



# Research on Practical Teaching System of Intelligent Manufacturing Engineering Major Considering the Improvement of Humanistic Quality

Zhijie Yang, Zhangjie Li, Jun Xiao<sup>(✉)</sup>, Hongtao Tang, Baigang Du, and Lei Wang

School of Mechanical and Electrical Engineering, Wuhan University of Technology, Wuhan,  
China

{yangzhijie, anhmcy, wanglei9455}@whut.edu.cn, 53711780@qq.com

**Abstract.** As an emerging major of interdisciplinary integration, the undergraduate major of intelligent manufacturing engineering puts forward extremely high requirements for cultivating the comprehensive quality of students. Facing the demand for talents in the future, the improvement of students' humanistic quality and knowledge are equally important, and the existing practical teaching system can no longer meet the requirements. This paper analyzes the importance of humanistic literacy and practical teaching to the cultivation of intelligent manufacturing engineering professionals, and proposes a method for building a practical teaching system to intelligent manufacturing engineering that takes into account the improvement of humanistic literacy, such as optimizing the teaching staff and improving the assessment and evaluation system, which has good research significance and application value.

**Keywords:** Humanistic Quality · Intelligent Manufacturing Engineering Major · Practice Teaching

## 1 Introduction

The undergraduate major of intelligent manufacturing engineering is mainly based on mechanical engineering, and is constructed by combining control science and engineering, computer science, information science and other disciplines. The major has strong interdisciplinary, systematic and practical characteristics. The talent training objectives of the intelligent manufacturing engineering major put forward higher requirements for the practical teaching system. At the same time, with the continuous improvement of educational concepts and social needs, talent training is not limited to the professional knowledge and practical skills of students majoring in intelligent manufacturing engineering. Humanistic literacy is of great practical significance to the comprehensive growth of students majoring in intelligent manufacturing engineering. In this paper, a series of researches are carried out on the practical teaching system of intelligent manufacturing engineering that takes into account the improvement of humanistic quality, and a feasible implementation plan is proposed.

© The Author(s) 2023

C. F. Peng et al. (Eds.): EIMT 2022, AHSSEH 3, pp. 331–337, 2023.

[https://doi.org/10.2991/978-94-6463-012-1\\_37](https://doi.org/10.2991/978-94-6463-012-1_37)

## **2 Practical Teaching and Intelligent Manufacturing Engineering Major**

The orientation of intelligent manufacturing engineering major is: facing the significant strategic needs of the country and the transformation and upgrading of the manufacturing industry, exploring the integration of informatization and professional education in the advanced manufacturing field, and building a new path of personnel training. Accelerate the movement of high-quality compound intelligent manufacturing talents with strong practical ability, a strong sense of innovation, and international competitiveness that match the industrial development [5]. Teaching practice plays an essential role in implementing innovative talents training strategies in higher education. The practical teaching system mainly enables students to apply the theoretical knowledge they have learned to practice by training valuable links. Through a series of relevant teaching links such as engineering training, curriculum experiment, production practice, social practice, curriculum design, graduation thesis, scientific research training, etc., the theoretical knowledge can be verified, and students' engineering practice ability and innovation ability can be trained [4]. The practise teaching system should be guided by the demand of the intelligent manufacturing industry and driven by engineering projects as the mainline throughout the whole process of practice teaching. Learning from the research results of practical teaching system of other majors [1], combined with the characteristics of intelligent manufacturing engineering, Planning and integration include helpful links such as various professional course experiments, course design, scientific and technological innovation activities, production practice, graduation design, etc. It is necessary to build a multi-level and three-dimensional practical teaching system and cultivate intellectual manufacturing talents with good innovation ability and engineering practice ability.

## **3 Humanities Literacy and Intelligent Manufacturing Engineering Major**

Students majoring in intelligent manufacturing engineering need solid knowledge and skills and need to absorb excellent spiritual values establish correct moral standards [2]. Talent cultivation needs to focus on their inner self-cultivation to truly educate people with culture and morals. Students majoring in intelligent manufacturing engineering, as high-quality talents in related industries, have intrinsic qualities such as mental outlook, moral standards, and value orientation, significantly affecting the development of future technology society. Therefore, in addition to systematic professional ability forging, intelligent manufacturing engineering professionals also need to form noble internal cultivation to exert its positive influence and driving force.

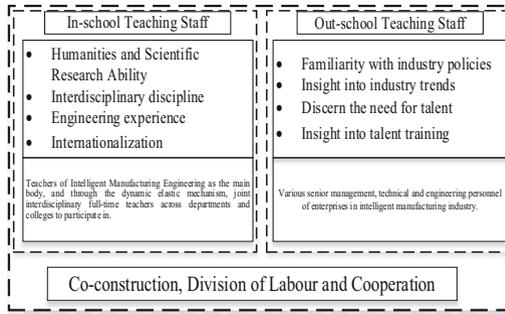
## **4 Construction of Practical Teaching System of Intelligent Manufacturing Engineering Major Taking into Account the Improvement of Humanistic Quality**

### **4.1 Clear the Significance of Humanistic Quality to Intelligent Manufacturing Engineering Major**

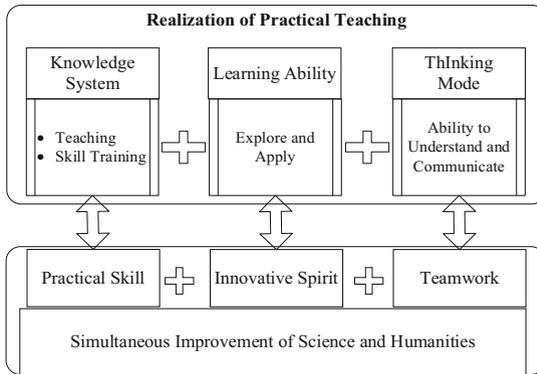
By studying politics, philosophy, literature, history, art, and other knowledge, students can internalize this knowledge into ideological awareness. They will quality at the spiritual level, and at the same time, externalize them into behaviour norms, communication principles and moral standards at the action level [3]. Students can improve the knowledge system, strengthen the construction of study style, stimulate interest in learning, correct ideas, broaden horizons, and improve aesthetics, which is helpful for students to understand their spiritual home fully, advocate truth and test it in practice, and increase their sense of happiness. Experience the hardships of teachers in teaching and educating people, Feel the family's deep concern and love for themselves, enhance self-confidence and courage in the face of difficulties and setbacks, and gain growth and gains and losses through complex study; In the process of promotion, learn to be grateful, learn to think, learn, to sum up, cultivate an independent, rational and peaceful mental health state, and establish a solid spiritual pillar for the success of the society.

### **4.2 Build a Team of Intelligent Manufacturing Engineering Teachers Who Consider the Improvement of Humanistic Quality**

Intelligent manufacturing involves a wide range of disciplines and manufacturing industries. It is difficult for a single type of teacher to bear the inherent requirements — Reform and Practice of Multi-agent Collaborative Education Model for Intelligent Manufacturing. Targeted build a stable faculty team inside and outside the school, considering the improvement of humanistic quality, to meet the training requirements of intelligent manufacturing engineering professionals. Teachers in the school should be composed of balanced humanities, scientific research ability, interdisciplinary background, rich engineering experience, and excellent internationalization ability. Teachers from the Department of Intelligent Manufacturing Engineering should be the main body. Teachers from inter-departmental and inter-college should cooperate and participate through the dynamic elastic mechanism. Off-campus teachers should come from the leading enterprises of the intelligent manufacturing industry and be composed of all kinds of senior management, technical and engineering personnel. In the process of practice teaching, Through the communication between teachers in and out of school, we can complement each other's advantages and use advanced practical teaching methods to promote the implementation of high-quality, practical teaching activities. At the same time, through the mode of "co-construction, division of labour and cooperation", Carry out research on the design and planning of practical teaching activities, the optimization and allocation of useful resources, the evaluation and continuous improvement of beneficial results, etc., and constantly optimize the cultivation mode of humanistic quality and education and teaching methods (Fig. 1).



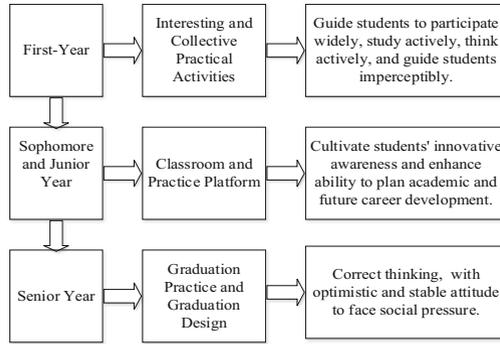
**Fig. 1.** The teaching staff of intelligent manufacturing engineering with humanistic quality improvement in mind



**Fig. 2.** Optimize the practical teaching process of intelligent manufacturing engineering major considering improving humanistic quality.

### 4.3 Optimize the Practical Teaching Process of Intelligent Manufacturing Engineering Major, Considering the Improvement of Humanistic Quality

In practical teaching, besides imparting knowledge and skills, teachers should set up more thinking links for students. Let students independently collect and analyze data, discuss and solve problems, stimulate students’ exploration enthusiasm Guiding students to independently design practical projects, stimulate students’ interest in learning, improve students’ helpful ability and cultivate the craftsman spirit of Excellence. The teachers guide students to understand the social needs, design reasonable plans, and constantly improve and explore. The teachers should teach students following their aptitude and help students improve their comprehensive quality through words and deeds (Fig. 2).



**Fig. 3.** Promoting Gradient of Practice Teaching of Intelligent Manufacturing Engineering Major Considering the Improvement of Humanistic Quality

**4.4 Form the Promotion Gradient of Practical Teaching of Intelligent Manufacturing Engineering Major Considering the Improvement of Humanistic Quality**

Students majoring in intelligent manufacturing engineering have a heavy schoolwork burden. The demand level of humanistic quality education is constantly changing. In improving students’ humanistic quality, teachers should grasp the actual needs realize the simultaneous innovation of humanistic quality cultivation and educational process. The first-year students’ knowledge points in the basic course are numerous, which requires students to spend a lot of time understanding and practising. Teachers should take learning adaptability as the starting point and guide students to participate extensively. Infiltrating humanistic knowledge into activities. Sophomores and juniors have many classes and severe difficulties, and practical courses occupy many students’ time. Therefore, teachers must make full use of professional classrooms and functional platforms, take the suitable teaching process as an essential link to improving students’ humanistic quality and cultivate students’ innovative consciousness, improve students’ professional quality, and planning ability of academic and future career development. Senior students are faced with practical pressures such as postgraduate entrance examinations and employment. Based on the practical application of enterprises, teachers should make better use of graduation practice, graduation design, and other applicable teaching links to further enhance humanistic quality, closely combine the needs of social competition and employment of enterprises, guide students to correct their thinking, and face social pressure with an optimistic and stable attitude (Fig. 3).

**4.5 Build a Practical Teaching Evaluation System of Intelligent Manufacturing Engineering Major that Considers the Improvement of Humanistic Quality**

The assessment of humanistic quality should not focus on scores and results. Multiple assessment models of homework, discussion, application, and examination should be established. In the homework discussion session, teachers could choose expandable materials that conform to the syllabus and have humanistic feelings as materials, assign

homework and carry out group discussions, for example, in the process of practical teaching, arrange students to consult the main content of Industry 4.0, and according to students' answers, discussions, and speeches, Evaluate students' feelings and attitudes about building a strong country and serving the country through science and technology, as well as their sense of mission and responsibility to devote themselves to their major. Select the advanced deeds that meet the professional characteristics of intelligent manufacturing and reflect the spirit of the times as cases, and ask the students to elaborate on the spirit of struggle, feelings of home and country, dedication and craftsmanship reflected in the case analysis. Add the experience to the practice report, Guide students to sum up and improve their ability, sum up general laws and solve engineering problems through phenomena, and cultivate students' excellent quality of teamwork and Excellence.

## 5 Summary Conclusion

The cultivation of humanistic literacy of intelligent manufacturing engineering is related to whether it can cultivate compound and innovative talents who have complete and systematic professional knowledge and skills, healthy psychology, sound personality, and both scientific and humanistic literacy. After comparative analysis, this paper proposes that a practical teaching system for intelligent manufacturing engineering that takes into account the improvement of humanistic literacy needs to further optimize the educational concept, establish a high-quality teaching team, optimize the practical teaching process, pay attention to the gradient of practical teaching advancement, and establish a complete assessment and evaluation system. The principle of student-oriented and teaching students in accordance with their aptitude can comprehensively improve the comprehensive quality of students.

**Acknowledgment.** This paper is supported by the Wuhan University of Technology Undergraduate "Course Ideological and Political" Demonstration Project Construction Project (No. 2021-2022-161); the second batch of industry-university cooperative education projects of the Ministry of Education "The construction of intelligent manufacturing engineering under the background of new engineering" (No. 202102447004); the Hubei Provincial Teaching and Research Project: Research on Virtual Simulation Experiment Teaching System of Mechanical Basic Courses for Non-Mechanical Majors (No. 2021134); the second batch of new engineering research and practice projects of the Ministry of Education: Construction and practice of multi-domain collaborative practice innovation platform for the new needs of talents in three major industries (Project No. E-XTYR20200643).

## References

1. Chen, F., Zhang, L., Wang, X., Jin, M., and Y. Zhou. 2021. Construction and practice of practical teaching system for internet of things engineering major under engineering education certification. *University Education*. 7: 5–8+12.
2. Li, H. 2021. Research on the cultivation path of the integration of humanistic quality improvement and ideological and political education of science and engineering college students. *Journal of Teaching and Educating (Higher Education Forum)* 9: 17–19.

3. Li, Z., and Y. Huang. 2019. On how to enhance science students' humanistic literacy in the new era. *Journal of College Advisor* 1: 81–86.
4. Yang, H., T. Liu, and Z. Chen. 2021. Discussion on multi-level practice teaching system of intelligent manufacturing engineering major. *Journal of Higher Education Forum* 8: 11–13.
5. Zhou, B., H. Lu, Z. Yang, and Z. Li. 2021. Construction and research of practical teaching system of intelligent manufacturing engineering specialty for cultivating new engineering talents. *Journal of Science & Technology Vision* 34: 49–52.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

