

Research and Practice of Flipped Classroom to Promote Autonomous Learning of Higher Vocational College Students

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Abstract: In recent years, due to the continuous enrollment expansion of higher vocational colleges in China, the quality level of higher vocational college students is uneven, and the learning ability of them has declined. Flipping classroom is a new teaching mode which can stimulate students' interest in learning and realize students' individualized learning. This paper introduces the teaching mode of flipped classroom in the course of "Android Programming Foundation". The investigation and analysis of the implementation effect of flipped classroom shows that this mode improves the effect of students' autonomous learning. Compared with the traditional teaching mode, students' learning objectives are clearer, they participate in learning activities more actively, and their learning outcomes are more effective. However, how to make learning plans and arrange learning time reasonably still needs further guidance from teachers.

1. Introduction

Vocational education is an important part of higher education in China. Teaching quality is the lifeline of the quality of higher vocational education, which has an important impact on the quality of personnel training. Its advantages and disadvantages directly affect the development of higher vocational education. Therefore, how to improve the quality of teaching in higher vocational colleges has become a problem worth pondering and researching. With the advent of the popularization of higher education, the government has begun to vigorously support higher vocational education, and formulated the enrollment expansion policy of higher vocational colleges. At present, the structure of higher vocational students presents a variety of characteristics, including college entrance examination students, students taking part in the high school academic level examination, 3 + certificate students in secondary vocational schools and five-year students in secondary and higher vocational colleges. This leads to a certain gap between higher vocational college students' cultural knowledge level and ordinary undergraduate students. There are widespread phenomena: students' learning foundation is weak, learning motivation is insufficient, lack of self-confidence, lack of effective learning methods, and lack of self-control [1][2]. On the other hand, according to relevant research, it is found that higher vocational college students' learning values tend to be more practical, hoping to learn practical technology and practical skills [3]. The traditional classroom teaching method, which mainly focuses on teaching knowledge, cannot attract higher vocational college students' interest in learning, nor can it stimulate their internal driving force of independent learning. As a new "student-centered" teaching mode, flipped classroom is attracting wide attention from researchers worldwide [10]. In order to promote the reform of classroom teaching in Higher Vocational Education and improve the quality of teaching, many higher vocational colleges have introduced the flipped classroom teaching mode into classroom teaching practice [4]. The existing research on flipped classroom mainly focuses on theoretical research and teaching practice, and there are few empirical studies to improve students' learning effect.

This paper considers the learning characteristics of higher vocational students and the characteristics of the course "Android Programming Foundation", and introduces the flipped classroom teaching mode into teaching practice. The investigation and analysis of the implementation effect of flipped classroom shows that this teaching mode promotes students' autonomous learning.

2. Teaching design based on flipped classroom

As a new teaching mode that reverses traditional classroom and realizes students' individualized learning, flipped classroom has attracted great attention from researchers and teachers at home and abroad in recent years [5]. Different from the traditional classroom teaching mode, the reversal of classroom teaching mode enables students to complete knowledge learning outside the classroom, while the classroom becomes a place for teachers and students to interact with each other, including answering questions, solving questions, exploring the application of knowledge, displaying results and so on, in order to achieve better teaching and learning effect. Flipped class divides the learning process into three stages: pre-class, in-class and after-class. In the pre-class stage, students mainly master the basic knowledge and they acquire more knowledge in related fields through the resources provided by autonomous learning. In class, teachers organize classroom activities to promote students to think deeply and practice what they have learned. After class, the students continue to deepen and expand their knowledge and skills according to the tasks assigned by the teachers. According to the essence of the flipped classroom, the overall teaching design process based on the flipped classroom is shown in Fig. 1.

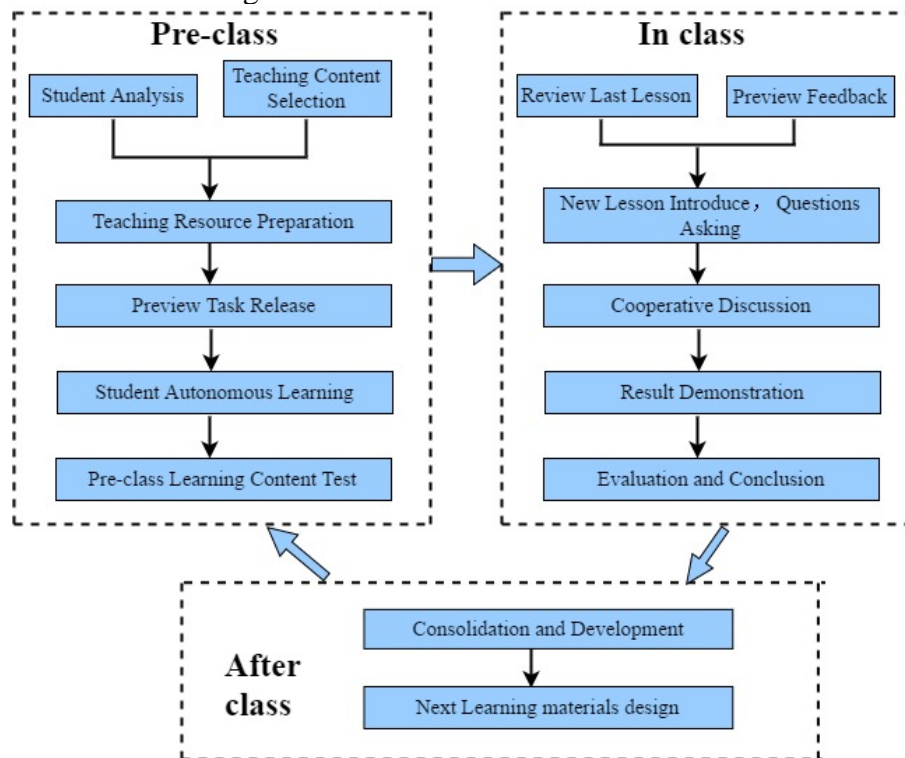


Fig.1 Overall teaching design process based on the flipped classroom

Taking the course "Android Programming Foundation" as an example, this paper chooses "Activities Jump and Data Transfer" as the teaching content. According to the curriculum standards, personnel training program and learning situation analysis, as well as the professional ability requirements of Android Development Engineer positions, the knowledge and skills objectives of this lesson are determined. Based on the flipped classroom teaching model, the design of the teaching process of this lesson is shown in Fig. 2.

3. Investigation and analysis of the implementation effect of flipped classroom

Flipped classroom teaching mode, by reversing the teaching process, creates conditions for students' autonomous learning in time and space, and learners' autonomous learning has become the key to the successful development of flipped classroom teaching [6].

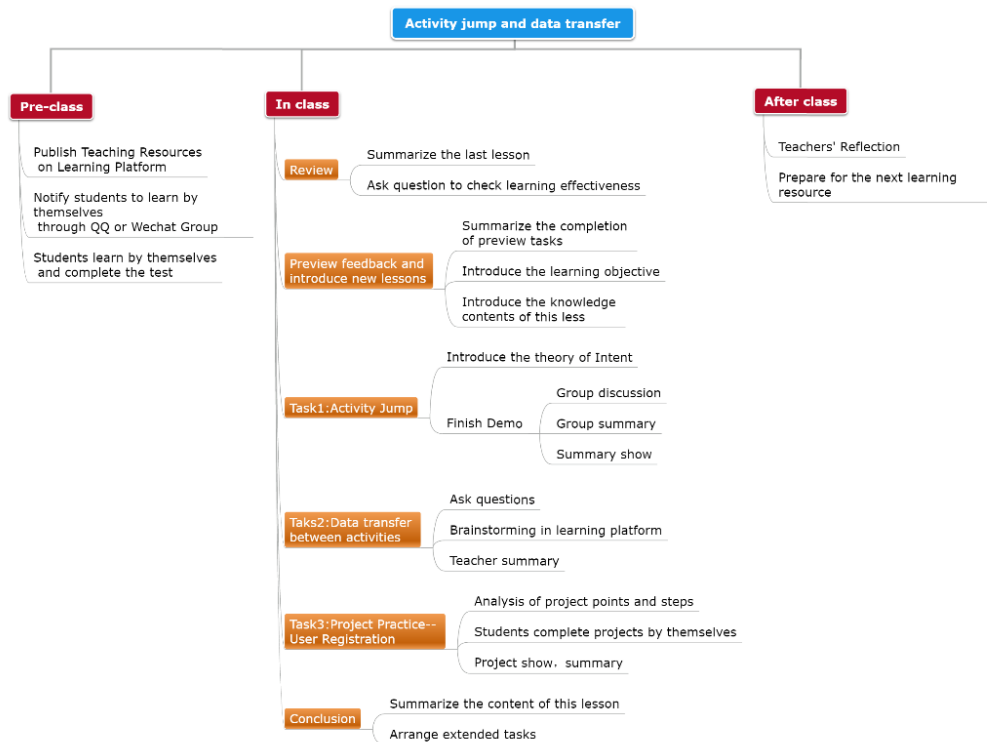


Fig.2 Design of the teaching process of this lesson

There is no strict definition of autonomous learning at present. Zimmerman, a famous foreign scholar, has proposed a very classical model of autonomous learning, and he divides autonomous learning into three parts: planning, behavior or will control and self-reflection [7]. Professor Weiguo Pang of East China Normal University believes that autonomous learning is essentially a process in which learners actively regulate and control the whole learning process, they have clear learning objectives and learning plans, and can monitor the learning process, evaluate the learning results and adjust their learning states [8]. The cultivation of autonomous learning ability is a long process. The purpose of this study is to stimulate and exercise students' self-regulated learning behaviors by designing teaching activities and student activities to promote self-regulated learning based on flipped classroom, to gradually improve students' autonomous learning ability. Based on the characteristics of learner autonomy in flipped classroom, this study designed a questionnaire from four dimensions: learning motivation, learning objectives, learning methods and learning gains. The choice of the question is a 5-level Richter scale [9], i.e. "very agree", "agree", "general", "disagree" and "very disagree". They are assigned 5, 4, 3, 2 and 1 points respectively. The survey was conducted among 56 learners in the course of "Android Programming Foundation". All the questionnaires were valid. The results of data analysis demonstrate that the average score of learners on all questions of the implementation effect of flipped classroom is 4.16 (variance is 0.006), and the proportion of learners who choose "very agree" and "agree" with each other is more than 80%. Thus, in the course of "Android Programming Foundation", the teaching mode of flipped classroom has been highly recognized by students. As shown in Table 1, there are obvious positive self-evaluation on all questions, which indicates that students fully recognize the effectiveness of self-learning under the flipped classroom model. The dimension with the highest score is learning motivation, with an average of 4.26, which indicates that students' subjective learning motivation is stimulated. Secondly, the dimension of learning goals, with an average of 4.16, shows that students' learning goals are clear both before and in class. Thirdly, the dimension of learning methods, with an average of 4.15, shows that under the flipped classroom teaching model, learners can independently complete pre-class self-study, actively participate in classroom activities, such as brainstorming, group collaboration discussion and summary, and project development. Among them, 82% of the students announce that they could study actively and make full preparations for each flipped classroom lesson. The

dimension with the lowest score is learning gain, with an average score of 4.12. Among learning gains, learners have a slightly higher recognition of deepening knowledge understanding and improving problem-solving ability. However, learners have the lowest degree of approval for the reasonable arrangement of learning time and the formulation of learning plans, which are 4.07. This result illustrates that teachers need to guide students further, help them manage their learning time efficiently and arrange their learning tasks reasonably.

Table 1 Questionnaire on the Effect of Flipping Classroom Implementation

Demension	No	Questions	Scores
Learing motivation	Q1	Compared with the traditional teaching mode, I prefer to take part in the teaching mode of flipped classroom.	4.36
	Q2	Compared with the traditional teaching mode, I devote more time and energy to pre-class study.	4.16
Learing Objectives	Q3	In pre-class learning, I can always understand the main teaching content of the resources provided by teachers, and have clear learning objectives.	4.09
	Q4	In classroom teaching, I can always understand the teachers' teaching intentions and have clear learning objectives.	4.2
	Q5	In the process of completing the individual and group collaborative tasks assigned by teachers, I have clear learning and action objectives.	4.2
Learning methods	Q6	I can take the initiative to study and make full preparations for each flipped classroom lesson.	4.18
	Q7	I can work independently or in collaboration with small groups to complete the learning task of flipped classroom lesson.	4.13
	Q8	I like to share our learning outcomes in class very much.	4.16
Learning gains	Q9	In the flipped classroom teaching mode, I will arrange learning time more reasonably.	4.07
	Q10	In the flipped classroom teaching mode, I will make a more reasonable learning plan.	4.07
	Q11	In the flipped classroom teaching mode, I have a deeper understanding of knowledge.	4.14
	Q12	In the flipped classroom teaching mode, my ability to solve problems has improved.	4.2

4. Summary and Prospect

This study shows that through the implementation of the flipped classroom teaching model, students' autonomous learning ability has achieved satisfactory results in four aspects: learning motivation, learning objectives, learning methods and learning gains. Flipped classroom teaching mode can promote higher vocational students' autonomous learning, but the effect of this mode on learning gains still needs to be improved. In the process of implementing the flipped classroom, several import problems are found: (i) The quality of students' pre-class learning is the key to implementing the flipped classroom teaching. If students do not complete the corresponding autonomous learning tasks before class, it is impossible to organize effective discussions in class, and it is impossible to turn over the classroom. (ii) Network teaching platform can provide support for the design of teachers' flipped classroom teaching activities. Teachers should fully grasp the individual and group learning situation of students before class. (iii) Flipped classroom teaching mode cannot replace all teaching forms. Teachers should analyze the reality and feasibility of its implementation from the aspects of teaching contents, students' characteristics and teaching conditions. Any teaching reform is not achieved overnight, but is growing and developing in practice. The teaching mode of flipping classroom improves the effect of teaching and learning through the way of autonomous

learning, and further promotes the improvement of students' autonomous learning ability. In the future, we will expand the research objects, so that this teaching mode can be applied to more students. Moreover, we will carry out multi-round teaching practice to make the learning mode more perfect, enrich the theory of autonomous learning, and guide the further development of curriculum teaching. We also hope that this study can provide reference for the follow-up study of teaching reform in the flipped classroom.

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