

# Research on Teaching Reform of Mechanical Design in Applied under the Background of “Six Excellence and One Top-Notch”

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**Abstract:** Under the talent training plan of “Six Excellence and One Top-Notch”, this paper analyzes the problems existing in the current mechanical design course of Anhui Science And Technology University, and puts forward corresponding reform measures and opinions, and makes statistics on the examination results of the recent three undergraduate students in our school. The data findings show that the new teaching mode following the reform can improve students’ academic performance and practical innovation ability, significantly improve the quality of talent training in application-oriented colleges and universities, and meet the requirements of talent training in colleges and universities under the current new situation.

**Keywords:** Teaching Reform; Mechanical Design; Talent training; Innovation ability

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## 1. Introduction

The implementation of the “Six Excellence and One Top-Notch” program aims to reform the traditional education model, stimulate students’ enthusiasm for learning, improve the quality of talent training, meet the needs of meet the needs of the enterprise society, so that the enterprise can develop faster and better, thus promoting the social progress, and making the talents trained by colleges and universities to meet the needs of the times<sup>[1-3]</sup>. Teachers must abandon some traditional teaching methods and talent training models, and through continuous reform and innovation of teaching mode, to form a new type of training mode based on the needs of the enterprise society<sup>[4]</sup>.

The major of mechanical and electronic engineering of Anhui Science and Technology University was officially established in 2008 and enrolled. After years of development, it has become a window major for enrollment and employment at our university, forming a curriculum system with electronic technology as the core and practical training as the guarantee. The methods and modes of talent cultivation are actively carrying out reform and progress around the national and regional development situation and the policy and policy of talents cultivation in the university. The mechanical mechanics major adheres to the professional construction idea of “facing the society, integrating into the local area, docking the industry, and taking application as the basis” to actively promote the cultivation of high-quality talents.

As a professional basic course of mechanical and electronic engineering, the mechanical design course enables students to master the basic design methods and use all the knowledge to solve practical engineering problems<sup>[5]</sup>. The traditional teaching method is

the teaching idea that the teacher is the main part and the student is the assistant. This teaching mode is difficult to meet the needs of the current era. As a result, it is necessary to actively consider the problems existing in the current mechanical design course, and put forward reasonable and executable reform measures according to the specific problems, so that trained talents can well meet the needs of the new era.

## 2. Existing problems

(1) The mechanical design course is highly theoretical, large calculation and difficult. It is very difficult for students to learn, and the calculation amount of homework is very large, especially the gear design and force analysis, which is very difficult. They need to have more theoretical knowledge to master the knowledge well. However, the theoretical class hours of this course are only 44 class hours. Under the premise of fewer class hours, it is necessary to explain the course thoroughly, and there is less discussion and exchange in the class. Some students listen to the daze, seem to understand but did not understand. In the long run, it makes the students lose learning motivation and passion, and the school effect is not good, and the number of students hanging up the examination is relatively large.

(2) At present, the course group's teaching staff is currently in a poor state. The School of Mechanical Engineering offers 8 majors in mechanical design courses, but there are only 6 teachers. The existing number of teachers cannot meet the teaching task of our college. In addition, there are brother colleges opening this course, resulting in a serious shortage of teaching teachers.

(3) The traditional teaching mode is relatively simple, mainly relying on the teachers' blackboard writing and classroom PPT explanation, which is relatively boring and lacks interaction, which cannot stimulate students' learning motivation.

(4) In the learning process of the school, it is difficult for students to combine the learning knowledge with the engineering case and lack the ability to practice and innovate. Many students only focus on the knowledge of the teaching materials and want to get higher scores in the examination, but neglect the cultivation of the innovative practice ability. Even if there are practical courses, most of the students show the indifferent attitude and do not actively carry out innovative design.

## 3. Reform methods

### 3.1 Refactoring of the course content

In the talent training plan, the class hours of mechanical design courses should be increased, whether theoretical class hours or experimental class hours need to be increased. The increase of class hours will enable teachers to flexibly control the class. Teachers can introduce some classic cases of enterprises into the classroom, so that students understand how to use mechanical design knowledge. Meanwhile, they will explain the current problems of the enterprise to students through cases, so as to stimulate students' subconscious to solve problems and subconsciously improve students' innovation ability<sup>[6]</sup>. At the same time, teachers can introduce classic equipment of our country's heavy equipment into the classroom to cultivate students' awareness of doing scientific research.

### 3.2 Build a high-level teaching team

As the basis of teaching, the teachers of the current mechanical design curriculum group are weak. In order to promote the realization of the excellent engineering training plan for mechanical and electronics major, we need to introduce more high-level teachers through campus publicity, school website publicity and colleague introduction. Simultaneously, the college must establish an employment system for part-time teachers in order to attract excellent teachers from outside the school<sup>[7]</sup>. We will vigorously support young master's teachers to pursue doctor's degrees and create more opportunities for middle-aged teachers to visit and study at well-known universities in China or abroad. Teachers can actively guide the students to think independently and cultivate students' ability to solve complex engineering problems by solving practical problems of the enterprise.

### 3.3 Reform teaching methods

The teaching method is an important component of the teaching process. According to the content of mechanical design, the whole textbook is modularized, the teaching content is optimized, and the content of mechanical design is divided into fatigue strength, connection, transmission, shafting and friction and wear. According to different teaching modules, different teaching modes are flexibly used according to the degree of difficulty of the course, and new methods are actively explored and tried. Teachers can reasonably use modern software such as Rain Classroom, Tangent Meeting, QQ group, Chao Xing and other modern software to carry out online and offline discussion questions and answers, and actively build a mechanical design teaching platform. Integrates syllabus, electronic textbooks, learning guides, teaching courseware, chapter practice questions, analysis of key exercises, simulation animations, MOOCs videos, and display of winning works in innovation competitions, etc. Actively introduce case-based teaching, flip classrooms, optimize teaching resources, enrich classroom teaching content, and teachers flexibly use all available teaching modes to

make classroom learning active, fully stimulate each student's learning motivation and enthusiasm, and improve the teaching quality of application-oriented undergraduate schools.

### 3.4 Improve teachers' ability

Under the background of "Six Excellence and One Top-Notch", higher requirements are put forward for teachers' ability. Teachers need excellent theoretical knowledge and practical ability. Many teachers come to work in universities directly after graduation from university and mastered rich theoretical knowledge, but lack practical experience. Therefore, the college should vigorously support young teachers to take temporary posts in enterprises, grasp the development trends of enterprises, and regularly organize engineers with practical operation experience to train teachers to enhance teachers' practical operation ability. In addition, the college can often organize academic activities to encourage teachers to actively participate in the academic frontier activities and understand the frontier knowledge. Teachers can apply to visit famous universities both at home and abroad to improve their abilities, so that the classroom is not boring, and students can easily acquire new knowledge.

### 3.5 Enhance the cultivation of innovation ability

The training of innovative talents is the purpose of our high-level applied university training, and it is also an important training goal of six excellence and one top-notch. Schools or colleges should incorporate the cultivation of innovation ability into the credit assessment, and students can participate in the competitions to get the credits, such as China International College Students' 'Internet+' Anhui Province hundreds of universities millions of college students popular science creative innovation competition, the National College Students' Industrial Design Competition, the National College Students' Mechanical Innovation and Design Competition, the National College Students' Innovation and Entrepreneurship Ability Competition, College Students' innovation and Entrepreneurship Competition, "Challenge Cup", PLC application ability competition organized by the school. Through the competition, students can integrate and absorb knowledge they have learned and make use of the existing knowledge for innovative design, solving practical problems. In addition, students can participate in the teacher's scientific research projects, and carry out relevant experiments and scientific research along with the instructor, so as to stimulate students' enthusiasm for scientific research, so as to enhance the cultivation of innovation ability.

## 4. Conclusion

In order to better realize the training plan of "six excellence and one top-notch" outstanding engineers, this paper analyzes the problems existing in the current traditional mechanical design curriculum, and puts forward effective measures for the existing problems. The reform of teaching methods and teaching mode is a long-term process, which requires continuous attempts. The course group optimized the teaching of mechanical design, carried out questionnaires, and compared and analyzed the teaching effect obtained by using the training mode. The statistical results show that the use of a new training mode for students has significantly improved student performance, which is beneficial to the implementation of excellent engineers train program.

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