Study on Practice of Cultivating Application-oriented Talents by Utilizing Flipped Classroom in Higher Vocational College

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Abstract—Taking the practical training course of higher vocational education as an example, with the aim of cultivating application-oriented talents, it aims to make the curriculum plan and combine with the characteristics of higher vocational education and introduce multimedia and internet technologies into training course, by using the teaching model of flipped classroom in higher vocational education. In order to demonstrate whether the flipped classroom teaching mode is feasible, the sample is used as an experimental model, which uses the traditional classroom teaching mode and the flipped classroom teaching mode. Through the method of questionnaire, investigation, test and statistics, this study demonstrates the positive effect of flipped classroom in the cultivation of higher vocational applied talents, and finds out the factors that restrict the development of the flipped classroom, and put forward the corresponding countermeasures.

Keywords—flipped classroom; higher vocational education; application-oriented talents cultivation; Micro-lesson

I. INTRODUCTION
According to the World Education Classification Standard promulgated by UNESCO in 1997, corresponding to the training of academic and engineering talents in general higher education, higher vocational education trains applied talents in higher education. The so-called applied talents refer to a special type of talents who can apply professional knowledge and skills to the professional social practice they engage in. They are skilled in the basic knowledge and basic skills of social production or social activities, mainly engaged in line of production of technology or professionals, whose specific connotation is constantly developing with the development of the history of higher education of development [1]. From the action plan for innovation and development of higher vocational education (2015-2018) and the 13th Five-Year Plan of Higher Vocational Education of Ministry of Education, the training of applied talents is an important direction of Higher Vocational Education in China in the future. Chongqing College of Electronic Engineering is one of the best developed vocational colleges in Chongqing, which has been taking the cultivation of applied talents with social satisfaction and needs of enterprises as its primary goal. Based on the implementation of the flipped classroom, through questionnaire design, investigation and statistical analysis, this paper demonstrates the positive role of the flipped classroom in the cultivation of Applied Talents in Higher Vocational colleges, and puts forward the restrictive factors and Countermeasures for the implementation of the flipped classroom in the cultivation of applied talents. As one of the core courses of computer hardware and peripheral specialty, the computer fault detection and maintenance training course has been regarded as a key course to train applied talents in this specialty. This course needs more practical guidance workload and requires high professional and technical ability of teachers. With the traditional teaching mode, teachers concentrate on teaching the basic theory and operation steps. Because of the different learning abilities of students and the limitations of the classroom environment (the number of classes is large, it is easy to talk in groups, but the teachers cannot see it), when students operate by themselves, the effect of training will be affected by the different understanding and practical ability of students. From the above point of view, the computer fault detection and maintenance training course is chosen as the pilot course of the college's flip classroom, which is typical of training applied talents in Higher Vocational colleges.

II. SELECTION AND METHOD OF EXPERIMENTAL MODEL
The experimental model selected 92 sophomores majoring in computer hardware and peripherals. In order to compare the samples, the students of the former two classes were divided into two classes: Traditional Classroom and Flipped Classroom. 46 students in each class participated in the training course of computer fault detection and repair for the core courses of the major in the first half of 2015. The teacher is a senior professional teacher. In order to meet the requirement of cultivating applied talents, teachers should make good preparations for the design of flipped classroom, the production of micro-class video and the organization of classroom activities before class, and introduce clearly the teaching mode and characteristics of flipped classroom to class F students. For Class T, teachers teach in accordance with the traditional classroom model, and for Class F, they use the flipped classroom teaching, and send out classroom feedback questionnaires in class. Through statistics and analysis of questionnaires and training results, interviews were conducted
with teachers and some typical students. Based on the above situation, the positive role, constraints and Countermeasures of the flipped classroom in the cultivation of applied talents were discussed.

III. DESIGN OF FLIPPING CLASSROOM

A. Preparation

Teachers design and preparation the teaching materials. Firstly, the courseware is elaborately made. Through the analysis of teaching objectives, teaching contents and teaching objects, according to the key points, difficulties and matters needing attention of computer fault detection and maintenance training project, the video of micro-lesson is collected, produced and sorted out, uploaded to “Superstar” self-learning platform, and the website of the learning platform is communicated to students, so that students can pass through the campus network in computer rooms and dormitories. Look at it over and over again at any time. Then carefully designed classroom teaching activities, including activity theme, activity guide, training evaluation, questionnaire survey, extracurricular learning content, and joint should reflect the training objectives of applied talents. Teachers establish “Wechat Groups” to communicate with students, understand their learning dynamics, and leave more time for students to develop their ability to think self, practice independently and to solve difficulty thing [2].

B. Classroom Reversal

Teachers guide students to watch micro-lesson videos independently after class, and preliminarily learn the relevant knowledge, operation steps and precautions involved in the course training project. When students encounter difficulties, they can communicate with classmates and teachers to solve them [3]. In the classroom, the teacher no longer explains the relevant knowledge, operation steps and matters needing attention of the training, but only takes about 10 minutes to test the learning results, to find out the problems, and then explains and emphasizes them before the students begin to operate. When students operate, the teacher observes one by one in the training room and directs them individually.

C. Detection and Evaluation of Training Skills

Class T and Class F have different teaching modes, but the rest, such as teachers, class time, and the requirements of practical skills testing, are exactly the same. Finally, the results of the two classes are compared. After SPSS (Statistical Product and Service Solutions) software calculation, the non-standardized alpha is obtained. Then, the running mean of the sample is calculated and the paired sample T test is carried out.

IV. STATISTICS AND ANALYSIS OF TEACHING EFFECT

Through the statistical analysis of 92 questionnaires and 92 practical training items, combined with interviews with some students and teachers, the following conclusions are drawn.

A. More Conducive to the Training of Applied Talents

1) The teaching mode of flipping classroom has trained students'ability of autonomous learning [4]. Flipping the classroom makes the teacher change from the leader of the classroom to the promoter and instructor of learning, and the students really become the protagonist of the classroom [5-6]. By comparing the roles of Class T and Class F in teaching through questionnaires, it is found that students in Class F generally think that the role of teachers is small or almost zero, while students in Class T think that teachers play a greater role. In interviews with some students in Class F, students generally believe that by turning over the classroom learning, passive listening and mechanically completing the tasks assigned by teachers has become their own initiative learning, and the learning effect is good. In a sense, it improves students'interest in learning and self-confidence.

2) Flipping the classroom is more conducive to improving students'practical ability. The training of practical ability is an important indicator of applied talents. In the traditional teaching mode, teachers'teaching occupies a large amount of classroom time, and students' operating time is limited. Under the flipped classroom teaching mode, students first watch micro-lesson videos, digest knowledge, and familiarize themselves with project operation process, then teachers answer questions and give key guidance in class.

3) The skills and qualities of students in flip class have been improved. By calculating the training skill scores of the two classes with SPSS software, the non-standardized alpha is obtained, and the alpha interval is 0.918 > 0.9, which indicates that the sample value is ideal and the reliability is high. Mean value calculation and paired sample T test are performed on the samples.

B. An Analysis of the Factors Restricting the Flipping Classroom

There are some difficulties and challenges in the process of carrying out the flipped classroom. The solution of these problems may be decisive for the promotion and implementation of the flipped classroom reform in the future.

1) It is difficult for students to guarantee and control their extra-curricular study time. According to the statistical results of the questionnaire "the number of times to watch the video of Superstar Panya platform micro-class", most students in Class F can watch the video consciously after class, 12 students can watch the video twice or more, and 3 students have never watched it. Although some students watched the video, they did not always keep learning in the process of watching it. Some of them were entertainment and could not learn to understand the content of each micro-lesson video. Through questionnaires, "Where is the extra-curricular time spent?" 30 students reflected that sophomores had more courses, most of which were professional courses. They did not have enough time to watch micro-lesson videos. Some students simply played videos while completing other extra-curricular assignments. Too much course work and a lot of
homework also lead to the important factor that students can use to flip the time limit before class. Once students fail to complete the pre-class learning tasks assigned by the flipped classroom before class, classroom teaching activities will be difficult to carry out as planned, and the flip may end in failure [5].

2) Teachers' workload is too heavy. Compared with traditional teaching methods, flipping classroom teaching method requires teachers to spend more time and energy designing teaching materials. There are two specific reasons: one is that the curriculum needs to re-prepare lessons, design new teaching plans and courseware; the other is that it takes a lot of time and energy to make micro-lesson videos. Making a small video about 8-10 minutes to make a training project speak clearly and vividly step by step requires teachers to study the training content, refine language, select appropriate scenes, design pictures and so on. The implementation of flipped classroom puts forward more requirements for teachers, which not only increases the workload of teachers, but also requires teachers to change the traditional teaching methods and teachers' identity. Teachers from the "front" to "behind the scenes", seemingly reduced workload, but in fact, teachers take into account the dual identity of "actor" and "director", not only need to "play" a good turn over the classroom "drama", but also "director" a good turn over the classroom "drama", pay much more labor than the traditional classroom.

3) There is a contradiction between the cost and quality of video production. In order to make a micro-course video of a course, teachers need to invest a lot of time and energy to record the video. Teachers, as non-professionals, spend a lot of time and energy on video recording and post-audio and video processing to familiarize themselves with and master the methods and skills of video recording equipment and post-audio and video processing software. In addition, for teachers who have been accustomed to teaching in front of students, it also takes time to adapt to the course recording process of "talking to themselves" in the face of cameras, handwritten boards and computers. However, teachers' hard-made micro-lesson videos may not get the corresponding return. First, the quality of micro-lesson videos is inevitably unsatisfactory. Secondly, students' learning time is difficult to control, and the learning effect may not be as good as the traditional classroom.

C. Strategies for Solving Constraints

According to the factors that restrict the development of flipped classroom, combined with the characteristics of higher vocational education and applied talents, the following solutions are put forward.

1) Ensure that students can study in depth after class. There are two key points in flipping classroom: first, in-depth learning really takes place after class; second, efficient use of classroom time to exchange learning experience and collide views, deepening students' cognition [6]. The occurrence of the first key point determines the implementation of the second key point. Firstly, teachers should arrange the learning contents and requirements of each lesson to the students in advance, and carefully make micro-lesson videos, ensure the quality of micro-lesson videos, stimulate students' interest in learning, and form a good habit of watching micro-lesson videos independently after class. Secondly, teachers should grasp the students' learning dynamics, strengthen the supervision and management of students, and ensure that students can truly learn after class by training class contacts.

2) Encourage more teachers to participate in the flip class. We should reduce the workload of teachers, encourage their enthusiasm for flipping classes, and encourage more teachers to participate in flipping classes. As with traditional teaching, a course can be taught by many teachers together. The difference is that the flipped classroom can be studied by many teachers together, teaching plans and courseware can be compiled, micro-course videos can be recorded together, and a course can be divided into several teaching units. Each teacher is responsible for the flipped course of one teaching unit. Video recording of classroom design, teaching and micro-lessons. Such a large task can be divided into several small tasks. The teaching content has not changed, but the workload of teachers has been greatly reduced.

3) Reference and utilization of open educational resources platform. Learning from and utilizing good resources is a shortcut or means to achieve the goal. An ideal video of micro-lesson does not necessarily need to be recorded by teachers themselves. In addition, in recent years, various open education resource platforms, such as excellent resource sharing courses, open online courses, MOOC, have been gradually popularized. Teachers can make full use of these open resources to produce new micro-lesson videos or borrow existing excellent micro-lesson videos directly to complement each other, enrich and optimize micro-lesson videos. Similar methods can greatly reduce the production cost of micro-lesson video, and improve the quality of flip classroom teaching, with twice the result with half the effort.

4) Establish an evaluation system for training applied talents in higher vocational colleges. Higher vocational education is to train high-skilled applied talents with certain management ability. The requirement of theoretical study is practical, sufficient and usable, with emphasis on training practical operation ability. In order to test the effectiveness of the training of applied talents in vocational colleges, some evaluation indexes should be added to the flipped classroom. Starting from the above, it is suggested to make a comprehensive evaluation from seven aspects: whether the design of teaching plan and courseware reflects the training objectives of higher vocational education; whether the micro-class video is concise and easy to understand; whether the micro-class video viewing platform is sound; whether teachers can effectively transfer the traditional classroom to the flipped classroom; whether there is a communication platform between teachers and students, inside and outside the classroom. And timely communication and discussion; whether students can independently and effectively learn
micro-lesson video and exploratory learning; whether students can solve difficult problems through communication and cooperation with others. In addition, we can also incorporate the flipped classroom into the evaluation of teachers' professional titles and the scoring items of the first evaluation, to encourage teachers to do a good job in the teaching of the flipped classroom, and to cultivate more applied talents in higher vocational colleges.

V. CONCLUSION

Flipping classroom fully embodies the teaching concept of "student-centered, teacher-led" [7]. Through the reversal of classroom teaching results, students' autonomous learning ability, cooperative learning ability and learning effect have been improved to a certain extent, and teachers have also been transformed and improved in teaching concept. It can be expected that the flipped classroom will become an important paradigm of training applied talents in higher vocational colleges. However, there are great differences in professional categories and curriculum coverage in higher vocational colleges, and the training target talents required by different specialties are also different. Discussing the applicability of flipped classroom also needs to be studied in combination with disciplines, specialties and curricula. However, there are reasons to believe that through the development of the flip classroom in higher vocational colleges, more excellent applied talents will be trained to serve the society.

REFERENCES