

Analysis of Experimental Teaching Reform Based on Ability-Oriented 3D Scanning Measurement Technology

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Abstract: 3D scanning measurement technology has been widely used in the teaching of mechanical and electrical majors in applied universities, in teaching practice, how to efficiently carry out experimental teaching of 3D scanning measurement technology, for improving the comprehensive quality of students is of great significance, can improve students' practical ability and professional quality training effect, further enhance students' practical ability, cooperation ability and innovative thinking. In this regard, this paper first analyzes the problems in the experimental teaching mode of traditional measurement technology, and then discusses the experimental teaching reform strategy based on ability-oriented, in order to provide reference for relevant personnel.

Keywords: Competency-Oriented; 3D Scanning Measurement Technology; Experimental Teaching; Reform Strategies

Introduction

In university professional courses, experimental teaching is not only an important way to carry out comprehensive quality education for students, but also an important part of new engineering. By applying modern measurement technology and precision testing instruments to related experimental teaching, we can continuously improve students' creativity and practice to meet the current society's needs for application-oriented talents. In this regard, in the process of educational reform and implementation, application-oriented undergraduate colleges should be combined with the characteristics of curriculum teaching, gradually reform the educational method, and integrate the practical teaching content. Then, taking ability-oriented as the starting point, design the experimental teaching scheme with 3D scanning measurement technology as the core, and extend it to the innovative experimental training projects and the training courses jointly built by schools and enterprises, highlighting the main role of students in experimental teaching, so that the quality and effect of experimental teaching can be further improved, and at the same time, students can have stronger soft power and the ability to solve complex problems.

1. The problems in the experimental teaching of 3D scanning measurement technology

1.1 The teaching content is fragmented

Tolerance detection technology plays an important role in mechanical engineering, and through an in-depth understanding of this technology, students can better understand tolerance control and error measurement in product design and manufacturing. At present, some colleges and universities mainly rely on the knowledge in textbooks for teaching when conducting experimental teaching, resulting in insufficient understanding of the systematization and integrity of measurement technology among students, and it is difficult to fully meet the society's requirements for vocational abilities related to measurement technology.

1.2 Lack of innovation in experimental teaching programs

In the past, teachers mostly used confirmatory experiments such as measuring length and verticality in teaching to teach students to master a certain knowledge point. In the process of experiments, students often only use vernier calipers, dial gauges and micrometers and other instruments to carry out simple operations, but the content of these experiments is very monotonous, and there is a lack of innovative practical projects to stimulate students' learning motivation, so it is difficult for students to have more understanding of the development trend and application of new measurement technology^[1]. Traditional experimental teaching cannot ensure that the teaching content is effective and cutting-edge, and it is difficult to stimulate students' enthusiasm and desire to explore, which is not conducive to the cultivation of students' independent learning and independent problem-solving ability, and cannot expand students' open thinking, which does not match the core concept of innovative talent training under the background of new engineering construction, nor does it meet the requirements for the comprehensive improvement of engineering students' quality.

1.3 Teaching evaluation methods are relatively single

At present, the assessment and evaluation of experimental teaching is mainly based on the students' experimental completion process and performance as the main assessment indicators, which is too single and one-sided. Because the experimental content is similar, so the students' experimental reports have high similarity, often plagiarism, and it is difficult to screen, so it is not possible to comprehensively and objectively reflect the students' learning results and mastery of knowledge, it is difficult to accurately evaluate the students' practical operation ability, and it is more difficult to evaluate the students' innovative thinking and independent problem-solving ability. This evaluation method also reduces students' enthusiasm and interest in independent innovation experiments, which is detrimental to the cultivation of students' analytical ability and creative thinking ability.

1.4 Experimental teaching is divorced from the actual needs of work

In terms of tolerance measurement experimental teaching, the experimental content selected at present still follows the traditional teaching method, which is very different from the content related to tolerance measurement in actual work. As a result, it is difficult for students to effectively combine what they learn in the classroom with actual work in the process of enterprise internship and job search, and it is difficult to effectively improve students' practical ability.

2. Based on ability-oriented 3D scanning measurement technology experimental teaching reform strategy

In order to emphasize students' practical and hands-on ability and highlight the characteristics of talent training, teachers need to continuously improve experimental teaching standards in the process of experimental teaching, and comprehensively increase innovative, research-based and design-based experimental content. Therefore, it is necessary to carry out innovative, research-based and design exploration in the teaching of engineering experiments.

2.1 Establish open and shared laboratories

The establishment of an open laboratory system is the basis for the reform of engineering experimental teaching. Under the condition of limited class time, open laboratories can provide hardware guarantee for students to carry out independent and innovative experiments. Laboratory openness and sharing is an important guarantee for cultivating innovative talents, and it is also an objective requirement for cultivating innovative talents^[2]. After a certain amount of online learning and practice, students can take the online exam, and after passing the exam, they can obtain a laboratory qualification certificate, so that students can enjoy open laboratory resources and learning fun.

2.2 Guide students to independently carry out experimental design

Innovative, research-based and designed experiments can stimulate students' interest in learning, so that students can become passive to active in the process of experimentation, so as to get more comprehensive training in problem discovery, analysis and problem solving, literature review and experimental skills. According to the new concept of talent training, combined with the characteristics of experimental teaching, the engineering experimental teaching concept of "student-centered, independent learning as the main line" is gradually formed. On the basis of the traditional experimental teaching mode, increasing innovative, research-based and design experimental teaching and improving the experimental teaching system can not only verify and reproduce relevant course knowledge, but also improve students' innovative spirit and practical ability, which is an important part of the formation of a high-level talent training system. The premise of enhancing innovation ability is to stimulate students' interest and put students' interest cultivation in the first place, so as to cultivate talents with engineering application capabilities. This teaching mode with students' independent innovation experiments as the main content can not only stimulate students' enthusiasm and interest in actively learning new knowledge, but also greatly help students' ability to independently design experiments, solve problems independently, and carry out exploratory research.

2.3 Establish a diversified assessment system

The reform of teaching mode and experimental content can stimulate students' interest and enthusiasm for learning, and provide conditions for cultivating students' innovative practical ability, and reasonable assessment and evaluation methods are the basis for ensuring teaching effects and learning effects. In addition to the preview report and experimental report, it can also test students' ability in program design, experimental operation, analysis and summary. Diversified assessment methods can narrow the deviation of a single method on the evaluation of learning effect, so as to make the assessment results more objective and comprehensive^[3]. This is not only conducive to evaluating students' mastery and application of engineering experiment teaching knowledge points as a whole, but also helps

to evaluate students' practical ability to think about problems, organize and coordinate and collect information from the perspective of engineering experiment innovation and improvement from a professional perspective.

2.4 School-enterprise cooperation to jointly build training programs

In order to enable students to have a better understanding of the development of 3D scanning measurement technology and the needs of practical work, the training method of school-enterprise cooperative education is integrated into experimental teaching, so that students can be improved in practice. This training method can better link the theoretical knowledge and practical work of the majors learned, and achieve the practical effect of enhancing students' technical ability training through continuous mutual conversion. In practice, it is necessary to make careful arrangements for the internship courses so that teaching and work practice are closely linked, so that the internship courses can play a better role.

Conclusion: In summary, in the practice of teaching reform, on the basis of 3D scanning measurement technology, student-centered, ability training as the guide, and the engineering application of 3D scanning measurement machine as the breakthrough, the experimental teaching scheme should be optimized; Take basic experiments and comprehensive experiments as the starting point to expand innovative experimental training projects; and the training plan jointly established by the school and the enterprise, so as to enhance students' interest in learning and broaden students' horizons; Guidance allows students to build a more complete and closer knowledge system to the market through learning, so that students can gain more competitive advantages in the process of job search or study.

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Project Name: Teaching and Research of Innovative Talent Training Course for Technical Measurement Based on 3D Reverse Modeling. ID: 2021CYYBJY028