

Study on the Design of High School Mathematics Micro Class Teaching under the Flipped Classroom Mode

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Abstract

The development of information age puts forward higher requirements for education, and many educators and front-line teachers try to combine teaching with information technology to improve students' learning efficiency and cultivate their abilities. The emergence of flipped classroom has created a huge wave in the world. Many scholars and educators have joined in the research of flipped classroom and pointed out that flipped classroom teaching will bring significant changes to the traditional classroom teaching. Micro class is the carrier of flipped classroom teaching. It has the characteristics of "fine, fine, skillful and transparent". With the use of mobile device terminals, students' learning place is not limited to the class, but can be any place in life. The teaching of micro class is conducive to cultivating students' independent learning ability, highlighting students' subjective status, improving students' learning efficiency, and providing teaching practice reference for cultivating students' personality quality.

Keywords

Flipped classroom, high school math, the class, the teaching design.

1. Introduction

The development of micro courses in China follows the flipped classroom, which is still in the development stage, and it lacks relevant theoretical guidance and specific quantitative indexes. According to a large number of literatures, there are several problems in the current study of high school mathematics micro-class: there are many researches related to theory, and the practice research is not sufficient, which often only stays on the surface. There are practical cases that are often described in general and not specific enough; There are many relevant journal articles, and the research content mainly focuses on the influence of micro-class on high school mathematics teaching, but lacks the specific implementation plan[1].

1.1. Teaching Design

Teaching design is to arrange a series of contents such as teaching objectives, teaching difficulties, teaching links, teaching methods and time arrangement in an orderly way according to the requirements of the new curriculum standards and the characteristics of students, and work out appropriate teaching plans and plans. Teaching design is a systematic process of planning the teaching system, and the teaching system itself is a good arrangement of resources and procedures for learning.

Any organization whose purpose is to develop the talents of a person can be included in the teaching system. The basic framework for teaching design is established and a complete theoretical system is formed[2].

1.2. Design of Mathematics Teaching

Mathematics teaching design, is a pointer to the characteristics of mathematics subject, specific teaching contents and the characteristics of the students, according to the basic theory and law

of mathematical disciplines, according to the requirements of the new mathematics curriculum standard, the viewpoint and method of the operation system of integrating curriculum resources and develop basic scheme of teaching activities, and plan to make the necessary reflection on the preliminary design, modify and perfect process[3].

Principles of mathematics teaching design:

(1) Integrity principle

As the teaching process is a multi-level integration process, it is necessary to integrate all factors (goals, contents, methods, etc.) into one, so as to obtain the best overall benefits. Therefore, the design of mathematics teaching should start from the whole, coordinate the weight of each link, make reasonable analysis and judgment, and realize the coordination and unification of teaching objectives, contents and methods.

(2) Principle of subjectivity

Students are the main body of teaching activity, mathematics teaching design is to revolve around the students, teaching process to highlight student's main body status, and fully arouse the enthusiasm of students and play to the learners' internal potential, no matter in the transfer or in the process of the internalization of knowledge is to consider from the Angle of students, exert students' initiative.

(3) Principle of development

The comprehensive development of students includes both the development of all students and the comprehensive development of students' mathematical knowledge, skills, process, methods, emotions and values. Its significance lies in not only paying attention to the development of students at the level of knowledge, but also paying attention to the comprehensive and coordinated development of students' ability and accomplishment.

(4) Principle of process

Conclusion is important, process is more important. The process of learning mathematics is not just to remember the conclusion, but to re-create the process created by predecessors in the process of knowledge exploration, change the passive acceptance of knowledge into the active exploration of knowledge, and truly recognize the thoughts and methods.

(5) Principle of openness

Humanistic learning theory points out that the learning process of students is the process of self-stimulation, promotion and evaluation with the help of teachers. In this process, students not only acquire knowledge, but also form a systematic learning method and a sound personality. Therefore, in the teaching design, students should be given enough space to give full play to encourage students to question, find and ask questions.

1.3. Teaching Design of High School Mathematics Micro-Class

The teaching design of micro-course in flipped classroom mode refers to the teaching activity plan for the implementation of micro-course based on the high school mathematics curriculum standards and subject features, with micro-video as the carrier of knowledge in teaching[4].

In recent years, gathered a large number of teaching video resources on the network, but the survey found that the distribution of these resources and satisfaction degree is not high, the reason is that the education resource itself has certain problem, the main body of these resources direction is wrong, is for the teacher's "teaching" concept to construction, ignoring the students "learning", fragmentation of knowledge should be to establish a complete knowledge system, convenient for students to learn from it.

Teachers teaching for students of a key, difficult and doubtful point, test the direction of the micro video need to meet time is short, the teaching content of two aspects, teaching design should be different according to the specific situation of the teaching purpose, the students

design, teaching content should be rich and interesting, creative in the link arrangement, attract the students had no intention of attention, to pass on knowledge in the relaxed happy atmosphere to the students. Modern micro-course teaching should retain the essence and take into account the advantages of traditional teaching, systematically integrate the course resources and knowledge, fragment the seemingly complete knowledge system, and finally integrate them together to achieve the integrity of knowledge structure.

2. Problems and Solutions in the Design of High School Mathematics Micro-Class Teaching

2.1. Problems in the Design of High School Mathematics Micro-Class Teaching

As an important part of the teaching process, the quality of micro-course design directly influences the final teaching effect. Therefore, we should pay attention to the problems existing in the design of micro-course teaching. By referring to a large number of materials and conducting surveys and interviews with teachers, I sorted out and concluded the problems in the design of micro-class teaching of high school mathematics.

2.1.1. Misunderstanding of the Concept of Micro Class

(1) Micro class is competition class

When discussing the meaning of micro class with teachers on the front line, teachers can easily understand micro class as competition class. Because these teachers have not conducted flipped classroom teaching, but have participated in traditional teaching ability competitions such as teaching skills competition and lecturing competition, and the micro-class competition only carries on the comparison and demonstration on the network, therefore the teacher can cause this kind of misunderstanding.

(2) Micro class is micro video

Micro-video is only a part of the teaching process of micro-course, and is the presentation, carrier or communication means of the teaching content. The concept of the two is not the same. Micro class is also very different from the traditional recorded class. Traditional recorded class is the real record of a complete class. In recorded class, there are many factors irrelevant to teaching.

(3) Micro courses are online courses

Microlecture is the product of the information age. Microlecture is the new change of the teaching system caused by the change of The Times. The implementation medium of micro courses is network, so teachers are easy to understand micro courses as online courses. Online courses are the sum of activities to implement teaching contents through network performance, while the teaching of micro courses focuses on the cultivation of students' independent learning ability by fragmented knowledge.

2.1.2. Production of Micro-Course Teaching Script

Teachers have a blind spot for the design of micro-course script, are unfamiliar to the emerging teaching methods, do not have standard cases for reference, lack of guidance for the design of scripting system, there are many versions of high school mathematics textbooks in China, the design of micro-course script needs to be diversified, and the teaching focus is difficult to grasp.

2.1.3. Recording of Micro Class

The recording of micro classes needs the support of information technology, and teachers lack the ability to use video to record and make software. Some important concepts and theorems in micro class need to be understood by students. Therefore, the teacher's mandarin and language organizing ability are very important in the recording of micro class. Teachers should

have an overall grasp of the duration of micro classes to avoid the distraction of students' attention caused by too long time.

2.1.4. Single Form of Micro-Course Teaching

Looking at the micro courses on the major micro course resource websites on the Internet, the teaching form of micro course is generally the retelling of knowledge and the practice of problems, and the single teaching form lacks innovation. Of course, there are some micro lessons made by teachers that convey knowledge in the background of stories, so that students can learn knowledge in a relaxed and pleasant atmosphere, which is worth learning from.

Most of the micro-lessons produced by teachers are to put the content of traditional classroom teaching on the Internet without changing it. They only divide the content of one lesson into several micro-lessons, which is time-consuming and laborious but not liked by students, thus causing them to lose their interest in learning. How to make a good microlecture to meet the needs of students is worth thinking.

2.2. Solutions to Problems in the Design of High School Mathematics Micro-Class Teaching

- (1) Train teachers from the aspects of the theory of flipped classroom teaching model, the concept of micro-class and the production method of micro-class. Build a general model of making micro lessons, and appreciate, analyze and learn high-quality micro lessons.
- (2) Support from education department and school. High school front-line mathematics teachers are under great pressure and have heavy teaching tasks. It is suggested that education department and school employ experts to train teachers in the design of micro-course teaching scripts. At the present stage, we can design and implement micro-course scripts for local textbook versions, and then modify the scripts according to the teaching effect.
- (3) The education bureau or the school shall train teachers in teaching skills, exercise and improve their application ability of teaching technology software.
- (4) Exercise the teacher's mandarin and language organizing ability. At the same time, supplement the part of micro course that is not easy to be clearly explained with subtitles. Word-for-word display will increase the cognitive load of students' reading.
- (5) Control the length of micro class, generally no more than 10 minutes. In micro class, the appropriate position is set to suspend, so that students can think independently.
- (6) We advocate teamwork and strive for the quality of micro courses. A series of knowledge modules is conducted for the knowledge content of a certain chapter to make the knowledge more coherent.
- (7) Pay more attention to mathematical problems in life, and apply them in the introduction of micro-class to stimulate students' interest in learning.
- (8) Schools can organize teachers to participate in micro class design competition, so as to avoid the single form of micro class teaching and realize diversified and rich micro class.

3. The Method and Model of High School Mathematics Micro Class

3.1. Recording Method of High School Mathematics under Flipped Classroom

There are a variety of recording methods for micro class. I have sorted out and analyzed the recording methods for various micro class competitions, which are as follows:

- (1) Screen recording software, including Camtasia Studio 8.0, video master or screen recording expert, etc.
- (2) Convert the PPT presentation to video after recording.
- (3) Professional video recording classroom shall be recorded.

- (4) Cell phone or DV+ whiteboard or blackboard for portrait recording.
- (5) Script board + screen recording software recording, including Wacom BAM Boo script board or painted king script board.
- (6) Recording at video demo, such as micro platform, etc.

The above is the most commonly used micro-course recording method. There is no good or bad method among various methods. Teachers choose the method suitable for their own use, as long as the expected effect can be achieved.

What is important is not the overlapping use of various technologies, but the design of a micro class. Therefore, before recording the micro class, we can choose appropriate methods according to our own design to achieve the best effect.

3.2. Design Model of High School Mathematics Micro-Class under Flipped Classroom

The ADDIE model mainly consists of three parts, that is, what to learn (the formulation of learning objectives), how to learn (the application of learning strategies) and how to judge learners' learning effects (the implementation of learning evaluation). The specific operation steps of the ADDIE model are as follows:

(1) Analysis

Before microlecture design, learners should be analyzed, teaching materials should be analyzed, key and difficult points should be analyzed, teaching tools should be analyzed and teaching environment should be analyzed, and teaching objectives should be set according to the above analysis.

(2) Design

This stage should be systematic and specific. The overall framework of micro-course should be designed, including the selection of teaching content in the framework, the introduction of life cases, the selection of sample questions, the setting of practice questions, etc., and the corresponding strategies and means to evaluate the learning effect should be designed.

(3) Development

According to the analysis and design of the first two stages, make micro class.

(4) Implementation

The pre-class, in-class viewing and after-class review will be implemented according to the designed content.

(5) Evaluation

To evaluate the teaching implementation and learning effect, we can refer to the four-level evaluation method.

4. Investigation and Analysis of High School Mathematics Micro-Class Teaching Effect

I conducted an interview and survey on the teaching effect of the class that implemented the flipped classroom teaching of mathematics micro-class. Through the feedback of students watching this mathematics micro-class, I understood the advantages and disadvantages of the implementation of mathematics micro-class and what needs to be improved, and proposed effective improvement plans for travel. There are seven questions in the interview outline, which are summarized as follows:

- (1) A total of 52 students in the class, 50 students watched the teaching video in the QQ group of the class (2 students asked for leave).

(2) Most students think it is helpful for them to watch the micro course video. By combining the micro course video with the learning materials before, during and after class, students can clearly understand the content of this lesson and easily grasp the key and difficult points. After watching the micro course video, they can successfully complete the knowledge outline. Students think that the learning process after class is relatively easy, no formality in class, unknowingly learn new knowledge.

(3) More than half of the students watched more than one time, for three reasons: one is the students for the new teaching method is novel, the second is the first time only to look about the knowledge of context, some details haven't noticed, a third is part of the student for the first time did not learn knowledge, through the second time to learn to understand knowledge.

(4) Most students like the teaching form of "going home to watch video + class discussion and do exercises".

(5) The reason why students like it is that they can study in a relaxed and pleasant way instead of being confined to a place as big as a desk. Students also think that video teaching can stop thinking at any time, so that they can have enough time to think without being afraid of failing to keep up with the pace of the class.

(6) Students generally put forward some Suggestions on the content and quality of video: students indicated that the voice of video was too low, and teachers were suggested to raise the volume or raise it through software in the later stage; Students suggested that having some interesting life examples as a mathematical background would greatly increase their interest in watching video.

(7) Students think this way of teaching will be the initiative back to them, they can pause at any time to think about questions, students in the comparison when you watch the video input, can participate in each link, there are some interesting mathematical problems can also be seen in the video, greatly increase students' interest in learning mathematics, so a positive influence on their study.

5. Improvement Measures

Based on the above investigation and analysis, in combination with the previous requirements on micro-course teaching design, I proposed the following points for attention and improvement measures:

(1) Keep in mind that the teaching object of micro class is students, not front-line teachers. Do not ignore the needs of students in order to pursue the "high status" of micro class. It is necessary to have an understanding of the students' learning situation, understand the students' recent development area, and carry out micro-class teaching in a planned way to achieve the best results.

(2) Try to explain only one knowledge point in a micro class video to avoid the accumulation of knowledge points. Micro lessons present fragmented knowledge. A micro lesson can be a part of the content of a textbook, so as to make a thorough explanation of knowledge points.

(3) The duration of micro-course video should be kept within ten minutes as much as possible. Since the best time for students' attention is ten minutes, it can make students learn with the highest efficiency.

(4) When making micro-video, students should be reminded of the key contents (such as yellow underlining, keywords circled on the screen, symbols or graphic marking, etc.); In the micro class, the appropriate position is set to suspend to provide students with space for thinking; Teachers can use the teaching software flexibly in video to avoid students' attention drop after waiting.

(5) Speak standard mandarin in micro-video, avoid verbose language, and improve language organizing ability. Use non-verbal signs such as intonation, intonation and repetition in places that require students' attention.

(6) The knowledge of other modules in micro class should be pointed out. If it is inconvenient to be pointed out immediately, it is suggested to remind students in the form of prompt text, so that students who forget can look up and learn.

(7) The method of making micro-video should be as simple as possible, and different presentation methods should be tried more often. It would be better to use multiple software alternately.

(8) Operation details of micro class production: don't move the mouse around on the screen; Note the background color scheme of the presentation; The picture of video should be simple and clear, and avoid irrelevant things. The recording environment of video should be quiet and avoid noisy places.

6. Conclusion

There are many reasons for influencing teachers' implementation of micro-class teaching:

(1) High school mathematics teachers do not have enough understanding and recognition of flipped classroom teaching model, so they do not have the ability to implement flipped classroom model in micro-class teaching.

(2) Lack of technical support from teachers, lack of successful implementation of micro-course teaching cases around, uncertainty about the effectiveness of micro-course teaching, and little courage to try micro-course teaching.

(3) The teacher has a blind spot for the design of micro-course script, lacks the guidance of the design script system, and it is difficult to grasp the teaching focus.

(4) As a result of the heavy teaching tasks, teachers generally believe that making micro-lessons takes time and energy, and they are willing but unable; Older teachers are not good at using information technology to teach, and are more accustomed to the traditional teaching mode, which affects the teaching methods and methods of young teachers.

In my opinion, flipped classroom and micro-class are the products of the information age, and it is of great significance to study the teaching design of micro-class in high school mathematics under the flipped classroom model. Only when new technologies are combined with new ways and means can there be huge benefits. It is suggested that high school mathematics teachers should try to carry out the flipped classroom model of micro-class teaching for certain courses, so as to stimulate students' interest in learning and cultivate their independence and autonomy.

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