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On the Teaching Reform of Mechanical Design Course under the Training Mode of Applied Talents

Zhenqian Zhang

Department of mechanical and electrical engineering, Zhoukou Normal University, Henan, 466001 China

Abstract

In order to do a good job in the cultivation of mechanical design talents and promote the reform of mechanical design curriculum and teaching, this paper analyzes the practical teaching mode of personnel training based on mechanical design. In terms of curriculum content and system, innovation of teaching methods, application of modern teaching means and cultivation of engineering practice ability, we should carry out curriculum teaching reform and exploration, improve the teaching effect and quality of personnel training, and lay a good foundation and implementation suggestions for the follow-up curriculum reform of related disciplines.

Keywords

Applied Talents Training; Mechanical Design; Reform in Education.

1. Introduction

At present, the demand for applied talents puts forward higher and stricter requirements for the reform and development of education. Facing the increasingly competitive and complex environment, how to improve students' comprehensive quality and ability and effectively adapt to the development of modern science and technology has always been the core and focus of higher education reform. Mechanical design is one of the professional basic courses that mechanical graduates need to master and practice. This paper focuses on the training objectives and requirements of application-oriented talents, the setting of teaching content, the innovation of teaching methods and the cultivation of engineering ability. It provides a reference for the improvement of the comprehensive quality and ability of Mechanical students.

2. Personnel Training Mode of Mechanical Specialty

As a typical engineering wide caliber major, mechanical engineering major mainly includes modern engineering graphics, mechanical principles, mechanical design, theoretical mechanics, material mechanics, mechanical manufacturing technology foundation, electrical and electronic technology, principle and application of single chip microcomputer and other courses. It has the characteristics of combining machinery and electronics, theory and practice, science and engineering, The goal is to cultivate application-oriented senior engineering and technical personnel who can not only master the basic knowledge, basic theory and basic skills of mechanical design, manufacturing and automation, but also have the ability to engage in mechanical product design, processing and manufacturing and equipment operation management in the front line of local production, construction, management and service.

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3. The Existing Problems of Mechanical Design Course

3.1. The Teaching Orientation and Training Objectives do not Meet the Current Needs

The existing curriculum standards and training objectives of mechanical design are formed according to the traditional talent training standards and modes, which are not closely related to the background of Intelligent Manufacturing in the orientation of curriculum objectives, implementation methods and means, evaluation methods, etc., so it is difficult to adapt to the development needs of the new era and talent capacity-building. In teaching practice, we should recognize the nature, status and role of the curriculum, pay attention to the combination of theory with practice, cultivate students' engineering consciousness and comprehensive ability, improve their innovation ability and consciousness, and cultivate professional and compound talents.

3.2. The Teaching Effect is Poor

At present, the teaching chapters of mechanical design include five parts: general introduction, connection, mechanical transmission, shafting parts and other parts, with 36 class hours. In the course of teaching, students do not know enough about the parts and components in the early stage. They often feel that the contents are various and disordered, the relevance between the articles is not clear, and they have no clue to learn. As a result, the achievement of ability training is not high, and the teaching effect is poor.

3.3. Teaching Methods Need to be Improved

At present, the teaching method of mechanical design course is mainly "teaching + watching", that is, the teachers make ppt display according to the requirements of the syllabus and the content of the teaching materials, and the students watch it in the classroom, so the teaching effect is not ideal. Teachers usually teach according to the textbook content, rarely combined with specific engineering examples, the application form of teaching means and methods is relatively single, the application of information assisted teaching is less, and students do not understand the specific structure and working principle of common parts and components.

3.4. Students' Innovation Ability Needs to be Improved

The course content is lack of related status and cutting-edge technology in this field, which is difficult to extend students' knowledge, and the theoretical teaching content is not closely related to engineering practice. The main content of the existing curriculum practice is curriculum design, often using the design of two-stage gear reducer as the main content, the content is single and there are many existing materials, students plagiarize.

4. Teaching Reform Plan of Mechanical Design Course

4.1. Highlight the Key Teaching Content and Optimize the Curriculum Theory System

The core and key to the cultivation of applied talents is to build a talent cultivation mode and curriculum system with ability as the core. The nature of mechanical design course is a design course with the design of general size parts as the core. Students can master relevant design rules and technical measures by learning relevant contents, so as to have the ability to design other general or special parts. In accordance with the new objectives and requirements of personnel training, on the basis of full investigation, discussion and analysis, we should reasonably set and adjust the curriculum teaching content and system setting, make clear the focus and foothold of personnel training, and focus on the cultivation of comprehensive ability, quality and skills. The content of teaching resources and courseware should be closely

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combined with the theme of intelligent manufacturing, and pay attention to the connection with the knowledge of intelligent design, green design and intelligent production. In the course teaching system, according to the idea of "total - sub - Total" and the main line, the course teaching and teaching are carried out, that is, taking the overall structure of the reducer as the main body, introducing the form and structural design of the components and parts of each part, and then the overall assembly synthesis. In the process of teaching, the strength calculation of screw connection, the strength calculation of gear transmission, the selection and design of rolling bearing, and the design of shaft are listed as the typical key contents of each chapter. In addition, the curriculum system should pay attention to the interdisciplinary, and the content should be appropriately interspersed with other disciplines. At the same time, the teaching content and sequence should be adjusted reasonably to ensure the reasonable convergence of knowledge, Increasing the understanding and application of theoretical knowledge can avoid repeated teaching.

4.2. Improve Teaching Methods and Teaching Effect

At present, the main problems existing in the teaching method of mechanical design course are as follows: students are not clear about the structure of parts, the principle of motion and the process, they do not have enough perceptual knowledge of what they have learned, and the teaching process is not interactive; The content of the course lacks the current situation and advanced technology in this field, which makes it difficult to extend students' knowledge; The theoretical teaching content is not closely related to engineering practice. Through the application of advanced information teaching methods, reasonable improvement of teaching methods, improve students' learning enthusiasm and interest, further improve the teaching effect.

In the teaching preparation stage, the interactive method is used to design questions in advance according to the teaching content, guide students to think actively and stimulate their interest in exploring the truth. In the process of teaching, we should take the principle of "precision, accuracy, width and novelty", accurately grasp the key and difficult contents, broaden the scope of content knowledge, appropriately increase relevant knowledge around the current trend of discipline development and cutting-edge content, teach students design ideas and methods, and encourage students to dare to ask questions and actively answer questions, so as to realize the good interaction between teachers and students. In addition, set up comprehensive discussion topics involving multi-disciplinary, let students participate in teaching, mobilize students' subjective initiative, make teaching and learning integrated.

The advanced multimedia information teaching method is adopted to enrich the teaching content of mechanical design application examples. Through the introduction of "national key equipment", "major engineering equipment" and "typical equipment and system", the students can understand and master the teaching content in class, and better master the problems of parts structure and design. By using advanced online teaching media such as Xuexitong and yuketang, we can provide teaching resources such as electronic courseware, electronic teaching plan, online exercises and online question answering to cultivate students' autonomous learning ability.

4.3. Enhance Students' Engineering Consciousness and Practical Ability

The cultivation of applied talents focuses on the improvement of students' practical ability and engineering consciousness. In the process of teaching, students' perceptual knowledge and understanding of common parts and components of mechanical equipment are further strengthened through on-site visit, production practice or mechanical equipment safety operation. By watching the relevant modern mechanical equipment and automatic production line literature and information, we can have a better understanding of the working principle of typical mechanical equipment and the role of common parts, main features and applications.

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Organize classroom discussion and communication based on practical engineering, help students digest abstract and difficult theoretical knowledge, cultivate students' awareness of engineering practice, reduce the boring of the course and improve the teaching effect through process guidance and introduction, analysis and discussion of engineering cases, etc. In addition, students' ability to solve practical engineering problems can be trained in the course of gear design, shaft structure design and gear mapping. In order to help students master the basic experimental skills of mechanical design, we should strengthen the level and quality of practical training, and let students choose their own topics according to their knowledge and skills in the process of experimental teaching. Encourage students to actively participate in all levels of mechanical design competition, cultivate students' innovative design consciousness, comprehensive design ability and team spirit.

4.4. Add Practice Links to Improve Students' Innovation and Practice Ability

When training students, we need to follow the concept of classroom teaching, combined with practical operation and reasonable application, so as to make the direction of talent training consistent with the needs of modern talent market, and ensure the complete integration of higher education and innovation and entrepreneurship education. Curriculum design is no longer the traditional two-stage reducer design, teachers combined with their own professional practice, using their own scientific research projects or enterprise actual problem cases, put forward the scheme and assumption that can give consideration to the use of basic knowledge of the course and solve practical problems, not stick to the form and result, give students more thinking and practice space. On the one hand, when carrying out practical teaching in all aspects of mechanical design course, the content should include cognition of mechanical system, analysis of modern intelligent equipment, discussion of cutting-edge theory, information technology training and other aspects, so that students can understand the development mode and application scheme of all aspects of mechanical design in Engineering, and improve their practical operation ability. On the other hand, after entering the training base, students can understand the mechanical design industry, make clear the requirements of mechanical design, conduct drills on all aspects, so that students can fully understand the modern mechanical design intelligent system, and master these knowledge, which can improve students' operation management and system analysis ability, and greatly improve the quality of personnel training.

4.5. Reform of Assessment Methods

This paper proposes a curriculum evaluation method that comprehensively reflects the students' learning ability and level, which is different from the previous one-sided emphasis on the examination results. It adopts the assessment method that combines the usual results, paper examination and engineering application ability, which is set reasonably according to the proportion, and tends to assess the students' comprehensive quality, innovation ability, engineering application ability, and the ability to analyze and solve practical problems.

5. Conclusion

According to the goal and requirement of applied talents training mode, this paper puts forward some reform methods and measures for mechanical design course from the aspects of course content and system, teaching mode and method, students' engineering ability training, etc., which provides reference for the implementation of mechanical design teaching in the future. When carrying out the personnel training of mechanical design, we need to understand the specific direction of comprehensive training teaching, do the corresponding reform, connect with the development of modern society and the times, carry out effective exploration and Analysis on specific posts, and reasonably adjust the teaching scheme and teaching materials according to the needs of practical posts. The school should provide enough extracurricular

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training opportunities for students, encourage students to participate, improve the quality of teaching, and cultivate professional talents for China's mechanical design industry.

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