



Quantitative Analysis and Research on Flipped Classroom Teaching Method

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ABSTRACT

Education is an important way to improve the quality of the working population. To improve the teaching effect, people are actively exploring more effective teaching techniques. The flipped classroom teaching method is one of them. The research of this article is divided into two parts. The first part uses quantitative methods to analyze the learning effects of learners who use flipped classrooms. The second part uses the interview method to understand the learner's work situation, to analyze whether the flipped classroom can improve the learner's work ability. The results of the two parts of the research show that the flipped classroom has a positive role in improving the learning effect and working ability of learners. In the research, it is found that the flipped classroom has a certain guiding effect on the learner's choice of occupation.

Keywords: *Flipped Classroom, Educational Technology, Learning Effect, Cultivating Work Ability*

I. INTRODUCTION

In the past 30 years, China has undergone great changes in various educational fields including educational technology. The Chinese government encourages the use of different educational technologies to achieve more ambitious economic and social development goals, which has also become an important catalyst for the development of China's education. The combination of online and offline education technology is a way to change the effect of previous education. Students master the basic knowledge of the course through online learning before class, and apply and discuss knowledge in class under the guidance of the teacher. Because this learning method is completely different from previous learning methods, it is also called "Flipped classroom".

In recent years, due to the widespread popularity of flipped classroom teaching technology, teaching staff of writing methods have begun to pay attention to flipped classrooms and their potential to help students develop and apply writing skills more proficiently. In higher education, Crouch and Mazur are regarded as early practitioners in the application of flipped classrooms in teaching (Crouch & Mazur, 2001). The teaching methods of flipped classrooms (Vazquez & Chiang, 2015) and how students view flipped classroom learning (Roach, 2014) have been well studied. Many disciplines have carried out the research and application of flipped classrooms (Giannakos, Krogstie & Chrisochoides, 2014). Some papers found that flipped classroom teaching methods have a positive impact on learning outcomes (Van Sickle, 2016), and some researchers believe that flipped classroom teaching methods have no significant impact on learning outcomes (Psihountas, 2018). Most of the existing researches focus on the learning effects of flipped classrooms, and the research on the application of the knowledge learned by the learners using flipped classrooms in work has not been found yet. Our goal is to try to fill this gap through the research of this article and supporting articles.

II. RESEARCH METHOD

This research mainly adopts quantitative research methods, supplemented by qualitative analysis methods of interview analysis, to observe and analyze whether the flipped classroom has a positive effect on the learners' working ability. Use quantitative research to analyze whether learners promote learning effects in flipped classrooms.

In this study, 85 students majoring in e-commerce in 2017 at a university were divided into 42 experimental classes and 43 control classes. The experimental class adopts the teaching technique of flipped classroom. The control class adopts traditional teaching methods.

There is no obvious difference between the students in the two classes in their previous knowledge base, learning ability and learning habits. In the teaching process research, the teaching ability and teaching conditions of the teachers in the two classes are basically the same, and there is no obvious difference.

The above methods are used to ensure the validity of the teaching data collected during the research process. The duration of the study is 1 year. Half of the year is the course study time, and the other half year is the time to work in the company. During study time, through questionnaires to investigate the students' learning interest and the development of study habits, the study results are collected to analyze whether there are significant differences between the two classes. During the working hours of the company, through interviews with the company where the learners are located, they can learn about their work performance, work ability and other information during their work.

III. RESEARCH AND DISCUSSION

3.1 The Implementation Process of The Flipped Classroom

To study the implementation effect of the flipped classroom teaching method, we carefully designed the teaching process of the flipped classroom. And set up control classes to use traditional teaching methods for teaching. There is no obvious difference between the teachers in the two classes in terms of teachers' educational background, teaching age, teaching experience and teaching ability.

Pre-class session: The core point of this session is that learners master theoretical knowledge through online learning. Teachers sort out the key points of curriculum knowledge and the ability requirements of related jobs, form a curriculum knowledge framework, and then disassemble it into multiple teaching modules. According to the teaching goals to be achieved by each teaching module, organize the knowledge points to form learning materials, including text descriptions, audio, video, design chapter study guides, learning tasks and test questions, and push them to students through the online learning platform. Under the guidance of the learning guide, students accept learning tasks, understand learning goals, complete knowledge learning online within the specified time frame, complete knowledge points quizzes and upload the result works to the learning platform. The learning platform records students' learning behaviors and learning results, quantifies learning results, provides teachers with analysis of student learning conditions, and provides a basis for continuous improvement in the implementation of the next stage of teaching. When online learning encounters problems, students can ask questions through the platform, and teachers will answer the questions online.

In-class session: The core point of this session is that learners display learning results, and promote learners to master knowledge through the display of results, discussion and analysis, and classroom discussions. Students publicly display their learning achievements and explain the thinking process of copywriting. Other students ask questions and discuss. Teachers summarize and comment, explain important and difficult knowledge, give individual guidance to students' individualized problems, and guide students to think about the advantages and disadvantages of the results based on the existing knowledge. Teachers examine students' participation in classroom activities through classroom situations, as well as students' optimization of their own learning results after participating in classroom discussions, quantify students' classroom learning effectiveness, discover deficiencies, and make further improvements. Due to limited classroom time, it is impossible to display and discuss students' works one by one. Students take turns to display the results of their work, and those who have not displayed the results participate in the activities by listening, asking questions, and comparing and analyzing their own results. Teachers should pay attention to the guidance analysis, discussion and solution of students' individualized problems in the course of the class, and encourage students to use their knowledge points flexibly in the creative process.

After class session: The core point of this link is to simulate the working environment and complete the work tasks. Cultivate students' work ability through work tasks, realize work ability requirements and master knowledge in work tasks. The study in this link requires students to master theoretical knowledge, and on a certain practical basis, carry out activities for work tasks. In the teaching process, since the students did not actually enter the work scene, teachers are required to organize auxiliary reference materials to appropriately decompose work tasks and complete guidance.

3.2 Course Learning Data Analysis

Assumptions:

H0: The average academic performance of the two classes is equal.

H1: The average academic performance of the two classes is not equal.

Alpha = 0.05

The results of the analysis of variance:

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Test class	42	3534.75	84.1607	73.0543
Control class	43	3294	76.6047	111.209

ANOVA

Source of Varianc	SS	df	MS	F	P-value	F crit
Between Group	1213.08	1	1213.08	13.1341	0.0005	3.95596
Within Group	7666.01	83	92.3615			
Total	8879.09	84				

Decision:

F test (13.13) > F crit (3.96)

Accept H1.

Conclusion: From the above data analysis, it can be found that different learning methods have different learning effects for learners.

To further verify, we further analyze whether there are significant differences in the learning effects of the two classes.

Assumptions:

H0: There is no significant difference in the learning effects of the two classes.

H1: The learning effects of the two classes are significantly different.

Alpha=0.05

t-Test: Two-sample Assuming Unequal Variances		
	Test class	Control class
Mean	84.16071429	76.60465116
Variance	73.05433362	111.2090255
Observations	42	43
Hypothesized Mean Difference	0	
df	80	
t Stat	3.633039543	
P(T<=t) one-tail	0.000246539	
t Critical one-tail	1.664124579	
P(T<=t) two-tail	0.000493077	
t Critical two-tail	1.990063421	

Decision:

t Stat (3.63) > t crit (1.99)

t is significant.

Accept H1.

Conclusion: There is a significant difference between the learning effects of the two classes. From the average point of view, the learning effect of the experimental class (84.16) is better than that of the control class (76.60). From the analysis of variance, the stability of the learning effect of the experimental class (73.05) is better than that of the control class (111.21). The above analysis can prove that the teaching method of flipped classroom can promote the learning effect of learners.

3.3 Business Process

We use the form of interviews to complete this part of the survey. The interviewees are the managers of the company where the surveyed person belongs, including the person in charge or middle management of the company who knows the specific work situation of the surveyed person. The purpose of designing the interviewees in this way is to ensure that the interviewee understands the work situation of the surveyed person and to ensure the validity of the survey data.

In terms of the content of the survey, we selected four aspects of work ability (work performance), work attitude, collaboration ability, and learning ability. Because these learners were scattered to work in 32 companies, and some jobs were not directly related to the content of the course learning, only 34 learners whose work content was closely related to the course learning content were selected at this stage (including 21 in the experimental class, Follow up with 13 students in the class). These learners were scattered into 14 companies. All enterprises are related to e-commerce, and they have provided necessary training for new recruits. In the survey, the interviewees were not told about the differences in learning styles.

We conducted interviews and surveys with 14 companies where the learners were located, sorted out the conversation records of the interview process, and obtained the following information.

There is no big difference in work performance and work attitude. Although the business content of each enterprise is related to e-commerce, there are industry differences, so it is impossible to adopt a unified standard to measure work performance. We mainly examine the accomplishment and effect of the research object on the task. In the survey, it was found that only one company expressed special praise to one student (experimental class), "This employee has a very good way to solve problems. The work effect is very good, and my customers are very satisfied." Other companies have expressed their praise. Investigators can meet basic work requirements and are qualified in terms

of work performance. In terms of work attitudes, the respondents have all been evaluated as good or above.

The learners in the experimental class performed better in terms of collaboration ability and learning ability. In terms of collaboration ability, all the research subjects have been well evaluated, including *"They can cooperate with the work. They are quickly integrated into the team. They cooperate well with their colleagues."* Among them, four students in the experimental class were evaluated as *"They have empathy. They are good at observing the emotions of others. They are happy to communicate with customers"*. The evaluation of the learning ability of the learners in the experimental class and the ability of independent access to data is significantly better than that of the students in the control class. The evaluation of the company is *"comparable to find ways to check data, go to study after get off work, and do not complain about working overtime and solving problems. Strong ability"* and so on.

In the choice of the learner's employment direction and the data of the company's employment, we can find that the learners of the experimental class are more interested in the work related to the course, and the probability of being hired is higher. The number of learners in the experimental class was 21, while the number of learners in the control class was 13. After investigating companies and jobs, we learned that learners who successfully entered the company chose these companies on their own initiative and entered the company through the recruitment process such as face-to-face interviews. This information can prove from the side that the flipped classroom has a positive guiding effect on the learner's choice of career.

The above investigation and research prove that the use of flipped classroom teaching methods does not significantly improve students' work ability, but it has obvious improvement in the work quality of students' collaboration ability and learning ability. Therefore, we believe that the knowledge and abilities learned through flipped classrooms can play a positive role in work.

3.4 Discussion on the Use of Flipped Classrooms for Lifelong Learning.

From the research, we can get that the flipped classroom can bring positive and positive effects to learners. Reasonable use of flipped classroom teaching methods will help learners better master the course knowledge. Such a positive influence will be brought into the learner's work process, which will have a positive effect on work skills and work abilities.

Because half of the time in flipped classrooms, learners conduct self-study through the Internet. This feature has brought greater convenience to the lifelong learning of the social workforce. Learners can learn knowledge points through the Internet, and then use this knowledge to complete the work. Such learning behaviors promote the learners to better understand and master course knowledge. Then examine the quality of the work through display, communication, and discussion, which will bring moderate learning pressure to learners. Appropriate pressure and good learning methods can improve the enthusiasm and effectiveness of learners to participate in learning, and further promote their mastery of curriculum knowledge. We believe that flipped classroom will become one of the important technologies for lifelong learning.

IV. CONCLUSION

This research uses the flipped classroom teaching method to study the students' learning effect and effective work ability training. In order to test whether the teaching technology can promote the teaching effect, the experimental class and the control class are designed, and the teaching is carried out under roughly the same objective conditions. This design ensures the validity of the collected data. Using quantitative methods to analyze the learning effect of the course, it is concluded that the performance of the experimental class is better, which means that the teaching method of the flipped classroom has a better promotion effect on the learning effect of the learners. Use interviews to track the work of these learners after entering the company. The study found that the learners in the experimental class had better performance in collaboration and learning abilities. This can prove that the teaching method of flipped classroom can promote the learner's work ability. Through extended analysis and discussion, we believe that flipped classrooms can help the social workforce achieve lifelong learning.

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