

# ***Organic Integration of Mechanical Drawing Teaching and Software Teaching under the Background of Informationization***

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**Abstract:** In secondary vocational education, the key is to cultivate students' good practical skills, and the core is to keep pace with the times. On the basis of theoretical knowledge, students' practical level and practical ability are improved, which further improves the requirements for mechanical drawing teaching. In this regard, teachers should adopt a variety of teaching methods, enrich teaching resources, and impart theoretical knowledge to students through an intuitive way to help students deeply understand and internalize knowledge. This paper takes the information age as the background and analyzes the application of CAXA entity design software in mechanical drawing classroom teaching, to help improve the efficiency and quality of mechanical image teaching.

## **1. The Practical Significance of CAXA Software Applied in Mechanical Drawing Teaching**

### **1.1 Visualized and visualized teaching**

As for the secondary vocational students who have just entered the school, because of the poor spatial imagination, they can't imagine the actual shape of the parts when they learn mechanical drawings. However, the transformation of the two-dimensional plan to the three-dimensional solid model can be realized through software solid modeling, three-dimensional data interface, assembly and other related functions. Visualizing and visualizing the teaching content helps students to understand deeply and master the knowledge content. Therefore, the efficiency and quality of classroom teaching can be improved, and the imagination of students' space can be improved to a certain extent.

### **1.2 Mobilize students' enthusiasm for learning**

Because mechanical drawing is a basic professional theory course, students generally feel bored and boring when they study, and their interest and enthusiasm for learning will also decline. In this regard, the reference to the software three-dimensional modeling function in the key content description helps the students to deeply understand and master the content, strengthen the students' self-confidence, and then motivate the students to learn enthusiasm and initiative.

## 2. The main problems in the teaching of mechanical drawing teaching

In the teaching of mechanical engineering, mechanical drawing is a necessary basic course. Therefore, the teaching process and application measures are still in the process of gradual development and progress, and this course is an important basis for students to learn professional knowledge. In this regard, students must accurately grasp the basic knowledge and apply it to practical training in order to lay the foundation for further study of difficult knowledge. Therefore, the mechanical drawing course is not only the main course and basic course of the mechanical major, but also an applied course that emphasizes the cultivation of students' practical ability. In the actual teaching, the teacher elaborates and extends the knowledge points to cultivate students' knowledge skills. Only in this way, students can initially recognize the mechanical profession, and then develop a good ability to map and realize the drawing operation. This clearly requires students not only need to have certain figurative thinking ability to form visual and figurative content in the brain, but also have strong spatial imagination.

Once the students are under pressure to learn the basics, the difficulty of subsequent learning will increase significantly. This will not only mislead students into misunderstandings, but also directly cause students to become proficient in applying their own knowledge systems to carry out professional work after entering the position. In the traditional mechanical drawing teaching, teachers generally use teaching tools as a supplement to give students a detailed presentation of the board in the classroom content. Moreover, the teacher will also teach the students by taking pictures, taking physical models and other means to explain the knowledge points in detail, so that students can understand the relationship between the projections, and then form a space understanding of points, lines and surfaces. However, this kind of teaching method has great limitations, and the promotion efficiency of teaching projects cannot meet expectations. In the long run, it will not only reduce the efficiency of teaching, but also gradually weaken students' enthusiasm for learning professional knowledge and skills.

In practical teaching, teachers are more willing to teach through physical objects. The teacher explains in kind, correctly guides the students to observe and explore the physical objects, and then arranges the corresponding drawing tasks for the students according to the students' mastery. Although at this level can be seen as an organic integration of theoretical knowledge and practical training, in the daily application process, the problem will gradually appear. Because students lack the ability to understand and imagine, teachers use indoctrinated teaching methods to demonstrate knowledge to students, and some of them can't keep up with the progress of teaching. In this case, students will not be able to solve the problem effectively. If the knowledge points that they do not understand accumulate over time, and the backlog will reach a certain level, qualitative changes will occur, which will directly hinder students' effective learning and practical application of professional knowledge. Therefore, the introduction of teaching content based on the physical model does not have a positive impact on all students. The teaching mode of integration of theory and practice is not the main teaching mode of practical training courses. This method is also applicable to mechanical drawing teaching.

In terms of the current situation, the software industry adopts a diversified software type. Especially in 3D software, in developed countries, the level of software application technology is relatively high, which directly leads to a large number of high-quality applications. This software has the advantage of being able to adapt to a variety of mechanical requirements and accurately achieve the target three-dimensional design. However, its internal structure is complicated, and it requires higher operation standards when applied. Moreover, before the application, the students spend too much time and energy to understand the operation mode of the software, which causes the limited time to be directly wasted on the learning software. Therefore, it is necessary to select a

three-dimensional design software with outstanding application advantages and relatively strong operational feasibility.

CAXA software is a drawing software developed by China for independent innovation. It conforms to China's mechanical drawing application standards, covering powerful functions and simple operation flow. Users can simply draw on the actual needs by simply learning how to use them. The efficiency of this software application is mainly due to the fact that the internal language environment is the mother tongue of China, and there are also dimensional spaces in the drawing methods and physical modeling set in the refinement project. In addition, CAXA software has its own unique features, that is, intelligent advantages, and can be proportionally adjusted for cartographic objects. Simplify complex knowledge when using this technique to explain mechanical knowledge in detail. Students can quickly master the knowledge based on image thinking and lay a solid foundation for the construction of 3D teaching models. CAXA software is widely used in teaching because of its outstanding application advantages. In the software application promotion environment, mechanical drawing teaching is gradually achieving organic integration with CAXA software.

### **3. The Effective Application of CAXA Software in Mechanical Drawing Teaching**

#### **3.1 Three-view teaching**

In the mechanical drawing teaching, the three views are basic content. The traditional teaching method is that the teacher urges the students to choose a scientific and appropriate placement method based on the model, allowing the students to observe from three angles and draw relevant content onto the drawings. The part that students can't observe needs to use their imagination. Teachers can only perform graphical analysis by explaining the blackboard. Generally speaking, students with strong imagination can think of three views of the figure, and students with weak imagination can't imagine the figure, which will have an adverse effect on the enthusiasm of students. Moreover, the mechanical mapping course will also arrange homework assignments, most of which do not have physical models, and can only rely on teacher analysis and student thinking. Teachers are not always aware of the student's work, so the teaching effect is not significant. The CAXA software can be used to create a three-dimensional model. The software changes the display mode by using the model rotation function, which encourages students to understand the model from different angles, so as to help students quickly master the three-view projection law and drawing method through imagination.

#### **3.2 Assembly view**

The picture is an important core content of the mechanical mapping course, which plays a key role in the whole curriculum system. The matrix is composed of a plurality of combinations such as superposition, cutting, and synthesis, and the surface of the composite body has different forms of intersection. Most students have difficulty understanding the main points when they first come into contact. If educators rely solely on a small number of physical models and picture teaching, they will not be able to generate specific visual cognition, and students will have difficulty understanding the basic issues of cut and coherence. Which leads to the inability to achieve the desired teaching goals. Therefore, the introduction of CAXA software at this time, through the construction of three-dimensional models, helps to achieve the authenticity and vividness of teaching. When cutting a cylinder, first select the cylinder construction model in the library, and cut the cylinder based on the drag and drop component, you can create the model with a simple process. Then, the educator should use the unique three-dimensional ball function to demonstrate the model

cutting method, and observe the real-time changes of the intersecting line after cutting, so as to facilitate real-time demonstration of the planes and intersection lines of the model, so that students can understand the essence of the intercept line. At the same time, it is in the plane of intersection and the surface of the solid, where the intersection line is the common line of the two. Teachers can also summarize the interception line by self-supervising students' practice. In the teaching process, according to different combinations, the CAXA software is used to construct the model in a short period of time to help students form a rich spatial imagination and logical thinking ability.

### **3.3 Sectional view teaching**

When learning the cutaway view, you can only use the book image and a small number of physical models to demonstrate. When students encounter a combination of no pictures or physical models, they cannot judge the internal structure of the object. However, after the introduction of the CAXA software, the three-dimensional model of the part can be constructed by software instructions, and the three-dimensional position cutting effect and process can be demonstrated by the section view tool, so that the internal shape of the part can be clearly observed. In this way, not only can students be mobilized to observe, but also help students understand and understand the whole process, even if they encounter changes in the type of questions, they can still be easily resolved.

### **3.4 Assembly drawing teaching**

The main purpose of the mechanical mapping course is to identify the readout assembly drawings. The so-called assembly drawing is actually a technical document that characterizes the design concept, guides production, installation, maintenance, and technical communication. Assembly function design through CAXA software can help students understand assembly drawings. After the substrate is drawn, the assembly, component or assembly is formed by stacking or cutting. In order to encourage students to quickly receive new knowledge, according to the working principle, the parts or the overall assembly movement design, the teacher through the animation function of CAXA software to play the demonstration, show the working principle and process of the assembly, help students to deeply understand the role of the drawing parts or The operation status of the assembly, and then contextualized classroom knowledge, stimulates the enthusiasm and initiative of students to think deeply. The three-dimensional ball is a three-dimensional pixel manipulation tool, which is based on X, Y, and Z handles in different directions, which can prompt students to quickly construct a three-dimensional space concept. In the process of mechanical drawing teaching, the three-dimensional ball tool can be used to greatly help to dimension and assemble parts. Therefore, you can use the 3D ball tool for component assembly explanation and dimensioning. As far as the students are concerned, not only the learning difficulty is reduced, but also the classroom optimization effect is further realized.

## **4. Conclusion**

In short, with the rapid development of the information age, the application of information technology is more and more extensive. The teaching method of organic integration of mechanical drawing teaching and software teaching still needs to be adjusted and optimized in real time. Only from the actual situation, based on the individualized needs of students, to develop a scientific and feasible teaching plan, can we further add fresh blood to the teaching of mechanical specialty. Moreover, with the organic integration of new technologies and classroom teaching, the teaching system has undergone fundamental changes, and it has effectively trained students' imagination and

drawing ability. This provides students with a broader imagination and platform to achieve a high degree of integration between teaching work and goals.

## References

- [1] Luo Pengcheng. *Application Analysis of Information Teaching Methods in Mechanical Drawing*[J]. *Science and Technology Prospects*, 2015(19).
- [2] Hu Rose. *Exploration of Information Teaching in Secondary Vocational Schools*[J]. *New Curriculum Research (Middle)*, 2017(2):83-84.
- [3] Wu Yan. *The Practice and Experience of the Flipping Classroom Teaching Mode in the Course of Mechanical Memorization in Secondary Vocational Schools*[J]. *Modern Vocational Education*, 2017(17).
- [4] Wei Xinhong, Yang Dacheng. *Analysis of the Application of Information Technology in Mechanical Drawing Teaching*[J]. *Occupation*, 2016(9).
- [5] Liu Handian. *On the Teaching of Spatial Imagination of "Mechanical Recognition" [J]. Urban Tutor: The second half of the month*, 2017 (1): 122-123.