

Research on the Construction and Reform of Practical Teaching in Engineering Majors of Private Universities——Taking the Intelligent Manufacturing College of Geely University of China as an example

YaoRong Yang

Geely University of China, Chengdu 641423, Sichuan Province, China

ABSTRACT

With the increasing changes in industrial demand, especially in the field of intelligent manufacturing, in order to meet the demand for high-quality talents in modern society, many universities have begun to re-examine their educational models, especially in practical teaching. Practical teaching, as an important component of engineering education, carries the responsibility of cultivating students' practical ability, innovation ability, and comprehensive quality. For students majoring in intelligent manufacturing, being able to interact with real engineering projects through practical teaching can help them better understand theoretical knowledge and exercise their ability to solve practical problems through hands-on operation. The School of Intelligent Manufacturing at Geely College is committed to optimizing its practical teaching system in this context, striving to provide students with richer learning platforms and more targeted practical opportunities. The college explores the "scenario fusion" practical teaching mode through innovative teaching concepts to enhance students' comprehensive abilities, especially in the field of intelligent manufacturing. By establishing a practical teaching system that is closer to the actual needs of the industry, the college aims to cultivate high-quality engineering and technical talents who are more adaptable to industrial development, and to cultivate more outstanding talents with practical operational abilities for society.

KEYWORDS

private universities; Engineering majors; Practical teaching; Construction; reform

1 Introduction

This study aims to analyze the existing practical teaching system of the Intelligent Manufacturing College of Geely University, explore its shortcomings in enhancing students' practical abilities, and propose practical and feasible improvement measures. The study analyzed the importance of practical teaching in engineering majors from a theoretical perspective, and proposed innovative system construction plans based on the specific situation of the college. Through research and analysis, this study explores how to effectively integrate practical resources both inside and outside the school through the "scenario fusion" teaching concept, enhance students' professional qualities, and cultivate high-quality applied talents that meet the needs of the industry. By improving the content of practical teaching, promoting the practice of teaching models, and ultimately achieving deep integration between education and industry, students' comprehensive abilities can be

improved, and they can have stronger market competitiveness in fields such as intelligent manufacturing.

2 Literature review

In recent years, practical teaching in engineering has gradually become a hot topic in education research both domestically and internationally, with a multidimensional development trend emerging. In China, with the continuous changes in industry development, universities are paying more and more attention to the reform and innovation of engineering practical teaching. In order to better cultivate students' practical abilities, universities have continuously built more practical bases, provided rich practical opportunities, and actively promoted project-based practical teaching models. By participating in the design, manufacturing, implementation, and evaluation of actual engineering projects, students' comprehensive abilities have been effectively improved. At the same time, domestic researchers are constantly exploring how to improve the effectiveness of engineering practical teaching by adjusting teaching modes, optimizing teaching content, and establishing a reasonable evaluation system, especially how to closely integrate teaching content with industry needs and cultivate high-quality engineering and technical talents that meet social demands.^[1]

In foreign countries, engineering education also emphasizes practical teaching, and many high-level universities provide students with various forms of practical opportunities, such as internships, experiments, and project practice. The practical teaching mode abroad emphasizes the integration of subject knowledge and practical operation, striving to cultivate students' innovation ability and interdisciplinary cooperation spirit. Research abroad also focuses on how to design practical teaching models that meet students' needs, evaluate the effectiveness of practical teaching, and analyze the profound impact of practical teaching on students' development. At the same time, some studies are combining practical teaching in engineering with issues such as social responsibility and sustainable development, exploring how to cultivate future engineers with social awareness.

3 Reform and Construction Strategy of Practical Teaching System in Intelligent Manufacturing College of Geely University

3.1 Reform Objectives of Practical Teaching System

The main goal of the practical teaching system of the Intelligent Manufacturing College of Geely College is to comprehensively enhance students' comprehensive practical abilities and cultivate applied talents with engineering practical abilities by reforming the existing practical teaching methods. In response to the current demand for high-quality engineering and technical talents in society, the college is committed to reforming the practical teaching process to help students acquire solid professional knowledge, accumulate experience in practical engineering projects, and cultivate problem-solving abilities. Specifically, the practical teaching objective of the college is to optimize the practical process, so that students can truly understand the application value of the theories they have learned and enhance their ability to solve practical engineering problems. In order to achieve this goal, the college emphasizes the integration of course content with industry development trends, and closely connects students' knowledge systems with practical work through project driven and industry university research integration.^[2]

In addition, the School of Intelligent Manufacturing pays special attention to the cultivation of

students' comprehensive abilities in the practical process, striving to use various forms of practical teaching, such as experiments, project practice, school enterprise cooperation, etc., to enable students to exercise in real work environments and expand their interdisciplinary comprehensive abilities.

By practicing in multiple scenarios, students' ability to adapt to rapidly changing social demands can be enhanced. Therefore, colleges should pay attention to the intuitiveness of practical teaching, require teaching content to have strong pertinence, closely integrate with hot issues in industry development, and ensure that students can gain valuable experience in the process of participating in teaching. At the same time, colleges should provide personalized training based on social employment needs and the characteristics of private university students, in order to provide more employment opportunities for students in the fierce market competition. By adjusting the teaching plan, the college strives to continuously break through the existing mode in practical teaching, promote the comprehensive improvement of students' overall quality, and enable them to become high-end engineering and technical talents that meet the needs of industry development^[3]. In general, the practical teaching goal of the Intelligent Manufacturing College of Geely College is to cultivate students' practical hands-on ability, innovation ability, and ability to solve practical engineering problems by building a systematic and practical education system. By closely integrating with industry development, it enhances students' professional qualities and lays a solid foundation for their future careers.

3.2 Research Methods and Ideas

3.2.1 Basic ideas

The basic idea of this study is to take the engineering practical teaching reform of the Intelligent Manufacturing College of Geely University as the starting point, systematically analyze its existing practical teaching system, explore its advantages and disadvantages in the current educational background, and propose practical and feasible optimization suggestions. By combining theory with practice, comprehensively analyzing the factors that affect the effectiveness of practical teaching, proposing a teaching system construction idea that is in line with the characteristics of intelligent manufacturing, in order to enhance students' comprehensive practical abilities. The purpose of the research is to conduct in-depth analysis around the "scene fusion" practical teaching system, striving to closely integrate theoretical knowledge with practical operation to meet the demand of society for high-quality applied engineering and technical talents.

This study analyzes the current practical teaching system of the Intelligent Manufacturing College of Geely University from multiple perspectives, and combines advanced experience in engineering education at home and abroad to extract a teaching model suitable for the characteristic development of the college. By conducting research on feedback from teachers, students, and related industries, understanding their needs for the current teaching system, gradually optimizing practical teaching content, teaching methods, and organizational management methods. Research focuses on how to improve students' practical skills in the field of intelligent manufacturing through innovative practical teaching methods, helping them better adapt to rapidly changing industry requirements in the workplace. The research approach includes building a practical teaching platform for school enterprise cooperation through deep cooperation with industry enterprises, enabling students to understand the latest development trends in the industry in a real work environment. Through the integrated teaching mode of "industry university research", students' hands-on ability is enhanced, and the comprehensive improvement of their practical abilities is promoted.^[4]

3.2.2 Specific Research Methods

To ensure the effectiveness of this study, multiple research methods were adopted to thoroughly analyze the practical teaching system of the Intelligent Manufacturing College and propose targeted reform plans. The main research methods include qualitative research, action research, case study, and teacher behavior research, which complement each other and jointly support the implementation of this study.

Firstly, qualitative research methods involve conducting in-depth questionnaire surveys to understand the evaluation of the existing practical teaching system by faculty and students in the college. By communicating with teachers and students, collecting feedback on teaching content, teaching methods, practical opportunities, and other aspects, we can identify the problems that currently exist in practical teaching. Qualitative research can help researchers delve into details that may have been overlooked in the teaching process, understand the actual difficulties students face in the learning process, and provide specific basis for optimizing the teaching system.

Secondly, action research methods emphasize reflection in practice. Researchers collaborate with teachers and students in practical teaching to design a series of teaching improvement measures. At the end of each semester, through the evaluation of implementation effectiveness, teaching strategies are adjusted in a timely manner to gradually optimize the teaching system. Action research can solve the problems encountered in current teaching, and through repeated practical adjustments, form a sustainable teaching reform model.

Thirdly, the case study method explores potential issues through in-depth analysis of specific practical teaching cases. The case can come from the internal practical teaching activities of the Intelligent Manufacturing School of Geely College, or from excellent practical teaching cases of other universities or enterprises. Through comparative analysis, summarize teaching methods with universal adaptability for reference and reference by Geely College and other higher education institutions.

Fourthly, research on teacher behavior focuses on the behavioral performance of teachers in practical teaching. Through investigation and research, analyze the teaching strategies, feedback mechanisms, and guidance methods adopted by teachers in the teaching process. The study of teacher behavior can help identify the teaching effectiveness of excellent teachers, and provide practical teaching experience for other teachers to learn from, promoting the overall improvement of teaching level.

3.3 Construction strategies for practical teaching system

The practical teaching system of the Intelligent Manufacturing College of Geely College has gradually formed a new framework centered on the "scenario fusion" teaching concept in the face of the increasingly changing industry development. The establishment of this system is to overcome the problems of "difficulty in practice" and "difficulty in application" in traditional practical teaching, while strengthening students' comprehensive and innovative abilities to better adapt to the industrial needs of intelligent manufacturing. Under this framework, teaching content should be tailored to industry realities and emphasize the diversity of scenarios. Through the innovative practical teaching mode of "scene fusion", the college hopes to break the boundaries of the classroom and cultivate high-quality applied talents that better meet the needs of society.

The practical teaching concept of "scene fusion" highlights the teaching goal of "thousands of people, thousands of faces", emphasizing individualized teaching and personalized cultivation to meet the different development needs of students. Under this concept, the college should pay special attention to implementing the "Three Realities, Three Realities" principle, which includes practicality, practicality, and effectiveness, focusing on the actual needs of student ability

cultivation, and enhancing the pertinence of teaching. One of the characteristics of this system is the diversification of teaching activities. In addition to classroom lectures and experimental operations, the course content should also include diverse teaching methods such as project practice, enterprise internships, and subject competitions.

Under the "scene fusion" practical teaching framework, students can make independent choices in multiple tracks according to their professional needs. In the professional practice stage, students can not only undertake the compulsory practical tasks in the curriculum, but also broaden their knowledge horizons and enhance their professional abilities by participating in scientific research projects or subject competitions. In the practical activities, the college encourages students to bring their learned knowledge into the enterprise and solve practical problems through the combination of theory and practice.

In addition, the "scenario fusion" teaching system of the School of Intelligent Manufacturing is carried out in four main scenarios: classrooms, laboratories, communities, and enterprises, forming a system of interconnected course experiments, professional practices, activity practices, and enterprise internships. Through multi-dimensional and multi-level practical teaching, students can gain different gains in different scenarios and gradually form complete professional practical abilities.^[5]

4 Conclusion

In summary, with the changes in industrial demand, the traditional engineering education model can no longer fully meet the requirements of modern society for high-quality talents. In the context of this era, the School of Intelligent Manufacturing at Geely College aims to provide students with more practical learning opportunities by optimizing the practical teaching system. As an important component of engineering education, the quality of practical teaching directly affects students' vocational abilities. In addition to focusing on the innovation of teaching methods, colleges should also strengthen cooperation with industries, promote the deep integration of education and industry through models such as school enterprise cooperation and industry university research integration, and cultivate more composite and innovative engineering and technical talents that meet the needs of the times, thus making greater contributions to the development of the intelligent manufacturing field.

References

- [1] Li Ting, Zhang Huang, Zheng Jinsong Exploring the Upgrading and Transformation Path of Traditional ICT Majors in Private Universities under the Background of New Engineering [J] Higher Engineering Education Research, 2023(4): 36-41.
- [2] Wang Dongdong, Han Bing, Fu Shanchun Research on Blended Teaching of Basic Principles of Concrete Structures in Private Universities: A Case Study of Xinyang University [J] Tech Wind, 2022(27): 16-18.
- [3] Li Xiaocui Research on Standardized Management of Experimental Teaching in Engineering Majors in Private Universities [J] Tech Wind, 2020(10): 47.
- [4] Wang Yulin, Wang Jinheng, Zhao Yuqi, etc Teaching Innovation and Practice of "Three Excellences and Three Innovations" in the Course of Database Principles and Applications in Private Universities under the Background of Information and Innovation [J] Computer and Telecommunications, 2024(5): 42-46.
- [5] Xu Yan Exploration of the Construction and Application of a Hybrid Online and Offline "Golden Course" Based on SPOC [J] Agricultural Machinery Use and Maintenance, 2023(1): 112-114