

# Reflection of Engineering Drawing Teaching Mode for Mechanical Majors under the Background of Application-Oriented Undergraduate Colleges and Universities Construction

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## Abstract

Engineering drawing course is a compulsory course for mechanical majors. Under the background of the construction of application-oriented undergraduate colleges and universities, the traditional teaching mode of engineering drawing course can no longer meet the training needs of applied talents. This paper deeply discusses the teaching mode of engineering drawing for mechanical majors from two aspects of students and teachers, and analyzes the problems faced by the teaching of Engineering Drawing Course under the current situation, which lays a foundation for the follow-up curriculum reform of application-oriented undergraduate colleges and universities.

## Keywords

Engineering drawing; Teaching reflection; Mechanical major; Application-oriented undergraduate colleges and universities.

## 1. Introduction

How the course teaching serves the cultivation of application-oriented talents is the crucial point in the construction of application-oriented undergraduate colleges and universities. The engineering drawing course is a compulsory professional introductory course for mechanical majors [1]. It mainly cultivates students' professional ability to read and draw engineering drawings, so students have high engineering professional quality. However, the traditional teaching mode is primarily based on theoretical teaching, and does not pay enough attention to the cultivation of students' application skills, and can no longer fully meet the needs of the current application-oriented undergraduate college construction [2]. Therefore, it is necessary to analyze and research the current teaching mode to find the existing insufficient.

## 2. Reflect on Teaching from the Perspective of Students

### 2.1. The Basic Knowledge and Basic Skills of Drawing Are Poorly Mastered

The current teaching method of engineering drawing is still dominated by classroom teaching, only focusing on theoretical learning, ignoring the cultivation of practical ability. Students have the poor subjective initiative in the learning process, low efficiency in accepting knowledge, and practical ability cannot be effectively exercised.

The knowledge points of cartography courses are fragmented and lack logic, which making it difficult for students to master them. Moreover, due to the incompatibility with the learning methods of the course, some of the basic knowledge and skills in the drawing are not well mastered.

## **2.2. Poor Spatial Thinking and Imagination**

In the process of drawing learning, for graphics with complex shapes and structures, it is necessary to rely on a strong spatial thinking ability to design and identify graphics accurately. However, because the students who have just entered the university have less contact with the structure of mechanical products, it is difficult for them to quickly master the spatial thinking ability to convert from two-dimensional graphics to three-dimensional images.

## **2.3. The Drawing Is Not Rigorous**

When evaluating and analyzing the graphics of the course design, graduation design, and other practical links completed by students in the later stage, it can be seen clearly that more than 70% of the students do not understand or comply with the basic requirements of drawing, such as using lines of the same thickness throughout the sketches. It is not uncommon for details such as the wrong position of the title bar, casually dimensioning and so on. Do not use standard drawing tools to draw and lack rigorous drawing professionalism.

## **2.4. Poor Hands-on Ability and Drawing Skills**

Many students have poor basic drawing skills. They do not have a clear understanding of the view selection and expression schemes of assembly drawings and parts drawings. They only copy existing references without their own understanding. Specifications, graphic symbols are randomly marked and repeated. Some students don't even know how to use rulers correctly, and their basic drawing skills are not solid [3].

# **3. Reflect on Teaching from the Perspective of the Teacher**

## **3.1. The Teaching Method Is Simple and Not Attractive**

The multimedia teaching method is widely used in engineering drawing teaching, and multimedia courseware is mainly used as the primary tool to present teaching content in class at present. On the one hand, the use of multimedia means can display some engineering graphics more intuitively and vividly, which is convenient for students to understand and learn, but too much reliance on multimedia will make teachers entirely rely on multimedia animation display when teaching drawing skills, while students cannot see the complete manual drawing process, which results in that the students cannot master the basic methods of manual drawing very well. In addition, long-term teaching using multimedia will make students feel bored, and the attractiveness of the classroom is not high. Teaching is divorced from the actual situation of the enterprise. Students in school do not understand the production specifications and production processes of the enterprise, and have not seen the standard drawings of the enterprise logo. Although the contents of the parts list and drawings will be described in class, students still have no real sensory experience of the drawings used for production. In the past, blueprints were used for processing parts, but now large enterprises do not expose blueprints. They all adopt the processing mode of three-dimensional digital technology. The standardization of electronic drawings is also a part of students' learning.

## **3.2. The Content of Teaching Materials Is Not Updated in Time and Is Out of Touch With the Enterprise**

Influenced by the compilation, publication and printing of textbooks, it takes a long time for a textbook to reach the students finally. The content of textbooks cannot be updated in time with the development of engineering technology, resulting in many new drawing methods and techniques that cannot be conveyed effectively to students, which affects the updating of students' knowledge to a certain extent. The content of textbooks is mainly based on theoretical knowledge and lacks the guidance of practice. It rarely involves issues related to enterprise production. Students do not know how the drawing knowledge they have learned is applied

and their role in the design and production of actual enterprise products. In the end, the knowledge learned by the tutors and students can only stay in the theoretical stage and cannot be applied practically.

The theory and practice of cartographic knowledge should be well integrated, and the current teaching method is still limited to the traditional teaching mode, all basic theoretical knowledge is first described in pure PPT in the classroom, and the degree of integration with ProE, UG, SolidWorks and other software Not enough, so that students feel that drawing is difficult to learn after listening to the class. The traditional teaching form is single, it is difficult to mobilize the enthusiasm of students, and the teaching effect is poor. From the perspective of the enterprise, the students have only learned some theoretical knowledge and lack the ability to deal with the basic problems of the enterprise. It takes time to train to meet the requirements of the post, and the employment advantage of the students is not obvious.

### 3.3. Backward Teaching Objectives and One-sided Assessment Methods

The teaching goal of the course is still at the level of mastering theoretical knowledge, and the assessment system is generally the assessment method of "final exam results + usual scores". The assessment method is single and rigid, which is easy to cause students to copy homework, make temporary surprises in exams, and mechanically memorize questions, which makes some students just to pass the exam. There is not enough attention to the cultivation of students' practical ability, and the assessment of learning effect is mainly based on the completion of closed-book examinations within the specified time, which cannot fully reflect the real situation of students' mastery of drawing skills. In order to put an end to the phenomenon of people not showing up to the classroom, and temporary surprises in the examination, the assessment system must be reformed.

## 4. Conclusion

The above problems cause and affect each other, and under the influence of mixed superposition, the students' drawing level is far lower than expected. The goal of application-oriented universities is to cultivate application-oriented professional and technical talents. The traditional engineering drawing teaching mode can no longer meet the requirements of application-oriented talent training. On the one hand, students' basic knowledge and basic skills are poor, their spatial thinking ability and professional quality are insufficient, and there is a lack of practical training. On the other hand, the current engineering drawing teaching faces with many problems, such as single teaching methods, untimely updating of teaching materials, backward teaching objectives and unreasonable assessment methods. Therefore, in the future teaching process, it is necessary to reform the teaching mode in a targeted manner to improve the training quality of applied talents.

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