

# On the Exploration and Practice of Teaching Reform of Work-integrated Learning in Mold Design and Manufacturing Course Based on Action-oriented Teaching Method in Technical Colleges

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**Abstract:** Action-oriented learning enables students to "learning by doing and doing by learning", which can not only enable students to master the required knowledge points and skills efficiently, but also fully mobilize students' participation in learning. In this paper, the course of Mold Design and Manufacturing is taken as the research object, and the action-oriented teaching method and concept are integrated into classroom teaching, forming an integrated teaching mode of work-study combination, which has achieved remarkable classroom teaching effect.

**Keywords:** Action-oriented teaching method; Mold design and manufacture; Integrated teaching

## 1. Introduction

The traditional subject-based teaching method guides teaching according to the order of textbook arrangement, which is not conducive to students in technical colleges to grasp basic knowledge and skills, so it is difficult for the concepts in textbooks to correspond to practical applications. Therefore, the action-oriented curriculum teaching method integrates abstract theoretical knowledge into specific learning situations, and achieves the purpose of learning knowledge and skills by training various representative tasks in the learning situations. In this paper, taking the course of Mold Design and Manufacturing as an example, the action-oriented curriculum design and teaching practice are carried out.

## 2. Curriculum overview and overall design of integrated teaching

### 2.1 Course overview

*Mold design and manufacturing* is a comprehensive practical course for students majoring in mold technology after learning all the basic courses of the major. Through the study of this course, students can have the ability to work out appropriate molding processing schemes according to the structural characteristics of different plastic or metal parts, and master the ability to design and manufacture plastic molds and stamping dies with moderate complexity. Only when students possess the above knowledge and skills, can they be competent for the corresponding jobs of mold majors and achieve high-quality decent employment.

### 2.2 The overall design of integrated teaching

In the course of Mold Design and Manufacturing for the major of Mold Technology, if the traditional teaching method is adopted, only the basic structure and design theory of moulds are taught, and there is no real design and manufacturing link, Each part is independent of each other, and the contents are basically arranged according to the structure form of the manual, However, it is difficult for students in technical colleges who are not familiar with design and manufacturing to learn, and it takes a lot of effort after one semester, which affects their enthusiasm for learning. Therefore, it is imperative to promote the teaching reform of this course.

Before the overall design of the course, the die industry is analyzed simply: according to different attributes, dies can be divided into many types, among which stamping die and plastic mould are the

most used, accounting for about 80% of the total number of dies. Considering the limited class hours, the course content of Mold Design and Manufacturing selects stamping die and plastic mould commonly used in dies to study. According to the course objectives of this course and the current situation of mold industry, the typical tasks, ability objectives and learning content structure in this study are shown in Table 1.

Table 1 Typical Work Tasks, Ability Goals and Learning Content Structure Table

Typical work tasks	Professional ability goal	Comprehensive quality	Working process knowledge	Learning content
Design and Manufacture of Stamping Die	1. Analysis ability of stamping forming process 2. Design ability of stamping die 3. Manufacturing ability of stamping die	1. Team cooperation ability 2. Problem solving ability 3. Learn to improve ability 4. environmental awareness 5. Evaluation feedback ability 6. Communication and expression ability 7. Innovation capacity	1. Basic theory of stamping forming 2. Analysis of stamping process and determination of process plan 3. Determination of stamping die design scheme 4. Determination of stamping die manufacturing scheme	1. Overview of stamping forming 2. Principles and characteristics of various stamping processes 3. Typical stamping die design 4. Typical stamping die manufacturing
Design and Manufacture of Plastic Mold	1. Analysis ability of plastic molding process 2. design ability Plastic mold 3. Manufacturing capacity of plastic mold	1. Team cooperation ability 2. Problem solving ability 3. Learn to improve ability 4. environmental awareness 5. Evaluation feedback ability 6. Communication and expression ability 7. Innovation capacity	1. Basic theory of plastic molding 2. Analysis of plastic forming process and determination of process plan 3. Determination of design scheme of plastic mold 4. Determination of manufacturing scheme of plastic mold	1. Overview of plastic molding 2. Principle and characteristics of plastic molding process 3. Typical plastic mold design 4. Typical plastic mold manufacturing

Table 2 Course assessment methods

Examination method	Examination content	Score	Grading standards	Implementation method
Process evaluation	Basic quality evaluation	10	Abide by classroom discipline, avoid truancy, being late and Leave early and have a correct attitude	Teachers evaluates according to students' usual class performance
	Classroom assignment evaluation	10	Fill in the mold design and manufacturing process documents and process cards carefully	Teachers evaluates according to the mold design and manufacturing process documents and process cards completed by the students
	Structural design evaluation	15	Correct design of mold structure, accurate and efficient drawing of structural drawings (2D engineering drawing design, 3D modeling design)	Teachers evaluate according to the students' mold structural design quality
	Parts manufacturing evaluation	20	Able to accurately and quickly complete the manufacturing and assembly of mold parts, and skillfully operate the tools and measuring tools of manufacturing equipment	Evaluate according to the completed quality of parts manufacturing and assembly
Final evaluation	Basic theory and comprehensive assessment	50	Written answer, use the form of filling in the blanks/choosing/answerin/reading graphics/designing and so on	According to the scoring criteria of the final exam, the academic affairs office organizes the exam for evaluation
	add up to	100		

In this course design, based on the teaching idea of working process orientation, taking the design and manufacture of typical mold structure as the main line, the course design is task-driven. Choose daily necessities that students can see everywhere in daily life as task carriers, and fully arouse students' interest in learning. Combining knowledge and practice organically into each task, by completing practical mold design and manufacturing tasks, students can feel the joy of success, so as to arouse students' interest in learning. In the process of performing tasks, students master knowledge and learn skills [2], Through the design and manufacture of the actual mold structure, they practice theory and practice synchronously, and integrate process specifications and industry specifications into the curriculum, which not only ensures the needs of skills, related knowledge and professional quality required by professional posts, but also maintains the relative independence of the original curriculum knowledge system, and cultivates students' social abilities such as self-study, unity and cooperation, communication with others and team spirit. Therefore, the assessment methods of this course are shown in Table 2.

### **3. The specific design and practice of integrated course teaching (Taking the design and manufacture of plastic injection mold for "button" plastic parts as an example)**

#### ***3.1 Task preparation***

In order to complete the task smoothly, it is necessary to make sufficient preparations. For teachers, preparing courseware, plastic products, coursework texts, etc, which are needed to complete the task, also gives students an intuitive impression and clarifies the objectives of this course. For students, use network resources to understand the application of two-plate plastic mold and the structure of the mold; Conduct market research and collect all kinds of buttons; Try to analyze the commonness and characteristics of these buttons. Through these preparations, students' autonomous learning ability, data collection ability and teamwork ability can be cultivated. Learning task description in this stage: according to the given plastic product "button" drawing, determine the molding process of button by using the knowledge of plastic molding process, and fill in the process card.

#### ***3.2 Divide study groups and consult information***

At this stage, teachers mainly use courseware, teaching materials, network and other resources to teach the basic knowledge of plastic injection molding needed to complete this task, and make the students clear about learning content, thinking problems, reference materials, reference tasks, reference websites, and divide them into groups. This stage cultivates students' autonomous learning ability, ability to consult data and ability to solve problems.

#### ***3.3 Students make work plans***

Students make work plans according to their work tasks. Including: learning content, working steps, time allocation, communication forms, self-assessment methods, results display, etc. The implementation of this task is divided into determining the molding process parameters, formulating the molding process, preliminarily selecting injection molding equipment, determining the design scheme of each part of the mold, and determining the working hours, contents and quality requirements of the manufacturing process of each part of the mold.

#### ***3.4 students implement the work plan***

Students complete the design and manufacture of plastic molds according to their work tasks and work plans. In the whole process of making and implementing the work plan, teachers guide tour, which trains students' autonomous learning ability, team cooperation ability, decision-making ability, organization planning ability, coordination ability and problem solving ability.

#### ***3.5 Students' achievement display, Summary and evaluation***

After the work, the students discuss, show and evaluate the design and manufacture scheme of plastic injection molding "button" mold in groups, and finally the teachers evaluate it. At this stage, students' ability to judge, self-evaluate, communicate and express, summarize and sum up, and boost their self-confidence in learning.

### 3.6 Organize data

After finishing the work, the students sorted out the design and manufacturing tasks of the "button" mold for injection parts in groups and wrote an experimental report. This process trains students' comprehensive professional abilities such as self-summarization, writing ability, copywriting ability and sustainable development.

### 4. Summary of the implementation of integrated curriculum teaching

The practice of action oriented teaching method in the integration of work and study in the course of mold design and manufacturing proves that students' participation in classroom learning is obviously enhanced, In the whole teaching process, each student can find his own position under the cooperation of team and group, and give full play to his own advantages in team cooperation based on individual differences of students, so that students who never participate in classroom activities in traditional teaching can rekindle their learning enthusiasm. The guiding text, project, exploration, role-playing, case teaching and group teaching in the action-oriented teaching method can be used alone in the process of classroom implementation, or two or more teaching methods can be used comprehensively to enrich the teaching forms, making the boring classroom teaching more energetic.

### 5. Conclusion.

Action-oriented teaching method is an advanced teaching concept of vocational education, through consulting, planning, decision-making, implementation, control and evaluation in class, students' ability of information search, autonomous learning, comprehensive vocational ability and sustainable development can be enhanced. In the specific stage of classroom implementation, the implementation steps can be appropriately adjusted according to the difficulty of teaching content, in the actual application process, different classroom learning methods should be appropriately adjusted and flexibly applied according to factors such as differences between different schools, majors, teachers and students.

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