

Research on Methods to Improve The Quality of Practical Teaching of Mechanical Majors in Applied Undergraduate Universities

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Abstract

As a typical engineering major, mechanical majors are highly applicable, and practical teaching is an important way for mechanical students to master professional skills. This article analyzes the problems faced by the practical teaching of mechanical majors in applied universities at the current stage from three aspects: practical teaching system, practical teaching resources and practical teaching methods, and proposes to improve the practical teaching system, strengthen the design of practical courses; strengthen practice Construction of teaching resources, enriching practical teaching resources in all aspects and dimensions; introducing new methods and new ideas, exploring three solution paths of diversified teaching models, promoting the continuous improvement and development of practical teaching, and better serving the cultivation of outstanding applied talents.

Keywords

Mechanical Major, Practice, Applied undergraduate universities.

1. Introduction

With the rapid development of applied undergraduate education, the cultivation of practical abilities of mechanical students has received increasing attention. As a qualified mechanical major student, you need to have certain practical abilities to deal with increasingly complex engineering problems. However, traditional teaching methods often focus on the explanation of theoretical knowledge and neglect the cultivation of practical abilities. This teaching method can no longer fully meet the needs of students majoring in mechanical engineering in modern applied undergraduate universities. Therefore, how to effectively cultivate students' practical abilities has become an important issue in the teaching of mechanical majors in applied undergraduate universities. Practical teaching plays an important role in improving students' practical and innovative abilities. In order to better play the role of practical teaching in cultivating applied undergraduate talents, it is necessary to strengthen the cultivation of full-time teachers' practical teaching ability, and at the same time carry out a series of reforms and explorations in the practical teaching of mechanical majors. At present, domestic and foreign scholars have conducted a series of research and discussions on the practical teaching of mechanical majors in applied undergraduate universities. For example, Zhang Xiaohong, Wang Lili and others proposed research on the construction of practical teaching system for applied undergraduate colleges and universities [1], while Li Ming and others conducted research on the reform and practice of applied undergraduate mechanical practical teaching system [2]. At the same time, some researchers have also proposed some practical teaching methods, such as using virtual reality technology, interactive teaching, etc. [3].

2. Analysis of the Problems in Practical Teaching

2.1. Imperfect practical teaching system

Through a survey of the mechanical major training programs of many local applied undergraduate universities, it can be found that most professional courses lack the setting of practical teaching links and the practical teaching system is incomplete. For example, professional basic courses such as engineering drawing and mechanical principles, most universities There is no special practice link. Some practice links are just a few simple experiments. There are no systematic teaching plans, outlines, plans, etc. Students' practice is just a quick glance, and the effect is not good.

2.2. Insufficient practical teaching resources

This problem is common in local undergraduate colleges and universities that have just transformed. Due to their short development time and insufficient conditions in all aspects, they have a shortage of teaching resources, including software and hardware, and require a large amount of investment. On the one hand, capital investment is not in place, and another important reason is that ideological understanding is not in place, resulting in a lack of professional talents and advanced equipment in practical teaching, and the practice link does not receive enough attention.

2.3. Single practical teaching method

Many colleges and universities rely too much on traditional experimental teaching, internship teaching and other methods in the practical teaching process, and lack innovation and flexibility. As a result, students are prone to fall into a monotonous and mechanical state during the practical teaching process, and are unable to acquire comprehensive practical knowledge and skills. It cannot meet the requirements of modern engineering education. The existence of these problems has resulted in the practical ability of students majoring in mechanical engineering in applied undergraduate universities not being fully improved and unable to meet the requirements of today's society for the training of applied talents.

3. Exploration of Practical Teaching Reform Strategies

3.1. Improve the practical teaching system and strengthen the design of practical courses

Practical courses are an important part of mechanical teaching and play an important role in improving students' practical and innovative abilities. In order to improve the effect of practical courses, improve the practical teaching system, and strengthen the design of practical courses is the key to improving the quality of practical teaching in mechanical majors. In the design of practical courses, first of all, it is necessary to clarify the practical teaching objectives and formulate practical teaching plans to ensure the pertinence and practicality of the practical courses. Practical teaching goals should be consistent with students' learning goals and career development goals, and at the same time, attention should be paid to cultivating students' practical and innovative abilities. Secondly, it is necessary to pay attention to the teaching design of practical courses, including teaching content, teaching methods, teaching methods, etc. In the design of teaching content, attention should be paid to combining practical needs and students' actual conditions, setting challenging and inspiring practical tasks, so that students can acquire more in-depth knowledge and skills in practice.

At the same time, it is necessary to pay attention to the evaluation and feedback mechanism of practical courses, including assessment methods and assessment content. A variety of assessment methods should be used, such as examinations, experiments, project reports, etc., so that students can get comprehensive training and improvement in different assessment

methods. In the design of assessment content, attention should be paid to combining it with the actual needs of enterprises and society, so that students can acquire more practical and competitive knowledge and skills in the practice process.

3.2. Strengthen the construction of practical teaching resources and enrich practical teaching resources in all aspects and dimensions

Make full use of information technology, such as digital twins, virtual reality, metaverse, etc., to establish rich digital practical teaching resources. At this stage, local ordinary undergraduate colleges generally face the dilemma of insufficient funds and insufficient resources, and technologies such as virtual simulation and digital simulation. The application in practical teaching can alleviate this problem to a great extent. Most practical projects can be realized in the form of software simulation, avoiding the financial pressure caused by large-scale purchase of practical training equipment. In this way, only it is necessary to purchase a small amount of equipment for practical experience after simulation. In addition, it is necessary to actively guide teachers to participate more in and research practical teaching, apply for various laboratory construction projects at all levels, strive for more construction funds, and improve existing practical teaching conditions.

While strengthening the construction of hardware facilities, we also need to pay attention to the construction of practical teaching teachers. The construction of practical teaching teachers is the key to improving the quality of practical teaching. An excellent team of practical teaching teachers can not only teach students professional skills, but also guide students to master innovation and entrepreneurial abilities, and improve students' overall quality. Therefore, the importance of building practical teaching faculty in applied undergraduate colleges and universities is self-evident. First of all, the training and cultivation of young teachers should be strengthened to improve teaching skills and practical experience. Secondly, professional training and academic exchange activities for practical teaching teachers should be strengthened to improve their professional level. Thirdly, we should strengthen the quantitative guarantee of practical teaching teachers and increase the investment in practical teaching resources in colleges and universities. Finally, systematic plans and measures for the construction of practical teaching teachers should be established to ensure the continuity and effectiveness of teacher team construction.

3.3. Introduce new methods, new ideas, and explore diversified teaching models

The problem of a single practical teaching method in mechanical majors is a major challenge faced by current mechanical engineering education. Traditional practical teaching methods for mechanical majors mainly include experiments, practical training, internships, etc. Although these teaching methods have certain effects, there are common problems such as single teaching methods and outdated teaching content. To address this problem, it is very necessary to introduce new practical teaching methods. For example, the use of project-based learning, case learning and other methods can help students better master professional knowledge and application skills. Project-based learning is a learning process in which students are grouped into groups to complete an actual project. In this process, students need to comprehensively use their professional knowledge and teamwork skills to solve practical problems. Case study allows students to have an in-depth understanding of professional knowledge and practical applications by simulating real cases. By organically combining various practical teaching forms such as traditional experimental teaching, internship teaching, and extracurricular scientific and technological activities with project-based teaching and case study, a diversified practical teaching model is established to provide students with a richer practical environment and practical opportunities. Improve the quality of students' practical teaching.

In order to further enhance students' practical ability and innovative exploration ability, students should also be encouraged to participate in practical research and innovation. Existing conditions can be used to provide students with research resources and opportunities, so that students have more opportunities to be exposed to this professional research field. cutting-edge knowledge and technology. Guide students to choose research directions according to their interests, hobbies and professional directions, and provide necessary guidance and assistance. Through students' own study and research, they personally design and produce innovative and practical mechanical products or physical models. They learn and practice while learning in the process, which improves students' innovative design awareness and comprehensive design capabilities, and strengthens the cultivation and development of hands-on ability. Engineering practice training improves students' thinking ability and practical level in solving practical engineering problems. At the same time, taking the subject skills competition as an opportunity, we select outstanding works to participate in various competitions at all levels, fully stimulate students' design and practical potential, and achieve a new practical education model that promotes teaching through competition and integrates competition and teaching, strengthens publicity and guidance, and expands The scope of rewards further enhances students' enthusiasm and initiative in hands-on practice, and enables practical teaching to enter a new model of diversified and coordinated development.

4. Conclusion

In order to make practical teaching better adapt to the needs of talent training in applied universities, this article analyzes the practical teaching system, practical teaching resources and practical teaching methods from three aspects: The problems faced by the practical teaching of mechanical majors in applied universities at this stage are analyzed, and it is proposed to improve the practical teaching system and strengthen the design of practical courses; strengthen the construction of practical teaching resources and enrich practical teaching resources in all aspects and dimensions; introduce new methods, New ideas, explore three solutions to the diversified teaching model, promote the continuous improvement and development of practical teaching, and better serve the cultivation of outstanding application-oriented talents.

References

- [1] Zhang Xiaohong, Wang Lili. Research on the Construction of Practical Teaching System in Applied Undergraduate Universities. *Science and Technology Journal*, 2019 (7): 168-169.
- [2] Li Ming. Reform and Practice of Practical Teaching System for Applied Undergraduate Mechanical Engineering. Nanjing University of Technology, 2016.
- [3] Li Ming, Li Hua. Research on the Reform of Practical Teaching System for Applied Undergraduate Mechanical Engineering. *Science and Technology Information*, 2018,35 (10): 51-54.