

Research on Practical Teaching Innovation of Automobile Manufacturing

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Abstract: Practical teaching innovation of automobile manufacturing is important for undergraduate majors in vehicle engineering. This paper studies the status quo and problems of practical teaching of automobile manufacturing practice, puts forward the basic ideas of teaching innovation of automobile manufacturing, aiming to bring more attention to automobile manufacturing practice teaching, strengthen school-enterprise contact, establish stable practice teaching base, and build a professional education team with teachers that meet both requirements in theoretical and practical teaching.

1. Introduction

Practical teaching of automobile manufacturing, with strong engineering and technical characteristics, is an important component of the curriculum system and structure of vehicle engineering. Its course setting is an important means for students to master basic skills and enable them to use theory in practice to analyze and solve problems and improve the overall quality. It also plays a significant role in cultivating talents with innovative ability. Although practical teaching of automobile manufacturing has been widely valued, problems still remain because it is more involved in practical classes than in theoretical ones. Therefore, this paper mainly studies the practical teaching innovation of the automobile manufacturing.

2. Significance of Practical Teaching of Automobile Manufacturing

There are two aspects in practical teaching of automobile manufacturing. One is production internship of automobile manufacturing, which is an important course in the teaching plan and a link in the university's practical teaching that combines the basic theoretical knowledge and professional knowledge with practice. A student major in engineering should not only have a solid basic theoretical knowledge, but also experience production internships in production departments or enterprises. Internships can enable students to have a further understanding of basic production process, major equipment and technology management^[1].

Practical teaching of the automobile manufacturing is difficult yet very important for the students of this major. Internship and practical teaching help students to reach out to the society, enhance understanding of the major and the reality and development of the profession and related industries, and establish a clearer professional awareness, which is conducive to their view of life, value, benefit and competition. It also enables students to strengthen their discipline, foster a spirit of solidarity and hard work, thus improving their overall quality. They can also learn the actual production techniques and related knowledge that do not exist in textbooks, access to new equipment, new processes and new products, thus laying a solid foundation for follow-up courses. Internship and practical teaching can help students to consolidate and comprehensively apply what they learnt in the subject, and learn more about automotive manufacturing technology and related courses (engineering materials, mechanical design, interchangeability and measurement technology, metal cutting machine tools, etc.), independently solve simple process problems and initially have the ability to design a process specification of a simple part. Students can apply the basic principles and methods of the fixture design based on technical requirements, learn to formulate the fixture design plan, complete its structure design, familiarize themselves with and apply the technical materials such as manuals, standards, and charts, cultivate basic skills like drawing, computing and

writing technical documents, learn to observe, analyze, and solve problems. Therefore, practical teaching can also deepen students' understanding of some basic theories so as to consolidate and broaden their knowledge scope.

3. Status Quo and Analysis of Practical Teaching of Automobile Manufacturing

3.1 Status quo

Practical teaching of automobile manufacturing is mainly about production internship, which is mainly based on internship concerning mechanical processing technology. Students spend 90% of their time staying in the machining workshop, and the rest of the time visiting other workshops or mechanical processing factories. The process of internship is: invite technical personnel to give lectures, learn about drawings, observe in workshops, learn about typical equipment, equipment and parts, take notes, write internship reports, etc. The whole internship mainly focuses on machining process of this subject^[21].

3.2 Main problems

3.2.1 *More emphasis on theory but not practice*

Most teachers and students regard the internship teaching as the attachment to theoretical teaching, thus violating the principle of combining theory with practice, which is not compatible with today's requirements of talent training. Now engineering students can master theories well, but lack the ability to perform and innovate, which is the result of emphasizing more on theory but not practice. Some students don't pay much attention to practice and idle along in the workshop, only want to copy others' internship report. They developed low practice ability, and bring bad impact to other students as well.

3.2.2 *Most teachers lack practical experience*

Most teachers are graduated from colleges and universities and have good theoretical basis for teaching theory of automobile manufacturing. However, their experience in this aspect is obviously lacking because they lack necessary platform for social practice. Judging from the size of the school's faculty, the number of teachers that meet both requirements in theoretical and practical teaching is obviously insufficient, which will hinder the development of professional practice of students.

3.2.3 *Lack of standardized practical teaching materials*

There are some problems in the teaching materials of automobile manufacturing, leading to the lack of certain reference and learning objectives for students' practical learning and activities. Specific problems are: first, internship materials have not updated. The content of teaching or tutorial materials is relatively old and is not suitable for the current development of enterprise technology; second, the practical knowledge guidance is too abstract, making it not very instructive.

3.2.4 *Enterprises are increasingly reluctant to accept student interns*

In market economy, enterprises, especially state-owned large and medium-sized ones, no longer should the obligation to support university education as they did in the planned economy. In production practice teaching, enterprises, universities and students need to rebuild a teaching model and corresponding relationship to meet the basic requirements of the market economy. This new relationship can benefit companies, universities, and students (especially companies).

3.2.5 *Prominent contradictions in production internships*

Insufficient funds for internships, heavy economic burden for students, concentrated internship time, and the possibility of poor production of enterprises during this period make it difficult for students to learn about the entire production process. In addition increasing number of interns and the model of concentrated internships bring many difficulties to teaching, management, accommodation, transportation, and safety.

3.2.6 *Problem in the model of internship and practical teaching*

There are several problems in the model of internship and practical teaching: the system of practical

teaching of automobile manufacturing has not been fully established and is incomplete; teaching content is relatively outdated with a monotonous form; teaching is mainly about the mechanical processing technology with little supplement of other content; the structure of internship and practical teaching is inappropriate as the whole process only takes into consideration the automobile manufacturing but not the comprehensive practical teaching.

3.2.7 Other problems

Since automobile manufacturing has greatly improved processing and manufacturing equipment has been modernized, students see less and less substantive content, making internship ineffective and students' lack of interest. On the one hand, enterprises have confidentiality system, so student cannot know certain technologies and knowledge, damaging their enthusiasm. On the other hand, practical teaching still lacks specific operational requirements, the evaluation system is not scientific enough, teaching content and system are not standardized, and the teaching staff is not well established.

4. Basic Ideas for Practical Teaching Innovation of Automobile Manufacturing

The goal of practical teaching innovation of automobile manufacturing is to optimize teaching methods from two indicators, namely, effect and efficiency. The former refers to whether the functions of teaching such as incentive function, cognitive function, function of developing intelligence, function of feedback evaluation can be fully utilized; the latter refers to the ability to obtain larger outputs (teaching effects) with smaller inputs (mainly time and effort of teachers and students). It is necessary to view practical teaching from multiple perspectives and figure out what teaching model can keep up with the pace of the times and bring better outcomes while improving efficiency.

4.1 Pay more attention to practical teaching of automobile manufacturing

Engineering colleges and universities have always emphasize more on theory but not practice (especially in English and computer), which takes up a lot of learning time for students, making the time for practice less and less. Thereby, the students lack competitiveness. In addition, severe employment environment and the fever of postgraduate examination have made the automobile manufacturing practice unable to deliver its own function. In view of this, it is necessary to discuss the importance and necessity of practical teaching first, which will enable the teachers and students to understand that in order to pay more attention to practice, they must change their mindset. Second, pay close attention to students' ideological education to make them more aware of the importance of practical teaching. It requires the cooperation between the counselor and the teachers to integrate this idea into each student. Third, there should be more time for practical teaching of automobile manufacturing^[3].

4.2 Strengthen school-enterprise contact and establish a stable practical teaching base

It is beneficial to establish regular contacts with companies and make friends extensively, especially through the students who graduated from the school and their companies by relying on the advantages of the school's theory, research and information, actively carry out technical cooperation and joint technical research, and establish a relatively stable production practice base if possible, which is more conducive to internship quality. Changan Group, in recent years, has become a stable production practice base for students major in vehicle engineering and thermal energy and power engineering. It boasts advanced equipment and production technology, a high degree of automation, strict management, and good living facilities, making it an ideal practice base. Before internship, we contact the relevant departments to exchange ideas on internship content, plans, arrangement, and students' living. In this way, our production internship can be successfully completed according to the teaching plan. However, a stable practice basis far from not enough, so it is necessary to establish more stable practice bases through multiple channels when possible^[4].

4.3 Actively build a professional education team with teachers that meet both requirements in theoretical and practical teaching.

The teacher's teaching quality and experience are directly related to the students' learning effect. Universities should actively build a professional education team with teachers that meet both requirements in theoretical and practical teaching, and strive to improve the teacher's professional practice quality. Specifically speaking, it is about to rationally formulate the training plan for vehicle engineering teachers, encourage them to practice in enterprises, and create opportunities for them to work in relevant departments, companies, and enterprises, provide a platform for teachers to conduct scientific researches and social investigations, and enhance their problem-solving ability and practical skills, thereby laying the foundation for the creation of a new education team with teachers that meet both requirements in theoretical and practical teaching. In addition, experts and young teachers with strong practical skills in the companies can be invited to serve as instructors to improve teaching effectiveness.

4.4 Reconsider practical teaching of automobile manufacturing from the perspective of comprehensiveness

Reconstruct the teaching content and structure of practical teaching of automobile manufacturing with the idea of integration. What is innovated in teaching content of practical teaching of automobile manufacturing is to make full use of the favorable conditions of internship to learn about automobile manufacturing, prepare curriculum design, and learn about automobile development and sales so as to reintegrate the content practical teaching of automobile manufacturing; regard automotive manufacturing internship as the main body and curriculum design preparation, automobile development and sales as supplement.

4.5 Establish a sound evaluation system of practice teaching

It is necessary to innovate and improve assessment methods and evaluation standards of practice teaching by taking hands-on ability, comprehensive analysis ability and innovation ability as main elements; establish and improve independent evaluation system of practical teaching to conduct comprehensive evaluation from the aspects of teaching system, content, faculty, teaching style, and study style so as to ensure the reliability of teaching effects; establish an expert supervision system to conduct on-site assessments such as oral examinations on a regular or irregular basis^[5].

5.Summary

Standardizing the process of practical teaching of automobile manufacturing, innovating its content and structure, and establishing a teaching model combining internship, curriculum design, and automobile development and sales not only helps to achieve better results and increase teaching efficiency, but also cultivates graduates with comprehensive ability of engineering practice and innovative development.

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