

# *Analysis of the Teaching Reform Strategy of Mechanical Principles*

**Huimin Zhang**

*Taishan University, Taian, Shandong, 271000, China*

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**Abstract:** With the rapid development of the manufacturing industry, in order to adapt to the development of the current era, the demand for mechanical professionals has doubled. The mechanical principle course is a professional basic compulsory course for cultivating mechanical students' spatial imagination, logical thinking ability and innovative design ability. High-quality course teaching has a very important position in professional teaching. Teaching reform is imperative. Various teaching methods, rich teaching content, active participation in science and technology competitions and other aspects are optimized to mobilize students' learning motivation and optimize courses. The content improves students' practical ability, deepens the understanding of theoretical knowledge, backs their creativity, and takes a multi-pronged approach to improve the quality of teaching.

## **1. Introduction**

Mechanical principle is a professional basic course for science and engineering and mechanical majors. It will play a role in the future professional course teaching. It will enlighten students' cognition of professional courses, consolidate the theoretical basic knowledge, and establish a mechanical structure. It is useful for the design and analysis of mechanical kinematics and mechanical kinematics. Dynamics should have a preliminary concept. This course requires students to have strong hands-on skills, perceive its internal structure, observe structure operation, analyze dynamic performance and understand its mechanical principles through practice, deepen the understanding of theoretical knowledge, and provide students with a better understanding of mechanical systems in the future. The plan has far-reaching significance. Due to the strong professionalism and practicality of the course, the demand for mechanical professionals is increasing. Improving the quality of teaching and cultivating practical talents are short of time, breaking the traditional teaching model, and reforming and innovating the curriculum to cultivate students' ability to comprehensively use knowledge.

## **2. Teaching Strategies for the Course of Mechanical Principles**

In order to adapt to the new teaching format, the curriculum must be adjusted accordingly to meet the needs of the society. On the basis of ensuring theoretical knowledge, it must be adjusted at any time according to the development of the subject and the needs of the society. Classroom teaching needs to add some experiments and practical training. Students participate in the hands-on

operation of what they have learned in the classroom to deepen their theoretical knowledge and use them to stimulate interest in learning and improve learning effects. Traditional teaching students lack the imagination of three-dimensional space. The rich multimedia courseware integrates animation, text, and pictures. In one, it shows the process of machine movement, and can also observe the internal structure of the machine to enhance students' understanding of the mechanical structure. High-quality courseware can stimulate students' curiosity and burst their curiosity. At the same time, blackboards and physical teaching aids should also give full play to their advantages. The derivation of formulas and diagrams of equations are better for teaching effects. After the derivation, the understanding will be deepened. The physical teaching aids play an auxiliary role to visualize the boring and abstract content. It is easier to understand and contributes to the teaching effect.

Increase the hours and projects of practical courses, arrange the practice of practical courses reasonably, ensure that there is sufficient equipment and equipment, each student can operate independently, and the subject projects are diversified. Students are encouraged to adjust the design plan according to their own ideas, and they can also use their own extracurricular time. Independently design experimental projects and demonstrate theoretical knowledge through experiments through independent design, structural analysis and assembly. Problems that arise in the process communicate with classmates and teachers to deepen basic knowledge and expand their own knowledge to make abstract Experiments are better understood, students' comprehensive design capabilities are cultivated, students' initiative in learning, love for professional knowledge, and a good learning atmosphere are created. A new round of industrial revolution has begun in China's Manufacturing 2025 and German Industry 4.0. Practical courses The frontier knowledge of related disciplines should be combined to show the development speed and prospects of the industry, and stimulate the motivation of students to learn.

Regarding the assessment of this course, various attempts should be made. The assessment of traditional test papers cannot truly reflect the degree of mastery of mechanical principles. Normal classroom performance is also the assessment point. Mechanical principles are a practical course. The performance of practical courses is also an important basis for assessment. At the same time, there are usually in-class tests and after-school exercises. Teachers should give objective scores based on the above comprehensive evaluation, divide the mechanical principle courses into scores, and students have theoretical knowledge. At the same time of practical operation, we must also pay attention to the usual performance. We can't always hold the erroneous concept of 600,000 years old. The unknown score evaluation promotes the development of students in all aspects. High test paper scores may also fail due to poor performance in normal times. It is not only limited to the comprehensive evaluation of test paper scores, but also makes a few overnight surprises before the test. The reform is conducive to the cultivation of students' comprehensive ability, and the training of professional mechanical talents plays a decisive role.

In the course design process, students are required to operate independently, the teacher makes appropriate guidance, and the content of the design is not limited to the design step calculations and hand-drawn drawings. Students are encouraged to use 3D software (such as UG, Solidworks, Ansys, Adams) to draw simulated 3D models. And through 3D software analysis simulation simulation, if there is a problem, actively communicate with the teacher, effectively improve the application ability of the software, in line with modern design methods, after class, encourage students and organize students to participate in various college student mechanical discipline competitions, such as mechanical innovation Contests, challenge cups, mechanical knowledge contests and other activities prepare for college students' mechanical competitions. From the whole process of conception, design, production and debugging of the scheme, students exercise their communication, innovation, adaptability and practical abilities. Students participate in all aspects

and details. Decide the success or failure of the design. The accuracy requirements for details arouse the attention of students, and reserve for future design work. If conditions permit, the school can organize interested students to participate in group competitions organized by the school. For those who have achieved results in the competition Students should be given certain rewards to expand their interests and tap their inherent potential. They should also communicate with companies, use their spare time to organize students to study in companies, strengthen school-enterprise cooperation, and enable students to fully use their knowledge in a variety of ways. Practice.

Teaching is inseparable from teachers. Teachers' guidance plays a particularly important role in the entire course of teaching. It is very necessary to improve the comprehensive quality of the teacher team. It is necessary to improve your practical ability, the ability to explore the frontiers of the subject, and the introduction of advanced teaching concepts. Teachers can be trained to become a double-qualified teacher. Teachers can use the vacation time to enrich themselves, carry out professional training or participate in the production line of the enterprise, and master first-hand information during field inspections, deepen their professional knowledge, and understand the current society's understanding of machinery. The demand for professional talents will make the training of students more targeted. Practical education will be carried out in the teaching process. The scope of practical courses will be more extensive. Teachers have opened up their horizons to better cultivate students' practical thinking and independent thinking, and improve their own design. Infect students at the same time, set a role model for students, learn endlessly, and spread positive energy for students by setting an example.

### 3. Characteristics of Traditional Teaching Courses

At present, many colleges and universities still adopt the traditional teaching mode. Classroom teaching focuses on teaching tasks and ignores students' ability to accept, unilaterally conveys theoretical knowledge and attaches it to textbooks, pays attention to the instillation of theoretical knowledge and ignores the cultivation of practical application and advancement. The courses are out of touch with the practical courses. Generally, theoretical courses are prioritized and the time for practical courses is squeezed. However, this course requires students to have a very clear practical ability. Too much emphasis on theory and underestimation of practice results in lack of exercise for students and students unable to learn Knowledge is applied to practice, and practice cannot demonstrate that the theory forms a vicious circle. The single form of courseware just condenses the content of the textbook into an electronic version. There is no qualitative change in essence. The relatively old-fashioned teaching method causes students to lack the ability to think independently, and there is no way to talk about innovation. Classroom content is boring, and the learning atmosphere is low. Gradually, students lose interest in learning, which affects the quality of teaching. The outdated content of textbooks cannot keep up with the development needs of the machinery industry. Teaching reform is imminent.

In the process of training basic skills, the formulation of the topic is single, outdated and lacks novelty. It is also stagnated in the structure of the reducer. The design content is high in repetition rate and is out of reality. For students with better qualifications, the design content is high. Fixed topics hinder their creative consciousness and cannot be flexibly exerted. Although they have exercised their calculation ability and analysis structure, students cannot correctly understand the importance of their design, cannot mobilize students' enthusiasm, and can hardly achieve the purpose of practice. To a certain extent, it can exercise the students' hands-on ability, but it takes a long time, is inefficient, and has low accuracy. After repeated revisions, the drawings have been blurred, dispelling the students' enthusiasm. In addition, they cannot use drawing software

proficiently and deviate from the times.

#### **4. Internet Technology in the Teaching Practice of Mechanical Principles**

When analysing the current learning situation of students' mechanical theory courses, it can be found that different students have different learning foundations and learning abilities, and each student's knowledge mastery degree is also different, which requires a suitable teaching plan according to the actual teaching. When students learn difficult knowledge points in depth, the key is to enable students to fully grasp the basic knowledge and concepts. In order to ensure that this cognitive process is reflected in the teaching practice of mechanical principles, it is necessary to adopt the "Internet +" sophisticated teaching method, which is a teaching method that has emerged with the deepening of teaching reform. From the perspective of the "Internet +" sophisticated teaching method teaching practice, when the teaching conditions are fully prepared, it can ensure the smooth development of the teaching process and ensure that the course teaching meets the learning needs of each student. Under the effect of this teaching method, the design of teaching content mainly considers students' knowledge understanding and learning ability to ensure the scientific and orderly development of classroom teaching of mechanical principles. The combination of Internet technology and teaching practice is the key to ensure the effective implementation of sophisticated teaching methods, and provides favorable conditions for the reform of mechanical principles teaching. In the traditional teaching environment, the innovation and implementation of teaching models are subject to certain restrictions, such as the high cost of teacher training and the high cost of printing paper materials. However, the emergence and development of technologies such as the Internet of Things and cloud computing have gradually formed a new teaching ecology, and future teaching methods are bound to undergo certain changes. Through the establishment of a cloud service platform, students' growth information can be recorded on the platform, so as to ensure that teachers can implement targeted teaching according to the characteristics of students, and can find teaching materials according to the actual needs of teaching.

The mechanical principle courses mainly include mechanical power design, mechanism motion design and mechanical system design. Some knowledge and concepts are relatively unfamiliar to students, and it is difficult to learn for students without practical experience, which is the main reason that affects the quality of teaching. The application of mind map in the course teaching can solve this problem well and promote the teaching reform of the mechanical principle course. Mind mapping refers to the integration of multiple central themes to form a personal database, and gradually improve student personal database information in the process of continuous course teaching, and then realize the improvement of students' comprehensive ability after the knowledge is internalized into the students' own abilities. Therefore, it can be said that the use of mind maps to sort out and integrate the knowledge of mechanical principles plays an important role, and can deepen students' understanding of knowledge. Especially in the "Internet + teaching" environment, online learning resources can be used to extend knowledge, which can provide students with rich teaching content. At this time, students need to find a learning method that suits them, link the knowledge and conduct a summary analysis to improve Teaching Quality.

#### **5. Conclusion**

With the development of teaching, cultivating comprehensive and application-oriented design talents is the goal of mechanical professional education. Curriculum reform measures have been proposed in many aspects to meet the needs of the times. Curriculum reforms mainly arouse students' interest in learning and truly master the knowledge they have learned. , To achieve the

principle of learning to be useful, comprehensive abilities are fully exercised, to lay a solid foundation for the implementation of professional courses in the future, at the same time, paying attention to classroom details and innovative teaching are particularly important for the cultivation of students' knowledge and abilities, passing boring theoretical knowledge through Sounds, animations, and models are intuitive and visualized. Through personal practice, students' hands-on skills, innovative thinking, teamwork, and adaptability can be exercised to improve students' comprehensive quality and improve teaching quality. The fundamental reform is still based on Student development and education is a long-term work. We need to keep up with the times and reform at any time, abandon the dross and optimize the development. We work together to improve teaching concepts, teaching methods and teaching models to better teaching results and meet social needs.

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