

## Reform and Exploration of Stamping Process and Die Design Course Based on Flipped Classroom

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### Abstract

This paper analyzed the characteristics of flipped classroom and projective-teaching, then combined with the course characteristics of 《 stamping technology and die design 》 ,put forward the general reform idea of flipped classroom and projective-teaching. Studied the teaching method, selection principle of project case and network platform construction of flipped classroom and projective- teaching which based on 《 stamping technology and die design 》 . At last, summarized the teaching reform achievement of flipped classroom and projective-teaching.

### Keywords

Flipped classroom; projective-teaching; die design.

### 1. Introduction

As an applied vocational college, the goal of talent training in our school is to train field engineers with certain technical development ability. This requires that students not only have a good theoretical basis, but also have a strong ability to analyze and solve problems. The course of stamping process and die design involves many aspects of knowledge and complicated contents, and has strong practical and theoretical depth. Under the traditional teaching mode, both students' learning and teachers' teaching are very difficult. The traditional teaching method is based on the knowledge system. Students are passively received in the learning process. They generally feel that there are many and disordered knowledge points, the content is boring, and it is difficult to master the difficult knowledge points. It is a serious disconnection for how to use the theoretical knowledge in engineering practice. In addition, due to the different acceptance ability of students, it can not be guaranteed that every knowledge point can tell all students thoroughly, which leads to the students with relatively weak understanding ability are more difficult to learn, more difficult and less interested, and finally they even step into the vicious circle of giving up learning. Project-based teaching can integrate theory teaching and practice activities, and make students understand how to apply theory knowledge in engineering, which is helpful to improve students' practical ability and innovation ability, and mobilize students' learning enthusiasm. With the popularization of information-based teaching methods, micro class, MOOC class and flipped class have become the focus of attention of the domestic and foreign education circles. Because flipped class can independently choose learning time, learning content and learning times according to students' own ability and characteristics, it can fully meet students' personalized learning needs, can well mobilize students' enthusiasm, and is well received by teachers and students. Welcome. In view of this, the author of "stamping process and mold design" for a class of flipped project-based teaching reform.

## 2. The Concept and Characteristics of Flipped Classroom and Project Teaching

The essence of flipped classroom is to impart knowledge to students through online courses, and then help students internalize knowledge through classroom interaction, question answering, discussion and other ways. Flipped classroom is characterized by network of knowledge points, autonomous learning time, reconstruction of teaching content and knowledge, student-centered, cultivation of students; ability of expression, cooperation and independent inquiry, diversification and process of learning effect evaluation. As long as students spend more time learning before class and actively participate in the interaction in class, they can achieve good learning results even if their previous foundation is weak. The experiential and practical characteristics of project-based teaching are project-oriented teaching, which enables students to complete a specific project case through the knowledge they have learned, so as to achieve the organic combination of theory and practice. In the process of completing the project, students' abilities of finding, analyzing and solving problems, team cooperation and innovation are cultivated. Project based teaching cases come from enterprises, which are easy to stimulate students' interest and enthusiasm in learning; the combination of theory and practice, the organic connection of knowledge points, overcomes the boring of traditional "indoctrination" teaching; in the process of project analysis and completion, increase students' participation and team cooperation ability.

## 3. The Overall Idea of Flipped Project-Based Teaching Reform

The overall idea of flipped project-based teaching reform is to realize classroom flipping with the help of online courses such as wechat and MOOC, so that each student can spend different time on theoretical knowledge learning according to their own learning ability, avoiding the shortcomings of traditional "full class" teaching, because the time limit system of class can not guarantee that all students can digest and absorb in time, so that students can enter through project-based teaching. One step is to understand knowledge and master how to apply theoretical knowledge to engineering practice. Students can learn independently through the school network platform, or download and learn the network resources of other colleges or platforms through the Internet resources, so as to grasp the basic theoretical knowledge in advance, avoiding the problem of insufficient time in the project-based teaching. Therefore, flipped classroom and project-based teaching is a good complementary teaching method. In the project-based teaching, the enterprise engineering cases are taken as the teaching items, the engineering application is the main part, the principle of sufficiency is insisted, and the tedious theoretical calculation and empty theoretical analysis are weakened with the help of CAD / CAE and other software as much as possible. Strengthen pre class monitoring, in class inspiration, after class guidance. By monitoring the pre class preview time of students and the percentage of actual preview students through the network course, check the messages of students on the network platform, and answer the common questions in class. In classroom teaching, according to the engineering cases from easy to difficult, after each chapter is taught, the students will be given the project of classroom flipping. After two weeks, the students will be asked to turn the classroom. During the flipping, other groups of students can ask questions and communicate in time. According to the real-time performance of each student, they will be given bonus points. Finally, the teacher will comment and correct, and guide the students to follow up the project implementation process. Attention. After class, in addition to timely reply to the problems on the network platform of students, we also need to guide the flipped classroom students to meet various problems in the process of carrying out the project, summarize the reasons for the quality of students; learning and formulate improvement measures. In order to help the students to carry out the project smoothly, each group of topics and tasks will be sent to the

students in advance. When assigning personnel to each group, pay attention to the reasonable collocation of students at different levels to ensure the smooth development of each group of projects.

## 4. Design of Flipped Project-Based Teaching Process

### 4.1. Pre Class Teaching Preparation and Network Platform Construction

The flipped project-based teaching should not only prepare for the information-based knowledge needed by flipped classroom, but also combine the requirements of factories and schools on the ability, knowledge, quality and other aspects of applied talents, follow the teaching law from easy to difficult, and select the appropriate project topics to carry out the project-based teaching.

In order to facilitate students; self-study and realize classroom flipping, use the school; network course platform to upload courseware ppt, homework question bank, self-test questions, self-study task list (learning content, learning objectives, self-test content to be completed, reference materials, etc.), project task list (project name, project content, etc.), task evaluation method, project template, micro video, mold mechanism motion animation, CAE score Analysis of animation, etc. In addition, in order to interact with teachers and students and solve the problems encountered in students; self-study and completion of the project in a timely manner, in addition to the online course message function area for students to leave messages, QQ group and wechat group are established respectively, so as to communicate and disseminate the latest mold knowledge to students in a timely manner. The main content of the lesson "stamping process and die design" is blanking process and die design, bending process and die design, drawing process and die design. The content selected for video recording of each chapter is mainly divided into deformation process analysis, process dimension calculation, process structure design, introduction to the working process of typical die and other knowledge points. The time of each video screen is about 10min. In the process of recording deformation, CAE software is used to help students understand through the visualized forming limit diagram. Combined with engineering cases, the application of process dimension calculation, process structure design in engineering and CAD software are introduced in detail

The application of parts in process dimension calculation and structure design. Using CAD software to draw two-dimensional and three-dimensional mold and record the animation when the mold works. Through the transparent processing of mold materials in the three-dimensional drawing and the use of section view, students can understand the assembly relationship and working principle of the mold more easily.

At the beginning of the semester, students are divided into groups of about 5 according to the difficulty and ease of flipping projects. The members of each group are mainly composed of free combination. However, it is necessary to pay attention to the reasonable combination of students; ability, consciousness and so on, so as to ensure that each group of projects can be carried out smoothly on schedule. The students of application-oriented undergraduate colleges have better self-study ability and are lively. As long as the grouping is reasonable, the supervision and guidance are timely, and the classroom guidance is in place, each group of students can actively promote their own project tasks. In order to better stimulate and encourage students; learning enthusiasm and conscientious attitude, each student;s preview effect and classroom performance are evaluated in time, and finally

Students; ability and quality displayed in this course will be evaluated and uploaded to the self built network platform, so as to provide reference opinions for employers and postgraduate supervisors when selecting students. Each student can only see his own evaluation and decide whether to let employers or instructors see his own evaluation.

## 4.2. Project Teaching and Classroom Flipping in Class

In class, first of all, the common problems reflected by students on the network platform are answered centrally. The problems of a few people can be answered directly on the network platform or in the teaching process. In the traditional teaching of stamping process and die design, the basic knowledge of stamping process and the basic theory of stamping process are generally introduced. The typical chapters of die design are generally explained in terms of deformation process analysis, quality analysis and control methods of formed parts, forming process design and calculation, die structure design, design of main parts, etc. When students study, they will feel knowledge fragmentation, lack of experience and ability to apply basic theoretical knowledge to engineering practice, and they will be helpless when they encounter mold design. Flipped project-based teaching can save the explanation time of basic theoretical knowledge. Through the explanation of engineering cases directly, students can master how to apply theoretical knowledge to engineering practice. Through flipped classroom, students can experience how to solve engineering cases, find out the shortcomings through the comment link, and further improve their analysis and solution

Ability of engineering problems. Finally, help students to summarize the knowledge involved in this flipped classroom.

The selection of teaching content is based on the learning of the main knowledge points of traditional teaching. The projects are all from the engineering cases of local enterprises. At the same time, combined with the ability, knowledge, quality requirements of application-oriented talents and the teaching law from easy to difficult, the basic ability projects, simple typical mold design projects and medium complex mold design projects are determined. The basic ability project is to enable students to master the ability of process plan design and process dimension calculation required in various mold design. In the process of explaining the simple mold design project, we will introduce the formulation of various process plans and the calculation of process dimensions according to the forming characteristics of various typical stamping parts, and let students understand and master the problems to be paid attention to in the design of typical mold, and understand the characteristics of various typical mold design. The medium complex die design project requires students not only to have all kinds of typical stamping process plan analysis, process size calculation, but also to have a variety of forming process combination mode and forming sequence, as well as medium complex die structure design.

In order to reduce the difficulty of students; flipping in class, control the flipping time in class, and improve the fidelity of learning situations, the questions used by students for flipping in class correspond to the knowledge points taught in the above six items respectively, and the questions can be adjusted appropriately every year, so as to avoid students directly copying the works of the previous students. In order to let each group member get exercise, after each group selects a part, the size of each member's part is modified to a different value, which not only enables everyone to work together to determine the process plan and mold structure, but also enables each student to complete the process size calculation independently. Finally, the group members recommend the students with the strongest comprehensive strength to complete the classroom flipping. After flipping the class, first give other students in the class time to ask questions and comment, and then the teacher finally comments and corrects. In order to improve the students' enthusiasm and work attitude, combine the project content with the curriculum design. The topics of simple typical mold design and medium complex mold design can be modified and improved according to the guidance, and the part drawing and assembly drawing can be completed and submitted as the curriculum design. For the topic of basic ability training, students can refer to the requirements of simple and typical mold design, select different part sizes for improvement and supplement, complete the part drawing and assembly drawing, and submit them as curriculum design.

The assessment and evaluation of classroom flipping are mainly from two aspects: the quality of the project completed by the student team and the effect of classroom flipping. The former is the main body of assessment. The evaluation methods are mainly divided into teacher's comments, group mutual comments and group members; self-evaluation, accounting for 50%, 30% and 20% respectively. The quality of the project mainly depends on whether the content is complete, whether the calculation is correct, whether the scheme is reasonable, whether the drawings are complete, standardized and correct, etc. The effect of classroom flipping mainly includes the quality and effect of PPT production, the quality and effect of classroom flipping, etc. In addition, teachers should evaluate students; self-study ability, self-study effect, innovation ability, team cooperation and self-assessment level.

### **4.3. Summary and Improvement After Class**

After class, each group of students should first summarize and summarize the knowledge points of the teacher's classroom projects, comment on the table of students flipped in class, find out the advantages and disadvantages of other teams, so as to improve their comprehensive ability. In order to avoid similar work in the future, the team who carried out classroom flipping summed up the shortcomings of the classroom performance and expectations in time. For the knowledge points that are not fully understood in the network self-study or the contents that are not digested and absorbed by the project-based cases taught by the teachers in the classroom, they should be solved in a timely manner by finding materials, network platform or directly communicating with teachers and students. Secondly, according to the project tasks assigned by the teacher in the classroom, timely division of labor and cooperation of team members are carried out. In case of difficulties, timely communication and solutions are needed. Problems that can not be solved or are uncertain can be discussed by leaving messages on the network platform or seeking teachers. Students in charge of classroom flipping also need to learn lecture skills.

After class, teachers supplement necessary materials according to students; classroom performance and project expansion tasks, analyze the causes of students; insufficient classroom performance and improvement measures, upload the information of students; classroom comments to the network, and answer students; questions on the network platform in time, so as to help students summarize and improve in time.

Although the popularization of information-based teaching provides necessary preconditions for the implementation of flipped classroom, flipped classroom can improve students; learning autonomy and interest, project-based implementation can improve students; ability to solve engineering problems, flipped classroom and project-based teaching have good complementarity, but it puts forward higher self-study ability and learning consciousness of students. The requirements also put forward new requirements for teachers; teaching level, micro class recording quality, knowledge updating rate, after class tutoring time, etc. Therefore, we need schools, students and teachers to create conditions for the project-based teaching of flipped classroom, and pay more efforts and exploration.

## **5. The effect of flipped Project Teaching**

### **5.1. Improve Students; Self-Study Ability and Interest**

Flipped project-based teaching has changed the defect that the traditional students can only receive knowledge passively and study knowledge independently, so that the knowledge learned can be flexibly applied in solving engineering practice. The perfect network platform enables students to have the premise of classroom flipping, let students know what to learn, how to learn and what to do after learning. Micro video can also avoid that students can not digest knowledge in time due to the limitation of class hours. Students can decide the time of

self-study according to their own learning ability, and finally test the self-study effect through the exercise library. It can avoid the confusion of students in traditional teaching, such as incomprehension, incomprehension and how to use knowledge, which greatly improves students; interest in learning. After class, each group of students should first summarize and summarize the knowledge

## **5.2. Optimize the Classroom Structure and Activate The Classroom Atmosphere**

Before class, students learn independently with the help of network platform to complete the digestion and absorption of basic knowledge. In the class, students can explain engineering cases by discussing engineering cases or classroom flipping, which makes students become the main body of the class and enlivens the classroom atmosphere. In case explanation, it mainly discusses the application of knowledge module in engineering and how to analyze and solve problems in engineering practice.

## **5.3. Realize the Complementary Advantages of Project Teaching and Flipped Classroom**

Project-based teaching requires students to master a lot of basic knowledge in advance. Due to the limitation of class hours, the traditional project-based teaching method, which focuses on basic knowledge first and then on cases or interspersed with cases, cannot be realized. If the implementation of flipped classroom adopts the traditional theoretical teaching mode, the classroom flipping of boring theoretical knowledge will inevitably lead to poor classroom effect, so using project-based content for classroom flipping can improve students; interest in learning. In order to realize the network resources such as the network platform and preview materials created by the classroom flipping, it is beneficial to carry out the self-study before class, without the need for teachers to teach traditional theoretical knowledge in the classroom, thus saving valuable time for the project-based teaching.

## **5.4. Improve the Comprehensive Quality and Ability Of Students**

In order to turn the class smoothly, students should carefully preview the basic knowledge before class, listen to the teacher how to solve the engineering case in class, discuss the implementation plan of the project with the team members after class, and think about how to explain the case. It is of great help to improve students; ability of analysis, problem solving, teamwork and expression.

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