

# *Research on the Strategies of Middle School Mathematics Teaching under Flipped Classroom Model*

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**Abstract:** With the implementation of the new curriculum reform, flipped classroom model has attracted the attention of many scholars and teachers. Flipped classroom is an innovative mode of education and teaching under the new curriculum reform, which has changed the traditional teaching form and process. The most obvious manifestation of flipped classroom is to return the “decision right” of classroom to students, and pay attention to students' independent learning before class. In the form of flipped learning, students can stimulate their own enthusiasm in classroom learning, give play to their subjective initiative and enthusiasm, and deepen their subjective understanding of knowledge. In the implementation of flipped classroom, teachers can improve the quality of mathematics teaching and cultivate students' mathematical thinking ability.

## 1. Introduction

### 1.1 Highlight the Concept of Student-Centered Education

In order to ensure that students can acquire knowledge in accordance with their own development needs in class and improve classroom efficiency, teachers should always be student-centered in the daily teaching process. At the same time, teachers design courses based on students' learning needs and development needs, and analyze students' individual needs from multiple angles and levels, so as to make educational methods more effective, reasonable and scientific. At the present stage, China's junior middle schools implement diversified enrollment policies, and there are great differences in students' individuality, leading to great differences in the methods and goals of mathematics teaching in middle schools. Therefore, the teacher should fully recognize the flip the importance and necessity of the classroom teaching mode, its rational use in the teaching of the mathematics, safeguard the scientific nature of the secondary vocational mathematical education, let the students according to their own actual learning and mastering the basic knowledge of study of select material and let every student can actively involved in the exploration of mathematics knowledge, implementation class to learn something.

### 1.2 Strengthen Students' Autonomy in Learning

Teachers should construct a reasonable flipped classroom teaching mode, so that students can master the corresponding knowledge points under the impact of multiple senses, such as using mind

mapping, video teaching, micro-class, etc. Only when teachers effectively apply teaching resources and truly implement “classroom flip” can students overcome obstacles, overcome difficulties, and independently enter into the exploration and discussion of mathematical knowledge. Finally, students build a complete knowledge system in the process of “from image to abstraction” and “from deduction to induction”. The application of flipped classroom can cultivate students' innovative thinking and independent exploration ability.

## **2. Problems Existing in Traditional Mathematics Teaching Model**

### **2.1 Students Do Not Concentrate on Their Study**

The traditional classroom is mainly the unilateral explanation of knowledge by the teacher, and students seldom participate in classroom communication. Students cannot really integrate into the classroom, and teachers' indoctrination makes students become the passive receivers of information. Such learning will affect the efficiency and concentration of many students, and it cannot reflect the concept of student center under the new curriculum reform. At the same time, most of the students in a class in middle school are between 40 and 50. Each student has different learning acceptance ability, which leads to different understanding and application of knowledge. Teachers cannot achieve the best development of students on the basis of their own original. In addition, teachers take no account of all students in their teaching. Therefore, a small number of students with poor self-control will be distracted by boring classroom content, resulting in very low classroom learning efficiency. In the long run, poor students will get worse grades, and the students themselves will become resistant and bored with math. The lack of attention in class will also lead to the poor mastery of some basic mathematics knowledge by many students, thus making them unable to study mathematics in a deeper level.

### **3. 2 Students Are Weak in Math**

Mathematics learning in middle school attaches great importance to understanding and applying knowledge, but teachers' explanation effect in class time is limited. This will result in students' inability to solve practical problems quickly and effectively when they encounter difficulties in their homework and examination papers, resulting in their lack of mathematical thinking and a blow to their personal confidence. Poor mastery of basic knowledge and learning methods will also make it impossible for students to carry out innovative activities on the basis of existing learning. The current quality-oriented education requirement is to promote the all-round development of students, especially to pay attention to the cultivation of students' practical application ability. Some students may get good scores in ordinary exams through mechanical memory and quiz tactics, but they lack innovative learning and a deeper understanding of mathematical knowledge, and their learning ability is still not improved, which will affect their comprehensive development. In particular, if students cannot cultivate logical thinking through mathematics learning, they will be affected to a certain extent in their future study and daily life.

## **4. Teaching Strategies under Flipped Classroom Model**

### **4.1 Scientific Preparation of Teaching Resources**

Teaching resources are an important carrier for students to generate outline cognition of relevant knowledge, and also the core content for teachers to teach subject skills. Therefore, teachers should design teaching contents scientifically according to their learning situation. Mathematics knowledge

has a strong abstract nature. Teachers should pay attention to the “picture sense” of materials when planning materials, such as intuitive videos, relevant literature materials, and courseware content of different levels. Secondly, teachers should formulate corresponding driving strategies according to students' learning interests and professional development needs, so that students can carry out exploration work step by step under the guidance of teaching resources, so as to effectively improve the learning quality.

For example, when learning the chapter “Multiplication of Powers with the Same Base”, teachers must first conduct in-depth analysis and exploration of the contents of the textbook and integrate the key contents of the textbook into the classroom teaching video. To strengthen students' understanding of the operation properties of powers of the same base, and to cultivate students' ability to carry out basic operation in combination with practical problems. During the teaching process, teachers should integrate these teaching priorities into classroom teaching videos, clarify classroom teaching objectives, and enable students to quickly grasp classroom teaching priorities in the process of autonomous learning through videos, so as to effectively develop students' reasoning ability and organized expression ability.

## 4.2 Do Well in Classroom Design

Classroom activities account for a large proportion in flipped classroom. Therefore, the teacher will be depending on the degree of master students in the class and specific performance in the classroom, a targeted design scientific and reasonable design, and according to the students have the learning basis, development characteristics, characteristics of information to carry out the interesting test activities, let different levels of students can be in a relaxed, enjoyable learning environment to acquire knowledge. Teachers can organize students to carry out group discussions by designing reasonable groups of students. When grouping, teachers should pay attention to the individual differences among students and ensure that each group should have a balanced personality and a relatively balanced level of strength, so that each student can be developed and inspired on the basis of their own original knowledge and the teaching practice level of teachers can also be improved.

For example, teachers in the “parallelogram” teaching, can be in class through the projector to put the test questions, quadrilateral mathematical knowledge to answer the game. Teachers carefully prepare the required questions before class, and set up 10 compulsory questions and 5 quick answer questions. Required questions range from basic knowledge to medium difficulty, with 6 points for each question, and 8 points for each question, with a total score of 100 points. Teachers guide students to develop competitive learning through reasonable difficulty design. Finally, the teacher should implement the incentive mechanism to reward and praise the students who have excellent performance in this contest, so as to improve the initiative of the students and the centrifugal force of the class. For example, game testing can be used when teaching trigonometric functions. Before class, the teacher should guide the students to preview the content of this chapter in advance, and integrate the questions found in the learning process and bring them into the class as analysis content. At the same time, teachers should prepare three types of test items of difficulty according to the different levels of students. At the beginning of the activity, teachers should guide each team member to finish the “project talk” one by one by way of relay race. After a certain group completes the presentation, the teacher should guide the rest of the students to “thumb up” according to the presentation effect. Then, the team members randomly invited another team to present in the same way. After the team finished the presentation, the rest of the students voted again. The team with the most “likes” retained their qualification and continued to accept the challenge from the rest of the team. Teachers guide students to carry out mathematical activities and improve their mathematical

ability by carrying out cooperative exploration and interactive games and taking the competition and reward system as incentive measures.

### **4.3 Build a Positive Learning Atmosphere**

Students are the main body of classroom learning, which is emphasized under the new curriculum reform. A positive learning atmosphere helps students become the protagonists of their classes. At the same time, active teaching environment can greatly enrich the classroom content, but also enrich the diversity of teachers' teaching methods. For example, in the teaching of Similar Triangle, teachers can borrow the teaching model of flipped classroom and use its advantages to find materials to show the concrete embodiment of similar triangle in People's Daily life for students. On the one hand, it can deepen the situational and life-oriented teaching and improve students' love for mathematics life. On the other hand, teachers can also guide students to combine knowledge with theory and cultivate students' rational thinking. Students can get rid of the shackles of traditional teaching, successfully walk out from the boring and rigid teaching form, gain the interest of learning and feel the pleasure of learning. Students can swim in the sea of mathematical knowledge in interesting and lively situational teaching.

### **4.4 Improve the Evaluation System**

The most fundamental purpose of mathematics learning is to enable learners to have a stronger mathematical thinking, and to apply mathematical knowledge to practical life, so that learners gradually form a good sense of mathematics. High school mathematics education should attach importance to the educational process, so that students at all levels can gradually improve their personal qualities and learning ability in the learning process, and build a driving force for future development. On the one hand, it enables students to clearly know their knowledge mastery problems in the process of independent learning, so as to facilitate students to correct their shortcomings in a timely manner and ensure the steady improvement of students' mathematics learning efficiency. On the other hand, it also promotes the sustainable development of flipped classroom in middle school mathematics teaching.

For example, teachers can apply personality assessment. Teachers should first formulate unified assessment content and take it as the key part of the semester assessment, such as the learning degree of micro-course video, network data acquisition degree, test completion degree, classroom participation degree, helping attitude and so on. In the examination of unity, teachers should strive for fairness and justice, and guide students to gradually improve their learning skills according to the examination content, so as to acquire rich subject knowledge on the basis of forming good study habits. Next, teachers should differentiate personalized evaluation content from unified evaluation content. For example, for students with relatively strong learning ability and perceptual ability, teachers should guide them to break through their own limits, dig out more challenging and difficult contents, and make them develop in a more profound direction. At the same time, teachers should guide students at this level to summarize learning methods and share them with other students, so that other students can transform their different advantages into strengths that meet their own development needs and promote their own development. For students with relatively weak learning ability, teachers should give them more encouragement, care and help so that they can continuously explore scientific and effective independent learning methods in flipped classroom teaching mode. When students at this level give feedback, teachers should guide students to summarize their own shortcomings and main problems at this stage, and use this as a clue to adjust the teaching content of flipped classroom.

## 5. Enlightenment of Flipped Classroom Model to Middle School Mathematics Teaching

### 5.1 Teachers Should Have Strong Ability and Quality

Flipped classroom teaching mode has many teaching steps and involves more knowledge outside the classroom. The quality of recorded teaching videos, the grouping of students' cooperation and communication, and the feedback of comprehensive teaching evaluation all put forward higher requirements for teachers. Teachers not only need to be able to carry out classroom teaching, but also need to be able to skillfully use information technology means; At the same time, the teacher should not only explain the key points and difficult points, but also give guidance and dispel doubts. Finally, teachers need to be able to manage not only the classroom, but also the extracurricular learning.

### 5.2 Students Should Have a Good Sense of Self-Discipline

Good self-discipline consciousness of students is the foundation of flipped classroom implementation. Flipped classroom is mainly to change the teaching of classroom knowledge by teachers into the autonomous understanding of mathematics knowledge by students. Whether front-line teachers can successfully flip the classroom depends on how well the class students master the knowledge of this chapter before class. If the students do not have a good sense of self-discipline, then the process of “watching videos -- self-testing exercises -- looking for problems” in the pre-class learning stage cannot be carried out effectively. This will seriously affect teachers' content teaching and students' knowledge understanding under flipped classroom, and the effectiveness of classroom implementation will be reduced.

## 6. Conclusion

In a word, teachers should pay attention to the application of the flipped model to implement mathematics teaching in middle schools, especially in middle schools. Teachers can deepen theoretical knowledge through pre-class guidance, in-class sorting and after-class consolidation, so that students have more learning initiatives, which can effectively improve students' learning enthusiasm. At the same time, it is also conducive to the cultivation of mathematical rational thinking and values. In addition, teachers should also strive to create a situational mathematics classroom to promote high-level practical teaching work from the outside. Finally, teachers also need to update the teaching concept with The Times, make reasonable use of teaching resources, and constantly improve the details of flipped classroom construction based on the actual situation of students. It is believed that with the deepening and implementation of flipped classroom model, it can have a better impact on the construction of mathematics classroom.

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