

Analysis of Teaching Reform Strategy of Mechanical Drawing in Higher Vocational Education Based on OBE Concept

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Abstract: In today's society, with the increasing demand for high-quality talents, it is particularly important to improve the quality of mechanical talents. OBE (Output based education) education philosophy is also known as result oriented education, ability oriented education, goal oriented education, or demand oriented education. Based on the OBE education concept and the actual situation of the mechanical drawing course, the article analyzed the necessity of the reform of the mechanical drawing course, and proposed targeted reform countermeasures based on the characteristics of the mechanical drawing course. It is hoped that the implementation of the above reform measures can play a positive role in promoting the training of mechanical and electrical engineering technicians in China.

Keywords: Higher Vocational Education; Mechanical Major; Mechanical Drawing; Reform in Education

“Mechanical drawing is one of the most important courses for mechanical majors, and its teaching effects have a significant impact on students' actual operational abilities.”^[1] Better drawing skills can enable students to better complete their own designs, thereby better expressing their own design ideas. Many higher vocational and technical colleges have paid high attention to this issue. However, in practice, due to some traditional teaching elements, their application in a certain field is limited. Therefore, how to promote the teaching reform of high-quality mechanical drawing courses has become a key issue for many higher vocational and technical colleges to consider.

1. Necessity of Teaching Reform in Mechanical Drawing for Mechanical Majors

Mechanical drawing is an examination of students' comprehensive practical abilities, which can only be truly mastered through a large number of practical exercises. At present, many vocational colleges still have significant shortcomings in this aspect of teaching, which cannot meet the improvement of students' mechanical ability, mainly manifested in the following aspects. First, in the current teaching of mechanical drawing courses in higher vocational colleges, only theoretical knowledge and relevant drawing methods are emphasized, while the cultivation of students' ability orientation is ignored. Secondly, at present, teachers in higher vocational colleges start from the projection of points, lines, and surfaces, which also poses a significant obstacle to students' understanding of graphics. Thirdly, the current drafting curriculum lacks a close integration with social employment practices, and is unable to establish good communication with enterprises and institutions. This has resulted in a disconnect between the current mechanical drafting curriculum and practice, which is very important for improving students' drafting skills and is also very detrimental to their future employment.

2. Problems in the Teaching Reform of Mechanical Drawing in Higher Vocational Colleges

2.1 Lack of Pertinence in Teaching Mechanical Drawing in Higher Vocational Colleges

Students in higher vocational colleges have a relatively weak learning foundation. Moreover, due to the incorrect learning methods formed in previous studies, their learning enthusiasm is not too high. Many teachers have high expectations of their students while teaching, as well as a desire to achieve success. As a result, teachers explain a lot in class, and some students cannot digest the knowledge

learned well and keep up with the pace of classroom teaching.

2.2 Separation between Theory and Practice in Mechanical Drawing Teaching in Higher Vocational Colleges

“In higher vocational and technical colleges, due to the lack of widespread attention, there is relatively little investment in some aspects of teaching.”^[2] In many schools, due to the limited number of teaching equipment, students take turns doing an experimental operation in some drawing courses. In addition, when teaching mechanical drawing, teachers consider that students have a relatively weak foundation and can only carry out simple and superficial knowledge, which cannot be well combined with specific practice. This has caused many students to spend relatively short time in practice and not use the knowledge they have learned well.

3. Countermeasures for Teaching Reform of Mechanical Drawing in Higher Vocational Colleges

3.1 Changing Teachers’ Teaching Concepts and Behaviors

“Teachers are the main guides for students to learn cartographic knowledge, and they play a positive role in improving students’ cartographic skills.”^[3] Therefore, in real life, teachers should change their teaching concepts and behaviors, and strengthen students’ creative thinking and practical application abilities. In the implementation process, teachers can start from the following aspects. Firstly, in terms of teaching organization, teachers should divide students into two groups, which can better promote cooperation between students and better complete teaching tasks. Secondly, in teaching, teachers should clarify their teaching objectives and arrange courses reasonably so that students can better complete their drawing exercises, thereby improving their drawing skills. In addition, during training, teachers should provide timely guidance to students to better solve the problems they encounter in the learning of drawing. In terms of teaching methods, it is necessary to strengthen the OBE education concept and achieve the unity of “teaching”, “learning”, and “doing”. For example, when measuring an item, the teacher can first demonstrate it and then let the students operate it themselves. They can also extend it to measure other items, etc.

3.2 Strengthening of the Reform of Teaching Design

In the course of mechanical drawing, it is necessary to strengthen the reform of teaching design, simplify theoretical knowledge points, and emphasize the key and difficult points of learning. As students have just been exposed to the study of mechanical drawing, they have not yet fully grasped the key and difficult points of knowledge, which has led to the phenomenon of grasping their eyebrows and moustaches in the process of learning. This not only leads to students’ low efficiency in learning, which is rarely used in reality, and is basically unavailable. Moreover, the amount of learning is large, making people physically and mentally tired, but the learning effect is not good. In teaching, teachers should constantly try new teaching methods to change the traditional way of relying solely on blackboard writing and make better use of various tools, such as WeChat, Blue Ink Cloud Classroom, Superstar, and so on. They can also use various multimedia means to create PPTs, microclasses, etc., for students to watch, which can not only enhance their interest in learning, but also help them better understand the operational process of mechanical drawing.

3.3 Teachers’ Innovative Teaching Methods

The principle of teaching students in accordance with their aptitude is very important, which directly affects the results of teaching and students’ acceptance of knowledge. Therefore, teachers need to innovate in teaching methods to increase teaching flexibility. However, because each student has their own characteristics, in the teaching of mechanical drawing, the teacher can first conduct a test. The focus of the test is not on the mastery of students’ knowledge, but rather on the testing of students’ imagination and innovative thinking abilities. On this basis, a detailed investigation is conducted on the basic conditions of students, and corresponding solutions are proposed.

3.4 Improving the importance of mechanical drawing teaching

Mechanical drawing is of great help to people’s daily life and has a wide range of applications. Therefore, enough attention should be paid in schools. Attaching importance to the teaching of mechanical drawing requires not only students to master the theoretical knowledge of mechanical drawing, but also to continuously improve their practical operation ability. This is a difficult skill to master. If only theoretical knowledge is emphasized while practical ability cultivation is ignored, it leads to a disconnect between students’ future work and practical application. To change this disconnect from reality, schools need to increase investment in infrastructure and tools. Teachers should integrate themselves into teaching and then allow students to operate independently, so that students’ hands-on ability can be strengthened.

3.5 Optimizing the Teaching Process of Mechanical Drawing Projects

Optimizing the teaching process of mechanical drawing projects should be based on the OBE education concept, and higher vocational and technical education should be targeted at cultivating practical and technical talents. Therefore, in education and teaching, it is necessary to pay attention to practical ability oriented education for students. "When students have a strong ability to read pictures and imagine space, teachers should strengthen practical teaching and involve students in practical drawing."^[4] Before conducting this training, students should have a comprehensive understanding of relevant drawing standards, and be guided by the working process to conduct practical teaching of mechanical drawing. On this basis, teachers can build an "engineering" type practical teaching environment according to specific circumstances. In the specific implementation, it is necessary to first create project tasks, which can be combined with teaching materials to set up tasks such as drawing simple three-dimensional parts, and simple components, and combined them with teaching levels to reasonably set up teaching content. Secondly, teachers should work together with students to formulate a plan that is practical and feasible based on the actual situation of students and actual work needs.

4. Conclusions

To sum up, in the teaching of mechanical drawing in vocational colleges, in order to ensure that students can better use charts to express their design ideas, it is necessary to strengthen the cultivation of vocational college students' spatial imagination. Secondly, theory was combined with practice to truly and effectively improve students' drawing skills. At the same time, it is also necessary to use an effective evaluation method to identify problems in the teaching process and further optimize the teaching process to improve students' mechanical drawing ability.

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