

Application Research of Task-driven Teaching in Mechanical Manufacturing and Automation Majors at Higher Vocational Colleges

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Abstract: Under the continuous renewal of curriculum reform in higher vocational colleges, the "task-driven" teaching method stands out for its applicability in cultivating students' innovative abilities and independent problem-solving skills. This paper takes students majoring in Mechanical Manufacturing and Automation at higher vocational colleges as the research subjects, proposes the task-driven teaching method, aims to enhance the teaching concepts, awareness, and abilities of teachers in Mechanical Manufacturing and Automation majors strengthen teachers' skills in applying the task-driven model in teaching Mechanical Manufacturing and Automation, elevate teachers' teaching concepts, reduce the difficulty of learning this course, and improve teaching effects.

Keywords: Task-driven Teaching Method, Learning Effect, Higher Vocational Colleges, 1+X Certificate, Professional Education

1. Introduction

Under the national advocacy for the development of vocational education, higher vocational education has flourished, presenting both opportunities and challenges. Higher vocational colleges have set requirements for the cultivation of students majoring in Mechanical Manufacturing and Automation. Students are expected not only to learn theoretical knowledge well but also to integrate theory with practice [1]. However, in actual teaching diagnostics, many students in this major at higher vocational colleges are quite familiar with "static" knowledge but significantly lack the ability to apply "dynamic" knowledge. To address the issue of

students passively receiving knowledge, coinciding with curriculum reforms, the task-driven teaching model is utilized in conjunction with school-enterprise cooperation and moral education, allowing students to achieve a comprehensive improvement in knowledge, emotions, and skills through tackling and analyzing tasks and problems. By completing learning tasks, students organically integrate mechanical manufacturing theory and practice, enhancing their professional qualities and comprehensive abilities [2].

2. Research Methods

This paper mainly researches improving the quality of talent cultivation in Mechanical Manufacturing and Automation majors at higher vocational colleges, aiming to enhance students' comprehensive understanding and mastery of professional knowledge and skills. It seeks to effectively meet the demands of "Made in China 2025," "Industry 4.0," and the like, aligning with society and industry's future talent needs. It endeavors to make higher vocational colleges a primary source of talent in the country, addressing issues of mismatch between talent supply and demand [3].

(1) Initially form a teaching theory guidance system for Mechanical Manufacturing and Automation majors at higher vocational colleges under the task-driven teaching model, clarifying the setting methods, principles, and precautions of "tasks" in professional courses, and exploring the steps of task-driven education and the teaching methods of teachers at each step. The research group will explore different task-driven teaching theoretical systems under different objectives, starting from professional integration task-driven teaching, classroom learning task-driven teaching, and after-class practice task-driven teaching [4].

(2) In alignment with the requirements for moral education and based on documents such as "Opinions on Deepening the Reform of the Talent Development System and Mechanism," the teaching model for Mechanical Manufacturing and Automation majors will be reevaluated through the lens of the task-driven teaching method. The approach involves curriculum project improvement (based on corporate division of labor, dividing students into several groups according to actual teaching tasks, and requiring students to design, install, and debug projects in a cooperative manner around tasks, using a "each to their own" method [5]. This not only consolidates students' knowledge and skills but also enhances their professional reverence and rigor) and school-enterprise cooperative dynamics (by jointly engaging enterprises and schools, enhancing students' employment competitiveness and task completion capability while fostering their professional spirit) among other methods, to achieve a simultaneous improvement in students' abilities, knowledge, and emotions.

(3) Incorporating the 1+X certificate training system, and based on the future development of higher vocational college education, the "three reforms in education" will be strengthened, including: first, teacher reform, which involves the construction of a "dual-qualified" talent pool to nurture the growth of the Mechanical Manufacturing and Automation teaching staff at higher vocational colleges; second, from a task-driven perspective, develop integrated textbooks based on "1+X," reflecting the "learning through teaching" and "doing through learning" aspects of Mechanical Manufacturing and Automation teaching at higher vocational colleges; third, by integrating tasks with the professional learning and growth requirements of students and leveraging the reform of higher vocational college teaching with talent cultivation in the new era as the core, relying on new educational concepts and strategies, and utilizing various new teaching technologies (such as the next generation of information technology) to enhance the teaching quality of Mechanical Manufacturing and Automation majors at higher vocational colleges [6].

3. Research Results

Under the task-driven teaching model, on one hand, for students of Mechanical Manufacturing and Automation, it helps them develop the ability to analyze and solve problems, boosts their professional confidence, and enhances their exploratory consciousness and independent learning habits. On the other hand, for professional course teachers in higher vocational colleges, the application of the task-driven method assists in correcting the disadvantages of traditional theory-focused teaching, innovating their teaching concepts, expanding their teaching horizons, creating a positive teaching atmosphere, and improving teaching effectiveness and quality [7].

3.1 Establishing Teaching Tasks

For task-driven teaching, the first step is to define the teaching objectives and tasks for Mechanical Manufacturing and Automation majors clearly, which is very suitable for this practice-intensive major. Establishing teaching tasks allows teachers to clarify their teaching direction and purpose, enabling them to conduct related teaching activities in a targeted manner, thus enhancing teaching effectiveness [8]. For students, it can specify the learning direction and purpose, allowing them to learn with focus and purpose, improve learning efficiency, and help teachers build an efficient classroom teaching environment.

3.2 Ensuring Task Completion

The Mechanical Manufacturing and Automation major has high requirements and standards for students' hands-on and practical abilities. During the learning process, the standards for students' operations are also high, which might result in relatively low individual learning efficiency [9]. Therefore, by forming study groups, students help each other and work together to complete learning tasks. During the learning process, teachers should encourage students to learn from and cooperate with each other, ultimately achieving a competitive atmosphere. In this process, their ability to think about and solve problems is enhanced, the mutual assistance between groups is strengthened, forming a collaborative and win-win learning situation. On this basis, it promotes the smooth implementation of the task-driven method, with teaching tasks being completed efficiently, joyfully, and competitively.

3.3 Ensuring Task Deployment

How to effectively conduct a Mechanical Manufacturing and Automation professional course is crucial, and designing appropriate teaching scenarios is one of the important measures. Therefore, when creating teaching scenarios, teachers must relate them to the teaching themes of professional courses, and as much as possible, close to the real situation of enterprise projects. By creating teaching scenarios, students are guided to enter into enterprise contexts with learning tasks, making them have vivid and intuitive impressions of related theoretical knowledge. A good teaching environment will positively promote the teaching effects, also sparking students' interest in learning and passion for exploring the truth and allowing the task-driven teaching method to be smoothly implemented. In the teaching of Mechanical Manufacturing and Automation professional courses, the primary role of the task-driven method is to lay a solid foundation for students. The first focus of the teaching scenarios designed by teachers is how to catch students' attention, enhance their interest in professional learning, and help students break free from the dull and monotonous original impression of the Mechanical Manufacturing and Automation major [10]. Therefore, the scenarios created by teachers need to be closely related to real enterprise work scenarios and students' learning lives to ensure the smooth implementation of task-driven teaching.

3.4 Perfecting Evaluation Tasks.

When students in Mechanical Manufacturing and Automation complete learning tasks, they acquire new knowledge and cognitive structures. However, this system is not yet perfect and requires teachers to evaluate each student's task outcomes, enhancing each student's knowledge structure system and thus achieving the teaching goals. Therefore, utilizing the characteristics of task-driven teaching, the evaluation process is divided into four aspects: regular grades, comprehensive ability scores, practical performance, and final exam results. These four aspects comprehensively evaluate each student's real learning situation and ability. Evaluating students during the process of completing professional tasks allows for self-evaluation

and mutual evaluation among students, then publishing their evaluation results to obtain timely feedback, identifying problems in the task-solving process, and making improvements to achieve good learning evaluation outcomes.

4. Innovation and Conclusion

The implementation of task-driven teaching in Mechanical Manufacturing and Automation majors at higher vocational colleges showcases innovation and breakthroughs.

(1) Academic Ideological Innovation: Task-driven teaching is not a novel research subject, but in this study, the research group will use task-driven teaching as a blueprint, combining it with the trends and directions of educational reform in higher vocational colleges, and integrating it with various policy requirements such as moral education, 1+X training, etc. Starting from all aspects of student growth and combining practical research, the study analyzes and summarizes strategies and methods for renewing task-driven teaching in the new era.

(2) Research Method Innovation: In this study, through a combination of theory and practice, utilizing practice bases, school-enterprise cooperation, group study tours, and other means, this paper fully leverages the initiative of students majoring in Mechanical Manufacturing and Automation. It will provide targeted guidance based on student differences for task assignment and development [11]. Additionally, it will widely accept research suggestions from teachers both within and outside the school, continuously adjusting research approaches through surveys, analysis, and experience sharing. This aims to make this educational reform study more in line with the teaching requirements of Mechanical Manufacturing and Automation majors at higher vocational colleges and conducive to further improving the quality of professional education.

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References

- [1] Ji Nan. Application of Task-Driven Teaching Method in Secondary Vocational Mechanical Manufacturing Majors. Agricultural Machinery Use and Maintenance, 2021 (09): 129-130.
- [2] Liu Jinshan. Application of Task-Driven Teaching Method in Mechanical Manufacturing and Processing Major Teaching. Hubei Agricultural Mechanization, 2020(18): 104-105.
- [3] Zhao Yujia. Application of Task-Driven Teaching Method in Online Computer Courses. Electronic Technology, 2022(05).
- [4] Zhou Mingjian; Wang Yuqin. An Empirical Study on the Effects of University Project-Based Teaching - Taking "Mechanical Engineering Materials and Their Forming Technology" Course Project-Based Teaching as an Example. Journal of Chaohu College, 2019(03).
- [5] Wu Zhiwei; Zhou Geng; Pan Chen. Practice of Task-Driven Flipped Classroom Teaching Based on Deep Learning. Laboratory Research and Exploration, 2023(02).
- [6] Gao Bo; Huo Kai; Chen Yu; Chen Yaqiong; Chen Yufei; Zhang Shaokang. Exploring the Enhancement of Students' Innovative Practice Abilities Under the New Engineering Background. Laboratory Research and Exploration, 2022(06).
- [7] Zhao Hongmei; Zhang Jili; Shi Huiwen; Jin Dawei; Zeng Yan. Research on the Innovation Path of Blended Teaching Reform in "Mechanical Design Basics" Course in Higher Vocational Education. Industrial Technology & Vocational Education. 2024, 22(01).
- [8] Wu Fan; Yuan Ziyao; Wang Leyan; Wu Yijia; Zhang Weishan. Theoretical Research and Application of Task-Driven Peer-Assisted Teaching Method. Journal of Higher Education, 2023(20).
- [9] Li Tao. Promoting Deep Learning in Students with Task-Driven Teaching in an Information Technology Environment - Teaching Practice and Thoughts on "Slightly Complex Combination Problems". Anhui Education Science Research, 2023.
- [10] Zhong Mengyuan; Zhang Xiaoqi; Feng Yinghao. Application of Process Evaluation in Project-Led Task-Driven Teaching Model. Guangdong Vocational and Technical Education and Research, 2023.
- [11] Qu Hui; Wang Chunhua; Wang Qi. Research and Application of Task-Driven Teaching Method in Basic Mechanical Design. Mechanical Design, 2018(S2).