

Research on Innovative Practice Path and Evaluation System of Online Mathematics Teaching

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Abstract: With the advent of the Internet plus era, online teaching has gradually become the trend of education. However, online teaching also has many problems, such as: easy to be interfered by irrelevant information, lack of teacher supervision and poor learning quality, which makes it difficult to ensure the teaching effect. In order to avoid online education becoming a mere formality, this paper starts from exploring the innovative practice path and innovative evaluation system of online teaching, constructs a three-dimensional learning method that is comprehensive in class and multi-level in textbooks and extracurricular, actively carries out teaching innovation with the help of rich and diverse multimedia knowledge base, and designs a teaching process that conforms to students' learning conditions. It is beneficial to enrich the connotation in class, broaden the extension after class, and attract students' consciousness.

1. Introduction

Mathematics is a creative and applied subject, and it is an indispensable tool for human progress. Hua Luogeng once said, "The universe is big, the particles are small, the speed of the rocket is fast, the chemical engineering is ingenious, the earth changes, the mystery of biology, and the daily use is complicated. There is no place without mathematics." Mathematics in primary and secondary schools is the basis for learning other disciplines, is also the basis for learning other disciplines, and is the language of all disciplines. Mathematics itself is highly theoretical. In addition, the traditional classroom form is single and time is limited, so students are prone to fatigue, which is not conducive to the improvement of students' quality.

With the rapid development of the times, online education, with its advantages of being free from time and space constraints, has gradually become a necessary way for people to improve their knowledge and skills. Through online education, people can tap their own knowledge of interest and skillfully use fragmented time to enjoy the convenience brought to us by the Internet. However, online education is not the direct relocation of traditional school teaching content and management processes online [1]. The British philosopher Whitehead once said that "the whole purpose of education is to make people have active wisdom" [2]. Limited to learning subject knowledge can only temporarily improve students' knowledge reserves. Overemphasis on memory will also lead to students' lack of innovative ability to solve problems [3].

Therefore, as a qualified teacher, we should not let online education become a mere formality,

but should innovate educational design methods and face scientific thinking: with the help of rich and diverse multimedia knowledge base, we should design a knowledge system that conforms to students' learning conditions and a reasonable, interesting and evidence-based teaching process to attract students to consciously and actively participate in learning [4]. In addition, teachers are pioneers and promoters of curriculum resources [5]. In order to make the curriculum more suitable for students' reality, they should also actively carry out teaching innovation, enrich the connotation in class, broaden the extension after class, and let students truly experience the fun of learning mathematics. This paper will make a beneficial exploration from two aspects: the realization path of innovative mathematics online teaching and the evaluation system.

2. The Realization Path of Mathematics Online Teaching

2.1. Innovative Teaching Methods

The current teaching methods have more or less shortcomings: on the one hand, in order to ensure the teaching progress, the traditional offline teaching is mostly full of students, ignoring the main role of students, which is not suitable for online education. On the other hand, online learning is more vulnerable to the interference and temptation of various kinds of information unrelated to mathematics learning on the Internet, and the teaching effect is difficult to guarantee. The current online classes continue the tradition of traditional classroom teachers teaching students to learn, but online education teachers can not understand the students' mastery in a timely manner like offline classes, which leads to the failure of Yiyantang to play its role well. In addition, the teaching time and space are completely separated, and online teaching and learning has obvious shortcomings, alienating teachers and students, students and students from the social feelings [6]. Changing the traditional "one speech hall" model, returning the leading role of the classroom to the students, and exchanging the roles of teachers and students, candidates and propositioners can effectively enhance students' interest in learning and help them master key classroom knowledge.

2.1.1. Exchange of Roles Between Teachers and Students

Listening to teachers blindly is easy to cause burnout. Imprisoned by the teaching mode of teachers, students' innovation ability will also decline, which is not conducive to the effective absorption of knowledge. When the roles of teachers and students are exchanged, the whole learning initiative will be held by students, who are the rightful masters of this lesson. At this time, the learning initiative is firmly in their own hands.

The classroom teaching process after role exchange can be divided into two parts: the first part is for teachers to explain basic concepts, define and guide students to preview similar definitions. The second part is given to the students. After the students explain, the teachers will comment and guide and supplement the missing knowledge points. Take the concept of odd and even functions in mathematics of the first grade of senior high school as an example: the teacher explained the relevant knowledge points of odd functions in the first lesson, which involved the definition, image, nature of odd functions and related exercises of odd functions.

In the class, we should highlight the commonness of learning function methods: we always use two threes and one to learn when analyzing functions. The first three refer to the three languages of mathematics (written language, symbolic language and graphic language); the second three finger function has three aspects (definition, image and property); an exponential combination method. In the whole class, we use written language and symbolic language to describe the definition and nature of function, draw the image of function by point drawing, and analyze the problems related to function by combining number with shape. In the next lesson, when learning the knowledge

points related to the even function, we will change the students to be teachers. Before class, we will carefully study the textbook and collect and sort out the data. We will complete the relevant classroom design and exercise setup according to the method that the teacher emphasizes learning the function. At this time, the teacher acts as a judge, commenting on the advantages and disadvantages of the students' classroom, pointing out the deficiencies and timely supplementing the knowledge points that the students missed in class. When preparing for the course, students will do their best to listen to the lecture in order to accumulate materials for their own class. After class, they will also carefully review the content of the previous lesson and preview the content of the next lesson. In this way, a multi-dimensional learning method with multiple levels outside the textbook has been built in an all-round way.

2.1.2. Person Role Exchange in Life Test

Another disadvantage of teachers' full pouring is that students do not know where the key points are, which leads to frequent falls into the trap of the problem setter when doing the problem. Let students play the role of the problem setter, which will force them to think seriously and grasp the important and difficult points of this lesson. Take the extended learning "Generals Drink Horses (Best Value Problem)" as an example, as shown in Figure 1.

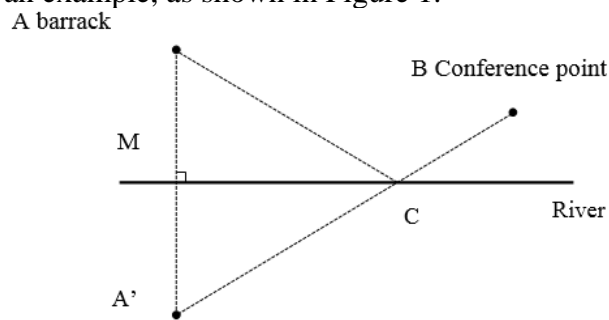


Figure 1: General Drinks Horses

The general starts from Camp A every day, first goes to the riverside to drink horses, and then goes to the meeting point B on the same side of the riverbank for a meeting. How can we ensure the shortest distance? (Principle: the triangle is congruent, and the line between two points is the shortest) The solution idea is to cross point A to make $AA' \perp$ river MC, cross river MC to point M, and $AM = MA'$. Connect BA' to intersect River MC at point C, where C is the drinking point.

If the geographical location of the barracks and meeting points is more special, other types of questions can be derived, as shown in Figure 2.

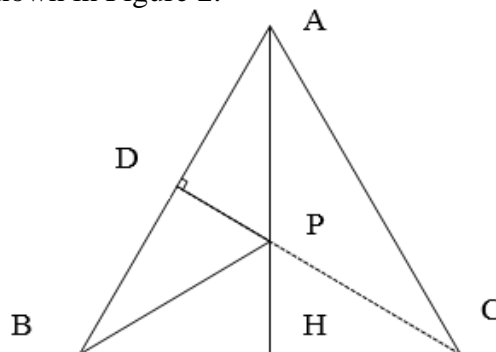


Figure 2: Derivative Issues of Military Camp Meetings

Triangle ABC is an equilateral triangle, $AH=10\text{cm}$, which is the height on the side of BC. P is a moving point on AH, D is the midpoint of AB, then the minimum value of $PD+PB$?

The principles of the two questions are the same. If AH is regarded as a river, B as a military camp, and D as a meeting point, this question will be transformed into a general drinking horses problem familiar to students. Find the corresponding point C of "Barrack B" opposite to "River AH", connect C with meeting point D, and hand it over to AH at P. Point P is the "horse drinking point". These two questions are based on the general drinking horses as the prototype, and the question is timely thrown to the students: Can you design a similar drinking horse problem? (Appropriate prompt: can the geographical location of the barracks and meeting points be distributed on other graphics?)

The following is the students' thinking, as shown in Figure 3.

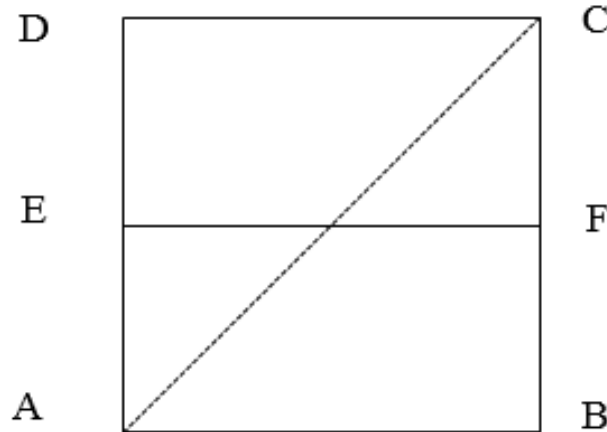


Figure 3: Student Thought I

ABCD is a square with a side length of 300 meters, point D and point C are military barracks and meeting points respectively. E, F is the midpoint of AD and BC respectively, and EF is a river. Ask where the horse drinking point M can make the journey shortest?

Student idea 2 is shown in Figure 4.

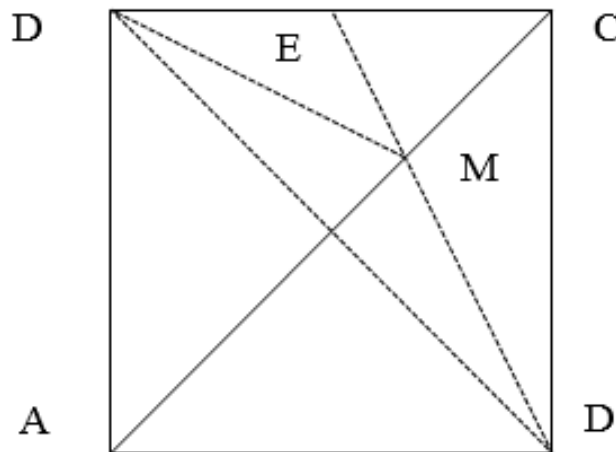


Figure 4: Student Thought II

ABCD is a square with a side length of 300 meters, point D and point E are barracks and conference points respectively, and point E is the midpoint of DC. AC is a river. Ask where the horse drinking point M can make the journey shortest?

Student idea 3 is shown in Figure 5.

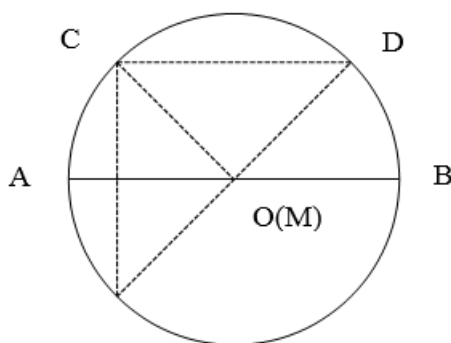


Figure 5: Student Thought III

Point D and point C are military barracks and conference points respectively, and both points are located on circle O with a radius of 100 meters. The distance between CDs is $100\sqrt{2}$ meters. Ask where the horse drinking point M can make the journey shortest?

From the ideas of the above three students, we can see that when students stand in the perspective of the question maker, their thinking will diverge and stimulate better ability to control knowledge. After the first student creates a new topic, other students will continue to study on the basis of these questions, so that one question will generate multiple questions. In addition, the process of problem setting is actually a process of calculation and thinking. In this process, students' enthusiasm is fully mobilized, and everyone can fully integrate into the classroom. In the remote context, the effective participation of everyone in the classroom will greatly improve the classroom efficiency.

2.2. Innovative Classroom Practice

A large number of studies have shown that the common feature of children with learning disabilities is poor attention [7-9]. To improve classroom efficiency and students' learning ability, we should pay attention to the changes of students' attention in class. The students' attention level showed a trend of decreasing first and then increasing with time, while the teacher's attention level during teaching was just the opposite: it showed a trend of increasing first and then decreasing with time. The unmatched attention of teachers and students will also affect the quality of learning to a certain extent [10,11]. Therefore, teachers should adjust students' learning status in a timely manner, and transfer inappropriate psychological cognitive activities that have little to do with tasks to physical, creative and reflective activities that are more relevant to learning tasks [12]. Studies have shown that children learn faster and have more profound memories of textbooks in a stress free and comfortable environment [13]. Under the background of remote online teaching, adding interesting group PK games in classroom exercises undoubtedly plays a positive role. Before the competition, the class is divided into different groups, and each group is an activity unit. This can not only cultivate the collective sense of honor, but also make the activities more participatory. First of all, we will conduct PK within the group to select the best. The winner represents the group and the first member of other groups to PK. Finally, we will select the winner between different groups. People are keen on games because games can intuitively and quickly give the performance of each player in this round of games, while learning is a long process, and non visualization seriously affects students' enthusiasm for learning. Therefore, visualizing the evaluation process of learning will greatly stimulate students' interest in learning and improve classroom efficiency. Take Mathematics Volume I of Grade 8 in junior high school (Jijiao Press) as an example: when learning the concept of fraction in the first section of Chapter 12, after teaching students the definition of fraction, you can set up game links to increase the interest of the classroom and arouse students' interest. Use the

"Shrimp Home" in the Schivol whiteboard to set the fraction as the house of the first shrimp and the non fraction as the house of the second shrimp; Each shrimp is marked with a formula on its back. Students need to match the formula on the shrimp back with the name of the house. Move the shrimp into the house to complete the game. The more successful matches and the shorter the time, the winner. Another example: when learning the Pythagorean theorem in Chapter 17, special triangles, in order to strengthen students' memory of Pythagorean numbers, we can set up a "rocket lift off" game. Different Pythagorean numbers are distributed on the rocket accessories. If the rocket accessories are correctly installed (matching the Pythagorean numbers on the rocket accessories correctly), the rocket can be successfully launched. The evaluation method is the same as "shrimp goes home". The addition of these small games can effectively attract students' attention in the classroom, specifically solve the problem that the learning situation of distance education students is not controllable, and ensure the smooth progress of the classroom.

2.3. Innovative Extension Service

The form of large class teaching should ensure the efficiency of most students' listening, and it is difficult to take care of each student. This will lead to students with weak foundation who can't keep up with the teaching progress, and students with good foundation who can't fully meet their requirements in class. Network resources are not only suitable for teachers' "teaching", but also suitable for students' autonomous learning.

The extension of classroom time and space through digital online resources helps to cultivate students' independent thinking, logical thinking and other abilities, and forms a good form of cooperation between teachers and students and between students and students [14]. The advantage of remote service is that it is not limited by space and time, so this advantage of remote courses should be amplified. Making full use of the Internet as a platform, so that students have more ways and resources to independently acquire mathematical knowledge, and promote students to actively learn mathematical knowledge, can change the current situation of passive learning. Teachers timely guide and train students in online learning methods, and create teaching resources that can repeat learning in different places and times by using hybrid teaching.

H. Ebbinghaus Forgetting Curve tells us that people's memories of newly accepted knowledge are often unreliable and unstable, so we should review them in time. For teachers, micro lessons can be the main way for students to review independently. At present, there are many existing micro course video network platforms in China, but few can seamlessly connect with the classroom. If students want to obtain a complete video, they need to spend a lot of time to find it from a large number of resources, which greatly reduces the efficiency of using fragmented time. Therefore, after-school extension service is very necessary for distance education. The setting of this part of micro courses should not only be able to effectively connect with the content of this lesson, but also meet the students' needs for expanding relevant content. Taking the triangle in Volume 2 of Grade 7 as an example, the center of gravity, inner heart and vertical center of the triangle will be involved when explaining the middle line, angular bisector and high line of the triangle. At this time, we can give timely guidance: we know that people have only one heart, so how many hearts do you guess in a triangle? Ask questions to arouse students' thinking and interest, and then lead to the center of gravity, heart and heart involved in the textbook. A triangle has five centers. In addition to the three centers mentioned above, there are external centers and side centers. In order to avoid the expansion content occupying the course time of key content, it can be put on the expansion after class and displayed in the form of micro class. In addition to extracurricular expansion, our micro lesson should also include the content outline of this lesson for students to review; the course corresponds to a summary exercise for the convenience of students' self-test. In this way, the micro course

system of main course outline summary self-test after class expansion has been formed. This way allows students to quickly find the content that matches this lesson, and truly achieves the efficient use of fragmented time.

3. Innovation Evaluation System

The new generation is a generation full of personality, and the current learning evaluation method is popular, which is difficult to take into account the personalized development needs of every student, obviously not conducive to the improvement of students' mathematical core literacy level. Educational evaluation has the functions of guidance, identification, improvement, regulation and incentive [15]. In most cases, people pay more attention to the identification function of education evaluation, so the mid-term and final examination is popular. But we should be clear that the most important purpose of evaluation is not to prove, but to improve [16]. The mid-term and final examination method adopted in traditional education has serious lag: for the lecturer, this evaluation method can't timely grasp the students' learning situation; For students, it is not easy to find learning loopholes, find and fill gaps in time, so it is not suitable for distance online education. To truly and comprehensively reflect students' learning achievements, it is necessary to innovate and optimize the evaluation system and create diversified evaluation methods.

3.1. Classroom Quizzes are Included in the Evaluation System

The quiz in class can clearly and timely reflect the students' acceptance of knowledge in this lesson. It is more beneficial to give students a fair, fair and open evaluation by including the ordinary quizzes into the evaluation system. Taking the mathematics of Jijiao Press, Volume 1 of Grade 8 as an example, this volume includes five chapters: fractions and fractional equations, congruent triangles, real numbers, axial symmetry and central symmetry, and special triangles. Each chapter only accounts for 10percent - 30percent of the final paper. For the chapters that account for a relatively small proportion, 10percent of the contents correspond to 2-3 choices or fill in the blank, and there are few inspection contents. This part of the examination questions obviously cannot fully show the students' overall learning situation for this chapter. The lack of a certain knowledge point is likely to result in the score rate of this part being only 30percent or even lower, which is obviously unfair. In the context of distance education, in order to pursue a more appropriate evaluation method, it is planned to record the results of ordinary quizzes into the overall evaluation. The proportion of quizzes can be calculated according to the importance of the knowledge points in the whole book, or according to the teachers' own evaluation needs.

3.2. The Activity Class is Included in the Evaluation System

Mathematics is not only a collision of thinking, but also a very important link of practical ability. However, nowadays, in the wave of the supremacy of scores, the practical ability is often ignored. Attaching importance to hands-on ability is not only conducive to cultivating people with all-round development under the requirements of the new curriculum standard, but also an important magic weapon to attract students' eyes and grasp their hearts in the classroom. It is necessary to include activity classes in the evaluation system. Take the factorization of the seventh grade mathematics volume II as an example. In the activity of "puzzle and factorization", you can take groups as the activity units and express your own activity results after the puzzle. The team members and groups shall score and evaluate each other, and the total scores shall be recorded and incorporated into the evaluation system.

4. Conclusion

With the arrival of the era of Internet plus, distance education will eventually become a trend. We are standing on the tide of the new curriculum reform, and we should adapt and innovate. We should take teachers' teaching as the basis, students' autonomous learning as the core, the Internet as the carrier, innovate teaching methods, classroom exercises, extended services, and evaluation systems to create a new classroom form. With the help of rich and diverse multimedia knowledge bases, we should actively carry out teaching innovation, design a knowledge system and a reasonable, interesting, and evidence-based teaching process that meet students' learning conditions, and transform teaching students to learn knowledge into teaching students to learn methods, Attract students to participate in learning consciously and actively, so that students can truly experience the fun of learning mathematics, and add luster to the education of the motherland.

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