is Difficult to Integrate into Professional Courses with Strong Theoretical Property

In terms of course teaching methods, teachers guide students to explore people's real physical and psychological needs and develop universal designs. In terms of teaching methods, teachers pay attention to guiding students to develop research ideas, enhance empathy, and carry forward the spirit of

seeking truth from facts, which coincides with the goals of carrying forward the fine traditions in course ideological and political construction and enhancing self-worth in learning and practice.

In the course, teachers choose topics to integrate into the education of Chinese fine traditions, enhance students' sense of social responsibility, and strengthen the inheritance of good traditions such as respecting the elderly and loving the young and the whole world as one community; in the course, teachers integrate the education of professional ideals, outlook on life, and values.

In the course, teachers integrate value education and advocate equality, unity and friendship. Only through equal transpositional consideration and contextual integration can the real needs of the target object be discovered.

In the curriculum, teachers integrate students' mental health education, enhance students' empathy education through user research on disadvantaged groups, and improve students' mental health; teachers enrich the class content more realistically and vividly, and use this as a starting point to integrate more practical projects into the course, teaching through practice, and educating people through practice. The study of industrial design procedures and methods is no longer limited to the mastery of professional method knowledge, but to cultivate students' exploration ability and ideas through methods, enhance the sense of social responsibility, and establish correct values and world views.

3. INNOVATIVE DIRECTION OF THE COURSE TEACHING REFORM OF "INDUSTRIAL DESIGN METHODS AND PROCEDURES"

The dimensional teaching ideas of course innovation concepts and ideas are from three dimensions: carrying out multi-dimensional innovation respectively from the training of in-class knowledge and skills, the training of after-class innovation ability, and the output-oriented "two natures and one degree" standard.

In-class knowledge and skills training: Teachers introduce enterprise projects from lesson preparation to synchronize teaching progress. Before class,

teachers clarify the orientation of the course, clarify the content and goals of class teaching, make full use of Lanmoyun's online resources for learning, use competition and teaching resources, and use enterprise project resources. In the class, teachers innovate teaching models, introduce project-based teaching models, integrate the competition and teaching process, pay attention to the explanation effect of theoretical knowledge, and improve students' ability to use the knowledge they have learned to solve practical problems.

As for the cultivation of extracurricular innovation ability, after class, teachers form a learning team across grades to innovate the layout form of homework after class. In practice, teachers expand practice themes, integrate competitions and teaching, enrich the subject direction, integrate schools and enterprises, and enhance students' enthusiasm. In the after-class evaluation, teachers focus on the course scoring standards, and at the same time introduce the integration of the enterprise project evaluation system and the competition and teaching evaluation.

Based on the goal orientation of the above two points, in the third dimension of course reform, teachers follow four goals of job requirements, training goals, graduation requirements and course goals, and adopt the goal-oriented reverse design idea for teaching innovation design. ("Figure 1")

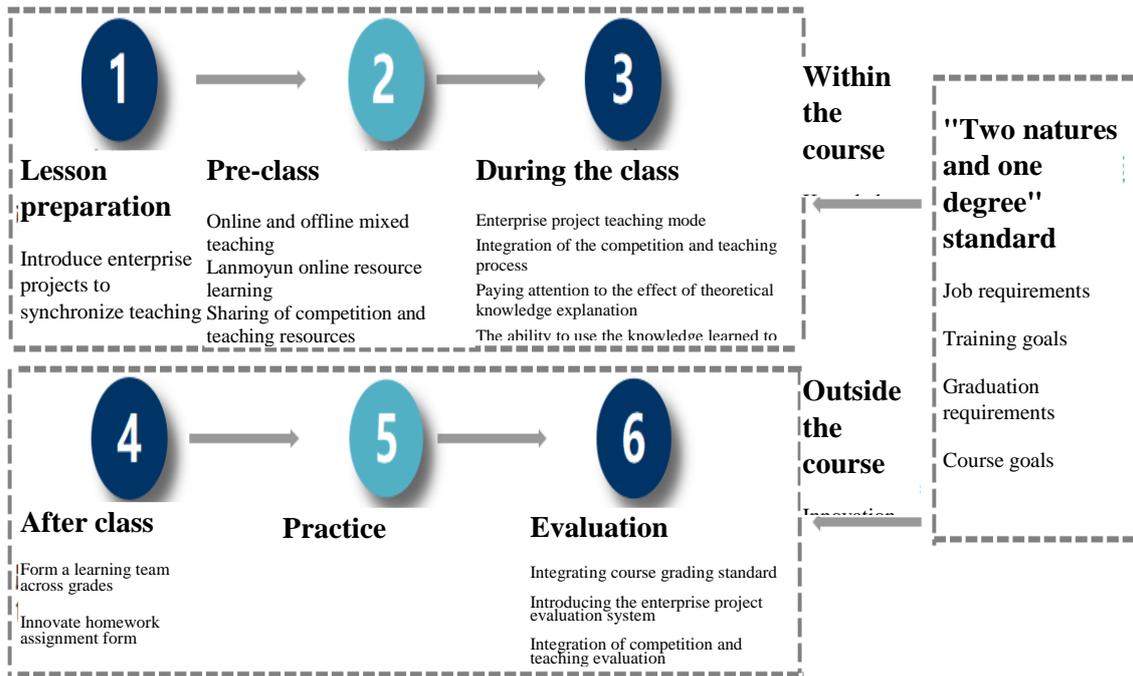


Figure 1 Innovative direction of the course teaching reform of "Industrial Design Methods and Procedures".

4. THE EFFECT AND POPULARIZATION AND APPLICATION VALUE OF THE COURSE TEACHING REFORM OF "INDUSTRIAL DESIGN METHODS AND PROCEDURES"

Teaching effect: Teachers introduce Mcos teaching quality management platform. In recent years, the students' evaluation of teaching in this course is above 95, and the evaluation of teaching by peers is above 97. The evaluation of the course teaching is excellent, accounting for the top 20% of the college's ranking.

Teaching achievements: Based on this course, teachers won the "third prize" in the 2020 Teaching Competition for Young Teachers in Wuchang University of Technology, and the 2020 Ideological and Political Outstanding Teachers. Approved projects: The Application of Informatization Teaching Method in Art Design Course under the Development of Internalized Teaching Mode in 2018 (School-level research project of Wuchang University of Technology); The second batch of industry-academy cooperative education project "Construction of Virtual Reality Comprehensive Laboratory" of the Ministry of Education; Science and Technology Development Center, Ministry of Education, University Industry-University-Research-

Innovation Cooperation Fund "Industrial Design Structure Disassembly and Modeling Training Virtual Simulation Experiment" and so on.

At the same time, under the support of this course, teachers instructed students to win the 2018 German IF Design Rising Star Award "Gold Award of the Year" global TOP8, as well as more than 30 various design competitions, and many student works have been put into production by enterprises.

5. CONCLUSION

As the society's demand for talents increases, the mode of talent training will certainly require innovation and reform. From a micro level, it is the reform of the course. This paper combines the characteristics of the course "Industrial Design Methods and Procedures" and initially explores how to carry out teaching innovation reforms in the context of escalating demand for talents and informatization teaching. It is recommended to innovate through the means of informatization teaching and information resource integration, the integration of competition and teaching, and school-enterprise cooperation, etc., in order to provide reference for teaching methods for art education courses.

AUTHORS' CONTRIBUTIONS

Chunlin Yu wrote the manuscript. Leichi Yuan contributed to revising and editing. Bo Mu offered course practice information and analysed data.

REFERENCES

- [1] Fang Youqin, The Exploration of the "Combination of Competition and Teaching" Teaching Model in the Course of "Photoshop" Against the Background of Mass Entrepreneurship and Innovation [J], *Software*, 2020.10. (in Chinese)
- [2] Zhang Chao, Research on the Reform Path of Art Design Professional Course Based on School-Enterprise Cooperation [J], *Fine Arts Literature*, 2020.2. (in Chinese)
- [3] Yu Lei, New Ideas for Informatization Teaching Reform of the Course "Constitution" [J], *China Packaging*, 2019.9. (in Chinese)
- [4] Xu Mingxia, Research and Practice of Art Design Informatization Course [J], *Art Education Research*, 2019.12. (in Chinese)
- [5] Yang Minghui, Research on In-depth Integration of Core Courses of Art Design Major and School-Enterprise Cooperation Business Projects in Teaching [J], *Art Education Research*, 2018.2. (in Chinese)
- [6] Tao Tao, School-Enterprise Cooperation Mechanism Research and Practice of Individual Courses in Art Design [J], *Art Education*, 2014.2. (in Chinese)