

Exploration on the Teaching Path of Higher Vocational Mechanical Major under the Integration of Post-Class-Competition-Certificate

Xiuli Yan*

Baotou Iron & Steel Vocational Technical College, Baotou 014010, Inner Mongolia, China

**Author to whom correspondence should be addressed.*

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: In recent years, with the country's high attention to vocational education and the in-depth promotion of the "Post-Class-Competition-Certificate" integration model, the teaching reform of higher vocational mechanical majors has also ushered in new development opportunities. The teaching model integrating "Post-Class-Competition-Certificate" can further improve the talent training model through the methods of "designing courses based on posts, integrating courses with certificates, complementing courses with competitions, and promoting construction through competitions". It not only shows important value in improving teaching quality, but also effectively enhances students' professional skills and comprehensive abilities. This not only meets the requirements of modern vocational education development but also makes positive contributions to students' personal growth and social development. In this regard, this paper explores the teaching path of higher vocational mechanical majors based on the integration of "Post-Class-Competition-Certificate", in order to provide a reference for improving the quality of mechanical professional talent training.

Keywords: "Post-Class-Competition-Certificate"; Integration; Mechanical major; Teaching reform

Online publication: November 3, 2025

1. Introduction

The development of higher vocational colleges should implement the talent training model of "Post-Class-Competition-Certificate" integration according to the current situation of social talent demand and the needs of students' comprehensive development. Only in this way can the effect of vocational education talent training be truly improved^[1]. Higher vocational mechanical majors mainly cultivate vocational and technical talents needed by society in mechanical manufacturing, mechanical design, etc. Teachers should focus on strengthening students' comprehensive quality and employment competitiveness in teaching, and help students better clarify the direction of their future career paths. Therefore, teachers of higher vocational mechanical majors should actively explore innovative reform strategies based on "Post-Class-Competition-Certificate", so as to further improve teaching quality and educational effectiveness.

2. Connotation and internal logic of the integration of “Post, Curriculum, Competition, and Certificate”

2.1. Analysis of the connotation of the integration of “Post, Curriculum, Competition, and Certificate”

The concept of integrating “Post, Curriculum, Competition, and Certificate” originates from the modern apprenticeship concept. It emphasizes the organic combination of enterprise work posts, professional curriculum teaching, vocational skills competitions, and vocational qualification certificates to build a new type of multi-subject collaborative education teaching model. Compared with traditional teaching concepts, this concept has successfully broken the separation between “education and industry” and “school and enterprise” in vocational education, realizing the cross-border integration of the education sector and the industrial sector. Specifically, “Post” refers to enterprise work positions, representing the actual work skill requirements and vocational skill standards of enterprise positions; “Curriculum” refers to school professional courses, which shoulder the educational responsibility of imparting theoretical knowledge and basic professional skills; “Competition” refers to industry vocational skills competitions, which can effectively train students’ practical abilities; “Certificate” refers to vocational qualification certificates, which are authoritative certifications of students’ vocational skill levels^[2].

2.2. Internal logic of the integration of “Post, Curriculum, Competition, and Certificate”

The four elements of “Post”, “Curriculum”, “Competition”, and “Certificate” are not simply parallel, they have certain internal connections^[3].

- (1) “Post”: Enterprise post practice can provide students with more opportunities for practical operations, enabling them to intern and train in real production environments, which is conducive to promoting students to internalize the theoretical knowledge they have learned into professional skills.
- (2) “Curriculum”: Professional curriculum teaching can help students master professional theoretical knowledge and technical skills, which is the premise for students to enter enterprises for post practice and an important foundation for students’ future career development.
- (3) “Competition”: Vocational skills competitions can not only create conditions for the further improvement of students’ practical ability and professional awareness, but also the professional benchmarks (such as new concepts, new skills, etc.) determined in the competitions can point out the direction for the optimization of the school’s professional curriculum system and the reform of talent training models.
- (4) “Certificate”: Vocational qualification certificates are authoritative; they are recognition and affirmation of students’ abilities, and also a powerful credential for students’ employment and career development. When students take exams for relevant certificates, they can test their mastery of knowledge and skills, which is conducive to pointing out a targeted direction for subsequent professional curriculum learning^[4].

3. Significance of teaching reform in higher vocational mechanical major based on the integration of “Post-Class-Competition-Certificate”

3.1. Conducive to promoting the efficient combination of theory and practice

Under the “Post-Class-Competition-Certificate” model, the teaching reform of mechanical major aims to eliminate the gap between theory and practice, and adopts post training, classroom teaching, professional competitions, and acquisition of skill level certificates as means to achieve the goal of “unity of knowledge and

action”^[5]. In this model, students can not only acquire theoretical knowledge in the classroom, but also apply the learned knowledge and skills to practical work. Meanwhile, skill competitions can consolidate and deepen the effect of theoretical teaching, and enrich students’ practical experience. In the process of preparing for skill level certificates, students can systematically review and integrate the theoretical knowledge they have learned, thereby achieving the purpose of combining theory with practice. Therefore, this can help students construct a sound knowledge system, improve their practical application ability, and lay a solid foundation for better carrying out related work in the future^[6].

3.2. Conducive to improving students’ professional quality and comprehensive ability

With the implementation of the “Post-Class-Competition-Certificate” teaching model, while focusing on theoretical teaching, it strengthens the cultivation of students’ professional quality and ability. Through this teaching model, students can apply the learned knowledge and skills in various work scenarios to solve different problems, better understand the rules of the industry, improve their professional quality and awareness, and enhance their teamwork and interpersonal communication skills. In addition, participating in various skill competitions can cultivate students’ innovative spirit and competitive awareness, which is of positive significance to their personal development. It enables students to achieve all-round improvement in professional skills, critical thinking, interpersonal communication, and self-management, so that they can better adapt to future work needs and post-challenges^[7].

3.3. Conducive to enhancing students’ practical application ability

Practical teaching provides students with opportunities to get in touch with real job positions in the machinery industry. Traditional classroom teaching methods usually only impart some abstract theoretical knowledge to students, but lack the introduction of real practical cases. In practical teaching, however, students can personally experience the specific job contents of the machinery industry and understand the practical problems and challenges they will face in this major in the future. The integrated “Post-Class-Competition-Certificate” model emphasizes practicality. Through practical teaching, students can gain a deeper understanding and application of the theoretical knowledge of the mechanical major, thereby enhancing their practical application ability.

4. Teaching reform strategies for higher vocational mechanical majors under the “Post-Course-Competition-Certificate” integration model

4.1. Reconstructing the curriculum system based on the “1+X” certificate standards

The formulation of talent training programs in higher vocational colleges should be closely aligned with the level requirements of the “1+X” certificate, adhere to the basic orientation of vocational education reform, and organically integrate the concept of “Post-Course-Competition-Certificate” integration into the curriculum system to better meet the demand for high-quality technical and skilled talents. By reasonably arranging the curriculum structure and teaching content, it is possible to not only scientifically organize teaching management and implementation but also flexibly adjust teaching methods, enhance the pertinence of talent training, and cultivate students’ social adaptability. The integration of “1+X” certificate requirements into curriculum content needs to break free from the constraints of disciplinary logic and eliminate curriculum boundaries. For example, courses such as Mechanical Drawing and Fundamentals of Mechanical Design can be integrated to form modular curriculum clusters. Specifically, the main content of the vocational skill level standards for CNC turning and

milling can be taken as a module, split and supplemented in the course CNC Machining Programming and Operation, and embedded into relevant teaching sessions, with the addition of practical training content for processing typical parts to strengthen students' production practice capabilities. In addition, innovations should be made in the arrangement of curriculum logic based on students' growth trajectory: basic courses and knowledge are offered in the early stage to lay a solid foundation, followed by comprehensive practical training. This ensures seamless connection between skill standard assessment and job requirements, truly enabling students to acquire what enterprises need at school and enhancing their adaptability to enterprise recruitment and the industry^[8].

4.2. Focusing on the reform of teaching methods to enhance the effectiveness of professional curriculum construction

Currently, curriculum construction is the core of promoting the "Post-Course-Competition-Certificate" integration. Higher vocational mechanical majors should promote teaching reform from multiple aspects such as curriculum content, teaching methods, and teaching forms, truly focusing on skill improvement and employment orientation, and promoting the organic integration of multiple teaching methods, including theory and practice, online and offline, and on-campus and off-campus, to smooth the talent training path of "Post-Course-Competition-Certificate"^[9]. At the same time, when carrying out teaching reform in mechanical majors, teachers should give full play to the leading role of classroom teaching and advocate the comprehensive application of teaching methods such as situational, blended, project-based, inquiry-based, cooperative, and interactive teaching. This allows students to explore and learn professional knowledge and skills in specific and real industry environments, thereby integrating knowledge imparting, skill training, and value guidance, and promoting them to apply diverse knowledge, concepts, and skills in practice to effectively enhance their comprehensive quality. For instance, teachers can construct relatively real professional scenarios by playing multimedia videos, simulating vocational scenarios in the machinery industry, and assigning post tasks. Each student is assigned a specific post, enabling them to choose post tasks that match their comprehensive abilities. Students then analyze and discuss project tasks in groups, which effectively improves their professional knowledge, vocational skills, professional literacy, and employability^[10]. In addition, the emergence of MOOCs (Massive Open Online Courses) allows students to independently learn relevant theoretical knowledge online before class, while class time can be used for research, practice, and problem-solving. This helps students deepen their understanding and application of knowledge more efficiently. Moreover, teachers' adoption of more modern teaching methods can also improve learning efficiency and interest, and provide students with broader and more diverse development paths for their future careers.

4.3. Innovating teaching models to improve the quality of practical teaching

Innovating teaching methods is key to deepening the quality of practical teaching. The "integration of posts, courses, competitions, and certificates" requires teachers of higher vocational mechanical majors to update their concepts: instead of adopting the "cramming" teaching model, they should use various advanced teaching methods. Firstly, teachers can adopt project-based teaching, taking actual mechanical products or production projects as the teaching carrier and guiding students to complete the design, production, and acceptance of products. For example, in CNC programming teaching, teachers can assign a task of processing complex components of a mechanical product, requiring students to use CNC programming knowledge and machine operation skills for product programming, processing, and measurement. Through completing projects, students not only acquire professional skills but also develop innovative thinking and problem-analysis abilities.

Secondly, case-based teaching can be frequently used, introducing typical cases from enterprise production into the teaching process. With the help of given cases, teachers guide students to analyze and solve problems, thereby cultivating their ability to address practical issues. For instance, in mechanical fault diagnosis teaching, teachers can cite fault cases of enterprise mechanical equipment, allowing students to analyze, discuss, and handle the faults. This helps improve students' practical problem-solving capabilities, professional skills, and career adaptability. Thirdly, cooperative learning can be implemented by dividing students into study groups. Students communicate and assist each other within groups to jointly complete learning tasks or projects. For example, students may be required to collaborate on specific projects in group learning; through project implementation, they jointly accomplish learning objectives, thereby enhancing their professional skills and teamwork abilities.

Meanwhile, teachers can leverage modern information technologies such as VR and AR. For example, in the operation teaching of large-scale and expensive equipment, VR technology can be used to create a virtual operation environment, enabling students to practice equipment operation in a virtual setting and avoiding equipment damage caused by misoperation. AR technology, on the other hand, can integrate virtual information with real scenes. For example, when explaining the structure of mechanical parts, AR devices can help students intuitively view the internal structure of parts, enhancing learning effectiveness, making up for the shortage of training equipment and venues, and improving the quality of practical teaching.

4.4. Establishing mechanical training bases to create an integrated atmosphere

As an important carrier for the integration of “posts, courses, competitions, and certificates”, the construction level of training bases directly affects teaching effectiveness. To this end, colleges should raise funds through multiple channels, and plan training bases at a high starting point based on the development trend of mechanical majors and the actual needs of enterprises. In terms of site layout, simulate enterprise production workshops and divide functional areas such as processing areas, assembly areas, and testing areas, so that students can become familiar with enterprise production layouts and processes during training. In terms of equipment configuration, not only should conventional mechanical processing equipment (such as lathes, milling machines, and drilling machines) be provided, but also cutting-edge industry equipment, such as advanced CNC machining centers, 3D printers, and industrial robots, should be introduced to enable students to access and master the latest technologies. Secondly, colleges can introduce enterprise management systems and culture into mechanical training bases to create an integrated atmosphere. In specific implementation, the 5S management (SEIRI, SEITON, SEISO, SEIKETSU, SHITSUKE) can be implemented, requiring students to regularly sort and organize training equipment and tools, keep the training site clean and tidy, and cultivate good work habits and professional qualities^[11]. At the same time, post enterprise slogans in the training base and set up cultural walls to display the enterprise's development history and advanced technological achievements, allowing students to be imperceptibly influenced by corporate culture.

In addition, colleges can cooperate with local machinery manufacturing enterprises to build off-campus training bases, providing students with opportunities to participate in real project practice. For example, students can be arranged to participate in actual enterprise production projects, engaging in the entire process from part processing to product assembly. Enterprise technicians and college teachers can jointly provide guidance, enabling students to deepen their professional knowledge and improve their practical abilities through practice. This truly achieves in-depth integration between colleges and enterprises, and creates a strong atmosphere for the integration of “posts, courses, competitions, and certificates”^[12].

4.5. Promote the construction of “Dual-Qualification” faculty teams and strengthen talent support

Teachers are a key factor in the teaching reform of higher vocational mechanical majors under the integration of “posts, courses, competitions, and certificates”. Schools should provide adequate training for existing teachers, strengthen the development of teaching staff, and conduct teacher training in a planned manner^[13]. Teachers should be selected to participate in practical training in enterprises regularly, with a duration of 2–3 months per academic year, to gain an understanding of the latest production technology levels, technological processes, and management methods from the frontline of enterprises, thereby accumulating rich practical experience. Schools should encourage teachers to participate in professional training programs, seminars, and skills competitions. For example, teachers can be selected to attend numerical control processing technology training and mechanical design innovation competitions, to continuously update their knowledge structure and professional skills^[14].

In addition, schools can focus on hiring technical experts and skilled craftsmen with extensive practical experience from enterprises as part-time teachers. These part-time teachers can undertake certain practical teaching tasks, bringing enterprise production experience and new technologies into the classroom. For instance, inviting enterprise numerical control programming experts to explain the programming skills and experience related to complex parts to students can make teaching content more in line with actual enterprise production. Schools also need to focus on establishing a reasonable teacher evaluation system to motivate teacher development. During the implementation process, for example, teachers’ practical teaching ability, enterprise practice experience, and achievements in guiding students’ practice should be taken as important evaluation indicators. Specifically, the weight of practical teaching ability assessment in teacher performance evaluation can be increased from the current 30% to 40%^[15], covering aspects such as practical teaching organization, guidance on students’ practical operations, and the effectiveness of practical teaching.

Teachers who actively participate in enterprise practice and guide students to win awards in skills competitions should be recognized and rewarded, so as to encourage teachers to actively engage in practical teaching reform and the development of their own “dual-qualification” capabilities, thereby providing strong talent support for the teaching reform of higher vocational mechanical majors under the integration of “posts, courses, competitions, and certificates”.

5. Conclusion

In summary, the integration model of “posts, courses, competitions, and certificates” provides new ideas and methods for the teaching reform of higher vocational mechanical majors. By basing on the “1+X” certificate standards to reconstruct the curriculum system, focusing on the reform of teaching methods to enhance the effectiveness of professional course construction, refining vocational ability training to improve students’ post competitiveness, and promoting the construction of “dual-qualification” faculty teams to strengthen talent support, we can effectively improve students’ comprehensive quality and employment competitiveness, and inject inexhaustible impetus into the development of the machinery industry.

Funding

General Project of Science and Technology Research in Institutions of Higher Learning of Inner Mongolia Autonomous Region (Project No.: NJZY23001)

Disclosure statement

The author declares no conflict of interest.

References

- [1] Zhang W, Liu Z, Xiao Y, 2025, Research on Talent Training Path of Mechanical Manufacturing and Automation Major Based on Integration of “Post, Course, Competition and Certificate”. *Die & Mould Manufacturing*, 25(1): 121–123.
- [2] Xu J, 2024, Research on Curriculum System of Higher Vocational Mechanical Manufacturing and Automation Major Based on Integration of “Post, Course, Competition and Certificate”. *Model World*, 2024(9): 170–173.
- [3] Chen S, 2025, Research on Cultivation of Innovative Ability of Secondary Vocational Mechanical Major Students Based on “Post, Course, Competition and Certificate”. *Papermaking Equipment & Materials*, 54(1): 225–227.
- [4] Zhou F, Zhang Z, Xu F, et al., 2022, Discussion and Practice on Teaching Reform of “Mechanical Drawing” Course for Mold Major under Integration of “Post, Course, Competition and Certificate”. *Die & Mould Industry*, 48(7): 69–71.
- [5] Ou E, 2022, Practical Exploration on Mechanical Basic Teaching Mode of Integration of “Post, Course, Competition and Certificate” with 1+X Certificate System for Secondary Vocational Industrial Robot Major. *Office Informatization*, 27(3): 62–64.
- [6] Wei L, Cai Y, Wang W, 2023, Research on Talent Training Mode of Mechanical Manufacturing and Automation Major Based on Integration of “Post, Course, Competition and Certificate”. *Journal of Xingtai Polytechnic College*, 40(3): 28–31.
- [7] Chen D, Huang J, Long H, et al., 2023, Reform and Practice of Higher Vocational Professional Curriculum Based on Integration of “Post, Course, Competition and Certificate”——Taking “Mechanical Measurement Technology” Course as an Example. *Ability and Wisdom*, 2023(30): 73–76.
- [8] Zhou H, 2024, Teaching Reform and Practice of Vocational Undergraduate Mechanical Majors Based on Five-Dimensional Integration of “Post, Course, Competition, Certificate and Innovation”. *Papermaking Equipment & Materials*, 53(9): 168–170.
- [9] Gu D, 2024, Research on Teaching Reform Strategy of “Mechanical Drawing and CAD” Course under Background of Integration of “Post, Course, Competition and Certificate”. *Teacher*, 2024(36): 90–92.
- [10] Li Q, 2024, Research on Teaching Reform of Mechanical Drawing Course Based on Integration of “Post, Course, Competition and Certificate”. *Die & Mould Manufacturing*, 24(9): 108–110.
- [11] Niu Z, 2024, Exploration on Online and Offline Teaching Mode of “Mechanical Drawing” Based on Integration of “Post, Course, Competition and Certificate”. *Teacher Doctrines*, 2024(24): 110–111.
- [12] Yang Z, Yan F, 2024, Construction of “Post, Course, Competition and Certificate” Talent Training Mode for Higher Vocational Mechanical Majors under 1+X Certificate System. *Journal of Xinjiang Vocational Education Research*, 15(2): 40–43.
- [13] Liang W, Shen Y, 2023, Research on Teaching Reform Practice of “Mechanical Foundation and Drawing Recognition” Course Based on Integration of “Post, Course, Competition and Certificate”. *Die & Mould Manufacturing*, 23(12): 80–82.
- [14] Zhu C, Huang L, Wang D, 2023, Exploration on Construction of Curriculum System of Integration of “Post, Course, Competition and Certificate” for Intelligent Manufacturing Major. *Journal of Higher Education*, 9(15): 74–77.
- [15] Qi J, 2023, Research on Project-Based Teaching Mode of Integration of “Post, Course, Competition and

Certificate”—Taking “Mechanical Transmission Design” Course as an Example. *Automobile Applied Technology*, 48(16): 165–170.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.