

# Research on the Teaching Mode of Internet-based Flipped Classroom in Advanced Mathematics Courses

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## ABSTRACT

The flipped classroom model under the background of "Internet + education" replace the traditional classroom teaching model. This model breaks through the time and space limitations of traditional courses, and uses the advantages of the Internet to enhance students' awareness of autonomous learning, increase students' interest in learning, change their leading position in learning, and cultivate students' innovative ability. This paper analyzes the research model of Internet-based flipped classrooms at home and abroad, and constructs a teaching model suitable for higher mathematics courses in Chinese medicine colleges. The integration of "online" and "offline" emphasizes student-centeredness and cultivates students' independent learning ability. Improving students' learning initiative and learning efficiency.

**Keywords:** *Internet, Flipped classroom, Teaching mode.*

## 1. INTRODUCTION

The "National Medium and Long-term Educational Reform and Development Plan (2010-2020)" clearly pointed out that information technology has a revolutionary impact on the development of education and must be highly valued; in the "Ten-Year Development Plan for Educational Informatization (2011-2020)" It also clearly pointed out that it is necessary to promote the deep integration of information technology and education and teaching, and realize the all-round innovation of educational thoughts, concepts, methods and means; the "Education Informationization 2.0 Action Plan" puts forward the core concept of adhering to the deep integration of information technology and education and teaching, and strives to build The new model of "Internet + education" talent training. The traditional teaching model has many drawbacks, such as certain geographical restrictions in classroom teaching, unbalanced distribution of educational resources, individual differences among students, limited classroom teaching time, and limitations in teacher-student interaction [1]. The rapid development of Internet technology has brought profound changes to education. It not only solves the problem of sharing high-quality curriculum resources, but also continuously integrates with traditional education. The "Internet + education" teaching model has emerged at the historic moment, such as micro-

classes and admiration. Classes, PBL teaching methods, CBL teaching methods, flipped classrooms [2], break through the limitations of traditional curriculum time and space. Among many teaching models, the student-centered flipped teaching model is gradually being respected. The flipped classroom teaching method, also known as the upside down classroom teaching method, is a subversive innovation to traditional teaching. The teaching method disrupts the traditional classroom teaching sequence. With the help of the Internet, it has realized the establishment of students' autonomous learning awareness and learning interest. The establishment of the establishment, the transformation of the dominant position of learning, and the cultivation of students' innovative ability. This model is in line with the development of educational informatization. The development of educational informatization must be guided by the innovation of educational concepts, based on the construction of high-quality educational resources and informatized learning environment, and based on learning methods and education. Model innovation is the core purpose.

Higher mathematics courses in Chinese medicine colleges are public basic courses, with fewer hours and more content. There are big differences in students' learning foundation, knowledge understanding ability, and abstract thinking ability. Traditional teaching models are difficult to achieve personalized talent

training. Therefore, it is necessary to construct a teaching model suitable for students of Chinese medicine colleges and universities to learn advanced mathematics courses, so that students can actively think, explore, and practice, and change from "learning" to "knowing how to learn" and "knowing how to use". Give full play to the advantages of the Internet and new media, implement a new teaching model of flipped classrooms, adopt a model of integration of "online" and "offline", combine advanced mathematics with professional subjects, and truly promote the innovation and development of advanced mathematics teaching models.

## **2. RESEARCH STATUS OF INTERNET-BASED FLIPPED CLASSROOM TEACHING MODE**

Many scholars at home and abroad have conducted research based on the Internet-based flipped classroom teaching model, and the flipped classroom concepts and models have gradually been accepted and applied to higher education reform practices. Internet-based flipped classrooms originated in 2006 when American Woodland Park high school teachers used PPT explanations to record videos to help students make up for their tuition. Not only did they use the Internet to make up for teaching time, they also enriched the teaching methods, optimized the teaching process, and activated the classroom teaching atmosphere. The Flipped Learning Network website defines the concept of flipped classrooms. Flipped learning is the transformation of the teaching space from group-oriented to individual-oriented, and the teacher's task is transformed into learning guidance. The rise of "Khan Academy" has attracted widespread attention to the flipped classroom teaching model. Mark Taylor proposed the "six-step teaching model" to solve the "learning generation gap" between students and teachers [3]. The "Flipped Classroom Europe Plan (2014-2015)" puts forward the five basic components of the flipped classroom, namely the sense of responsibility of the learner, the teacher becoming the instructor or helper of the course, the curriculum that can be used for review or remedial, the active learner, Personalized education. FLN puts forward the four pillars of flipped classrooms, namely, flexible teaching environment, learning culture, carefully edited course content, and professional teachers." Zhang Le and Zhang Yunxia proposed the flipped classroom teaching model of "double masters, three models and five rings", "double "Main" refers to students as the main body and teachers as the leading role. "Three models" refers to pre-class teaching preparation, in-class teaching seminars, and after-class teaching development models. Evaluation link and dialing link [4]. Xie Shuxiao proposed that students use MOOC/SPOC resources to learn independently to achieve a synchronized flipped classroom teaching

model in multiple campuses [5]. Guo Jianpeng proposed goals, preparations, teaching videos, reviews, tests, and activities The O-PIRTAS flipped classroom general model of seven links including, summary, etc. [6].

## **3. THE ROLE AND SIGNIFICANCE OF INTERNET-BASED FLIPPED CLASSROOMS IN TEACHING**

### ***3.1. Promote teacher-student exchanges***

Based on the network platform, it provides students with comprehensive education and learning services. It is no longer limited to traditional classroom teaching, and allows students to use mobile phones, mobile PCs and other devices to conduct learning dialogues with teachers at any time. Especially when it comes to important and difficult knowledge, it is inevitable that some students have poor understanding and unskilled applications. Teachers can use new Internet media (such as WeChat, QQ) channels to answer students' doubts after class. By opening up a second classroom, full communication between teachers and students can not only eliminate blind spots in knowledge, but also establish a good teacher-student relationship.

### ***3.2. Enhance students' initiative in learning***

Integrate various modern educational methods, fully mobilize students' learning enthusiasm, enhance students' independent learning ability, and enable students to complete the transition from "I want to learn" to "I want to learn". Record each student's online learning time, the number of questions and answers in class, the completion and accuracy of homework after class, etc. on the network platform. Then use big data technology to summarize these parameters and assign certain weights. The calculation results and the final assessment results are processed uniformly to ensure that the assessment results obtained are more in line with the true level of the students, and they can also motivate students to learn actively.

### ***3.3. Improve students' learning efficiency***

Flipping the classroom changes the traditional classroom teaching sequence. Students complete the learning of new knowledge before class. Teachers use exercises and other methods to guide students to consolidate new knowledge in the classroom, allowing students to listen to the class with questions and improve learning efficiency.

### ***3.4. Reflects the student-centered***

The flipped classroom is implemented in accordance with the teaching method of "before class + during class + after class", which is based on the "student-centered"

link to achieve the goal of stimulating students' interest and achieving good classroom teaching effects. Due to the use of Internet information technology, learning is not restricted by space and time, thus stimulating students' interest in learning mathematics, which is conducive to the realization of "student-centered" mathematics education.

### 3.5. Improve the quality of teaching

Internet-based higher mathematics education model teachers use heuristics, guidance, questioning, and discussion flexibly in teaching, and use modern educational information technology to make the more abstract and boring knowledge points in mathematics concrete, it is easier to understand and improves the quality of teaching.

## 4. APPLICATION OF INTERNET-BASED FLIPPED CLASSROOM IN ADVANCED MATHEMATICS COURSES

Advanced mathematics is a highly abstract subject. It can not only cultivate college students' good logical thinking and innovative abilities, but also improve their comprehensive qualities and abilities. It is important for students' logical thinking, spatial imagination, and calculation abilities. There are requirements, which also puts forward higher requirements for teaching work. The traditional teaching mode takes the teacher as the

center, the teaching material as the center, and the classroom as the center of the "three-center" model. The teaching form presents a single and one-way attribute, that is, "organization of teaching-introduction of new lessons-teaching of new lessons-summary and induction -Assign homework" modularized teaching process and "teacher transfer-student acceptance" classroom teaching operating mechanism. Change the traditional concept of "teacher-centered, textbook-centered, and classroom-centered", and truly establish the modern education concept of "student-centered", and adopt a hybrid teaching model that combines online learning and classroom teaching. The knowledge points are classified into micro-classes, released with the help of online teaching platforms (Cloud Class, Chaoxing Learning Tong, etc.), and implemented in actual work, such as curriculum development, classroom teaching, teaching evaluation, standardizing teaching behaviors, and improving teaching effectiveness. Sexuality makes teaching activities a way of cultivating students' ability development, not just a form of teaching links, thus promoting students' all-round development. In addition to the traditional teaching interaction and evaluation rules, Internet-based teaching also introduces the evaluation of online courses. The computer uses big data analysis to make full preparations for the refined realization of course teaching evaluation. The design of the "Internet +" advanced mathematics course teaching model is shown in Figure 1.

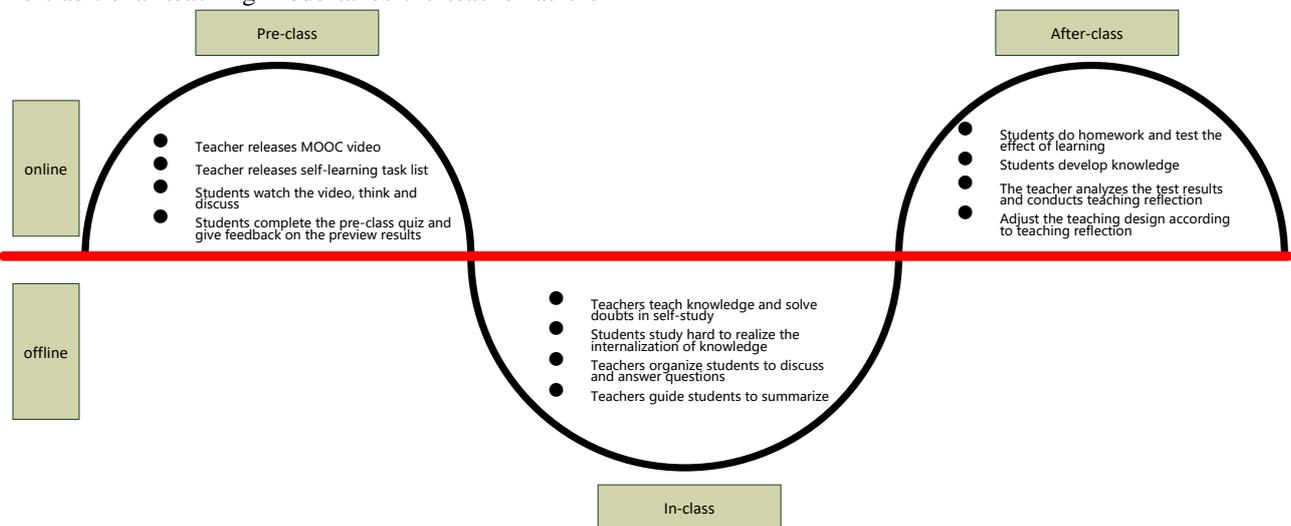


Figure 1 Flow chart of Internet-based flipped classroom

### 4.1. Pre-class teaching design (online)

Before class, teachers release teaching video resources and self-learning task lists. Students watch videos, think, discuss, complete pre-class quizzes and give feedback on preview results. Use the Lanmoyun class platform to push learning resources to students in real time, including teaching progress, teaching courseware, teaching videos, pre-school guidance, after-school expansion exercises, pre-class self-study task

lists and other materials to assist students in completing pre-class self-study and class Review later.

Taking the concept of definite integral teaching as an example. Teachers recommend MOOC national quality course videos and other learning resources, and students learn online. Understand what is a trapezoid with curved sides, how to solve the area of a trapezoid with curved sides, the definition of definite integral, and understand the solution ideas of "division, approximate substitution, sum, and limit". The MOOC national

quality course video integrates graphics, text, audio and video to present teaching content, simplifying the learning materials, reducing the cognitive load of students, and mobilizing students' interest in learning through vivid pictures and videos. Courses based on "design" have not only changed the traditional teaching methods, but also changed the design of distance education and online video courses, so as to ensure that students can achieve active learning and deep learning as much as possible, and finally achieve the goal of guiding students to actively respond to the future through course learning.

Students discuss online pre-class tasks proposed by teachers. The teacher guides the discussion process. For students who perform well, points will be rewarded in the Lanmoyun class. The study and teacher-student interaction in the pre-class preparation stage breaks the time and space limitations, which not only increases the classroom capacity, but also improves the learning efficiency.

#### ***4.2. In-class instructional design (offline)***

In classroom teaching, teaching modes such as "problem guidance", "task-driven" and "case teaching" are mainly adopted, combined with real life, to design vivid cases, and apply knowledge points to cases to deepen students' basic knowledge. Understanding fully reflects the professional teaching characteristics of "integration of teaching, learning and doing". Teachers create situations to introduce new courses, focus on intensive lectures, break through difficulties, guide students to summarize and summarize concepts, and complete the internalization of knowledge. Teaching is carried out by combining multimedia courseware and blackboard writing. Combining multimedia text, graphics and other auxiliary means to give full play to its fast, vivid and vivid characteristics, to provide students with intuitive and perceptual materials, which can not only quickly cut into the teaching content, but also help students understand and understand the problem, and optimize the combination. On the basis of this, improve teaching efficiency and improve teaching effects, and multimedia text, images, video and audio and other auxiliary materials are conducive to mobilizing students' learning enthusiasm, allowing students to change from passive acceptance of knowledge to active participation in learning.

In the classroom teaching of the concept of definite integral, describe some phenomena in life, such as how to solve the irregular figure area such as land and leaves. Asking practical questions, mobilizing students' emotional factors, allowing students to initially perceive the subject of this article, and pave the way for the following learning. The organic integration of mathematics knowledge, mathematics culture and real life avoids the boring process of abstracting

mathematical concepts and broadens students' horizons. With the help of a computer program, the number of divisions of the interval is doubled, and the limit process of "small rectangular area sum" getting closer and closer to the "curved side trapezoidal area" is dynamically demonstrated. Simulate the abstract tetralogy of "segmentation, approximation, summation, and limit" vividly, so that students can deeply understand and master "division of the whole, local linearization, substituting straight for curve, changing finite to infinite, and continuous to discrete". The way to solve the problem. Let students discover laws, form concepts, and infiltrate mathematical ideas from special to general.

#### ***4.3. After-class instructional design (online)***

After the students complete their homework and quality development, the teacher analyzes the test results. Teachers reflect on the teaching methods, teaching content, teaching process, and teaching evaluation, and then adjust the teaching design. Use the network-assisted teaching platform to implement activities such as teaching courseware sharing, exercise testing, study discussion, online Q&A and other activities. Using QQ, WeChat and other network information communication tools, online answers to the difficult points encountered by students in learning, assisting students in off-class learning, and providing a guarantee for the smooth implementation of the teaching reform to strengthen practical ability.

After class, based on the concept of definite integral and the application knowledge points of definite integral, guide students to contact their major after class, and search for articles on the Internet to find out whether there is an article that uses the idea of definite integral to solve the problem of the profession, so that students can experience the idea of using definite integral. How to carry out mathematical modeling in the professional field of study.

This design takes problem-based and heuristic teaching as the guiding ideology, and classroom theoretical explanations, examples and student exercises as the main teaching methods and means. Cases introduce concepts, driven by questions, group discussions, dilute theories, use the Internet, multimedia, combined with graphic teaching, follow the gradual cognitive law, use multimedia animation presentations, blackboards, discussions, examples, exercises, questions, and introduction to the history of mathematics, etc. With a variety of teaching methods and means, the teacher puts forward a series of interlocking questions. Under the enlightenment and guidance of the teacher, students are allowed to analyze and explore independently, and in the process of exploration, they summarize the concept of definite integral and stimulate the initiative and enthusiasm of students to learn definite integrals.

## 5. CONCLUSIONS

Under the background and trend of the integration of "Internet + education", student-centered flipped classroom teaching, students customize their learning methods and paths according to their actual learning needs, but teachers need to conduct scientific research during the learning process. Guide help them optimize learning content, methods and paths, so as to give full play to the greatest advantages and effects of personalized learning.

Through the reform of the higher mathematics teaching model, the organic combination of the Internet-based teaching system and the flipped classroom is initially introduced to shorten the teaching time, highlight the important and difficult points, and enhance the interest. Based on the background of the Internet era, students are guided to use smart phones correctly, and real-time interactions before, during and after class are realized and processed, and a new teaching concept of "student-centered" is initially formed, and students' learning interest and achievement are improved. Through the network platform, we can fully understand the learning process of students learning mathematics, help students recognize their own strengths and weaknesses in problem-solving strategies, thinking methods, or study habits, and focus on cultivating students' ability to solve and analyze problems, so that students can form correct learning expectations. Form positive emotional attitudes and values towards mathematics, help students understand themselves, building confidence, stimulating students' enthusiasm for learning, and improve classroom activity. Diagnose students' difficulties in learning in time, adjusting and improving the teaching process, and finally formulate a set of reasonable higher mathematics teaching models suitable for our students.

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