

Discussion and Practice of Learning Methods in the Practice Phase of College Students Based on Engineering Education Certification

Mei Yang^{a*}, Shuwei Lv^b and Zhuojuan Yang^c

School of Mechanical Engineering, Ji Lin Engineering Normal University, Changchun, China

^ayangmei120277@163.com, ^bLv0529@126.com, ^cyzj660557@163.com

**corresponding author*

Keywords: School-enterprise Cooperation, Cultivation Mode, At-enterprise Practice, Management

Abstract: In the context of engineering education certification. The principles, practices, methods, experiences and defects of management over students in at-enterprise learning were described in the paper by taking Jitong Engineer Class in Jilin Engineering Normal University for example. In the whole process, the enterprise dominates the management to cooperate with the university functioning as a facilitator with due attention paid to the combination of systematic discipline and humanistic care, which proves an effective guarantee for teaching effects of the stage.

1. Introduction Introduction to Engineering Education Certification

Engineering education certification refers to the professional certification implemented by professional certification institutions for engineering professional education opened by higher education institutions. It is carried out by professional or industry associations in conjunction with education experts in the field and experts from related industries and enterprises, aiming to provide relevant engineering technology Talents enter the industry to provide preparatory education quality assurance. The core is to confirm that engineering graduates meet the established quality standards recognized by the industry. It is a qualification evaluation oriented to training goals and graduation requirements. Engineering education certification requires the establishment of professional curriculum system, the allocation of teaching staff, and the allocation of school conditions, etc., all around the core task of students' graduation ability. Engineering education certification is an internationally accepted engineering education quality assurance system, and it is also an important foundation for achieving international mutual recognition of engineering education and international mutual recognition of engineer qualifications. Its purpose is to promote the mutual recognition of engineering degrees and the international flow of engineering and technical personnel through multilateral recognition of engineering education qualifications.

The training and training of undergraduate engineering students in my country's universities in accordance with international engineering education certification standards is a key step in the

internationalization of engineering talents in my country. Subsequent universities must formulate talent training goals and graduation requirements suitable for their majors according to the certification standards, and according to the quality of graduates It is required to establish a curriculum system and form a continuous improvement mechanism, so as to achieve the ultimate goal-the quality of talent training meets the training goal of certification standards.

2. The importance of Practical Teaching in Engineering Education Certification

The core content of engineering education certification standards for university undergraduate graduation requirements is to be able to use professional knowledge to analyze and study complex engineering problems and design solutions. It can be seen that the certification standards attach importance to examining whether students have the ability to comprehensively use the scientific theories, professional knowledge and technical means they have learned to analyze and solve complex engineering problems. With the ability to solve complex engineering problems, in addition to requiring students to master the necessary basic engineering knowledge, they must also receive training in engineering practice, engineering design methods and other aspects of the professional skills in order to design systems, units or process flows that meet specific needs. Therefore, the connotation of certification standards is closer to engineering practice and closer to the needs of the business community for talents. To achieve this training goal, we must carefully study the practical teaching links in the professional curriculum system, conduct practical teaching reform research, and provide students with a training platform to participate in engineering practice.

3. Comparing with the Engineering Education Certification Standards, the Content of Our School's Mechanical Design and Manufacturing and Automation Professional Practice Teaching Reform

The core content of engineering education certification standards for university undergraduate graduation requirements is to be able to use professional knowledge to analyze and study complex engineering problems and design solutions. Based on this, the computer automation major of our school has carried out practical teaching reforms from three aspects. The first experimental teaching content: add comprehensive design experimental projects to train students to conduct research on complex engineering problems, including designing experiments, analyzing and processing experimental data, and obtaining reasonable and effective conclusions; further increasing the opening of the laboratory to allow Students can really enter the laboratory to design experiments at any time to verify the feasibility of the designed scheme. Second, strengthen the construction of practice bases. School-enterprise integration needs to be further deepened so that students can truly participate in enterprise production; enable enterprises to participate in teaching, participate in the formulation of professional training goals, and participate in practical teaching such as experiments, curriculum design, graduation design, etc. In the link, to improve students' ability to solve engineering problems. Third, increase support for students' extracurricular scientific and technological activities, so that students can improve their practical ability, problem-solving ability, and innovation ability in scientific and technological activities. Here only introduce how our school's computer automation major can further deepen the integration of school-enterprise cooperation training, so that students can truly participate in enterprise production, thereby improving students' ability to solve complex problems in engineering practice in the certification standards.

4. The Discussion and Practice of the Learning Methods of Our School's Mechanical Design, Manufacturing and Automation Students in the Practical Stage of the Enterprise

The School of Mechanical Engineering of our school has carried out in-depth school-enterprise cooperation with Jilin Province General Machinery Group Co., Ltd. (hereinafter referred to as Jitong Group Company). In 2014, the two parties signed the "2.5+1.5+(1)" order training plan for mechanical engineers. Among them, "2.5" refers to two and a half years of theoretical courses in school; "1.5" refers to studying in Jitong Group for one and a half years; "(1)" refers to students staying in Jitong Group after graduation. After work, the school will continue to track and guide for one year, and then give the student engineer treatment after passing the enterprise assessment. After two-and-a-half years of school study, the first batch of Jitong engineer class students went to Jitong Group to start their corporate study on March 22, 2017. About two-thirds of the students signed an employment agreement with Jitong Group after graduation. At present, the signed students have been working in the company for two years. The students have grown up very quickly in Jitong Group, and most of them have become the main technical personnel of the company. Facts have proved that the training model of the "Jitong Engineer Class" in our school is relatively successful.

4.1. Basic Principles of Student Management in the Enterprise Learning Stage

The "2.5+1.5+ (1)" training mode of Jitong Engineer Class is a new mode and new exploration of our school's talent training. For this reason, both schools and enterprises attach great importance to it. The teaching steering committee composed of members such as the director of the personnel department and the director of the technology center, after repeated discussions and consultations, formulated the "2.5+1.5+(1)" talent training model for the Jitong engineer class and the management plan for the learning stage of the enterprise. The basic principle is based on business management, supplemented by school management, school-enterprise linkage, and collaborative management. In the management process, we pay attention to the close integration of the system and humanistic care, so as to better ensure the teaching effect.

4.2. The school and Enterprise Jointly Develop a Management System

In order to smoothly and effectively carry out school-enterprise cooperation, enhance students' engineering quality and innovation awareness, improve the quality of talent training, and achieve better training results, both schools and enterprises jointly formulated the "School-Enterprise Cooperation Internship Student Management System" and "School-Enterprise Cooperation Internship Students" System documents such as "Safety Management Formulation" and "Achievement Evaluation System for Jitong Engineer Class Students". These systems provide a good prerequisite foundation for guaranteeing the learning effect of the Jitong engineer class students jointly cultivated by schools and enterprises.

4.3. Management of Students at the Stage of School-Enterprise Joint Training

During the school-enterprise joint training stage, student management mainly includes learning management and daily management. During the one-and-a-half years of enterprise study in Jitong Engineer Class, both schools and enterprises attach great importance to students' learning. The principal, the dean of academic affairs, the branch secretary and the dean visit the company from time to time to visit the students, communicate face-to-face with the students, understand, master, and check the learning status of the students in a timely manner. Students feel the school's care and attention to them. The enterprise and the school each select an instructor to guide and manage the students, and the instructors inside and outside the school communicate closely to form a joint effort to solve practical problems in student management.

4.3.1. Daily Management

The effect of student enterprise learning is directly related to process management. For this reason, the instructors selected by schools and enterprises must have a strong sense of responsibility, a hard-working spirit, strong communication skills and rich theoretical and practical knowledge. Only instructors with these qualities and abilities can achieve good management results.

First, establish the QQ and WeChat communication management platform of Jitong engineer class to realize continuous attention and management online and offline. Communication management platforms such as QQ and WeChat have been established for the Jitong engineer class. The personnel on this platform include the branch dean, more than 10 professional course teachers, 1 school-enterprise instructor, and all Jitong engineer class students. The teachers in the group answered all kinds of questions raised by students in time, and solved all kinds of puzzles encountered in students' life, work, and professional course study.

Second, the division of labor between the school and the company's instructors will enable students to integrate into the company as soon as possible and adapt to the pace of the company's work. The instructor in the school is mainly responsible for the management of students' daily thoughts and behavioral norms. School instructors go to the workshop to meet with students at least three times a week, and hold class meetings once every two weeks to summarize the stages and solve problems in time. For example, when students first entered the company, due to changes in their schedules and living environment, they showed varying degrees of irritability and anxiety. The instructor promptly guided them and strengthened their daily management requirements; individual students lacked active learning awareness and organized discipline. Poor sex, not active in work, perfunctory, lack of hard-working spirit, poor self-control ability and other bad performances. The school instructors corrected the students' bad behaviors in time through management systems and individual communication. Enterprise instructors visit the workshop during the day to inspect the students' learning and internships, introduce the corporate culture and corporate development to the students at night, introduce the company's main products and related customers, explain the prone to errors and problems that need attention in the work, so that the students are The company has a detailed understanding, which speeds up the integration of students and the company.

4.3.2. Learning Management

The enterprise learning stage is an integral part of university education, so we must pay attention to student learning management. In the enterprise learning stage, student learning management mainly starts from the following three aspects.

First, our school's Jitong engineer class students have practiced in the company for one and a half years and live in the single dormitory of Jitong Group. The company's technical staff uses the company's products every night to explain to the students the company's product structure design, three-dimensional drawing, process design, etc. Professional knowledge. Each topic must be assessed, and the assessment method adopts a written test, an interview or a combination of the two. This part is mainly performed by the company's technical staff and gives the corresponding assessment results.

Second, each student is required to write a learning log, which contains professional knowledge and thought summary, which are submitted regularly every two weeks and reviewed by the school instructor; the instructor invites every professional teacher in the school to enter the QQ and WeChat platform of Jitong Engineer Class, Answer all kinds of professional knowledge questions raised by students at any time.

Third, the practical courses that have not been completed in the school (theoretical courses have

all been completed in the school) are carried out in the enterprise learning stage, under the joint guidance of enterprise technicians and professional teachers in the school, and the design materials will be submitted by the enterprise and Teachers of professional courses in the school jointly give corresponding results, that is, students use the practical knowledge learned in the enterprise and the enterprise practice projects they have done to replace the corresponding practical courses in the class. For example, in the graduation design link, each student's graduation design topic selection must be a design related to the company's products, and be completed by an enterprise technical staff and the school's professional teacher. The company and the school instructor jointly give the graduation design results.

4.4. Experience and Insufficiency

4.4.1. Experience

First, the rights and interests of students at the stage of enterprise practice must be guaranteed. Jitong Group attaches great importance to the cooperation with our school's school-enterprise. It not only provides students with the best board and lodging treatment, but also provides students with a certain monthly salary subsidy. Since the first day the student enters the company, Jitong Group has Students have paid for employee medical insurance, and the school has also bought accident insurance for students, which fully protects students' enthusiasm for business practice and personal safety.

Second, it is necessary to deal with the contradictions arising from the students in the practice stage of the enterprise. The school instructors must be diligent in communicating with the students and all the personnel in contact with the students in the enterprise to ensure that daily contradictions and problems are handled in a timely, expeditious and stable manner. For example, in the course of enterprise practice, students have contact with the workshop worker masters. Because the worker masters have different language expressions and abilities, and their personal ideas are also different, they will inevitably have language conflicts with students. As instructors, they must understand the situation in time and solve them properly to ensure The smooth development of school-enterprise cooperation.

4.4.2. Deficiencies

Some management systems are not in place, and management needs to be further refined.

5. Conclusions

Practice has proved that after one and a half years of enterprise study, the students of our school's "2.5+1.5+(1)" Jitong engineer class have greatly improved their theoretical application, practical ability, and engineering quality, and their self-confidence in employment and professionalism Literacy and professionalism have also been greatly improved, and the effectiveness of student business practice has been improved. Students' practical skills have reached the engineering education certification standards. It shortens the time for students to adapt to the post after entering the enterprise. After graduation, most of the students can undertake the design and on-site production management of some small projects of the enterprise. It has strengthened our confidence in persisting in the in-depth school-enterprise cooperation and the motivation to continue to explore the in-depth school-enterprise cooperation to reform the talent training model.

Acknowledgements

This paper was supported by Jilin Province education science planning project of China (No. GH20340), Program for Innovative Research Team of Jilin Engineering Normal University.

References

- [1] Deng Dongjing, Yi Suhong, Ouyang He, et al. Investigation on the Status Quo of Internship in Vocational Colleges[J]. *China Vocational and Technical Education*, 2015 (12): 88-91+96.
- [2] Chen Jia. Analysis of student management issues during internship in higher vocational college [J] . *Cultural and Educational Data*, 2015(21): 112-113.
- [3] Chen Jiefang. Interpretation of "Integration of Industry, Education and Research" and "Integration of Work and Learning" [J] *China Higher Education Research*, 2006(12): 34-36.
- [4] Tang Jianlin. Exploration and Analysis of the Evaluation Mechanism of Enterprise Practice Courses under the Mode of "Working and Studying Special Class" [J] *Cultural and Educational Data*, 2016(10):153-154.
- [5] Ding Jinchang. Implementation of "school-enterprise cooperation, work-study integration" school-level thinking and practice of model college construction [J] *Wenzhou Vocational and Technical College Journal*, 2008(9): 16-20.