

# Research on the reform and development of mechanical design and manufacturing specialty through the new and modern apprenticeship training mode

*Dongmei Xia*

Foshan Polytechnic, Foshan Guangdong, 528137

**Abstract:** the new modern apprenticeship is a new vocational education mode different from the enterprise order training mode. In view of the higher requirements of the growing machinery and equipment manufacturing industry for practitioners, the talent training of Vocational Colleges in China is facing various problems. The advantages of the new and modern apprenticeship talent training mode are outstanding. School enterprise cooperation, work study combination, and the reform of mechanical design and manufacturing have improved the technical level and comprehensive quality of higher vocational students. Based on the new modern apprenticeship talent training mode, this paper carried out the research and practice of mechanical design and manufacturing specialty, combined with the development of China's mechanical manufacturing industry, hoping to provide reference for the cultivation of high skilled talents in China's mechanical manufacturing industry, and for the reform and Development Research of mechanical design and manufacturing specialty.

**Key words:** new modern apprenticeship; Mechanical design and manufacturing; Reform research; Effective strategy

Mechanical equipment manufacturing industry is the foundation of our country and plays an irreplaceable key role in rejuvenating China and promoting China's social and economic development. In order to deliver more compound professional and technical talents to related industries, higher vocational colleges need to actively undertake the task of cultivating talents, and strengthen the comprehensive reform of mechanical design and manufacturing teaching. The implementation of the new modern apprenticeship system is the wisest way to significantly improve the quality of talent training, which is conducive to students' obtaining more and more effective work skills, so that they can adapt to the job demand as soon as possible, and promote the smooth realization of the goal of "made in China 2025" as a whole.

## 1. Overview

### 1.1 New modern apprenticeship

The new modern apprenticeship emphasizes the close combination of traditional apprenticeship training and modern vocational education. The implementation subject of this talent training mode is no longer limited to enterprises or teachers, but advocates that teachers and enterprise mentors work together to impart knowledge and skills to students. Within the framework of the enterprise post standard system, students' education and teaching are jointly carried out through multiple forms such as dual subject training (enterprise + school), dual tutor teaching (in school teachers + enterprise tutors), and dual main line learning (Online + offline), work study alternation, and on-the-job education, and the concept of innovation and entrepreneurship is timely integrated into the whole talent training process. It aims to improve the quality of talent training. The new modern apprenticeship system is the basic institutional carrier and effective form of integration of production and education. Based on absorbing the advantages and specialties of the traditional modern apprenticeship system, combined with the specific requirements of the new era Society for talents, this paper puts forward some useful optimization suggestions, especially focusing on the construction of double qualified teachers' team, the development of standard system and certification content participated by enterprises, Work together to impart knowledge and skills training to students, and form a new vocational education mode of taking up posts after class and employment after graduation.

### 1.2 Mechanical design and manufacturing

The research direction of mechanical design and manufacturing is based on mechanical design and manufacturing, integrated into the interdisciplinary of computer science, information technology and automatic control technology, and using the theories and methods of advanced design and manufacturing technology to solve the complex technical problems in the field of modern engineering, so as to realize the intelligent design and manufacturing of products. The main talent training goal of this major is to cultivate highly skilled and high-quality talents for the industry and society who not only master solid professional knowledge, but also can be engaged in mechanical design, mechanical manufacturing, precision testing, equipment operation, operation management and other aspects in the first line of industrial production. The new and modern apprenticeship talent training mode has greatly promoted the reform of teaching mode and teaching method of mechanical design and manufacturing specialty, expanded the means, scope and form of teaching and learning, and led to the reform of educational philosophy, teaching methods and learning methods. On the one hand, students can obtain the professional knowledge of mechanical industrial product production integrating design and manufacturing through professional learning, On the other hand, it can enable students to obtain corresponding professional skills and professional qualities through real job practice, promote the balanced development of talent training level of mechanical design and manufacturing major in Colleges and universities, improve the overall level of vocational education and theoretical and practical teaching of the major, and improve the quality of talent training.

## 2. Current situation and problems

2.1 The current situation of the implementation of the new modern apprenticeship system in the major of mechanical design and

manufacturing

The new modern apprenticeship and the deep integration of mechanical design and manufacturing have achieved remarkable practical results. First of all, the integration of production and education has been deepened. With the extensive and in-depth pilot work of the new modern apprenticeship, both schools and enterprises have a deeper understanding of their roles in the process of the new modern apprenticeship, and their understanding of the new modern apprenticeship itself is becoming more and more clear and comprehensive. Secondly, teachers' professional level has been improved. Teachers play an irreplaceable role in the whole process of talent training of mechanical design and manufacturing specialty. With the in-depth practice and implementation of the pilot work of the new modern apprenticeship system, it further promotes the continuous progress of professional teaching reform. Driven by practical needs, the comprehensive teaching level of professional teachers has increased by leaps and bounds. More and more teachers can independently complete high-quality education and teaching tasks. The improvement of professional theory and practical skills has effectively promoted the improvement of the quality of personnel training in the pilot of the new modern apprenticeship system.

However, in addition to achieving satisfactory results, the implementation of the new modern apprenticeship system in the major of mechanical design and manufacturing still faces various difficulties, such as the low degree of social recognition, the lack of sustainability of the school enterprise interest integration mechanism, the lack of in-depth integration of industry and education, and the lack of effectiveness of collaborative education. The enthusiasm of enterprises to participate needs to be improved, the school should accumulate more experience in management, and do a good job in the ideological work of students, so that they can change their view of the new and modern apprenticeship system, and fully realize the key role of this new talent training mode in the talent training of mechanical design and manufacturing specialty.

#### 2.2 The main problems of implementing the new modern apprenticeship system in mechanical design and manufacturing specialty

First of all, we need to solve the problem of enterprises' low enthusiasm for participation. The implementation and practice of the new modern apprenticeship can not be separated from the cooperation and support of enterprises from the beginning to the end. The deep cooperation between enterprises and schools is an important bottleneck to ensure the success of the new modern apprenticeship. However, from a practical point of view, although many enterprises, as an extremely important subject, have participated in the process of new and modern apprenticeship talent training, in fact, the enthusiasm of enterprises' participation has not been fully stimulated. They have always undertaken less talent training tasks, and the intensity, depth and breadth of investment are still insufficient, Therefore, the results of the pilot of the new modern apprenticeship system are greatly reduced.

Secondly, what needs to be solved is the problem of double tutor mechanism. From the perspective of the current pilot practice of the new modern apprenticeship system, neither enterprises nor schools have established a perfect dual mentor selection and training mechanism for promotion, which may lead to differences in talent training, professional teaching and other aspects between the two sides, which is not conducive to further cooperation.

### 3. Effective strategies of teaching reform

#### 3.1 Strengthen top-level design and improve integration mechanism

We will improve institutional arrangements for personnel training, enrollment and employment, and teaching management. Strictly review enterprise qualifications, and put forward clear standards and requirements for participating enterprises from the aspects of enterprise management level, master technology level, internship and training conditions, etc. Clearly define the rights, responsibilities and interests of all parties, determine the "employee" identity of the apprentice, and construct the interest integration mechanism of "government, administration, enterprise, school and apprentice".

#### 3.2 Set up a double division team and build a close cooperation mechanism

In the New Apprenticeship class, teachers are mainly composed of two parts, one is professional teachers in the school, the other is to hire teachers from enterprises, and professional teachers and enterprise teachers form a double qualified team. The mechanical design and manufacturing industry requires employees to have high mechanical design and manufacturing ability. Therefore, in this process, the main responsibility of professional teachers is to try their best to impart professional knowledge to students, while the enterprise master is mainly responsible for passing on the exquisite skills and excellent professional quality of the production line to students. Enterprise masters are an important part of the implementation of the new modern apprenticeship. Their participation attitude, comprehensive ability and quality are directly related to the practical results of the new modern apprenticeship.

The most common problem in school enterprise cooperation is that enterprise technicians have heavy tasks and have no extra time and energy to teach apprentices. At the same time, enterprise masters do not necessarily have the quality and ability to complete teaching tasks. Therefore, enterprise teachers can be allowed to fully participate in the process of apprenticeship training only by obtaining the corresponding professional skill certification as the evaluation qualification. In addition, professional teachers and business masters should strengthen communication and exchanges to promote cooperation and progress between the two sides. On the one hand, teachers in the school should be more familiar with the skill requirements of enterprise jobs, so as to guide the teaching of professional theory courses in the school and improve their professional quality. On the other hand, it helps enterprise masters to further familiarize themselves with the teaching rules, improve the ways and methods of apprenticeship, enable them to gradually complete the transformation from enterprise technicians to experienced apprentice masters, improve the comprehensive teaching level of the double qualified teacher team, and lay a solid foundation for the teaching reform of Mechanical design and manufacturing.

### 3.3 Collaborative development of courses and joint undertaking of teaching tasks

To ensure the effective implementation of the new modern apprenticeship system in the mechanical design and manufacturing major and ensure the quality of professional talent training, the primary task of both schools and enterprises is to deeply integrate and formulate professional talent training programs, standardized curriculum standards, assessment programs, etc. collaborative development of professional curriculum system organically combining theory and practice, mainly including professional foundation module, professional quality module, professional ability module and personal sustainable development module.

The professional quality module is mainly to cultivate students' good professional quality. In short, professional quality refers to the basic connotation of students' work, and is the job responsibilities and work guidelines that every employee of the enterprise should abide by. The professional quality course attaches great importance to moral education, with special emphasis on not only adding necessary moral education courses to the professional curriculum system, such as college students' career planning courses, innovation and entrepreneurship courses, ideological and political courses, but also infiltrating moral education elements into the professional curriculum teaching in time, so as to form a perfect moral education system.

In the vocational ability module, double qualified teachers should establish the correct teaching concept of post skills. Starting from the actual situation of the enterprise, they should focus on the analysis of the posts related to the mechanical design and manufacturing major, extract the professional skills that students must master from the posts, and strengthen the practical training for them. In addition, teachers should also pay attention to fully respect the dominant position of students, fully mobilize their enthusiasm and initiative of independent operation, and then realize the overall goal of vocational ability Module Curriculum Education and teaching.

### 3.4 Enrich teaching methods and improve the overall teaching quality

In the new modern apprenticeship talent training mode, the training subject has undergone fundamental changes, so the traditional teaching methods are no longer suitable for the needs of social development. Professional teaching reform should effectively keep pace with the pace of changes in the times, keep pace with the times, constantly absorb the advantages of advanced teaching methods, promote the visualization of abstract theory, the diversification of boring preaching, and actively introduce diversified teaching methods such as information teaching, project teaching method, and cooperative teaching method, so as to ensure the all-round development of students.

Mechanical design and manufacturing is a highly practical discipline. To implement the new and modern apprenticeship system, teachers should guide students to use skills, strengthen knowledge and acquire experience in near real situations, and guide students to directly participate in the real projects of mechanical design and manufacturing companies in the course of learning. Through the construction of a real practical teaching system to guide students to combine theory and practice in time. At the same time, in order to improve the intuitiveness and pertinence of teaching knowledge, teachers can give full play to the advantages of internet teaching, make online courseware and micro courseware combined with teaching content, truly reflect each teaching link of the project in video courseware, and combine students' feedback, especially focus on the important and difficult points that students have not yet mastered, To improve the accuracy of knowledge explanation.

The cultivation of new and modern apprenticeship talents needs to rely on high-quality training base. In the process of construction of training base, the fundamental principle of "integration of teaching and production" should be followed, and the guiding ideology of "laboratory → public training room of school construction professional group → training room of school Enterprise Co Construction professional direction → enterprise workshop" should be adhered to, so as to truly provide a solid place for the orderly promotion of professional teaching, Highlight the practicability of the overall teaching process, so as to promote the cultivation process of students' lifelong development ability and improve the overall quality of talent cultivation.

## 4. Conclusion

To sum up, the new and modern apprenticeship talent training mode is conducive to promoting enterprises' participation in the whole process of vocational education talent training, realizing the docking of specialty setting and industrial demand, curriculum content and professional standards, teaching process and production process, graduation certificate and vocational qualification certificate, vocational education and lifelong learning, and improving the quality and pertinence of talent training.

Schools and enterprises are the core elements of the new and modern apprenticeship talent training. They pay more attention to guiding students to apply knowledge to the workplace, and pay more attention to the cultivation and development of apprentices' comprehensive professional ability. Students can obtain "double certificates" of professional qualification certificate and academic certificate when they graduate, so as to enhance social competitiveness. The teaching reform and practice of mechanical design and manufacturing through the new and modern apprenticeship training mode deserves more attention from schools.

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# Research on the exploration of college education and teaching reform under the background of mass entrepreneurship and innovation

Yonghui Li

School of Marxism, Southwestern University of Finance and Economics, Chengdu Sichuan, 610000

**Abstract:** with the deepening of higher education reform, colleges and universities pay more and more attention to the application of innovation and entrepreneurship policy and innovation driven development policy. In order to ensure the improvement of the employment rate of colleges and universities, the national economic development and the enhancement of comprehensive strength, it is necessary to integrate the innovation and entrepreneurship policy into the education and teaching reform of colleges and universities, improve the teaching efficiency and quality, and optimize the teaching reform. Based on this, this paper will focus on the exploration of college education and teaching reform under the background of mass entrepreneurship and innovation.

**Key words:** Mass entrepreneurship and innovation; Colleges and universities; Teaching; Reform

In recent years, China has vigorously advocated college students to carry out innovation and entrepreneurship, improve the employment rate of college students, promote the stable growth of China's economic level, and improve the level of social development. China has issued a number of policies to ensure the development of innovation and entrepreneurship, and encourage and support College students to have the courage to try and develop their potential. In the context of mass entrepreneurship and innovation, higher education reform should conform to the changes of the times, actively explore appropriate paths to carry out education reform, improve the participation of college students, and improve their employment rate.

## 1. Requirements for higher education and teaching reform under the background of mass entrepreneurship and innovation

In the context of mass entrepreneurship and innovation, colleges and universities should actively respond to the requirements of national policies, cultivate college students' innovative participation thoughts, and promote the overall development of the national economy. With the continuous development and implementation of the innovation and entrepreneurship policy, colleges and universities should pay more attention to the needs of talent training and actively assume the responsibility of innovative talent training. First of all, under the background of mass entrepreneurship and innovation, social development puts forward new requirements for college students' education, which requires teachers to have good ability and teaching knowledge, cultivate excellent students with innovation ability, innovation consciousness and practical skills, and establish the awareness of making contributions to social and economic development. However, due

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