

## Reform of engineering drawing classroom teaching based on OBE

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**Abstract:** Based on the training objectives, this paper analyzes the main problems in the teaching of engineering drawing, designs the online teaching, classroom teaching, project leading, open laboratory, assessment and evaluation system, fully mobilizes students' participation in classroom learning, encourages students to develop independent learning and practice, constructs an open after class teaching environment, and further strengthens classroom teaching Learning and practice, to promote the effective achievement of curriculum effect and objectives. "Engineering Drawing" mainly studies drawing and reading mechanical drawings. It is a technical basic course with both theory and practice. It is a required professional basic course for engineering students. It plays a connecting role in the construction of major. The quality of course teaching will directly affect students' learning of follow-up major courses, as well as the achievement of practical teaching links such as course design and graduation design. With the improvement of mechanization, the importance of engineering drawing course is increasingly prominent. The purpose of engineering drawing is to enable students to master the basic knowledge of drawing, the basic theory of projection method, the formation of three views and projection law, the expression method of machine parts, computer drawing and other knowledge; to cultivate students' ability of drawing and understanding of drawing, spatial thinking, configuration design, problem recognition and solution, and to train students to use it together with professional knowledge for solution Solve the practical problems of the project.

### 1. Current problems in classroom teaching

#### 1.1. Students' main position in the classroom is not highlighted, and students' participation is low.

At present, most of the teachers in most schools are still the traditional teaching mode, in which the teacher talks and the students practice after class. According to the survey report, most students can understand in class, but they can't do the after-school questions. This phenomenon, in essence, is the disconnection between theory and practice, which is not in line with OBE's goal oriented theory [1]. What teachers do in class is actually relatively simple basic knowledge teaching, but what students do after class is the most difficult application practice. The process from theory to practice, for most students, without several times of guidance, may take a lot of time and can not be completed, resulting in a slowly growing weariness of learning.

#### 1.2. The efficiency of traditional classroom teaching is very low.

The traditional classroom teaching is a roll call before class, the content is explained step by step from the beginning to the end, and the students review and practice after class. The efficiency is relatively low, and the teacher's mastery of the students in this lesson can only be judged by experience or the homework handed in by the students next time, which lacks a certain pertinence and has a certain lag.

### **1.3. Students' spatial imagination ability is uneven.**

A small number of students have a good ability of space imagination. The teacher can understand it as soon as he speaks. Some of them are ordinary, and some of them are very poor. No matter what the teacher says in the classroom, they will not be able to think out unless they see the entity.

### **1.4. It is difficult for the entity model base to meet the requirements.**

The entity model base is not only a single model, but also a waste of human and material resources, so the utilization rate is low. Entity model not only can't meet the personalized needs of teachers and some students, but also needs to find the model library every time when using it. It's very inconvenient to go back after using it.

## **2. Classroom teaching reform**

In order to thoroughly implement the OBE concept of "student center, achievement oriented and continuous improvement", improve the students' professional core ability and professional skills, so as to better adapt to the social needs, we have scientifically designed online and offline teaching, project leading, open laboratory, assessment and evaluation system, etc. in view of the problems existing in the current classroom teaching [2].

### **2.1. Online and offline Teaching**

In order to carry out the spirit of the "40 higher education documents", we should actively promote the construction of the "Internet +" new form of "golden class", adopt the flipped classroom teaching method, conduct online self-learning on line resources such as MOOC, Mu classroom, cloud class and so on, and assign the learning tasks on the line of the next class before class break, so as to guide students to make full use of the good resources on the Internet. Offline, student-centered and problem-oriented, we will carry out classroom testing, student mutual evaluation, classroom competition and other teaching activities, and focus on teaching.

The specific implementation is that, according to the current learning characteristics of college students, before class, according to the characteristics and actual situation of our school, specialty and learning situation, we record the micro class of teaching content, and put out some basic exercises related to the content, upload them to the MOOC class, and let students preview and practice in advance. It should be noted that the upload time must be fixed. In the classroom, the teacher summarizes the content and has key teaching points and difficulties. For the rest of the class time, the teacher will gradually guide the students to practice in various forms and ways. From simple to difficult, gradually in-depth, gradually transition to engineering practice, so as to achieve the purpose of cultivating students' ability, learning to apply. In the whole process, we should change the way of thinking, change the experiential and random teaching into the rational and orderly teaching, change the emphasis on Teachers' teaching to students' learning, set up the consciousness of subject, stress the main position of students, and pay attention to the cultivation of students' ability.

### **2.2. Project leading**

As an applied undergraduate university, it adheres to the goal of serving the local area. In order to build a suitable undergraduate talent training system, the university requires each major to increase the proportion of practical teaching in the latest undergraduate training program. In order to improve the practical teaching effect of this course, we study the relationship between the training objectives of the major and the course objectives, design the actual projects, guide the students to master the drawing methods, skills and precautions of the engineering drawings with the carriers of the professional course design and actual engineering drawings, and train the students to combine the basic knowledge and professional knowledge of the graphics to solve the complex engineering problems Ability.

### **2.3. Open laboratory**

It is necessary for the development of experimental teaching in Colleges and universities to open laboratories in an all-round way, which is conducive to improving the utilization rate of experimental resources and playing an important role in the process of cultivating innovative talents. To solve the problem of students' poor spatial imagination, we have added four class hours of three-dimensional software courses, which focus on teaching students to draw basic three-dimensional using three-dimensional software. In the follow-up course, students will go to the laboratory to draw the combination and section view according to their needs. It is very urgent and important for most students to cultivate the ability of spatial imagination by drawing and observing [3].

### **2.4. Assessment and evaluation system**

Pay more attention to process assessment, including online question answering, project practice, classroom competition, discussion and mutual evaluation, mutual question answering, etc., and make proportion distribution according to the assessment knowledge points corresponding to the training objectives of the course. Online assessment accounts for 20% of normal performance, offline assessment accounts for 20% of normal performance, project practice accounts for 40% of normal performance, and classroom participation accounts for 20% of normal performance. Class participation mainly adopts the point system, attendance, online question answering, project practice, class competition, discussion and mutual evaluation, mutual question answering and other activities. Participation has points, which can be automatically completed through the setting of cloud class.

## **3. Classroom teaching effect**

In order to ensure the effect of classroom teaching, learning mobilization is carried out before each course. In each classroom teaching, we must summarize the preview on the Internet, praise the first few students, and urge them to learn independently by asking reasons, asking questions in class, etc. For exercises arranged after class, after each person finishes, sign with a black neutral pen, take photos and upload them, so as to prevent one person from using more than one person, encourage and urge the students to complete their own learning.

After two semesters of practice comparison, this is a practical classroom teaching mode. It has significantly improved the participation of students in the classroom. For students with poor imagination, it has also improved their learning enthusiasm and learning difficulty, significantly improved their learning efficiency, and also improved their ability to make full use of the effective resources of the network and improve their independent learning and lifelong learning.

## **4. Conclusion**

Engineering drawing course has the characteristics of strong theory, high requirement for understanding ability and space imagination ability, close connection with engineering practice and so on. It plays an important role in training engineering students. In order to cultivate students' ability of reading and drawing, combine the knowledge of drawing with their professional knowledge, solve the practical problems of engineering, and have the ability of independent learning and lifelong learning, we have designed the online teaching, classroom teaching, project leading, laboratory opening, assessment and evaluation system scientifically through careful teaching design, so as to fully mobilize students' participation in classroom learning To encourage students to carry out independent learning and practice, build an open after-school teaching environment, further strengthen classroom teaching and practice, and promote the effective achievement of curriculum effect and objectives.

## References

- [1] "Exploration on Modularization Reform of Cartographic Curriculum Based on Obeconcept,". Jing Chen, Shangshu Liu, Fuhua Liu, Guogang Jiang. Yangtze River Series. 2017.
- [2] "Practice and Exploration of Service-oriented Engineering Training Teaching System Under The Concept of obe Engineering Education,". Xiangxia Liu, Hui Xu, Lei Wang, Jianhua Cao, Yuan Gong. 2019international Conference on Management, Education Technology and Economics. 2019.
- [3] "Teaching Research of 3dcadsoftware In Mechanical Drawing Based on Flipped Class Model,". Fengmin Zhang. Education Teaching Forum. 2017.