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Research on Teaching Model of Industrial Design Practice Course Based on Team Collaboration

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***Abstract**: Practice course is an important course type of industrial design teaching system. Team cooperation is the mainstream mode of industrial design work in the future. It will be an inevitable trend for the discipline construction of industrial design major in Colleges and universities to introduce the form of team cooperation into practice courses. Through the exploration and practice of several practical courses of industrial design major in three universities, the necessity of introducing team cooperation into the design practice course is fully verified, and the implementation of the industrial design practice course based on team cooperation is summarized into five teaching parts: providing course topics→setting up students' teams→completing projects by team cooperation→reporting, displaying and submitting results→course assessment.*

***Key words**: Team collaboration; Industrial design; Teaching model; Teaching practice*

Introduction

The major courses in the teaching system of design major in most colleges and universities in China are mainly divided into three categories: major theory course, major design course and major practice course. Due to the emphasis of discipline application in the training of talents, the proportion of professional practice courses in all course categories is increasing day by day. Industrial design involves artistry, science and economy. It is a systems engineering, involving many subjects. It requires the team members to work together and improve the creativity and feasibility of the design scheme from different positions and perspectives. Therefore, in the teaching of industrial design, it is very important to cultivate the team spirit of students, not only to improve the comprehensive professional knowledge of students, but also to improve the cooperation of future employment. Therefore, in the teaching of industrial design, it is very important to cultivate the team spirit of students, not only to improve the comprehensive professional knowledge of students, but also to improve the cooperation of future employment. Through many years of teaching practice and summary, this paper explores the teaching mode based on students' team cooperation for industrial design practice courses, in order to improve students' comprehensive ability of innovative design, communication and expression and team cooperation spirit.

Necessity of Introducing Team Cooperation Teaching Mode to Design Practical Courses

The discipline characteristics of industrial design determine that design practitioners must have a variety of

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interdisciplinary knowledge and team spirit. Although the existing industrial design personnel training system in China involves a wide range of contents and a large variety of courses, in fact, most of the talents still cannot meet the needs of the market and enterprises. There are two reasons: A. The division of disciplines in Colleges and universities is quite different from the division of work types of designers by the market or enterprises; B. The transformation of students from design theory to design practice ability requires not only time but also a new understanding of the major, and also a new understanding of their own work in the design team. This situation is extremely unfavorable for students to quickly create value and apply what they have learned.

With the rapid development of technology and the gradual maturity of the design industry, the division of design will be increasingly clear and more detailed, and the individual traces of industrial design will be increasingly fuzzy and clearer, and the brand or design team brand will be replaced (Sun & Wang, 2013). Teamwork will be the general trend, and the industrial design team spirit will be one of the important standards for enterprises to measure talents. Participating in many kinds of practical activities can promote students to integrate theory with practice, put knowledge into practice, and improve and test their ability to deal with practical problems, display skills and innovation. Therefore, as an experimental and testing platform, practical courses are indispensable core work for any college industrial design major to train qualified industrial designers and excellent design talents. In the process of teaching, colleges and universities should emphasize and train students' sense of team cooperation, and enhance the ability of team cooperation in design practice. At the same time, teamwork can promote students and students, students and teachers to find problems, develop strengths and make up weaknesses, inspire each other and collide with inspiration, effectively improve the innovation and completion of the design scheme, and increase their chances of obtaining excellent practical results. Therefore, it is necessary to explore the teaching mode of student team cooperation in the design of practical courses.

Concept of Team Cooperation Teaching Mode

Based on the theory of autonomous learning and cooperative learning, the teaching mode of team cooperation is established according to the characteristics of industrial design discipline, which guides students to complete the practical tasks of the course according to the process of "team building→role division→exploration learnin→division of work and cooperation". Teachers play a leading and guiding role in this model. The core is to organize the students in the class into multiple teams according to the topics of the course. According to their own interests and strengths, they play different roles in the design team and complete the task together through collaborative cooperation. This mode emphasizes the combination of team members' individual exploration and team cooperation exploration (Fan, 2007).

Through the mutual supervision, mutual inspiration and cooperation of team members, students' enthusiasm for independent learning can be effectively aroused, making up for the lack of full supervision and guidance of teachers in designing practical courses, and at the same time, students' team spirit, sense of cooperation, interpersonal communication ability and sense of responsibility can be cultivated, mutual learning, strengths and weaknesses can be improved, and the national medium and long term education reform can be truly realized And the development plan outline (2010-2020) puts forward the modern education concept of students as the main body and teachers as the leading role. Compared with the traditional training mechanism

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of individual completion of practical tasks, the establishment of the curriculum teaching mode based on team cooperation is more conducive to the cultivation of industrial design talents with comprehensive literacy and complete capability framework, which is an inevitable trend in the discipline construction of various industrial design colleges.

Teaching Practice of Industrial Design Based on Teamwork

According to the different grades, contents and requirements of students, there will be some differences in the specific implementation contents. However, the overall teaching process can be followed as follows: providing course topics, setting up students' teams, completing projects in teams, reporting, displaying and submitting results, and evaluating courses, as shown in figure 1. Among them, the two teaching links of topic selection and course assessment are mainly teachers, and the middle three teaching links are mainly students.

Providing course topics

According to the teaching objectives and curriculum syllabus, practical courses should specify appropriate topics and corresponding curriculum requirements, so that students can complete the curriculum tasks within a certain framework. Different colleges and universities, different teachers and different courses have certain differences in providing students with curriculum topics, but they can provide topics in four ways as a whole:

A. Teachers can specify topics for students according to their own research direction or prediction of cutting-edge trends and hot topics.

B. Teachers can specify topics according to existing research topics, so as to realize mutual promotion of teaching and research.

C. The third is to select the appropriate topic according to the existing design competition, so that students will have clear objectives and design constraints, and later through the work competition, it is also convenient for side evaluation of the design results, but also for students to accumulate some experience in the competition and award-winning results.

D. Students choose their own topics according to their own interests and concerns, so that students' learning initiative will more mobilization, design innovation and design goals will be more clear.

Forming teams of students

The team in the course, like the team in the enterprise or the actual project, is closely related to whether the topic can be carried out normally and the final result quality. Therefore, team building is very important in the course teaching based on team cooperation. Students can form teams in three forms: free grouping, open recruitment and teacher appointment.

A. The form of free grouping refers to the group formed by students' free combination according to their own wishes. Usually, students form a group according to the intimacy, familiarity or the same dormitory.

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B. The form of open recruitment of members is to simulate the form of project team formation of some enterprises, and students with mature ideas or topics as the team leader are open to recruit all kinds of groups that meet the needs of the team.

C. The form of teacher designation refers to that the teacher directly determines the composition of each team member, for example, the teacher can determine the composition according to the odd even number of student number, continuous student number grouping, random designation, etc. when the teacher is very familiar with the ability and specialty of the students, the teacher can also specify the team member according to the teaching goal and the composition of team members.

With regard to the number of team members, there are differences in the number of different majors or courses. For example, Dong Fuping (2019) adopts the form of free combination of 5-6 people in the elective course of nanomaterials, Ma Zhiguo (2019) groups 4-6 people in the teaching exploration of the innovation and entrepreneurship guidance course for College students, and Shi Yuan (2018) and Qin Peng (2019) also adopt the form of multi person team during the teaching implementation. Based on the characteristics of the role and content division of industrial design teaching tasks, the relatively small number of students in the class of design professional practice courses, and the actual teaching effect of course implementation, referring to the actual composition and number of personnel in the industrial design team of enterprises, it is suggested that the number of members in the industrial design course team should be 3-5.

Team work to complete the project

The teaching process is mainly carried out by students. The teacher's work is mainly to supervise the progress of the project, guide the students' problems, and provide real-time help for the students' difficulties. The task of team cooperation can be completed in four stages, including topic selection→ role division → exploration and learning → division of work and cooperation.

A. To determine the topic is to select and determine the topic of the team from the range of topics given by the course through discussion and consultation of team members. There may be some iterations and adjustments in the process of completing the topic in this stage.

B. Role division refers to the determination of the roles of the team members and their respective divisions according to the needs of the completion of the project from the perspective of the whole process of industrial design. Due to objective conditions, the same member can play multiple roles according to the characteristics of the team members and the workload of different roles, but the task amount of each member should be balanced as much as possible.

C. Exploration learning refers to the team members' independent exploration and learning for their roles, so as to be competent for the role needs and complete the specific tasks to be undertaken.

D. Division of work and cooperation refers to the cooperation and help among multiple members to ensure the smooth implementation of the whole project.

In order to grasp the progress of the project and the division of labor of the team members, the teacher can

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carry out periodic inspection on the teaching link in stages, and the inspection contents can successively include topic selection report, research report, creative sketch comparison, detailed scheme report, etc.

Results of reporting, displaying and submitting

The main purpose of this teaching link is to summarize the research results so that teachers can evaluate and assess the students' curriculum performance. The most important and indispensable content is to submit the research results in the form of a team according to the provisions of the curriculum outline and the specific requirements of teachers, which can usually include display boards, renderings, research reports, display videos, physical models, prototypes and other forms. If the team chooses the topic of the competition, it shall also submit the relevant materials specified in the competition. In order to enable students and teams to learn from each other, learn from each other's strengths and complement each other's weaknesses, and at the same time exercise students' expression ability, display ability and other comprehensive abilities, the team can selectively report results to the whole class, or even publicly display results according to the curriculum requirements.

Curriculum assessment

Course assessment is the last link of course teaching, and its main task is to comprehensively evaluate the whole course performance and professional ability of students. At present, the assessment method of practical curriculum design in Colleges and universities is usually teachers' subjective evaluation method. According to the comprehensive impression of the whole guidance process of students and the submitted design results, the assessment results have certain randomness, and it is easy to produce the problem of inconsistency between students' expectations and teachers' assessment. The new teaching mode must have the corresponding course examination method (Jia, Xiao, Qu, & et al., 2018). Through the teaching practice of many practical courses, it is found that the multi factor quantitative scoring mechanism is more reasonable and effective. The determination of quantitative factors should highlight four points: process control, member contribution, final results and students' participation.

It is suggested that the quantitative grouping should be based on the 100 point system. The weight of the first and second grade factors in the total course score should be determined comprehensively, such as the regulations of the composition of the course score, the teaching objectives of the practical course, and the enthusiasm of the students.

Conclusions

Team cooperation will be the mainstream mode of industrial design in the future, and it should also be one of the important goals of industrial design education and talent training in Colleges and universities. Compared with the traditional training mechanism of individual completion of practical tasks, the establishment of curriculum practice activities based on the form of team cooperation is more conducive to the cultivation of industrial design talents with comprehensive literacy and complete capability framework, which is an inevitable trend in the discipline construction of various industrial design colleges. Based on the teaching exploration and practice of many practical courses for many years, this paper sums up the overall teaching

mode of various practical courses. However, the above steps may need to be adjusted according to the actual situation when teaching different college teaching assessment standards and different course contents, but it is hoped to provide some inspiration and reference for peers.

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