Course Reform of Mechanical Manufacturing Technology Foundation Based on Internet +

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Abstract—**With the advent of the "Internet +" era, many teaching methods such as flip classrooms, mixed teaching, and MOOC have provided many innovative teaching methods for the majority of educators. The classroom structure has also undergone major changes in the "Internet +" era. The teaching structure has entered a mixed stage, and the teacher-student relationship tends to be equal. Teachers should change from being taught in the classroom standing in front of podium to being integrated into the "guidance" of students, using the "diagnosis" of big data, and "helping" after hiding in the net cloud. This article takes "Machinery Manufacturing Technology Foundation" as the application object, analyzes some teaching viewpoints of the "Internet +" era" Machinery Manufacturing Technology Foundation" teaching reform, and provides reference for college engineering teachers to adapt to the opportunities and challenges of the "Internet +" era.**

Keywords—Internet +; Micro-class; Flip classroom; Mechanical manufacturing

I. INTRODUCTION

With the advent of the industry 4.0 era, the widespread use of Internet technology and cloud technology has enabled all walks of life to set off an intelligent revolution. Then the field of education is not different, especially the curriculum construction is quietly launching a revolution without smoke. Online teaching is not limited by time, space and resources. Through the Internet and cloud technology, the high-quality teaching resources of colleges and universities around the world can be integrated and applied through online platforms such as MOOC, micro-curriculum and flip-up classrooms, making the teaching of the curriculum increasingly rich and three-dimensional [1-2]. In the "National Medium- and Long-Term Education Reform and Development Plan (2010-2020)", it is clearly stated that we should pay attention to the important role of information technology in education reform, and put forward the requirements of information technology education in higher education institutions in the new era. Under this policy, the information teaching competitions of colleges and universities across the country and the provinces are in full swing every year, which also promotes the reform of information technology teaching in higher education institutions.

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structure has undergone major changes in the "Internet +" era. The teaching structure has entered a mixed phase, and the teacher-student relationship has become equal. Teachers should change from being taught in the classroom, standing in front of the podium, to being integrated into the "guidance" of students, "diagnosing" with big data, and "helping students" after hiding in the cloud. Teaching and research are equally important in colleges and universities. College teachers generally engage in both teaching and academic research. Most teachers concentrate on scientific research. There are few opportunities for teachers and students to meet in addition to class. In addition, Chinese universities have begun to enter the "only child" college student era. This is a change that cannot be ignored. Their status in the family is the background for the growth of college students who admire themselves and respect me. Students like to do things independently according to their own ideas, and do not like the participation of others. These have caused obstacles in the communication between teachers and students. Teachers do not understand students, and students do not understand teachers. The network supplements the problems of less communication between teachers and students due to differences in role status and personality psychology, and satisfies the needs of students' communication, which is important for students to learn to communicate and establish good interpersonal relationships.

"Machinery Manufacturing Technology Foundation" is one of the important professional courses of mechanical engineering in colleges and universities. Most of its teaching is based on traditional teaching or project-introduction teaching methods. Due to limited time in class, knowledge information and skill information are insufficient, making students The knowledge points are poorly mastered and the application ability is not strong [3]. The use of information-based teaching mode can make up for this deficiency. With the help of mobile APP and online courses, the information technology teaching reform of "Machinery Manufacturing Technology Foundation" is adopted. The teaching concept is to adopt the flip classroom teaching method, the task-driven teaching method, the information-based teaching method, the process evaluation method, and the pre-class knowledge transmission. The specific content and implementation plan of in-class knowledge internalization and extracurricular knowledge development, realize the information of teaching resources, the information of teaching activities, and the information of teaching evaluation, aiming to better serve students to learn,

create a second classroom, and cultivate application technical talents.

II. INTEGRATE VARIOUS HIGH-QUALITY RESOURCES USING "INTERNET +"

Informatization teaching is guided by modern teaching concepts, supported by information technology, and applied with modern teaching concepts. In the information-based teaching model, a series of factors such as concept, organization, content, model, technology, evaluation, and environment are required to be informatized. Its essence is to fully and properly use modern information technology, resources and tools to create a 7×24 h form of learning and communication.

Compared with the traditional "passing knowledge-accepting knowledge" teaching mode, the information-based teaching mode transforms the teaching link into "information-based teaching before the classroom" through informatized teaching resources (such as micro-courses, MOOCs, videos, network resources, etc.). Resource transfer knowledge—information-based instructional design internalization knowledge—information-based teaching activities in the classroom expands knowledge", enables students to acquire more abundant learning resources and is in the main position of learning, while teachers play an auxiliary and guiding role. Fully mobilize students' enthusiasm for learning, and create a fair and impartial evaluation mechanism to stimulate students' autonomy in learning. The teaching organization of the information-based teaching model can plan the following steps:

(1) formulate the overall curriculum, chapters and classroom design;

(2) create informational teaching resources for pre-class knowledge transfer;

(3) develop knowledge internalization in the classroom. Tasks, leading the learning knowledge with tasks;

(4) determining the activity plan for post-class knowledge development;

(5) formulating evaluation plans for all teaching links.

"Machinery Manufacturing Technology Foundation" is the core professional foundation course of mechanical designing, manufacturing and automation. The teaching tasks of this course are to teach students some common scientific laws in the process of mechanical parts manufacturing and machine assembly through course teaching, experiment, internship, course design, graduation design, etc., to master the specific process problems (improve quality, Basic knowledge and ability of productivity) [4-6]. Participate in the design and development of engineering solutions, considering cost, quality, environmental protection, safety, reliability, shape, adaptability and impact on the environment, identify, evaluate and select the technologies, processes and methods required to complete the engineering tasks. Determine the solution to develop the theory of comprehensive application of relevant courses, combined with the actual production analysis and the ability to solve practical engineering problems. In the traditional "Machinery Manufacturing Technology Foundation" teaching

process, the theoretical teaching and the practical teaching are opened independently. The arrangement of the curriculum and the learning environment cannot fully combine theoretical and practical applications. The curriculum group teachers use the "interconnected" thinking to create "micro-cases", and introduce the technological innovations in the production practice enterprises, surrounding enterprises and teachers' scientific research achievements that will be practiced in the future into the classroom teaching cases, with the heuristic teaching method as the main Encourage students to learn relevant knowledge around the project. In recent years, the course group has added relevant cases of related cooperative enterprises such as shaft parts and box parts. The teachers combined with the golden key of the high-efficiency flipped classroom to make teaching micro-videos and open the door of "content is king, individuality learning ". And develop a "learning task list" to open the door of "effective guidance, active learning".

III. INNOVATIVE CLASSROOM STRUCTURE AND TEACHING METHODS AND METHODS USING THE "INTERNET +" PLATFORM

Considering the thinking of system engineering theory, the foundation of the micro-course-based mechanical manufacturing technology flipping classroom is inspired by the "Internet +" thinking, aiming at a certain knowledge point or teaching link in the basic teaching process of mechanical manufacturing technology, with the Internet (Including mobile internet) as a tool, with teaching video as the carrier, optimize and reorganize the four key elements of teachers, students, teaching resources and teaching content, and form a modular, visual, ubiquitous, flexible and other characteristics. The basic innovation teaching model of mechanical manufacturing technology. This model implies a multidimensional feature of time-space-structure fusion.

(1) Time dimension: The Mechanical Manufacturing Technology Foundation micro-class system needs to evolve with the introduction of new resources, new technologies and new goals, and be perfected and evolved in the evolution, just like the living organisms keep pace with the times , continuous innovation and development.

(2) Spatial dimension: The Mechanical Manufacturing Technology Foundation micro-course system is the product of deep integration of Internet technology and traditional educational methods. Therefore, its expansion needs to use cyberspace as a carrier, such as interconnecting various teaching resource websites, and even establishing a public service platform for educational resources, providing free download and resource sharing.

(3) Structural dimension: refers to the heuristic project learning method guided by the heuristic project learning method in the process of micro-course teaching of mechanical manufacturing technology. Through the demand and problem orientation, the students' collaborative innovation thinking is stimulated to enhance their discovery and thinking problems. Ability to solve problems, develop their independent thinking skills and teamwork spirit.

"Machinery Manufacturing Technology Foundation" requires students to have certain practical experience in order

to achieve better teaching results. However, these practical experiences are also lacking by students. The course group teachers combined with the network platform to take practical knowledge points. The case-based teaching mode mainly adopts the case analysis method, discussion method, simulation method and other teaching methods. For example, the "how to realize the six-point positioning of the shaft parts " in the course mainly adopts the case analysis method. After the teacher explains, the students are arranged to think "how to achieve the six-point positioning of the box parts", and in the form of group discussion, everyone can brainstorm, each person can find a measure or more measures, and then the representatives of the group speak, the other groups of students answer and supplement, in the discussion and analysis, there is no restriction on the way of students finding answers. You can seek them in books, or you can check them online or ask for help from WeChat. Through this method of teaching, students not only master the methods of analogy analysis. And exercise the students' innovative ability, teamwork ability, language Skills and information query processing capabilities.

For the general knowledge points, students should adopt the teaching method of self-learning in advance and then report in class. For example, "How to improve production efficiency" in the course, inform everyone in advance on the online teaching platform to discuss tasks and discussion requirements, encourage students to make micro-videos, slides, and remind students that there are pictures with truth, less text on the rules of the book. Through this kind of teaching, not only students can master the knowledge points that should be learned, but also exercise the students' micro-video, slide production ability, use principle rules to analyze problem-solving ability, language expression ability and information query processing ability. In order to expand the knowledge points, the case simulation method is adopted to strengthen the cultivation of students' engineering awareness. For example, through processing safety cases, economic dispute cases, and engineering product quality cases in the mechanical manufacturing process, students are allowed to simulate the identity of one of the enterprises, discuss and analyze problems that happening in the machining process, and cultivate students' safety awareness, economic awareness, quality awareness, environmental awareness.

In the "Internet +" era, students' learning can not only use the fragment time to learn independently, but also guide students to participate deeply, focusing on the development of students' innovative thinking, problem solving ability, practical ability and teamwork ability in creating and collaborating, making full use of " The group cooperates learning" and opens the door of "collective wisdom and efficient interaction". With the support of Internet technology, by calling online and offline resources, everyone can be a learner and creator. Teachers should combine the carrier of innovative education under the background of "Internet +" to make full use of the "network cloud platform" and open the door of "effective mixed learning". Teachers and students share learning experiences, exchange learning methods, and serve the classroom.

IV. GRASP THE "INTERCONNECTED" OPPORTUNITY TO BUILD A NETWORK TEACHING MANAGEMENT PLATFORM

This course group grasps the "Internet +" opportunity, builds a basic network teaching platform for mechanical manufacturing technology, and establishes a learning environment for students and teachers to communicate. The platform includes modules for synchronous teaching modules, teaching case resources, course notifications, Q&A discussions, and coursework. Using the "Machine Manufacturing Technology Foundation" online teaching platform, teachers and students, in-class and extra-curricular, pre- and post-class teaching links can be organically combined. At the same time, the university's science and technology innovation platform was established, and an environment for students' innovative learning and design was established. Students were actively involved in various high-end design and manufacturing software and teaching software according to their personal interests, and actively carried out mechanical innovation activities.

The classroom teaching process is designed from the aspects of teaching content, teaching objects, teaching objectives, key points, difficulties, and implementation process. Compared with the traditional teaching methods, the biggest difference is the design of the classroom teaching implementation process. There are many resources for creating teaching resources such as courseware PPT, micro-courses, tutorials, and case parts. Students follow the guidance of the guiding case, learn the knowledge points through courseware and micro-classes, complete the problems in the guiding case, and return to submit the guiding case to the online course platform before the class, so that the teachers can understand the students' pre-class learning. The developed knowledge extension content is work type, that is, the student makes the design basis and the positioning benchmark according to a given number of cases, and uploads the online course platform, the teacher performs the correction, and gives the experience value according to the situation. Develop an evaluation system throughout the entire teaching process (ie, before class, in class, after class), including the review of pre-course resource experience, the performance of classroom activities, and the submission of after-school assignments to achieve a process assessment.

V. CONCLUSION

Generally, "Internet +" is a direction, a trend. The network environment provides a variety of interactive channels for teachers and students, which plays an important role in making up for the lack of face-to-face teaching in classroom teaching. In addition, the network provides students with a free and open learning space, which not only helps to mobilize students' enthusiasm, broadens students' horizons, meets students' needs for knowledge, but also plays an important role in cultivating students' creative spirit and establishing lifelong learning concepts. Teachers and students can use a variety of interactive and communication tools to make teaching and learning in the classroom using micro-classes, MOOCs, and flipping classrooms. Students can choose their own learning content according to their own characteristics to achieve personalized learning. "Internet + education" brings opportunities and

challenges. Teachers and students in engineering universities should make full use of the Internet as an auxiliary education teaching tool to face the opportunities and challenges brought by the Internet..

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