

Exploration of the Teaching Mode under the Background of Production and Education Integration

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Abstract: The integration of industry and education is a new mode of education and teaching in applied undergraduate universities under the background of the new era. Home appliance industry is a local characteristic industry where the school is located, which has a large demand for talents. At the same time, due to the rapid development of intelligent technology, the home appliance industry also puts forward new requirements for talent ability. In order to respond to the requirements of the integration of industry and education, the curriculum has cooperated with many leading enterprises in the area where the school is located to jointly reform the teaching of the basic curriculum of mechanical design. Through the reconstruction of teaching content, the reform of teaching methods and the construction of teaching resources, the curriculum is reformed, and a new integrated teaching mode except a tool software course is explored.

1. Introduction

This course is a professional basic course for mechanical upgrading students. It is an important course to cultivate students' engineering thinking and improve students' engineering quality and engineering innovation ability^[1]. We must keep up with the needs of the Times and comply with the engineering certification education talent training target positioning. Establish a progressive goal system of knowledge goal, ability goal and quality goal. According to the pain points existing in the teaching, the theory and the time teaching content are reconstructed, and the "experiential" classroom teaching method is used, integrating the ideological and political elements and labor education concept with the spirit of craftsman as the core. At the same time of improving the teaching effect, it enhances students' recognition of the major and engineering quality, and cultivates students' engineering feelings^{[2][3][4]}.

2. Analysis of the course status quo

(1) The experimental practice project is not strong operability

In order to improve students' innovation ability, "Mechanical Design" and "Mechanical Design Foundation" of domestic universities carry out course teaching in the form of case and project teaching^[5]. For example, Tsinghua University adopts the "learning school by doing" proposed by Dewey; Shanghai Jiao Tong University "feeds teaching with scientific research"; the "competition and class linkage" of Lanzhou Institute of Technology. Projects and real cases throughout the teaching. The teaching object of this course is the students of mechanical upgrading, they generally theoretical foundation is not good enough, but the practical ability is strong. The cases and projects of universities are more difficult for them, which leads to the lack of practical projects for the students in our university^[6].

(2) Students have uneven foundations

The course is taught for the mechanical students, except that the theoretical foundation is not strong. The professional foundation of the student is also uneven, some students are mechanical class, some are near machine class. Some students have learned this course, but it is not deep

enough. The unified teaching progress and teaching content in class are not suitable for students with ununified foundation.

(3) Less credit hours and more content

This course includes the contents of institutional principles, general parts, mechanical transmission and other parts, with 40 class hours of theory class hours and 8 practice class hours. Less class hours. If only one part of the content is discussed, and the curriculum system is not completed, students can only learn the curriculum fragments, which is not good for the establishment of students' engineering thinking.

(4) Curriculum island, the comprehensive ability is not strong

The course and the course are relatively isolated, no contact course learning, students will have a headache. Which course needs to hand in the homework will be considered first. The student is just a learner, and is a passive person in the activity of "teaching and learning". Therefore, the curriculum reform should integrate the curriculum, teaching and learning objects, industry and teaching by projects, so as to form the coordinated development of multi-dimensional integration.

(5) Lack of engineering feelings and low professional recognition

At the beginning of the semester, the teacher of the course group once asked the students to share their understanding of the mechanical major. Many students have a very narrow understanding. The general recognition and pride of the mechanical major is relatively weak. On the one hand, the lack of professional identity is the stereotype of the major, on the other hand, the students who really participate in it have low participation and practice in the learning process. Without a sense of achievement, there is no sense of identity. No identity, no pride.

3. Curriculum reform measures

(1) Reconstruction of teaching content

The content of this course mainly includes two parts: institutional principles and mechanical design. Students are required to have a certain foundation of engineering mechanics and mechanical drawing curriculum foundation. Follow the needs of students' inconsistent foundation and lifelong learning, the teaching content is reconstructed according to the knowledge context.

The knowledge point before the reconstruction is a combination of simple mechanical principles and mechanical design^[7]. The sequence is also in accordance with the traditional mechanism to mechanical transmission to general parts. There is no main line running through the order of knowledge, and it is more scattered. And students for the foundation of mechanical major is not deep, such an arrangement of students in learning, will feel no connection, learning will be more abstract. The reconstructed knowledge is reorganized according to the general process of mechanical design, with the production process of the machine as the context. Related content is divided into in-class and after-class learning, supplemented by online learning resources, which not only ensure the smooth achievement of teaching objectives, but also meet the requirements of students' lifelong learning. After the reconstruction and with a main line through, it is a good continuity. Let the students in the process of learning experience better, more conducive to the development of engineering quality.

(2) Construction of online teaching resources

This course includes the knowledge points of mechanical principle and mechanical design, covering the principles of the organization, common mechanism, common transmission, and general parts. There are 48 hours, including 40 theoretical and 8 practice. Less class hours, more content. This course is offered for the students. Some students have studied this course, but the content is less and the difficulty is shallow. Some students have not been exposed to this course and have almost no foundation. And the students' general theoretical foundation is not enough, and the foundation of mathematics and physics is weak. However, some students plan to take the postgraduate entrance examination, and this course is a required course for the entrance examination of mechanical majors. For the above reasons, the content of the course needs to be fully covered and in-depth. Only relying on the planned class hours in class, and the uniform teaching schedule is not suitable for students with different foundations.

Therefore, the course has built online resources in the "classroom school" and the "Network teaching platform of the School of Science and Technology of Ningbo University", and the relevant course resources of the Zhejiang MOOC platform are also cited.

(3) Multi-sensory and experiential thinking training

Cultivating students' engineering thinking is the ability goal of this course. Cultivating students' engineering thinking is the most critical way to improve their engineering innovation ability. In the teaching process, it effectively enhances the students' engineering consciousness and cultivates the students' engineering quality.

(4) Advanced project-driven case teaching method

In the 2022 National College Mechanical Design Curriculum Teaching Seminar, almost all universities have adopted the project-type case teaching method^[8]. For example, Professor Liu Ying from Tsinghua University shared the "middle school by doing" used in this course, and Professor Guo Weizhong from Shanghai Jiao Tong University shared the method of submitting the whole project through through, and so on. It shows that the project-type case teaching method is an effective method in cultivating students' engineering innovation ability and reaching the cost course teaching goal.

Because of the different composition and basis of the students, the projects and cases of other universities are not applicable to the students in our university. For the students in our school, the practical operation projects and cases of the above undergraduate institutions are difficult and difficult to complete. According to the teaching object of this course, the advanced projects and cases are set up. The project is feasible for the students to upgrade to our school.

Guided by the education and teaching planning project, the project team optimizes the training system of mechanical and electrical majors according to the training objectives of innovative talents. According to the requirements of the innovative talent training system, we build the school-enterprise cooperation project database. Introduce the real enterprise project into the first and second classes according to the course content. The teaching effect has been greatly improved, and the abstract degree of the course has been reduced. Due to the introduction of enterprise projects, students can have a more intuitive understanding of the actual environment of engineering application while learning. It has explored an innovative talent training mode of "project leading, platform support and integration of industry and education".

(5) Integration of ideological and political elements

With moral education as the foundation, we should cultivate more engineering talents with the sense of family and country and responsibility, and mechanical engineering talents with the ideal of serving the country through science and technology and with the spirit of craftsmanship in practice. According to the characteristics of the course content, the ideological and political elements are condensed, and the ideological and political cases are constructed to improve the ideological and political teaching effect of the course. According to the characteristics of the course, the course group takes the spirit of craftsmanship as the core, extracts the ideological and political elements of ideals and beliefs, values, scientific spirit and professional responsibility, and forms a mapping relationship with the course content.

4. Teaching reflection

In the process of reform, mixed teaching is adopted, which effectively solves the situation of fewer class hours and different levels and needs. The project-type teaching method is adopted to mobilize the enthusiasm of the students to participate in the practice, and the theory of proper knowledge is reflected in the teaching. The background of the integration of industry and education also reflects the characteristics of the construction of local and regional universities.

However, in the teaching process, the construction of online resources needs to be constantly adjusted according to the needs of students and learning conditions. The construction of the case base is also relatively thin, and more students need to participate in it to enrich the case and enrich the project database. The improvement of teaching requires more active participation of "teaching and learning" members.

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