Talking about Cultivation of Mechanical Literacy of Engineering Students in Applied Universities

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Abstract: This paper takes “application-oriented talent training” as the goal, and tries to explore the new mode of engineering mechanics course teaching in view of the shortcomings in the existing mechanics teaching of engineering. Teachers should keep up with the times when organizing teaching content, and pay attention to the professional reality. In the process of implementing teaching, teachers can combine the examples of mechanics in life and production to educate students on engineering awareness. Only by internalizing the knowledge of mechanics into the mechanical literacy of students, students can effectively improve their Abstract thinking ability and innovative consciousness by using mechanics to solve practical problems.

1. Introduction

At present, science and technology are changing with each passing day, and the knowledge economy is beginning to see. How to cultivate high-quality and creative talents that adapt to the competition in the 21st century has become a hot topic in the higher education sector. The development of science and technology and the progress of all social undertakings must rely on continuous innovation, and innovation depends on talents, especially relying on young talents. Higher education for the 21st century needs to have a teaching model that is compatible with the cultivation of college students' innovative ability. It is necessary to continuously promote the teaching mode of mechanical innovation in engineering specialty. As a first-level discipline, the development of this discipline has made great contributions to the development of China's national economy and the progress of industry. In order to promote the development of engineering mechanics teaching in universities, it is necessary to cultivate students' mechanical literacy. The improvement of mechanical literacy is inseparable from the improvement of engineering consciousness and innovation consciousness.

2. Improve Students' Engineering Awareness

The concrete practices carried out by engineering people using scientific theories are scientific, social, practical, innovative and complex. Engineering is for practical purposes, but scientific theory is the foundation and technology is the means.

Engineering students need to be engaged in engineering and technical work after graduation. Engineering technology is a specific application combining basic theory and engineering knowledge. To train engineers and technicians with good quality, we must pay attention to the education and training of engineering awareness such as safety, quality, group, responsibility, environmental protection and economy. Colleges and universities should lay the foundation for students to cultivate and accumulate engineering awareness. Teachers should make students gradually clear what they should do and how to do in future engineering practice. Students need to be clear about their sense of mission and responsibility, and establish a strong sense of engineering. Only students have engineering awareness, learning engineering and technical knowledge, solving

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engineering problems, and improving engineering practice ability.

The education and training of students' engineering awareness in engineering colleges should go through the various courses related to engineering. The mechanics course is a course between basic and professional courses. This kind of course has strong theoretical theory and is closely related to engineering and production practice. It is a professional basic course that engineering students must learn. With the rapid development of economy, society and science and technology, cultivating high-quality graduates who have both innovative ability and engineering practice knowledge have an irreplaceable special status in the education and training of students' engineering consciousness.

3. Enhance Students' Sense of Innovation

3.1 Change Teaching Ideas and Reform Teaching Concepts

The traditional mechanics teaching mode is centered on “teaching”, ignoring students' deep understanding and mastery of knowledge, hindering the students' creative potential. When teaching college mechanics courses, college teachers should give full play to the main role of students in teaching activities and create a good environment for activating innovative consciousness. Teachers should shift their main focus from instilling knowledge details to developing students' self-learning ability, independent thinking and independent judgment, innovative thinking ability and problem-solving ability.

The mechanics course is the foundation of most engineering disciplines. Engineering students can only learn more about engineering applications and engineering design through the study of mechanics. Engineering is the source and attribution of the mechanics curriculum. Teachers must try their best to motivate students to learn the motivation and consciousness of the mechanics course.

3.2 Enhance Students' Sense of Innovation and Confidence

Studies in modern psychology have shown that every normal person has the potential for innovation and the possibility of invention. Different levels of innovation capability can carry out different levels of creative activities. Innovation is not unfathomable. It is not only genius that can innovate. In the course of mechanics teaching, teachers should combine the innovative examples related to mechanics knowledge to explain, thus enhancing students' sense of innovation and confidence. Teachers should also pay attention to highlighting key points and difficulties in the teaching process, especially the key points that are not mature in theory or technology. Teachers should educate students not to memorize, and encourage students to dare to doubt and dare to present different opinions.

4. Develop Innovative Teaching Models

4.1 Strengthening Cultivation of Students' Self-study Ability

Teachers must attach great importance to the cultivation of students' self-learning ability. Because knowledge and skills need to be added and updated from time to time, the vast majority of the knowledge students use in their lifetime depends on self-study. For the engineering discipline, the mechanics course is the basic course for students to contact earlier, so that students should pay attention to the cultivation of self-learning ability from the beginning of entering the university, which will benefit students for life.

4.2 Strengthen Training of Students' Innovative Thinking

Innovative thinking is the thinking process in which a person seeks new relationships from certain facts and finds new answers based on existing experience. Any innovation activity is the result of innovative thinking. The teaching of mechanics courses must strengthen the training of students' creative thinking. Teachers should emphasize the key points when giving lectures, and at the same time give students a larger space for thinking. Teachers make students have problems to

think about, have problems to study, and guide students to actively seek out some innovative points of knowledge.

5. Flexible and Versatile Teaching Methods

Students have not completed the relevant practical courses before learning the mechanics related courses, so many students react to the difficulty of learning this course. In view of the fact that the course content will involve some incomprehensible objects, some familiar structures should be listed when explaining new knowledge. The way of animation can enhance students' perceptual knowledge and deepen their understanding of theory. In order to cultivate students' engineering application ability, teachers should use engineering examples and mechanical problems in life as teaching cases. In the teaching of engineering cases, heuristic teaching can cultivate students' ability to ask questions, analyze problems and solve problems. A life-oriented approach to teaching can make it easier for students to receive relevant theoretical knowledge.

5.1 Promote Learning by Subject Competition

By encouraging students to compete in various related disciplines, students are encouraged to use mechanical thinking to solve practical problems, thereby improving mechanical literacy.

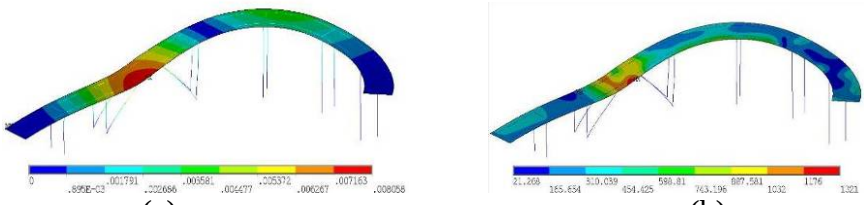
(a) (b)

Fig. 1. Structural design innovation studio student production model site map

5.2 Introducing Finite Element Software into Mechanics Teaching

As multimedia technology has been widely used in college classrooms, many highly reliable engineering analysis software is constantly emerging. Teachers can combine part of the mechanics model into the classroom according to the research field they are good at and the mechanics knowledge they want to teach. This not only enables students to really get into the engineering examples, but also broadens the horizons of students and makes students realize The Abstract concepts and theorems drawn by textbooks and teachers can play such a large role in practical engineering.

Figure 2 shows the finite element solution calculation and post-processing results of Ansys finite element software.



(a) (b)

Fig. 2. Cloud map obtained by ANSYS in the 2015 national competition

5.3 Development Network Second Classroom

The mechanics teaching team can build a mechanics course learning website. Students can learn independently through the website. Students can not only download teaching courseware and learning materials on the website, but also learn to communicate and answer questions online.

5.4 Encourage Students to Enter Company

Many engineering majors have adopted a school-enterprise joint education model. Students can use the summer and winter vacation time to visit the company and practice, so as to enhance students' perceptual knowledge, broaden students' knowledge, and enhance students' industry cognition and employment competitiveness. Internships in companies can improve students' knowledge and application skills. At the same time, students can find problems, analyze problems, and solve problems in practice.

6. Summary

This paper takes “application-oriented talent training” as the goal, and explores the new mode of engineering mechanics course teaching in view of the deficiencies in the existing mechanics-related teaching, and puts forward some strategies for the teaching reform of mechanics course. When organizing teaching content, we must keep pace with the times, update the knowledge and technology of the frontiers in a timely manner, and pay attention to the professional reality. When choosing a teaching method, pay attention to the content of the course, and be good at mobilizing the enthusiasm of the students. In the implementation of the teaching process, focus on cultivating students' self-learning ability and appropriate introduction of CAE technology. In the teaching process, we must not only teach students the necessary basic theoretical knowledge, but also focus on cultivating students' theoretical and practical ability, independent learning ability, let students learn to learn, be good at application, and be willing to innovate. This is the goal of teaching and measurement. The standard of teaching quality. Only by constantly updating the teaching mode and adopting flexible teaching methods can we continuously improve the students' mechanical literacy.

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