

Research on the Flipped Classroom Teaching Mode of Design Education under PBL Theory

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Abstract. Design is a subject with strong practicality, and how to combine theory with practice is a very important content in design education. In design education, the PBL-based flipped classroom teaching model is a typical teaching mode of reconstructing the learning process, which is very suitable for the teaching of art design courses. Based on the PBL theory and the advantages of the flipped classroom, this paper analyzes the role requirements and tasks of teachers and students in the flipped classroom of design education. On this basis, it mainly discusses the classroom technology innovation, the project teaching method innovation and the social extension innovation under the background of informatization. From above three aspects, the paper studies the innovation of the teaching mode of the design education flipped classroom, and promotes the development of design education reform in China.

Keywords: design education, flipped classroom, technology innovation, project teaching method, extension innovation.

1. Introduction

Problem-Based Learning is abbreviated as PBL, which is also called problem-based learning or problem-driven teaching method. It is called problem-oriented teaching method, and this kind of teaching method is not based on teacher's lecturing like traditional teaching, but based on problems, takes students as the main body, teachers as guidance, and students' abilities development as teaching objectives. In the process of teaching, it emphasizes students' active learning, and gives full play to the guiding role of problems in the learning process, so as to arouse the students' initiative and enthusiasm. PBL links learning to tasks or problems, enabling learners to engage in completing tasks or solving problems. It designs real and reasonable problems or tasks, emphasizes learning into meaningful problem situations, and solves problems through learner's self-exploration and cooperation, so as to enable students to learn the subject knowledge hidden behind the problems, and form the skills to solve problems and the ability of autonomous learning. "Flipped classroom", also known as "inverted classroom", is a teaching model that mixes the instructional method and constructivism theory, providing a platform for students to learn repeatedly. A flipped classroom is usually carried out when a video created by teachers themselves or taught by famous teachers before class, as well as through other means, so that the students can finish the learning of relevant knowledge after class. After going back to the classroom, teachers and students communicate and finish their homework face to face, when students have problems, they ask their teachers and classmates for advice, and the mode provides time for teacher-student interaction and personalized learning of students, and enables students to arrange their own learning activities and conduct personalized learning.

2. Role requirements and tasks of teachers and students in flipped classroom of design education

Under PBL theory, it is necessary to analyze the roles and tasks of teachers and students, combine the characteristics of design discipline, analyze the learning problems in design education, sum up the forms and contents of students' cooperative learning and autonomous learning,

summarize the students' self-evaluation, group evaluation and teacher comments in each stage in the learning process.

2.1 Role requirements and tasks of teachers in the flipped classroom of design education

In design education, what do teachers do in the flipped classroom? Firstly, teachers should establish appropriate teaching process according to different design courses, analyze learner characteristics, learning needs and teaching contents, make or download teaching videos according to different teaching objectives, teaching tasks and characteristics of students' learning ability and learning time allocation, and develop a pre-class learning reference plan for students to watch videos, practice feedback, and learn independently, and establish a flipped classroom teaching process with three stages of preparation, pre-class learning, and classroom design. Flipped classroom starts from one or several problems that need to be solved, these problems may be very practical problems that students may encounter in their future professional fields, or there may be no fixed problems, solutions and processes. This requires teachers to have good course design ability, and the design problem can not only integrate the knowledge into it, but also fully arouse the enthusiasm of the students, which is the guarantee of the success of teaching. Therefore, in the flipped classroom teaching of art design, teachers need to comprehensively understand students' academic stages and knowledge and skill background in advance, set teaching objectives and give appropriate design problems, teach and evaluate students' skills of cooperation and communication, teach students how to obtain various resources support and how to achieve the goals, provide appropriate guidance based on students' research methods, design abilities, environmental analysis, thematic guidance, and available resources both inside and outside the school, and the role of the teacher in this teaching method is a coach who guides cognitive learning skills, from simply teaching knowledge to teaching students to learn, help students to develop their skills during their participation in the activities. Teachers need to integrate course content with students' skills and use appropriate methods to motivate students. Students can be divided into groups according to different stages of the subject, teachers can conduct interactive and collaborative activities with students or team members to find solutions, and teach them how to manage their own learning process. The teacher also provides students with assistance in individual design, group collaboration, time management, expert introduction, and modification suggestions during the process of creating student design schemes. After the task is completed, the teacher provides students with the opportunity to show their creative works and provides appropriate comments. This requires teachers to have ideas, savvy, innovation, and long-term experience and ability to explore in design practice.

2.2 Role requirements and tasks of students in the flipped classroom of design education

What do students do in the flipped classroom teaching of design education? Students may have some dependence on the traditional education mode and lack the exploration and ability to find and solve problems actively. In the flipped classroom of design education, students should learn to start from themselves, complete the role transformation, and transform from passive learners to active learners who can control learning. Students should fully investigate the course problems designed by the teachers, sort out the materials and record the relevant details, learn to sort out the outline and form a phased learning report. From the beginning of preparing the materials, students should consult a large number of documents and various design materials, including various dynamic videos, designer's design works, press conference, order meeting. Moreover, students should also master the popular trends issued by the relevant authorities, and make a comparative analysis with the popular trends in the market, extract their own judgments from them and apply them to their own designs. In addition, students should have the ability to form a team and communicate and coordinate with the team members, actively communicate with other students, think and judge the problems with the team members, brainstorm, propose a large number of solutions, continuously explore and discuss the final feasible design scheme, repeatedly collect corrective suggestions and feedback evaluation for improvement. Students should work together to get the best design results

and present the best design work. Compared with ordinary classroom learning, such a learning method requires more time and energy in the preparation of the early stage, so students are required to have the consciousness of active learning and the ability of course planning, self-learning management, self-planning and reflection and correction. This kind of teaching method is result-oriented, the learning results are clear and explicit, and the students will really experience the happiness of learning results. Through the learning, the students further strengthen the ability of literature retrieval and reference materials, and improve the comprehensive understanding, logical reasoning, induction, summary and oral expression.

3. Study on the innovation of the teaching mode of the flipped classroom in design education

Creative design education is an important way to cultivate design talents. Creative design education and creative design are closely related, a good creative design needs the cooperation of innovative design education mode and gives full play to students' subjective initiative so as to explore students' creativity. Flipped classroom is an educational method different from the traditional teaching mode, and the innovative mode of flipped classroom will have better teaching effect. The training of design talents is one of the core elements of creative economy, while colleges and universities are the knowledge center of creative economy, which can reflect and strengthen the value and importance of creative economy era. The cultivation of creative talents needs to focus on cultural guidance and resource support. Creative talents should focus more on artistic expression and spiritual influence in the process of education. The change of economic situation needs corresponding education, the economy environment we live in now is quite different from that of many years ago. Therefore, we need different execution styles and different priority education in education. Design education in China needs to establish an education model based on the social needs, and the innovative teaching model of flipped classroom can better solve the main problems that restrict the cultivation of creative design education, that is, to solve the problems that the school education is out of the market demand, the theoretical teaching is not adapted to the professional practice, and the teachers pay too much attention to the theory.

3.1 Technological innovation of design education flipped classroom under the background of informatization

Under the background of informatization, teaching technology will become the main support of education development in the new era. Technology is the foundation of the application of new technology and innovative art in the practice of flipped classroom teaching. Internet innovation technology has promoted the high-speed development of education in an all-round way, which makes education face a new form of free, shared and open education from the traditional classroom model. In the past, it may have been difficult to teach art through technology, but now with the development of computer technology, the teaching process of design education can be directly replaced by artistic experience, which strengthens the students' ability of feeling and expressing art. Teachers can learn more advanced knowledge of computer-aided technology, such as artificial intelligence, AI technology, cloud classroom and other technical teaching systems. Before class, teachers push relevant excellent design case pictures or videos through cloud classroom, Chaoxing Fanya and Baidu Cloud to help students learn independently, so that students will have their own cognition and judgment on relevant knowledge points and design works, in the classroom, based on design problems, a teacher may invite out-of-school experts or enterprise practitioners through network video connection or VR live scenes prepared in advance, help students learn the latest technology in the industry. Therefore, students have a specific understanding of the design task, in this way, it is helpful to the acceptance and absorption of theoretical knowledge. For example, when learning garment design-related courses, teachers can use computer-aided tools while combining with actual offline works to help students further understand the required design effects from

perspectives such as audiovisual and tactile aspects; when showcasing design works, a 3D virtual T-stand can be designed, and each work can be presented comprehensively in front of the public through the 3D virtual T-stand, and the audience can feel immersive as the virtual T-stand is displayed. Under the guidance of the problem task designed by the teacher in advance, the students carry out the preliminary scheme design, the teacher guides the modification in the classroom, and the students further deepen the design. During this period, a group report, mutual review from classmates and teacher review will be held to summarize the problems and modification opinions, and finalize the final design plan. The above-mentioned examples can fully illustrate that the flipped classroom model under the information background can fully utilize the new teaching technology means to jointly construct the interrelated teaching environment, and truly realize the teaching goal of combining theory with practice.

3.2 Project teaching method innovation based on practical needs in design education flipped classroom

“Project teaching method” has been gradually focused on by the educational circles of all countries. Design course itself is a very practical course, and art design teaching is a process that teachers guide students to carry out innovative thinking training. Therefore, project teaching is aimed at some problems in the industry or a practical problem, which is an important model and content of design education flipped classroom. In fact, the project teaching method of flipped classroom is a teaching method aiming at the actual needs of the industry, and it is based on solving the practical problems in reality. In the design education, teachers can introduce external professional resources according to the school-enterprise cooperation project, and assign the design tasks to the students according to the actual needs, ask students investigate and analyze the design task, consult the data, understand the actual design requirements and similar designs. On the basis that students have a certain understanding of the subject project, invite the experts with strong practical ability of the enterprise go to the classroom to further publicize and make case analysis. Project teams can be formed by students, or by students and enterprises working together to delve into practical situations. While completing designated projects, students can learn and apply existing knowledge, and cultivate the ability to solve practical problems on the front line of practice, and this is a practical exercise. As for the project-type subjects that cooperate with enterprises, they can directly enter the enterprises to connect the practical resources. Firstly, enterprises or teachers select a feasible design project in reality, and students discuss the design projects in groups and write out their own design plans, including design background, inspiration source application scenarios, and application prospects, etc. On this basis, the project design is formally carried out, and students practice with “brainstorming” at the beginning of the design. Draw a lot of creative design sketches, while the teacher guides the students to select the best performance plan from a number of sketches. Students will draw a sketch again based on the analysis to find a new design. Finally, the students explain the design idea and construction principle, demonstrate the results of the project, evaluate the students’ works by the teachers, select the best scheme together with the supervisor of the enterprise, and the project finally be selected by the enterprise is for practical application. The process of project teaching is definitely not smooth, students will encounter many difficulties, and even experience the process of overturning their own design one after another. It’s a great learning experience every time students searching for a new design scheme. The completion of the whole design project requires many discussions, attempts, reflections and modifications. Such a repeated process can fully explore the creative potential of students, cultivate and improve their hands-on ability, practical ability and comprehensive ability, and cultivate students’ endurance of frustration at the same time.

3.3 Extension innovation of design education flipped classroom based on social learning

Design education is not a simple drawing, and the process of design is a comprehensive subject combining engineering, liberal arts and even social science. Therefore, in the process of design

education, the understanding and innovation of artistic concepts, social environment, new materials and new processes are also the indispensable part of design education. Art design also has the characteristic that the relevant professional knowledge is updated quickly. If we want art and design course to keep up with the pace of social development, the course should deeply explore the connection of new technology, professional knowledge and teaching method. The art design flipped classroom can start from the design production department, front-line sales, and the practical ability of feedback process. The subject is set on this basis, then the relevant theoretical knowledge will be taught. It is not a simple superposition of specialty and teaching for design education flipped classroom, but the actual integration of teaching, society, specialty and science and technology, which often needs more social learning opportunities to master. Outside the classroom, teachers need to change with the development of digital education and modern social environment, closely combine the teaching and learning inside and outside the classroom with the society, and realize the innovation of teaching mode.

4. Summary

The innovative teaching method of design education flipped classroom has many advantages. Firstly, this teaching method creates a relaxed and active learning atmosphere for students, so that they can speak freely and actively in the design process, fully express their own design ideas, and easily obtain information from social resources, student and teacher at the same time, secondly, the flipped classroom teaching method innovation can expose as much of the course-related problems as possible on the spot, the understanding of the correct theory can be deepened in the discussion, new problems can be constantly discovered and solved, which can make students understand the learning knowledge more deeply. The flipped classroom teaching method innovation can realize the timely and effective cooperative interaction between teachers and students, teachers and society, students and society, so as to ensure they play different functions and roles in design education, and serve for design teaching in all directions.

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