

# Reflecting on the Teaching Analysis of Pictorial Geometry and Mechanical Drawing Course from the Cultivation of Engineering Design Ability



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**Abstract:** Along with the deepening of education and teaching curriculum reform in the new era, it also fully promotes the new development of teaching curriculum of pictorial geometry and mechanical drawing course. Traditional teaching methods and teaching concepts are no longer applicable to students at this stage, and pictorial geometry is the most basic professional course in a mechanical drawing course, teachers should focus their teaching on the cultivation of students' engineering design ability, deepen the education and teaching reform of mechanical drawing course, fully carry out the creation of diversified teaching classes, and establish a perfect modular teaching system, so that students can more intuitively, comprehensively and effectively master mechanical drawing course. In this way, students can master the knowledge of mechanical drawing courses more intuitively, comprehensively and effectively, and further promote the comprehensive development of students' overall quality. This paper discusses "reflecting on the teaching analysis of pictorial geometry and mechanical drawing course from the cultivation of engineering design ability" for reference only.

**Keywords:** engineering design ability cultivation; mechanical drawing course; curriculum teaching reform.

Mechanical drawing course is the most basic professional technical course in major institutions, and it is also the most important professional technical course to cultivate students' engineering design ability. By deepening the reform of the teaching system of mechanical drawing courses, the professional training course for students is launched for the course of drawing geometry in mechanical drawing, which is the first and the most important step for the cultivation of students' engineering design ability. Only by actively guiding students to enter the door of engineering design, can we lay a solid foundation for student's future learning careers, so that students can successfully complete the mechanical drawing course, and graduation design, and further improve the level of students engineering design ability, and then make the teaching quality

level of mechanical drawing course can also be effectively improved.

## 1. The teaching status and problems of the mechanical drawing course

### 1.1 Students' interest in mechanical drawing course is not high

The main reason for students' low interest in mechanical drawing courses is that most students are usually very confused about the choice of professional and technical courses, they do not know what they want to learn now and what they want to do in the future, and they choose mechanical drawing course due to the constraints of various conditions and factors. In the learning process of the mechanical drawing process, most students are curious and try to learn, because the mechanical drawing course is a professional and technical course, which has certain requirements for students' ability to understand,

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hands-on ability, spatial imagination, engineering design and other abilities, which also makes students encounter relatively more problems and difficulties in the learning process of mechanical drawing, and often At the present stage of mechanical drawing teaching courses, most teachers' teaching methods are too old-fashioned, the teaching atmosphere is too depressing, and not enough attention is paid to the cultivation of students' interest in learning when students encounter problems, they cannot seek help from teachers in time, and as the unsolved problems gradually increase, students' frustration will also increase, and over time, it makes students lose interest in mechanical drawing courses. This is not conducive to the cultivation of students' interest in learning, but also to the improvement of students' engineering design ability level, and at the same time, this, to a certain extent, also reduces the level of teaching quality of mechanical drawing courses and hinders the process of teaching reform of mechanical drawing courses (Pu, 2022).

### **1.2 Contradiction between teaching content and teaching hours**

At the present stage of the mechanical drawing course, there is a certain contradiction between the teaching content and the teaching hours. As the most basic professional course of mechanical drawing course, it has a strong theoretical system, which requires a relatively high understanding ability of students, and most teachers in the teaching process of mechanical drawing course do not pay enough attention to the special characteristics of drawing geometry and do not fully combine the growth characteristics of students and the actual learning needs, and prepare a thorough teaching plan in advance, which also makes This makes the content of classroom teaching and teaching hours do not match each other, so that students cannot get systematic teaching, and the knowledge of pictorial geometry cannot be well penetrated. For example, in the teaching process of the mechanical drawing course, due to the mismatch between the teaching content and the teaching time, it often happens that the teaching time is over but the teaching content is not

finished, which leads to the phenomenon of pressure class. And sometimes, because the teacher lectures too fast, the class time is not yet finished, finished teaching content, to a certain extent, although the basic teaching task is completed, because of the fast lecture speed, also makes the students can not be a good understanding of knowledge, resulting in the students' thinking ability, spatial ability, the ability to read and analyze drawings and engineering design ability can not be well cultivated. This is not conducive to the overall development of students comprehensive quality, and to a certain extent, it also hinders the process of teaching reform of mechanical drawing courses (Tan, 2022).

### **1.3 The current teaching methods and means are too old-fashioned**

At the present stage of the mechanical drawing course teaching process, compared with the traditional teaching method, usually the teacher speaks, and students listen to the way of teaching, although this teaching method, there is a certain intuition, but is not conducive to the absorption of students' knowledge, but also not conducive to the cultivation of students' engineering design ability. For example, in the teaching process, the teacher pays too much attention to his own thinking mode explanation, although to a certain extent, fully promotes the teaching process of the mechanical drawing course, but ignores the students' comprehension and analysis ability, resulting in students can not well understand the knowledge, thus making the teaching efficiency of mechanical drawing course is greatly discounted. At the same time, if the teacher has been focusing on theoretical knowledge, then to a certain extent, the actual learning needs of students will be ignored, thus making the problems encountered by students in the learning process, can not be solved in a timely manner, which also causes a certain pressure on the learning process of students in the future (Sun, 2021).

### **1.4 The teaching mode at the present stage is too rigid**

In terms of the current stage of the mechanical drawing teaching course, the teacher's teaching mode

is too rigid, which makes the teaching classroom atmosphere too depressing, unable to raise the students' interest in learning, and unable to make the mechanical drawing teaching knowledge to be well penetrated, which is not conducive to the cultivation of students' engineering design ability. For example, in the traditional mechanical drawing teaching classroom, the teacher's teaching concept is too old-fashioned, and can not interact with students, so the teacher can not timely capture the students' learning dynamics, but also can not timely help students solve problems, resulting in a certain gap between students and teachers, can not cooperate well, which makes the atmosphere of the teaching classroom is too depressing, to a certain extent, also hinders the development of mechanical drawing. To a certain extent, it also hinders the progress of the reform of mechanical drawing teaching courses (Ma , 2021).

## **2. Effective measures for the reform of mechanical drawing course teaching**

### **2.1 Fully stimulate students' learning interest and cultivate students' engineering design ability**

In the teaching process of the mechanical drawing course at the present stage, the teacher introduces the development background, practical application and development direction of the mechanical drawing course to the students, so that the students clearly understand what mechanical drawing course is and what is the use of learning mechanical drawing well, thus further deepening the student's knowledge of mechanical drawing course and stimulating their learning enthusiasm. At the same time, the teacher can also fully expand the level of development of mechanical drawing and development issues to students, so that students clearly understand the level of ability and gap of mechanical drawing in China at this stage, so as to further stimulate the students' sense of responsibility and mission, so that students can actively participate in the study of mechanical drawing courses. In addition, in the teaching of mechanical drawing courses, teachers can also use diversified teaching

methods, carry out diversified teaching classrooms, enrich the classroom teaching content, and improve the classroom teaching system, through the full combination of theoretical knowledge and practical teaching activities, so that students can have a strong interest in a mechanical drawing course, further cultivate students' engineering design ability, improve The teaching quality level of mechanical drawing course is improved, and the new development of mechanical drawing course teaching reform is promoted. For example, in the mechanical drawing teaching course, the teacher can actively use multimedia slides to make students more intuitive to learning mechanical drawing, which is more conducive to deepening students' understanding of the knowledge of mechanical drawing course and cultivating students' engineering design ability. In addition, the teacher can also lead students to visit the practical training base, through the way of teaching practice activities, fully stimulate students' interest in learning, expand students' thinking, so that students can generate more ideas about mechanical drawing courses, and further enhance students' interest in learning mechanical drawing courses (Wang & Zhou , 2020).

### **2.2 Fully coordinate the contradiction between teaching content and teaching hours**

In the mechanical drawing teaching course, the teacher can fully coordinate the contradiction between teaching content and teaching hours by fully combining the growth characteristics of students and the actual learning needs, making a thorough teaching plan in advance, preparing a good teaching plan, and simplifying the teaching content. Thus, the teacher can teach the students more intuitive and systematic knowledge in a limited time, and make the students absorb the classroom knowledge to the maximum extent in a limited time, which is more conducive to establishing the students' thinking consciousness, spatial consciousness, reading and analyzing consciousness, cultivating the students' engineering design ability, further improving the students' engineering design ability level, and promoting the reform of the new curriculum system

of mechanical drawing. process. For example, in the mechanical drawing teaching course, the teacher can first arrange the pre-course pre-study homework for students, let students mark the places they have questions, and then in class, the teacher should first solve students' marking problems, and then circle the key points of knowledge for students, set up students as the main body of the classroom, which will make students in the future learning process, can develop a good habit of independent learning, so more This is more conducive to the cultivation of students' engineering design ability and the construction of efficient mechanical drawing classroom (Wang, 2019).

### **2.3 Fully optimize the teaching methods and teaching means at this stage**

In the teaching course of mechanical drawing, the teaching methods and teaching mean at the present stage are fully optimized to achieve the double improvement of teaching effect and teaching efficiency. Due to the special nature of the mechanical drawing course, the course content is relatively abstract, the traditional teaching method does not make the students understand the knowledge of mechanical drawing well, but through the reasonable use of multimedia teaching, the abstract things concrete, not only can make the students more intuitive, three-dimensional mechanical drawing learning but also can fully reduce the teaching pressure of the teacher, so that the teacher can have more time and energy to cultivate the engineering design ability of students. For example, at the present stage of the mechanical drawing teaching course, before the class, the teacher can collect relevant pictures and videos for the classroom teaching content, play them to the students during the class, and teach the students the main points of mechanical drawing knowledge by text, pictures, videos and other forms at the same time, so that the mechanical drawing knowledge is not boring, and thus fully drive the students' learning enthusiasm. In this way, it is more favourable to cultivate students' learning interests, promote students' knowledge absorption, and further enhance the level

of students' engineering design ability (Meng & Dong, 2019).

### **2.4 Fully optimize the current teaching mode to actively carry out the creation of a diversified teaching classroom**

As the learning content of the mechanical drawing course is challenging, therefore, fully optimizing the teaching mode of the current stage of the mechanical system course and actively carrying out the creation of a diversified teaching classroom, is more conducive to the cultivation of students' engineering design ability. A good teacher-student relationship is the basis for building a harmonious classroom atmosphere and is also the fundamental driving force for improving the quality of classroom teaching. By fully combining students' growth characteristics and actual learning needs, teachers use diversified teaching methods, adopt a modular teaching system, actively carry out contextualized practical teaching activities, and reasonably use software related to mechanical drawing design, so that students can timely apply theoretical knowledge to practical activities, further deepen students' knowledge of mechanical drawing processes and mechanical drawing standards, and allow Students can fully grasp the computer drafting ability, and can independently draw some simple mechanical product samples so that students can have a certain degree of adaptability, understanding and creative ability. In addition, the teacher can also consolidate students' impressions of mechanical drawing by summarizing and grading students according to their daily records and performance, so that students can find their own shortcomings in the evaluation and improve them, thus further improving the level of students' engineering design ability, improving the quality level of mechanical drawing teaching course, and thus promoting the process of mechanical drawing course reform (Yao, 2018).

### **3. Conclusion**

Combined with the above discussion, this paper discusses "reflecting on the analysis of the teaching of pictorial geometry and mechanical drawing course

from the cultivation of engineering design ability", which shows that there are still more problems in the mechanical drawing teaching course at the present stage, which is not conducive to the cultivation of students' engineering design ability, therefore, the reform of mechanical drawing teaching course is essential to fully cultivate students' engineering design ability. Therefore, the reform of mechanical drawing teaching courses is very important to fully cultivate the engineering design ability of students. By fully optimizing the teaching methods and teaching means at this stage, coordinating the contradiction between teaching contents and teaching hours, and actively carrying out the creation of diversified teaching classrooms, we can fully stimulate students' learning interests, drive students' learning enthusiasm, further improve students' engineering design ability level, and then cultivate more excellent practical talents for the society.

#### Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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