Exploration of Teaching Reform in the Practice-oriented Course of "Stamping Technology and Mold Design"

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Abstract. Under the guidance of the talent cultivation goal of "cultivating applied talents" proposed by the Ministry of Education, this paper introduces a practice-oriented teaching mode, based on the course objective of "stamping process and die design", and adopts a combination of knowledge module and project module to carry out systematic curriculum reform in terms of teaching design, teaching method, online resource construction and course evaluation. Based on the course objective of "Stamping Process and Tooling Design", this paper introduces a practice-oriented teaching mode, adopts the combination of knowledge module and project module in the form of project practice teaching, and carries out systematic curriculum reform in terms of teaching design, teaching method, online resource construction and course evaluation. The aim is to strengthen students' practical ability and cultivate their sense of teamwork on the basis of their basic professional knowledge and skills. The data of teaching reform practice show that the practice-oriented curriculum teaching reform has achieved certain results.

Keywords: practice-oriented; project-based teaching; teaching design; teaching reform.

1 Introduction

To fulfill the talent development objectives of "creating distinctive features" and "developing applied talents" set forth by the Ministry of Education, guided by these objectives, universities must focus on cultivating high-level applied talents, embracing the philosophy of enhancing student learning outcomes, enhancing students' practical capabilities, and fostering applied talents with a solid theoretical foundation, strong practical and social adaptability, and innovative spirit as well as employability and entrepreneurial skills [1]. In this context, adopting a student-centered educational philosophy and a practice-oriented teaching model is essential.

"Stamping Technology and Mold Design "is a compulsory course in the Materials Forming and Control Engineering major. The course is aimed at core job positions and cultivates students' abilities to learn process analysis, mold structure design, component design, actively identify and solve problems, independent learning, and innovative thinking. It helps students establish a good professional spirit and a craftsman spirit of excellence [2].

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2 Background of Teaching Reform in the Practice-oriented Course of "Stamping Technology and Mold Design"

2.1 Analysis of the Current Situation

To align with societal development needs, scholars globally have proposed reforms in talent cultivation modes in recent years: an emphasis on enhancing students' holistic human qualities and practical skills. Universities have also developed and implemented specific reform strategies based on their operational contexts [3-5]. "Stamping Technology and Mold Design" is a compulsory course that is highly practical and applicable. The course's nature and future career prospects dictate that students must have fundamental professional knowledge and robust practical skills. Therefore, by focusing on practical teaching, cultivating students' applied skills and hands-on abilities, and enhancing their employability, the practice-oriented approach to training must be a top priority in the curriculum [6]. Consequently, the primary challenge for the teaching reform of this course is to intensify the innovation and reform in practical teaching.

2.2 Existing Problems

Strengthening students' practical abilities means enhancing their core competitiveness in the workplace. However, there is still a phenomenon in the current classroom where knowledge is emphasized over practical experience, which is mainly reflected in three aspects of classroom education.

Firstly, the light practice of classroom objectives. The curriculum design has not been clearly defined in terms of students' knowledge mastery and practical ability training, and teaching is still mainly based on textbook knowledge, neglecting the cultivation of students' practical abilities. This has led to a lack of core competitive abilities that students should acquire after course learning.

Secondly, there is a light emphasis on practical teaching content. In the design of classroom content, it did not start from the needs of social and vocational positions, resulting in a disconnect between the course content and the requirements of vocational positions. In classroom education, the current practical needs of vocational positions were ignored, and theoretical knowledge learning was still emphasized, without truly combining with social needs. As a result, some students found that the knowledge they learned in school had not been applied to practical work after graduation [7].

Finally, light practice in the course implementation process. Teachers have not kept up with the times in classroom teaching by combining current teaching methods. The teaching mode is simple, with textbooks as the core of teaching, or teaching around some professional equipment. They do not pay attention to cooperation and exploration among classmates, nor do they pay attention to cultivating students' practical exploration ability. As a result, the knowledge learned by students has not been truly applied in practice, there is no connection between theory and practice, and there is a lack of experience. And neglecting teaching evaluation after class, teacher evaluation only measures students' knowledge mastery, lacking knowledge evaluation of skill

application, resulting in students lacking application and innovation abilities in their positions after graduation [8].

3 Teaching Design of Teaching Reform in the Practice-oriented Course of "Stamping Technology and Mold Design"

3.1 Overall Teaching Design

The practice-oriented teaching model aims to contribute to practical education by changing teaching design, teaching objectives, and curriculum structure [9]. Based on this teaching method, the course of "Stamping Technology and Mold Design" is constructed as a systematic "2-3-4" course structure that applies knowledge to practice (as shown in Figure 1): two learning contexts (general basic theory, basic stamping mold design) include three typical stamping mold (punching, bending, deep drawing) development projects, each with four technical activity tasks (process analysis, process design, part design, mold design,), cultivating students' abilities according to the entire process of actual project development, with actual projects as the goal, course learning as the guide, learning by doing, achieving the integration of professionalism and professionalism, and cultivating students' professional abilities and professional qualities.

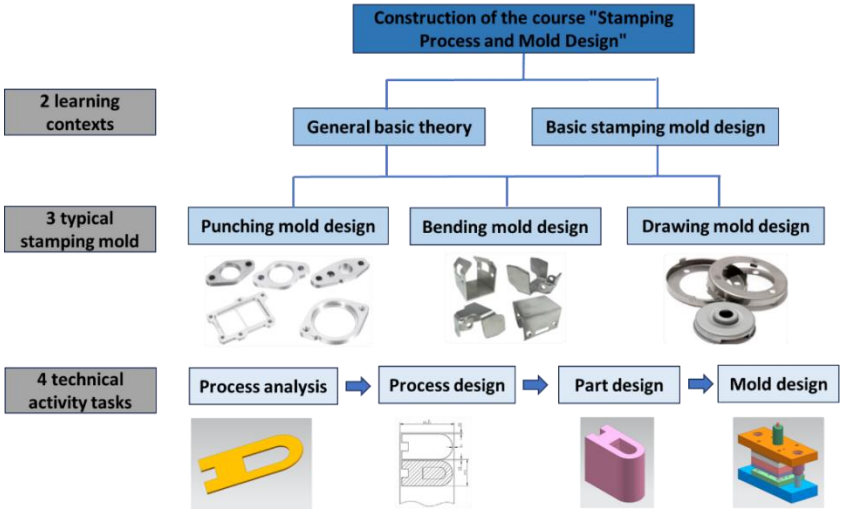

Fig. 1. "2-3-4" Course Structure.

3.2 Course Design Practice Teaching

After four rounds of practice-oriented teaching courses, online teaching resources and learning platforms have been initially established. Corresponding teaching materials have been designed for different project teaching contents, as shown in Table 1.

Table 1. Curriculum Teaching Resources.

Number	Course Resources	Course Resource Construction Explanation
1	Course Introduction	Introduce the teaching objectives, teaching format, assessment methods, etc. of the course as a whole
2	teaching program	Developing teaching syllabus based on OBE teaching mode
3	Teaching Schedule	Develop teaching content for each class based on the teaching calendar
4	Teaching plan	Provide a detailed introduction to teaching objectives, content, methods, key points, and difficulties
5	Multimedia courseware	Create PPT courseware with rich format and content
6	Video resources	Selected multiple classic design cases and extracurricular learning materials
7	Exercise materials	Building an online exercise database for real-time online testing
8	Practical design tasks	Provide each group of students with a practical mold design task in the form of a group

3.3 Implementation Process for Course Design Practice Teaching

The goal of this course's educational reform is to integrate practical mold structure design tasks with traditional offline classroom instruction, establishing a platform that blends dynamic online resources with offline instructional design practices. This model aims to inspire and guide students in exploring key issues, enhancing their learning autonomy and creativity. The specific implementation process includes the following aspects.

Dynamic course resource development before class. This includes: (1) Posting course introductions, syllabus, and teaching schedule on the Chaoxing Learning Platform to provide students with an overview of the course; (2) Uploading course-related courseware, videos, and case studies; (3) Analyzing course content, planning, and assigning learning tasks; (4) Establishing online discussion and communication channels between teachers and students to enhance traditional classroom experiences.

Enhance the design of offline classroom instruction. By analyzing key teaching points, difficulties, and doubts, and considering the varying learning capabilities of students, we design diverse classroom instructional content. Employing group discussions and project-based teaching, the teaching content is divided into knowledge modules and mold design project modules, as depicted in Figure 2. Thus, after explaining the content of each knowledge module, students proceed to corresponding project modules in groups. This progressive learning approach enhances the quality of instruction. During the practical component of the mold design project, students first analyze the stamping processes and design molds for their respective stamping components. They then upload these designs to an online assignment platform for immediate online drawing review by teachers. Teachers and students engage in online discussions centered on the design content and potential issues, ultimately refining the classroom instruction format through feedback and design result evaluations.

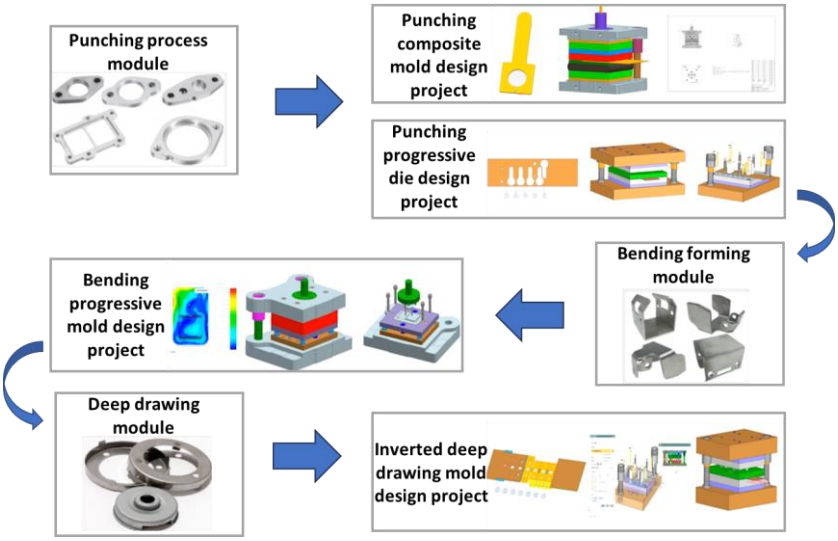

Fig. 2. Project teaching method of knowledge module + mold project design module.

4 Measure of Teaching Reform in the Practice-oriented Course of "Stamping Technology and Mold Design"

4.1 Practice Oriented, Establish New Teaching Concepts

Establishing new teaching concepts is mainly reflected in four aspects:

(1) Transforming from emphasizing "teaching" over "learning" to emphasizing "learning" over "teaching", fully leveraging students' subjectivity, ensuring that students not only learn knowledge, but also learn how to solve practical problems and cultivate practical abilities.

(2) Practical teaching has shifted from a focus on verification to a combination of diversified and multi-level experiments, respecting students' individual differences and improving their practical literacy in a hierarchical and targeted manner.

(3) Transforming from "offline as the main focus" to an organic combination of "online and offline" to enhance teachers' teaching organization design level and students' self-learning ability.

(4) The evaluation method for students' learning effectiveness has shifted from "result oriented" to "process and result oriented", with a greater emphasis on students' initiative and participation throughout the entire course learning period.

4.2 Practice Oriented, Establish New Teaching Objectives

With the support of new teaching concepts, classroom education should aim to cultivate students' practical abilities in order to carry out teaching [10]. Stamping Technology and Mold Design "is a compulsory course in the major, which is the foundation for students

to engage in related work in the future. This course requires students not only to know, but also to be proficient and understand. In response to current social needs, redesign teaching objectives, establish core positions suitable for students, analyze core competencies based on core positions, and ultimately determine teaching content.

4.3 Practice Oriented, Combining Theoretical Courses with Practical Training Courses

Stamping Process and Mold Design "is a theoretical course, and after the theoretical course, there will be a 2-week practical training course on" Stamping Mold Course Design ". Therefore, it is necessary to combine theoretical course teaching with practical course teaching, and theoretical courses should serve practical course teaching. Attempting to intersperse theoretical and practical courses for explanation and training is beneficial for mastering theoretical knowledge and theory, as well as applying theoretical knowledge to practical mold design.

4.4 Practice Oriented, Establish Professional Practice Bases

Adopting innovative teaching models, introducing teaching equipment that is compatible with practical teaching systems, integrating various high-quality resources, and continuously developing teaching platforms to ensure the effective implementation of classroom teaching. Establish a professional practice base to provide students with a platform for practical teaching. By allowing students to intern in enterprises, they can enhance their core competitiveness in their positions. For example, Essilor Luxottica Tristar (Dongguan) Glasses Co., Ltd. in Dongguan City, Guangdong Province, has a complete stamping mold design team and advanced mold manufacturing and processing equipment. It attempts to establish cooperation with the company and establish a social practice center to enable students to participate in social production through practice, thereby improving their professional level and innovation ability. At the same time, some practical activities should be organized to continuously stimulate students' enthusiasm, allowing them to independently form teams and cultivate their cooperation ability through collaborative exploration with classmates. Through these activities, outstanding talents can be selected, providing effective ways for students' talent selection and cultivating their competitiveness.

5 The Effectiveness of Teaching Reform in the Practice-oriented Course of "Stamping Technology and Mold Design"

Course assessment is an important means of measuring learning effectiveness, evaluating teaching quality, and verifying whether course objectives have been achieved [11]. This course is based on the OBE teaching model and requires an evaluation of the achievement of course objectives in terms of the teaching process and results. Due to the current online platform mainly assessing students' mastery of knowledge, this

course has increased the proportion of practical design and group discussions in the grade evaluation, in order to provide targeted evaluation of students' practical abilities. Therefore, this course has designed a diversified course evaluation system as shown in Table 2.

Table 2. Evaluation System for "Stamping Process and Mold Design" Course.

Assessment indicators	Proportion of indicators/10%	Test nuclear indicators	Proportion of sub indicators/10%
Attendance	0	Classroom check-in	Not included in regular grades, unable to participate in final exams below 2/3 attendance rate
Classroom activities	20	Classroom random testing	50
		Special Discussion	50
Practical Design	20	Stamping process analysis	10
		Stamping die design	60
		Modeling software application	10
final exam	60	The forefront and characteristics of stamping technology and mold design development	10
		Deformation properties and forming laws of stamping forming	30
		Design method of stamping die	60

In recent years, the primary beneficiaries of instruction have been students majoring in Material Forming and Control Engineering. Utilizing the classroom evaluation system mentioned above, we analyzed the final grades of students from the classes of 2019, 2020, 2021, and 2022, with the data presented in Table 3.

The data in the table reveals that as practice-oriented teaching reforms have progressed, there has been a significant enhancement in the rates of excellence and proficiency, as well as in the pass rate and average scores among students.

The integration of knowledge and project modules within a project-based teaching approach has not only ignited students' passion for learning but has also made their educational experience more focused. Consequently, students in the context of educational reforms demonstrate greater engagement in the classroom, more readily sharing their personal perspectives. The analysis of the results indicates that the practice-oriented teaching reforms have yielded notable successes.

Table 3. Comparison of Final Exam Scores for the "Stamping Technology and Mold Design" Course from 2019 to 2022.

Grade level	Total students	Excellent/% [90,100]	Good/% [80,90]	Medium/% [70,80]	Passed/% [60,70]	Failed/% [0,60]	Average score	Passing rate/%
2019	29	3.45%	34.8%	37.6%	17.23%	6.90%	75.6	93.1%
2020	23	8.70%	40.4%	42.2%	4.35%	4.35%	78.1	95.70%
2021	29	13.79%	44.1%	34.8%	7.2%	0%	80.2	100%
2022	26	15.38%	47.3%	30.8%	6.5%	0%	82.5	100%

6 Conclusion

In applied undergraduate institutions undergoing educational reforms, adopting an "integrated theory and practice" teaching model effectively stimulates student interest, enhances their learning initiative, and boosts their overall competencies [12]. This paper introduces a project-based teaching approach that integrates knowledge and project modules in the "Stamping Process and Mold Design" course. Focused on the outcomes of mold design projects, students enhance their understanding of theoretical knowledge through lectures and thematic discussions. Through group-based mold design and modeling exercises, students reinforce the practical application of theoretical knowledge and provide timely feedback on the curriculum to facilitate ongoing enhancements. Data analysis from several rounds of practical teaching indicates that this reform has yielded positive outcomes and can be replicated in similar courses.

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