

Research and Exploration on the Reform of Engineering Training Mode

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Abstract. This paper discusses the reform of engineering training mode to improve teaching quality and effectiveness. The current problems, such as the disconnection between theory and practice and insufficient student ability training, are analyzed. The proposed reform measures include enhancing practical teaching, innovating course settings, establishing engineering laboratories and practice bases, and strengthening student ability training. This paper emphasizes the importance of the reform of engineering training mode as a trend and future direction of higher education. Only through continuous reform and innovation can we better adapt to social changes and make greater contributions to cultivating high-quality engineering talents. Schools, teachers, and students should work together to optimize course settings, focus on practical teaching, and improve the practical effectiveness of courses. In conclusion, this paper provides a comprehensive analysis of the reform of engineering training mode, highlighting the importance of practical teaching and student ability training. Practical and effective reform measures and methods are proposed, providing useful insights for the cultivation of high-quality engineering talents.

1. Introduction

As an important part of applied undergraduate education, engineering training aims to cultivate students' practical skills and innovative ability to meet the complex and changing social demands in the future^[1]. However, in practice, there are many problems in engineering training education in many applied undergraduate institutions. Some students think that engineering training lacks practical meaning and there are cognitive barriers; some teachers have insufficient teaching experience to guide students effectively; some schools lack diversified engineering training programs, which leads to the lack of comprehensive quality training for students. These problems not only affect students' practical ability and career development but also restrict the quality and development of applied undergraduate education.

As a unique way of engineering education, how to build a way of thinking and knowledge structure that meets the requirements of the new era, and how to cultivate practical ability and innovation ability are topics that need to be explored in the field of engineering training reform in colleges and universities. Therefore, this study aims to explore how to improve engineering training education in applied undergraduate institutions to enhance students' practical ability and comprehensive quality. This study will analyze the problems of engineering training education from two perspectives: students' learning and teachers' teaching guidance, and propose improvement solutions by combining the design and implementation of diversified engineering training programs. The study will also address the improvement

of the assessment and evaluation mechanism of engineering training education to improve the quality of education and promote students' independent learning. The research results of this study are expected to provide reference and reference for the improvement of engineering training education in applied local undergraduate institutions.

2. ANALYSIS OF EXISTING PROBLEMS OF ENGINEERING TRAINING IN LOCAL UNIVERSITIES

Each local university in China has formulated its engineering training model according to the equipment and staffing of the engineering training center, and combined with its practical teaching requirements. Its problems can be broadly considered from two aspects^[2-4].

2.1. Analysis from the macro aspect

(1) Engineering education is disconnected from the development of emerging industries and new economies. The talent cultivation mode and cultivation system are not perfect, the cultivation mode is single, and the problem of homogenization of the cultivation structure is prominent^[5]. With the emergence of new industries and modes in the new economy, such as mobile Internet, Internet of things, and intelligent manufacturing, the diversified, personalized, and multi-level demands for talent cultivation are increasingly prominent.

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(2) There is also a disconnect between engineering practice and innovation and entrepreneurship education. The future industry needs unknown technology to solve unknown problems, which requires engineering talents to have higher innovation and entrepreneurship abilities and cross-border integration abilities. At present, there are problems such as the separation of innovation and entrepreneurship education from the engineering practice system and the shortage of teachers, which lead to the mismatch between engineering ability cultivation and innovation education of students.

2.2 Analysis from the microscopic aspect

In engineering training, there are also many problems in students' learning and teachers' teaching guidance. On the one hand, some students lack practical experience and have difficulty in converting theoretical knowledge into practical operation ability. On the other hand, some teachers may lack relevant engineering practice experience and cannot provide sufficient guidance and assistance. These problems affect the learning effect and practical ability of students and restrict the improvement of teachers' teaching levels^[6].

First of all, students' enthusiasm and autonomy in learning need to be further improved. In engineering training, students usually need to perform practical operations, which requires strong autonomy and enthusiasm. However, in reality, some students may lack sufficient learning motivation and just complete the task of course learning, and a large part of them come with the attitude of mixing credits, not realizing the importance of engineering practical training at all or the advantages brought by industry-academia-research cooperation projects. Driven by such a concept, students' learning attitudes will become more and more improper, and bad behaviors such as playing with cell phones and sleeping in class are common. To stimulate students' learning enthusiasm and autonomy, schools can take various measures, such as providing opportunities for practical operations, setting up practical projects, and strengthening cooperation with enterprises to provide students with opportunities for practical operations and practical experience^[7].

Secondly, some teachers may lack relevant engineering practice experience to provide sufficient guidance and assistance to students. The role of teachers is crucial in practical teaching sessions such as metalworking practice. Teachers need to provide guidance and assistance to students so that they can learn the right practical skills and methods. However, some teachers may lack relevant practical engineering experience and are unable to provide sufficient guidance and assistance to students. The teaching methods are relatively single, and some teachers' knowledge is still stuck in the traditional stage of metalworking practice, which cannot meet the progress of the times. The teaching methods generally stay in the way that teachers demonstrate and teach, and students copy and do what they do, which makes students less motivated and unable to complete the projects of industry-university cooperation well, not to mention innovative training.

In summary, there are many problems in students' learning and teachers' teaching guidance. To solve these problems, schools, teachers, and students need to work together to strengthen the reform and innovation of practical teaching, and improve students' practical ability and teachers' practical experience and guidance.

3. Suggestions for reform in teaching methods

After analyzing the current problems of engineering training, this paper proposes three directions for improvement, which are to establish a diversified engineering training education system, to strengthen teachers' teaching guidance and students' independent learning, and to optimize the design and implementation of engineering training projects. In this part, these three directions will be discussed and elaborated in detail.

3.1 Establishing a diversified engineering training education system

The essence of engineering training is to cultivate students' practical ability, so the education system should be reformed to meet the requirements of students at different levels and with different needs. Specifically, the following measures can be considered:

1. Establish a multi-level engineering training education system

A multi-level engineering training education system should be established to meet the needs of students at different levels. For undergraduates, emphasis should be placed on cultivating their practical hands-on ability and encouraging them to participate in various practical activities and engineering training; for master and doctoral students, emphasis should be placed on cultivating research and innovation ability and encouraging them to participate in various scientific research projects and practical activities.

2. Establish diversified engineering training courses

A variety of different engineering training courses should be established to meet the needs of different students. For example, for students with a practical foundation, some advanced engineering training courses, such as automatic control, robotics, etc., can be offered; for students without a practical foundation, some basic courses, such as engineering drawing, basic mechanical manufacturing, etc., can be offered.

3.2 Strengthen teachers' teaching guidance and students' independent studying

In terms of strengthening teachers' teaching guidance and students' independent learning, improvements should be made in the following aspects.

First, schools should strengthen the training and guidance of teachers and improve their teaching level. Teachers are one of the most important aspects of engineering training, and their level directly affects students' learning outcomes. Therefore, schools should develop a series of teacher training programs, including

training in teaching skills, experimental skills, engineering project design, and guidance, to improve teachers' comprehensive quality and professional level. At the same time, schools should also establish a sound teaching guidance mechanism to provide teachers with comprehensive guidance and support.

Second, students' ability of independent learning is also an essential part of engineering training. To cultivate students' independent learning abilities, schools can take the following measures. First, to strengthen students' independent learning by offering courses. Schools can guide students to think and explore independently in the learning process and improve their learning ability through innovative curriculum design. Second, to exercise students' independent learning ability by organizing them to participate in various practical activities. Students can participate in engineering practice, science and technology competitions, and other activities to improve their independent learning ability by designing, organizing, and implementing projects on their own.

3.3 Optimize the design and implementation of engineering training programs

To improve the effectiveness and practicality of engineering training, schools should optimize the design and implementation of engineering training programs. Specifically, improvements can be made in the following aspects.

First, schools should design personalized engineering training programs for students according to their professional strengths and personal interests. Students of different majors have different professional strengths and personal interests, and schools should tailor engineering training programs for them according to these factors, to improve their learning motivation and learning effect.

Secondly, schools should focus on the practical application value of engineering training programs. During the design and implementation of engineering training projects, schools should pay attention to the practical application value and effectiveness, avoiding only staying at the theoretical level and ignoring the practical application value. To this end, schools can invite experts and entrepreneurs from enterprises, industry associations and other practical application fields to participate in the development of engineering training programs, so that engineering training is more targeted and can be more easily dovetailed with enterprises.

4. Improvement of assessment and evaluation mechanism

4.1 Assessment indicators and methods for engineering training education

In the process of improving engineering training education, assessment is an essential part. Therefore, we need to establish reasonable assessment indexes and

methods to comprehensively and objectively assess the quality and effectiveness of engineering training education. In determining assessment indexes, the following aspects need to be considered:

The improvement of students' practical ability, including skill level, comprehensive quality, innovation ability, etc;

The design and implementation of engineering training projects, including the difficulty, feasibility, practicality, etc. of the projects

The situation of students' participation and learning attitude, including aspects such as students' motivation and independent learning ability;

The guidance and teaching level of teachers, including aspects such as teachers' teaching ability and guidance methods.

When determining the assessment methods, it is necessary to use a combination of various methods, such as questionnaire survey, practical operation, internship report, oral defense, etc., to reflect the situation of engineering training education comprehensively.

4.2 Improvement scheme of examination mechanism

At present, many schools still adopt traditional examination and assessment methods in engineering training education, which do not fully reflect the actual ability and comprehensive quality of students. Therefore, it is necessary to improve the assessment mechanism and adopt a combination of multiple assessment methods to assess students' ability and quality more comprehensively and objectively. The specific improvement plan includes the following aspects:

Introducing diversified assessment methods, such as practical operation, internship reports, and oral defense, in order to reflect students' abilities and qualities comprehensively;

Establishing an assessment team, consisting of several teachers, enterprise representatives, etc., to ensure the objectivity and fairness of the assessment;

To fully consider aspects such as students' independent learning ability and innovation ability in the assessment process to promote students' overall development.

5. Conclusion

Local colleges and universities take cultivating talents serving local industries and enterprises as the main goal of talent cultivation, to achieve misalignment and special development with engineering superior colleges and universities and comprehensive colleges and universities in the reform of engineering education of new engineering, local colleges, and universities should take the initiative to connect with industries and enterprises, introduce enterprise engineering technicians into the classroom, especially in engineering training courses to strengthen the construction of school-enterprise collaborative engineering training environment and engineering-oriented teachers' team. Through the

cooperation between schools and enterprises, they should carry out the construction of an engineering training project library closely related to industries and enterprises, improve teaching mode and teaching methods, improve assessment methods, strengthen the communication and learning among students, teachers, and engineers, and innovate the cultivation method of engineering technical talents under the background of new engineering science.

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