

# *Reform and Practice of Blended Teaching Mode in Statistics Flipped Classroom*

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**Abstract:** Based on the concept of "student-centered", a flipped classroom blended teaching "theoretical model" is formed that is guided by course objectives, organically combines video autonomous learning, experimental training exercises, case analysis and discussion, and research report writing; Based on the course objectives, this paper explore a flipped classroom blended teaching "practical path" that integrates pre-class knowledge learning, in class presentation and discussion, and post class expansion and improvement; Based on the concept of "exam learning", this paper develop and implement a flipped classroom mixed "formative" assessment system that combines online and offline, and unifies groups and individuals with the concept of "breaking down the whole into parts, saving and withdrawing from the whole".

## 1. Introduction

Flipped Classroom, also known as "Flipped Classroom" or "Inverted Classroom," refers to the readjustment of time inside and outside the classroom, shifting the decision-making power of learning from the teacher to the students. Before class, students complete knowledge input through video lectures, reading e-books, reviewing materials, and discussing with classmates; In class, students are more focused on project-based active learning, working together to analyze and solve problems, and completing knowledge internalization; After class, students gain more authentic learning through practice and complete knowledge output. Blended teaching is an "online" and "offline" teaching method that combines the advantages of online teaching and traditional teaching. Flipped classroom blended teaching can lead learners' learning from shallow to deep to deep learning.

In the important discourse on education, China proposes the need to deepen education and teaching reform, and to implement the results of teaching reform and innovative exploration into curriculum construction. For example, based on MOOC, SPOC, or other online courses, appropriate digital teaching tools should be used to transform the school's curriculum in combination with the actual situation of the school <sup>[1]</sup>. Students should implement online self-directed learning, and organically combine it with offline teaching to carry out flipped classrooms and blended teaching, Create a deep integration of online courses with our school's classroom teaching.

The statistics course is a shared offline course for education in Jiangxi Province's universities in 2018, and a high-quality online open course in Jiangxi Province in 2020. As a fundamental course

for undergraduate majors in economics and management, it is a methodological science that studies the overall quantitative aspects of a large number of social phenomena (mainly economic phenomena); People understand the regularity of the development of social phenomena through the study of various quantitative relationships in social phenomena. After years of theoretical research and practice, the teaching team has explored the 'four in one, three step flipped classroom hybrid teaching model', implemented the 'student centered' educational philosophy, and basically achieved the highest pursuit of students' genuine love and lifelong benefit.

## **2. Transforming from "teacher centered" to "student centered"**

In traditional statistics teaching, although it is reasonable, there are also many problems that are not conducive to achieving the goals of statistics teaching. In traditional statistics teaching, the main role of students is passive indoctrination, and their learning is in an "alienated" state. The difficulties faced include: firstly, learning knowledge is easy, but applying it is difficult; Secondly, it affects the cultivation of independent thinking, judgment, and innovation abilities; Thirdly, it is not conducive to the cultivation of autonomous learning ability; Fourthly, it is not conducive to cultivating teamwork awareness and skills among college students. The key concept for the success of teaching reform is to shift from "teacher centered, student centered" to "student centered, teacher centered"<sup>[2]</sup>. Only with a 'student centered' approach can professional education better penetrate the ear, brain, and heart. The transformation from a "teacher centered" to a "student centered" approach is imperative and urgent for university teaching.

## **3. Theoretical Model and Practical Path of Hybrid Teaching in Flipped Classroom of Statistics**

The forms and methods of statistics teaching serve the teaching content and objectives. Without specific content, even the best methods will become empty and meaningless. The main teaching objective of the statistics course is to reflect and achieve through the organic and effective integration of values, knowledge, abilities, qualities, and ideological and political goals in teaching, based on the school's positioning and professional talent cultivation goals. Specifically manifested as:

### **3.1 Value objectives.**

The teaching of statistics courses first focuses on the requirements of the builders and successors of the socialist cause with Chinese characteristics in the new era, playing the role of curriculum education and value guidance, and integrating moral education and ideological and political work into the entire process and system of statistics teaching.

### **3.2 Knowledge objectives.**

The teaching of statistics courses helps students achieve the goal of exploring basic theories and methods of statistics by implementing the "student centered" teaching philosophy, introducing subject competitions and social research.

### **3.3 Capability objectives.**

The teaching of statistics courses promotes the development of students' learning and critical thinking abilities through the concept of "gender equality" in the process of "learning by doing and

learning by doing".

### 3.4 Quality objectives.

The teaching of statistics courses is committed to adapting the quality of talents to the characteristics of the times, social and economic needs, talent cultivation goals, and student personality development.

### 3.5 Ideological and political goals.

By combining relevant cases and using ideological and political courses, students are equipped with statistical literacy, professional ethics, the ability to meet the opportunities and challenges of the big data era, and the scientific thinking of materialist dialectics.

In order to effectively achieve the curriculum teaching objectives, the teaching team is based on the "student-centered" education concept, where students no longer revolve around teachers, but rather teachers revolve around students. Students become the protagonists in the classroom, while teachers are only the instructional designers, learning guides, and facilitators behind them. A flipped classroom blended teaching "theoretical model" (as shown in Figure 1) has been constructed, which includes video self-directed learning, experimental training exercises, case analysis and discussion, and research report writing as a "four in one" organic unity. On the basis of completely changing the traditional classroom appearance, the integration of theory and practice in statistics courses has been efficiently achieved. **Video self-directed learning:** Accurately grasp theoretical knowledge points, lay theoretical support for analyzing and solving problems, and enhance learning engagement and fun; **Experimental Training Exercise:** Guide students to learn through self-compiled SPSS experimental training notes, which helps them master statistical methods; **Case analysis and discussion:** Students improve their ability to apply theoretical knowledge to solve practical problems and stimulate collective creativity and cooperation awareness by conducting case studies on award-winning works such as previous market research and analysis competitions; **Research report writing:** Through social research, writing research reports, and participating in subject competitions such as market research and analysis competitions, students' abilities to understand, analyze, and solve problems have been effectively improved<sup>[3]</sup>. Through the reform of teaching models, students' enthusiasm, initiative, and creativity in learning have been effectively stimulated, and the quality of statistics teaching has been effectively improved.

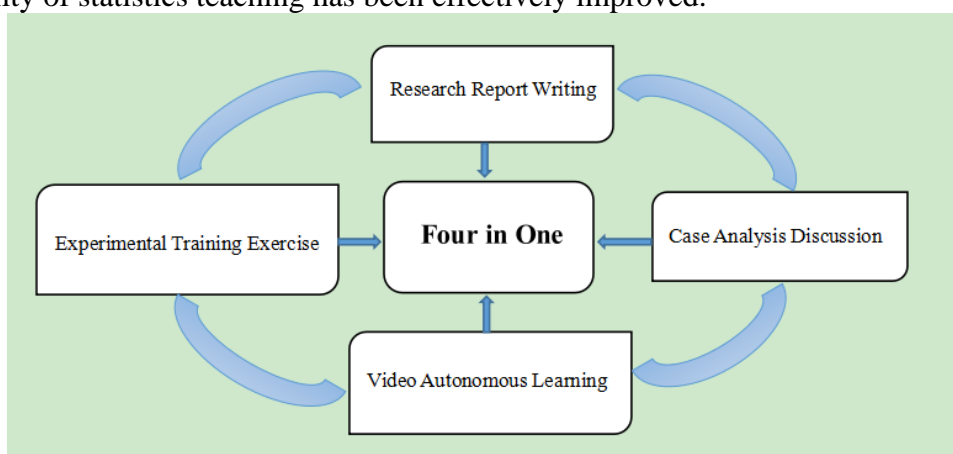


Figure 1: Content Setting of the "Four in One" Hybrid Teaching Model in the Flipped Classroom of Statistics

The "three step" flipped classroom blended teaching "practical path" of pre class knowledge

learning, in class presentation and discussion, and post class expansion and improvement (as shown in Figure 2) has solved the problem of students' lack of autonomy caused by "mechanized indoctrination" and achieved a "nonlinear positive feedback" mechanism for learning. In this mode, students discover problems in their learning through video learning, bring them back to the classroom to participate in discussions and solve problems. Returning the initiative in learning to students and making them truly 'learners' of autonomous learning is conducive to the cultivation of lifelong learning abilities<sup>[4]</sup>.

#### 4. A Hybrid "Formative" Assessment System for Flipped Classroom Statistics

A reasonable examination method is the basic guarantee for the effective operation of teaching design and the smooth realization of teaching objectives. The teaching team has developed an examination system based on the concept of "exam learning", which combines online and offline examinations and unifies individual and group examinations. The system aims to guide and motivate students to engage in diverse learning in statistics courses. This examination method effectively achieves the educational concept of "student centered" and the teaching objectives of statistics courses.

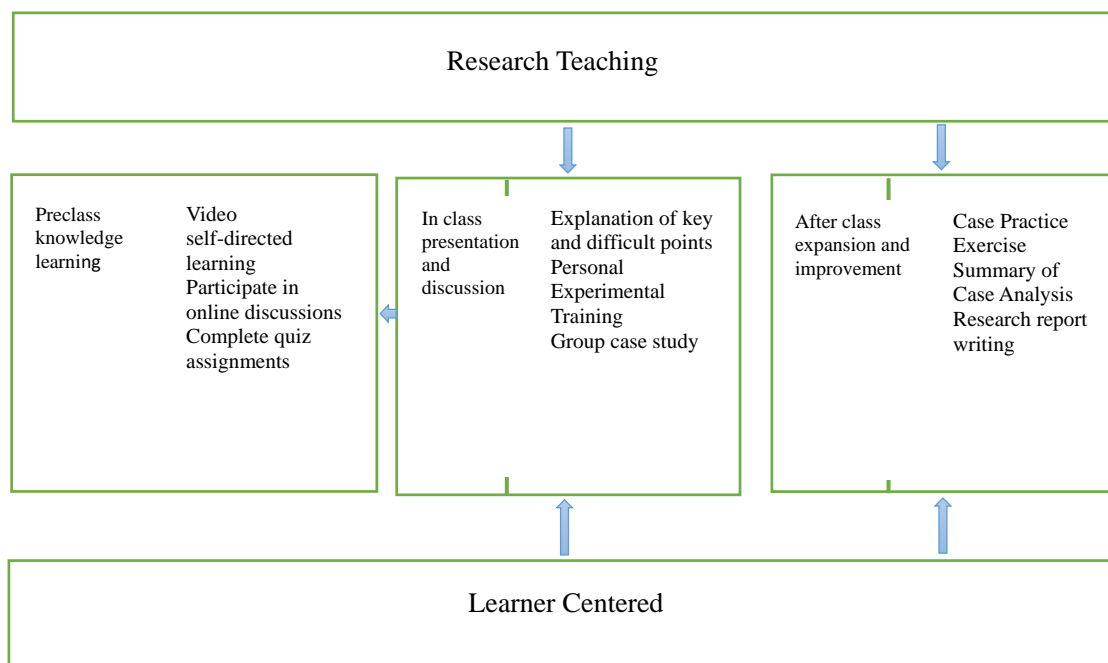


Figure 2: The "Three Step" Model of Hybrid Teaching in Flipped Classroom of Statistics

## 5. Conclusion

### 5.1 The role of students: from passive indoctrination to active learners

In traditional classrooms, students mainly passively receive knowledge taught by teachers. In the 'four in one, three step' flipped classroom hybrid teaching mode, students actively learn video theory, discuss case studies, and discuss practical problems, and the passive indoctrination learning mode is transformed into active exploration. In traditional classrooms, teachers speak and students listen. Flipped classroom: Three steps: pre class knowledge learning, in class presentation and discussion, and post class expansion and improvement<sup>[5]</sup>. In the flipped mode of statistics courses, all learning processes revolve around the student center, and they become the main body of "creative learning"

in learning practice, fundamentally solving the problem of transitioning from "mechanical indoctrination" to "active learning". Students truly become the masters of learning, and their enthusiasm, initiative, and creativity are comprehensively enhanced.

### **5.2 The role of a teacher: from an indoctrinator of knowledge to a mentor of learning**

In traditional classrooms, the main role of teachers is to impart knowledge and impart knowledge that students are not exposed to. In the 'four in one, three step' flipped classroom hybrid teaching mode, teachers have changed their role from being "indoctrinators" to "supporters", and they are no longer "givers of teaching content" but "coaches who support learning". The "indoctrination" of basic knowledge points in statistics has been completed in pre class video learning. The main role of teachers is to design course operation modes, guide students in experimental training, conduct case studies, and write research reports. Teachers have truly achieved the educational concept of "teaching teamwork" through collective lesson preparation, unified lesson preparation ideas, joint recording of teaching videos, and self-editing of statistical experiment and training lectures.

### **5.3 Teacher-student relationship: from students centered around teachers to teachers centered around learning**

In traditional teaching, students can only "unite" around the teacher in order to obtain the desired score. What the teacher teaches is what the students listen to and learn, or in other words, the teacher's "teaching" invisibly limits the boundaries of students' learning. In the three-step flipped teaching of statistics courses, students discover problems during preclass learning and bring them back to the classroom to participate in discussions and solve problems. Teachers provide timely answers and assistance to various questions raised by students in physical classrooms and teaching platforms, forming a good non-linear interactive discussion and enhancing learning effectiveness through the "positive feedback effect". Thus, the passive situation of "learning" relying on "teaching" in the traditional teacher-student relationship can be changed, and the educational concept of "teaching" serving "learning" can be fully realized, truly realizing the educational concept of "student-centered".

### **5.4 Group cooperation: significant improvement in team awareness and cooperation skills**

Teamwork learning and assessment "is one of the biggest features of this teaching model. Under the 'four in one, three step' flipped classroom blended teaching model, not only does it emphasize 'teamwork teaching', but it also places greater emphasis on 'teamwork learning'. For every learner entering the information age, learning is not just an isolated individual behavior, but also an activity of communication and collaboration between people. Team-based learning is beneficial for stimulating learners' interest in learning, cultivating a healthy personality, enhancing collaboration skills, and enhancing the communication skills of team members. In addition to emphasizing the improvement of statistical theory literacy, the flipped classroom blended teaching also pays special attention to cultivating students' cooperative awareness and skills. The mutual cooperation in case study analysis, research report writing, and the traction of 50% cooperation score assessment are all conducive to comprehensively improving the comprehensive quality of learners<sup>[6]</sup>. The team oriented and creative mode of learning and assessment has achieved good teaching results in teaching practice.

## 5.5 Quaternity: organic unity of improving theoretical literacy and problem-solving ability

The organic combination of video self-directed learning, experimental training exercises, case analysis and discussion, and research report writing in the "four in one" teaching content has solved the problem of "theory and practice disconnection" in traditional statistics course teaching, thereby comprehensively improving learners' ability to apply theory to analyze and solve problems. Learning video theory can help master basic knowledge points; Experimental and practical exercises can help master statistical methods; Case studies can be promoted by learning from the award-winning works of previous subject competitions; Writing research reports can help improve one's ability to analyze and solve problems. In learning, teachers and students should integrate theory with practice, enhance problem awareness during theoretical learning, and strengthen theory during problem discussion. The "four in one" promotes each other and comprehensively improves learners' learning efficiency.

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