

Research on Effective Teaching Mode of NC Machining Technology and Programming Course

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Keywords: Flipped classroom; Teaching mode; Information technology; Numerical control (NC)

Abstract. The reform of curriculum teaching is an eternal topic for colleges and universities. The direction of the teaching reform of vocational education is to take students' morality as the fundamental, to serve the development as the purpose, to promote the employment oriented, and to promote the students' ability to innovate and start a business. The technical colleagues needed by enterprises not only have professional skills, but also have methodological, social and personal capabilities. With the rapid development of information technology, it is possible to build a new effective teaching mode for NC machining technology and programming course.

Introduction

The development speed of education information work in China is astonishing, the colleges and universities all over the world are generally involved in the Internet, the access rate is up to 90%. The teaching environment of the school has been greatly improved because of the popularization of the network [1]. In the school teaching, information is gradually popularized and popularized, and the new teaching is used in the network space. The teachers and students of mode exploration have already broken through 60 million. Under the background of the deep integration of information technology and transaction teaching, the research of new teaching mode has become a hot topic in the educational field. This paper takes the course of numerical control processing technology and programming as an example to change the original teaching mode [2], increase the interest of the classroom learning, improve the enthusiasm of the students and improve the students' learning efficiency.

The Present Situation of Numerical Control Course Teaching

The present situation of teachers. At present, there is a lack of "double qualified" teachers who are competent for numerical control teaching and are familiar with the production situation of universities. The teachers of numerical control courses in this university are mainly derived from graduate students from various colleges and universities [3], as well as the training instructors of Changbai Mountain skilled teachers. Teachers are less likely to work in enterprises or have less working experience.

The present situation of the teaching content of the numerical control course. The goal of education is to face the frontline of production, service, technology and management, and cultivate applied talents with comprehensive quality and professional ability. Although we have been making efforts to adjust the teaching content in recent years, we are still lagging behind. The knowledge and skills that students can acquire at school can not meet the needs of enterprises. Because the teaching conditions of the school are limited, it is mainly focused on the explanation of theoretical knowledge, such as the operation, programming and maintenance of the CNC machine tools, which are in urgent need of the skills in the teaching effect is relatively weak. In the practical training teaching [4], as long as it focuses on the training of numerical control machine tool operation of the students, there are not many skills training for the selection of numerical control tools and tools, the selection of the process route, the setting of the cutting amount and so on, the automatic programming of numerical control, the maintenance and maintenance of the CNC machine tools. The textbooks currently used also have shortcomings such as backward content,

single form and lack of practicality. The study books applicable to the fault diagnosis of CNC machine tools, the principle maintenance and maintenance of numerical control system and the training of numerical control talents are very limited, far behind the production practice.

The present situation of numerical control course teaching method. Most of the teachers'

teaching methods are focused on practice and traditional classroom teaching, and about 70% of the professional teachers participate in practical teaching. Influenced by traditional teaching, most teachers always adopt classroom teaching methods in teaching methods, and all teachers transmit knowledge in one direction [5]. In this teaching method, the teacher controls the whole teaching process and determines the way and pace of the teaching material. As the teaching progress is completed on time, it often ignores whether the students have mastered the knowledge, let the students feel the passive type of the students, and can not stimulate their initiative and enthusiasm in the study, and weaken the students. Although teachers have adopted the project approach, it is still a teacher centered classroom teaching [6].

The present situation of the evaluation structure of numerical control course teaching. At

present, there are three components in the teaching evaluation of NC course in our school: attendance 10%, experiment 30% and final grade 60%. According to the ratio, the three achievements are summarized, and the final result of the students is obtained. This way of evaluation emphasizes the importance of the results and does not pay enough attention to the students' process. At the same time, the main body of evaluation is teachers, but neglects the students' self-evaluation, mutual evaluation and other reviews, which can not reflect the characteristics of vocational education [7].

Construction of Numerical Control Course Overturn Classroom Teaching Mode

Frame design aspect. Classroom teaching is divided into pre class learning and course learning, which highlights that information technology and activity learning are the important factors affecting the development of the flipped class, which effectively guarantees the personalized collaborative learning, and has strong guidance and maneuverability for teachers.

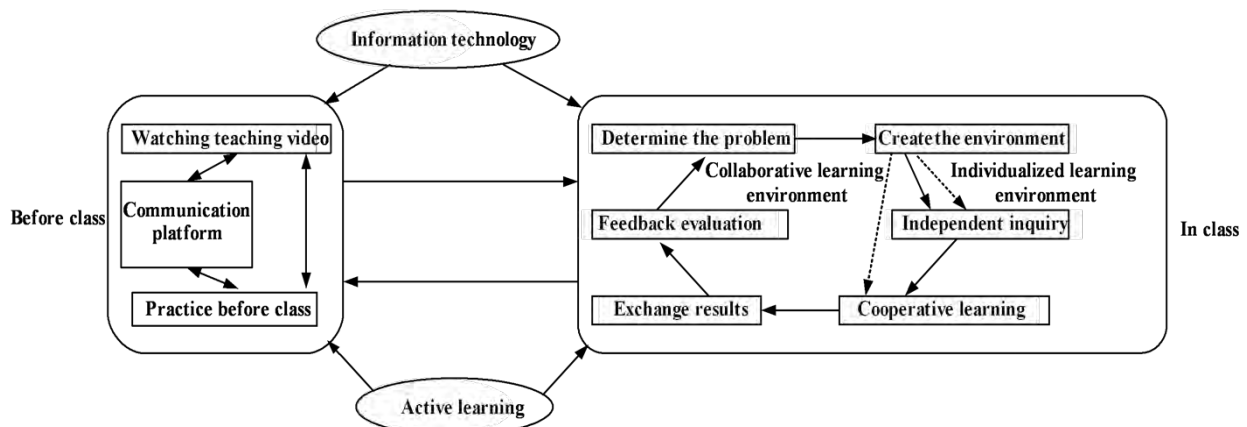


Figure 1. The mode of overturning the classroom teaching

Teaching process. 1) The teacher's operation flow is shown in Fig. 2

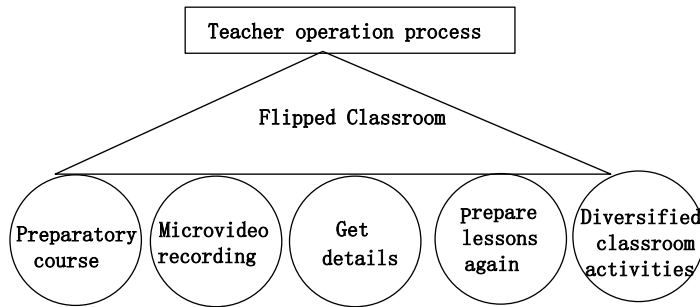


Figure 2. Teacher operation process

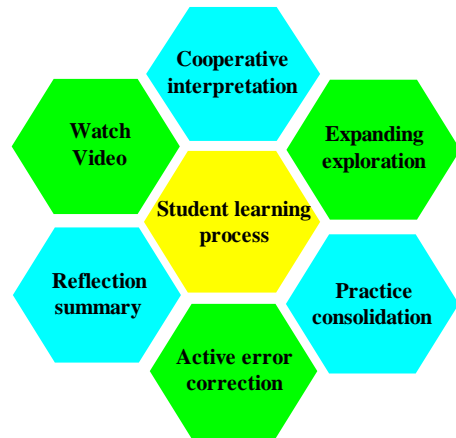


Figure 3. Student learning process

2) The student learning process is shown in Fig. 3

The construction of teaching mode. Flipped classroom teaching mode refers to teachers and students through the classroom teaching and learning two-way activities, to solve students' learning difficulties encountered in the process [8]. According to the present situation and characteristics of the teaching of numerical control course in our school, and the author's practical experience in the front line of numerical control teaching for a long time, the "343" teaching mode which is suitable for the numerical control course of our school is constructed.

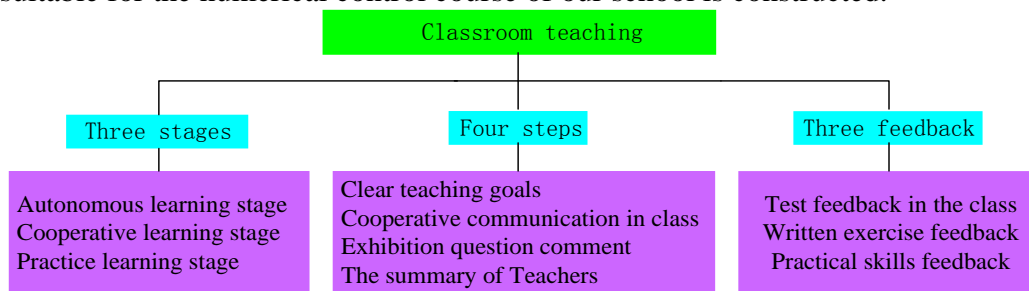


Figure 4. The "343" teaching mode

Teaching Case Design

The author takes class 15 from class 1 as an experimental class in the flipping class, and takes class 15 from class 2 as a control class in traditional teaching, taking the "format meaning of tool radius compensation instruction" as an example, which shows the application process and effect of this teaching model in numerical control teaching.

Analysis of curriculum content and expected results. The format meaning of tool radius compensation instruction is an important link in the numerical control teaching process. The course content mainly includes how to establish tool radius compensation and how to cancel the tool radius compensation, and how to correctly understand the tool radius compensation process and the significance of compensation.

After the study of this class, the students should be programmed with the tool supplement instruction, arrange the processing technology, read the new knowledge points independently and cooperate with the members of the team, can clearly express their suggestions and opinions, enhance the ability to communicate with the people, and cultivate the team spirit.

Preparation of extracurricular learning resources. In the spare time, teachers make teaching tasks, produce video clips, teaching resources, and assign learning tasks [9]. After completing the above preparation, the teacher will publish relevant information to the resource web, and students will learn according to the content.

The process of independent learning after class. The teacher's self - learning task before the class: students watch PPT, study according to the study task single, and ask students or teachers in

the course of learning, or watch the video repeatedly. The teacher looks at and counts the students' autonomous learning process online, and comments on the completion of the study exercises.

Classroom activities. At this stage, teachers are not fully explained, but in combination with the difficulty of the students to screen and explain the situation, using the form of animation to enhance the sense of the senses, strengthen the understanding of the students, improve the efficiency of the classroom, and the selection of knowledge can fully present the idea that "students can do".

Evaluation and summary. The teacher arranged the simulation factory production task list. The students began with the operation process of the factory. The students began to test the practical contact of the students. The teachers evaluated them, summed up the problems and solutions of the students, and uploaded the resources network for the students to review and use.

Effect feedback. Through classroom observation, the students' learning atmosphere and knowledge mastery in two aspects are compared, and the following conclusions are drawn:

1) Through classroom performance, about 90% of the students can learn from the learning resources uploaded to the Internet by the teacher, and they can complete the task before class independently. On the one hand, from the perspective of research results, students can plan, make decisions, and process workpieces through group work [10]. On the other hand, from the results of the report, all the team reporting personnel can successfully complete the parts processing, can correctly set the tool radius compensation, the tool, the program check and processing. This shows that group cooperation has also achieved good results.

2) From the perspective of mastery, it is mainly students who have mastered the processing of this project. The results are shown in Table 1 according to the students' self-evaluation of their products and the comprehensive evaluation of their teachers.

Table 1 Comparison of teaching effects between flipped classroom and traditional classroom

technical ability	The proportion of the 1 classes in the flipped class	The proportion of the 2 classes in the traditional class
Knowledge point Mastery	88.89%(40/45)	66.67%(30/45)
Writing process and programming	86.67%(39/45)	71.11%(32/45)
Processing situation	93.33%(42/45)	73.33%(33/45)

From the above table, we can see that the effect of flipped classroom teaching is remarkable, which shows that this teaching mode is feasible.

Conclusion

This mode has changed the teaching mode of class teaching and class practice, and has been combined with advanced network information technology, and achieved good results. Let the student become the leader of the study, the teacher is responsible for guiding and answering questions, and then improve the students' learning enthusiasm, let the students know how to study, how to solve the problem, combine with the practice of the factory, and improve the students' comprehensive professional ability. At the same time, the teachers also put forward higher requirements. Different from the traditional teaching, the teacher, in addition to collecting a large amount of information and resources, also makes use of information technology to make micro classes, and rationally and cleverly design the various aspects of the classroom, and use more time to realize the interaction between teachers and students.

Acknowledgements

This paper is sponsored by project fund from Leading Group Office of Jilin Provincial Educational Science (Project Title: Research on the effective teaching mode of NC machining technology and programming course for mechanical specialty in colleges and universities under the background of

transformation and development; Contract NO. GH170624). In addition, it is also sponsored by the grant from the Higher Education Research Institute of Jilin Engineering Normal University.

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