Hybrid Teaching Practice Exploration of Design Thinking and Methodology Course for the Reform of Design Innovation Education

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Abstract. With the continuous development of higher education, more and more design schools are focusing on the training of design innovators and design education of reform. The emphasis on the discovery and cultivation of students' creativity and logical thinking is one of the directions of design education reform. Design Thinking and Methodology is an emerging course, and the purpose of this study is to determine how this course can transform education towards design innovation, guide students to broaden their thinking, and enhance their initiative in classroom learning.

1. Status and Trends of Modern Design Education

1.1. Problems of Modern Design Education

1.1.1. Lack of Innovation in Teaching Methods

If teachers teach design knowledge in a boring theoretical way, this lack of innovation in teaching will cause students to only act as "spectators" in the classroom, but not actively and efficiently participate in the classroom for learning. Besides, if classroom interaction is inadequate, teachers rarely guide and suggest students' designs and ideas on time, and students cannot effectively exchange ideas because of a lack of teamwork, which will restrict students' creativity. Under this kind of teaching mode, teachers can neither achieve considerable teaching effects nor can students fully absorb and comprehend the knowledge.

1.1.2. The Proliferation of Curricula and Lack of Depth in Teaching Content

At present, Chinese universities tend to set up a large number of subjects for students in art and design disciplines, and overly segmented professional courses fill almost every semester from the time a student enters university to graduation, resulting in fewer hours per course in a limited amount of time. In the classroom, the teacher is only able to teach to complete the required lesson tasks, and the students learn with the aim of passing, which leads to a low level of absorption of the course content.

1.2. Trends in Design Education

Along with the reform and changes in design education, universities in China are paying more and more attention to the cultivation of innovative design talents and the reform of design teaching content and methods. Through a comprehensive analysis of the current situation of design education, based on the basic requirements for the goal of cultivating design innovation talents, combining the needs of art design teaching, the following trends of design innovation education are summarized:
1.2.1. Student-centered Teaching Methods

Under the background of design education reform, the traditional knowledge-centered approach to education is no longer applicable and will be gradually transformed into a new student-centered teaching method. The design of art and design education based on educational innovation highlights the concept of "learning" as the center of instructional design, emphasizes that students are the main body of learning and an active constructor of meaning, stresses the "collaboration" and "communication" between students and teachers, students and students, and underlines the creation of "context" and the design of the learning environment, taking students' construction of knowledge as the goal of the entire learning process[1].

1.2.2. Focusing on Training Students' Innovative Quality

Education should focus on how best to nurture excellent innovators and improve students' innovation quality. Dr. Amabile, a professor at Harvard Business School, believes that the three main elements for innovation are professional knowledge, innovative thinking, and driving force. The cultivation and development of innovative quality require students to organically combine the above three elements to achieve. To achieve design innovation, students first need to have a wealth of professional knowledge, coupled with a way of thinking based on design thinking, which can form the internal driving force of innovation, and ultimately achieve the cultivation of innovative talents. Also, students need to be taught that they are not afraid of failure and risk. Hundreds of iterations are about learning from failure and growing in understanding, just like IDEO advocates, "Fail early and fail often".

2. Teaching Characteristics of Design Thinking and Methodology Courses

2.1. Design Thinking and Methodology

Thinking is an indirect understanding and reaction to things, while design thinking is an abstract understanding of the design content. IDEO's CEO Tim Brown believes that design thinking is a human-oriented innovation method, the purpose is to not only meet the needs of users but also meet the technical possibilities and the necessary conditions for commercial success[2]. German scholars believe that the main purpose of design thinking is to train innovators, and students' creativity can only be obtained through practice and creative thinking habits[3]. Design thinking not only teaches thinking methods but also promotes creativity through specific practices. Its ideas are being spread and accepted in Chinese universities[4]. The design method is the result of the rationalization of design thinking, which is the concrete embodiment and induction of logical thinking based on methodology. It is usually oriented or aimed at solving a specific type of problem and analyzes and plans the content, tasks, tools, skills, etc. of the entire design process.

2.2. Teaching Design Thinking and Methodology

In 1980, Shanghai Jiao tong University first opened a course on creativity and invention. Since then, many universities have also offered courses on design thinking, design methods, and creativity[6]. This is a course that takes the essential characteristics, basic forms, and basic laws of design thinking as the main research object. It is also a science that discusses and studies the potential development of Design Thinking and Methodology[5]. Learning about Design Thinking and Methodology has an enhancing effect on students' internal design skills and helps them to develop their design methodological framework and improvement. The Design Thinking and Methodology
course is based on an educational philosophy that focuses on "process" and is a typical cross-curricular course. The nature of the curriculum is the result of the overlap of multiple design disciplines such as creativity, psychology, aesthetics, and other disciplines such as economics and management.

In 1956, Bloom, a famous American educational psychologist, proposed to divide teaching objectives into three target areas: cognition, emotion, and motor skills [7]. According to the above three goals, the teaching goals of Design Thinking and Methodology can be divided into the following two points:

2.2.1. Teaching Objectives in Theoretical Knowledge

Design Thinking and Methodology are interdisciplinary, so students need to master sufficient theoretical foundations in their studies. This includes not only professional theoretical knowledge related to design majors but also covers other professional methods and tools. The course aims to cultivate the innovative awareness and ability required by students, allowing students to flexibly integrate the theoretical knowledge they have learned into design practice.

2.2.2. Teaching Objectives for Professional Skills

Design Thinking and Methodology aims to teach students to learn and master basic design thinking and logical analysis skills and to be able to apply them to the analysis and thinking of design. Design thinking enables students to be creative and logical, while the application of methodology enables students to apply their knowledge to new situations and problems, empowering them to solve challenging problems through the integration of multidisciplinary knowledge and professional skills.

3. Teaching Practice Based on SPOC Hybrid Teaching Mode

3.1. Course Introduction and Features

Design methodology SPOC hybrid teaching practice is the foundation and core course in the training program of product designing. The course combines the cutting-edge content and teaching methods of the "Design Thinking" course at the Stanford University School of Design and the "Product Design Methods" course at the School of Industrial Design, Delft University, the Netherlands.

To better realize the pedagogical reform of design education, the design methodology SPOC hybrid teaching practice is based on the online course platform, combined with offline course lectures, quizzes, and reports, through teacher’s lectures, student’s discussions, design tests and exercises, to organize integrated, practical and exploratory teaching and learning. This teaching format changes the separation of theory and application in traditional teaching. It takes a design task as the goal, limits the specific situation, and connects the learning and application of theoretical knowledge with the design process as the mainline so that the theory and application can be organically integrated. Implementation of SPOC hybrid learning, relying on online platforms for course resources, making full use of such resources as multimedia teaching, group learning, labs, etc., and let the students become the master of the classroom.
3.2. Course Structure and Content

The course will be structured around a given topic. Through user observation and analysis, students use the information collected to explore users’ pain points and define design opportunities in a given situation, then use design tools such as brainstorming and requirement lists to form preliminary creative ideas under the guidance of divergent thinking. After that, students quantify and compare different designing solutions through program evaluation to select a most reasonable design solution, and finally make a product prototype for testing, and iteratively improve product details. The details are shown in Figure 1.

![Figure 1. Design methodology course structure.](image)

In teaching strategies and methods, design methodology SPOC hybrid teaching experiment organizes teaching according to the "BOPP" goal, that is:

**Bridge in:** to warm up and introduce, which is the first step to attract students’ interests in the lesson, and it requires the teacher to design a topic to introduce the main content of the lesson. For example, teachers can inspire students' curiosity and interest in the following courses by telling a real event that they have personally experienced, which will pave the way for the further development of the course.

**Objectives:** At this stage, the teacher needs to assign learning tasks and objectives of the course to enhance students' understanding of the course content, as the course carried out gradually.

**Pre-Assessment:** This phase will involve several quizzes that will enable the teacher to get an accurate picture of the student's progress in hybrid learning and how well they have mastered what they have learned.

**Participatory Learning:** At this stage, the teacher will organize participatory learning sessions in the classroom, such as group discussions and live debates, and the purpose is to encourage students to further their study through classroom interaction. The teacher gives the students clear objectives at this stage, allowing them to participate in, reflect on, and learn more "under hypnosis"[8].

To implement the above teaching strategies and methods, design methodological pedagogical reform combined with teaching content, based on online courses, we have formulated specific teaching links, teaching processes, teaching methods, and their composition for the planning of all course knowledge points. The teaching ideas are shown in Figure 2.
The design methodology SPOC hybrid teaching divides the entire course content into six modules: lectures, class discussions, online discussions, tests and small assignments, unit assignments and case explanations, and practical links, as shown in Figure 3. Each module in the teaching content is connected in series with each other to form the mainline of teaching, and the new media teaching resources are used to fully and efficiently integrate the course content, which helps students to enhance their interest in learning. The dual-line learning mode of online and offline integration releases a lot of time for students to digest knowledge. Students take the initiative to review the knowledge in online courses, and offline courses are for teachers to answer key and difficult questions for students.

3.3. Actual Teaching Case

In the actual teaching process, students' course learning objectives will revolve around the theme of "morning process" and conduct offline and online learning, as shown in Figure 4. At the beginning of the course, the teacher guides the students to have a preliminary understanding of the upcoming study plan by telling their "morning process". After that, the students need to express their "morning process" with the help of visual chart tools and analyze them in a deconstructed way. In the theoretical learning stage, the teacher will check the students’ learning of the mixed online teaching content through some quizzes during the offline class, to better grasp the progress of the students.
In the middle of the course, the teacher will organize students to join in participatory learning in the class (see Figure 5). The students will discuss in their groups, select reasonable design objects, and make reasonable guesses and analyses on the "morning process". After that, students need to independently complete user surveys in groups and observe users and situations. Students need to use their thinking and understanding to plan the kind of research they will undertake and the specific content of the research. The teacher will not guide the student how to do user research throughout, but will objectively analyze the process and make suggestions. This approach helps to cultivate students' independent learning ability and understanding of design thinking.

After the user surveys, the students will organize and analyze the survey in the group, find the user's pain points in the "morning process", define their design opportunities, and then make a preliminary plan for the problem. After aggregating multiple design schemes, students will create their list of needs, analyze the user's needs, requirements and hopes, as well as the process of product generation, distribution, use and discard, and then through the Harris configuration file to quantify the design plan comparison, select the best plan for the next step of development. In the later design process, students also need to make prototypes, restore user feedbacks on products through prototype testing, and iterate on the products.

At the end of the course, to obtain a better display effect and cultivate students' hands-on ability, students will make physical models of the products. Also, the students will present their final results in small groups using multimedia equipment. The teacher will also ask questions, make comments, and give advice based on the students' presentations.
3.4. Course Assessment Mode

Compared with previous design methodology courses where the only evaluation is the course work, the evaluation is too simplistic and results-oriented. This design methodology course reform, combining online and offline learning through a hybrid teaching method, fully highlights monitor and evaluate the learning process and interaction effects. The new course evaluation method can be a more accurate, scientific, and reasonable assessment of students' comprehensive learning situation, and the teacher's teaching effect is also more concrete and intuitive.

4. Summary

The design methodology SPOC hybrid teaching practice assessment consists of three parts: usual homework, after-school Q&A, and the final course report, which are accounted for in Figure 6. Design methodology courses, and indeed other courses in product design, need to focus more on the process of learning and innovation, that is, the process is more important than the result.

Figure 6. Design methodology assessment mode.

In summary, by concluding the current status and trends of design education, analyzing the teaching characteristics of Design Thinking and Methodology, and combining the effects of actual teaching cases, it can be seen that the design methodology SPOC hybrid teaching practice has a considerable role in advancing educational reform towards design innovation. We believe that in the future reform and development, it can base on students’ development, face design innovation, continuously improve the content of courses, improve teaching quality, make greater contributions to the cultivation of design talents with innovative thinking, and also propose an effective solution for education reform based on design innovation.

Comment

① Figure 1, Figure 2, Figure 3, Figure 6 Source: Author self-made.

② Figure 4, Figure 5 Source: The real shot of the lecture scene.

References


