Intelligent Education Platform-Driven Efficient Development of High School Mathematics Classes

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Abstract: Under the background of the rapid development of information technology in the 21st century, the application of intelligent education platform in the field of education is becoming more and more popular. This paper focuses on senior high school mathematics teaching, and deeply discusses how the intelligent education platform can help the three key classes of new class, review class and lecture and evaluation class to achieve efficient development. Through analyzing the unique advantages and application strategies of the intelligent education platform in each class type, and combining with specific teaching examples, this paper expounds its important role in improving the teaching quality and enhancing the learning effect of students, aiming to provide valuable references for the reform of senior high school mathematics teaching.

1. Introduction

As the core component of China's mathematics education system, high school mathematics is not only an important cornerstone of students' sustainable development and lifelong learning, but also a key link to cultivate their comprehensive literacy. According to the requirements of *the Mathematics Curriculum Standards for General High Schools (2017 edition, 2020 revision)*, mathematics teachers should attach importance to the application of information technology and realize the deep integration of information technology and mathematics curriculum[1]. In the face of the new situation of the reform of the college entrance examination, the examination pays more attention to students' comprehensive knowledge application ability, information acquisition and processing ability, as well as critical thinking and logical reasoning ability[2]. However, the traditional high school mathematics teaching has some problems, such as single teaching method, limited teaching resources and insufficient attention to students' individual needs. With the advent of the era of Education Informatization 2.0, various intelligent education platforms have emerged at the historic moment, bringing new opportunities for the development of high school mathematics teaching. These platforms integrate rich digital teaching resources, advanced teaching AIDS and intelligent data analysis technology, and provide diversified and precise teaching support according to the characteristics and needs of different class types, helping to comprehensively improve and optimize the quality of senior high school mathematics teaching.

2. The intelligent education platform promotes the coordinated development of new class, review class, lecture and evaluation class

In the new wave of education informatization, the intelligent education platform based on powerful functions and data resources can penetrate into the teaching and learning process of new class, review class, lecture and evaluation class, so that the interaction of the three can be connected and jointly promoted, so as to build a curriculum teaching model framework based on the intelligent education platform, as shown in Figure 1. In this mode, the new class creates scenarios, intuitionistic demonstrations and real-time interactions through the knowledge resources of the system, so that students can obtain relevant knowledge. The generated student activity information,

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such as the participation of students in class and the mastery of various knowledge points, is an important basis for determining the content and focus of the review class, so as to guide the efficient implementation of the review class. According to the acquired information, the review class will sort out the knowledge, organize personalized learning according to the system report data, and complete the mock exam. The data generated in this process, such as wrong questions and problem solving, can be used for lecture and evaluation class. Based on the accurate analysis of the platform, the problems exposed in the review class and the new class can be explained in a variety of interactive exchanges, to solve students' doubts, deepen their understanding of knowledge, and truly internalize the newly taught knowledge. The formation of students' problem-solving ideas and thinking patterns can prepare for the next stage of new teaching and learning, form a good teaching cycle, and help students to make continuous progress.

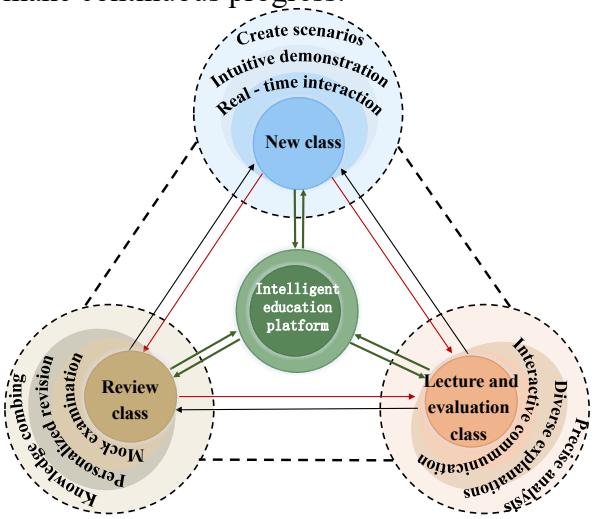

Figure 1: Framework of course teaching mode based on intelligent education platform.

3. The application of intelligent education platform in high school mathematics curriculum

3.1. The application of intelligent education platform in the new class of high school mathematics

3.1.1. Create scenarios to stimulate learning interest

In senior high school mathematics teaching, creating attractive teaching scenes plays a key role in promoting students' learning interest. An excellent introduction can not only quickly attract students' attention, but also effectively ignite their thirst for knowledge. With the massive multimedia resources provided by the intelligent education platform, teachers can make use of these tools to create vivid and interesting teaching scenes. For example, when explaining the concept of "derivative", teachers can introduce the topic by showing a historical video about Newton and the origin of calculus. Videos could focus on the rapid development of physics in the 17th century, when the study of the laws of motion and astronomical phenomena needed precise mathematical tools. It was against this background that Newton devoted himself to the study of bodies in free fall and the motion of celestial bodies, but got bogged down by problems such as instantaneous velocities and curve tangents. After countless derivations and calculations, Newton innovatively put forward the "fluid number", which marked the birth of calculus. He used unique mathematical techniques to deal with the dynamic changes of variables, and realized the leap from static to dynamic. After the students have watched the video, the teacher can guide them: Newton's key idea in solving the instantaneous rate of change is at the heart of the concept of derivatives, which naturally introduces derivatives and stimulates students' curiosity.

3.1.2. Intuitive demonstration to break through teaching difficulties

In high school mathematics teaching, using Intuitive demonstration to break through teaching

difficulties is an important means to improve teaching quality. Many mathematical principles and definitions are abstract and difficult for students to understand, but through the animation, 3D model and other technologies of the intelligent education platform, we can intuitively show the abstract mathematical knowledge to students, and students can better grasp and understand. Taking the concept of "line with different surfaces" in "solid geometry" as an example, it is difficult for students to fully understand the spatial position relationship of the line with different surfaces, which is neither parallel nor intersecting, through drawing on the blackboard in traditional teaching. However, with the 3D model function of the intelligent education platform, teachers and students can rotate and scale the model together, observe the position of the lines with different faces from different angles, and understand the characteristics of the lines with different faces, so as to easily break through this difficulty.

3.1.3. Real-time interaction to improve class participation

The intelligent education platform supports a variety of classroom interaction methods, such as online questions, group discussions, and quick answers. In the new classes, teachers can make use of these interactive functions to guide students to actively participate in classroom teaching. For example, when explaining "the parity of functions", teachers show some function images on the platform, and then ask students to judge the parity of these functions by asking questions online, and express their own opinions and judgment basis on the platform. Other students can comment on and supplement their views, while the teacher guides and summarizes. This kind of real-time interaction not only enlivens the classroom atmosphere, but also enables teachers to know the students' mastery of knowledge in time and adjust teaching strategies.

3.2. The application of intelligent education platform in the review class of high school mathematics

3.2.1. Knowledge combing and construction of knowledge system

The review class is an indispensable part of the teaching process. Its main goal is to help students consolidate what they have learned, deepen their understanding, build a systematic knowledge framework, and improve their ability to apply knowledge. The mind mapping tool provided by the intelligent education platform provides an effective learning aid for teachers and students. For example, when reviewing the chapter "Trigonometric Function", students can take the definition of trigonometric function as the core, systematically comb the knowledge points such as relevant formulas, images and properties, induction formulas and identity transformation through the form of mind map, so as to clearly show the internal relationship between various knowledge points. In addition, teachers can also share excellent mind map cases on the platform for students' reference and study, and help them master effective knowledge arrangement methods.

3.2.2. Personalized revision to meet different needs

The platform provides digital resource support for students' personalized learning and provides more possibilities for students' in-depth learning[3]. Each student has different mastery of knowledge and weak links in the learning process of mathematics. With the help of big data analysis technology, the intelligent education platform can analyze students' learning according to their usual homework, test scores and other data, and formulate personalized review plans for students. The platform will push targeted review materials and exercises for students, such as for students with poor grasp of the "series" part, the platform will push videos of general term formula solving, series summation and other related knowledge points and special exercises, so that students can review in a targeted way and improve the review efficiency.

3.2.3. Mock examination to improve test-taking ability

Mock examination is an important means to check students' learning results and improve their test-taking ability in the review stage. The intelligent education platform provides a wealth of mock examination resources, and teachers can organize mock examinations on the platform according to

the teaching progress and the actual situation of students. After the test, the platform will automatically grade the test papers and generate a detailed test analysis report. The report not only covers basic information such as students' grades and answering time, but also classifies and analyzes wrong questions, pointing out students' problems in knowledge mastery and problem-solving skills. According to the analysis report, teachers can give targeted explanations and guidance in class to help students identify gaps and make up for them, so as to further improve their test-taking ability.

3.3. The application of intelligent education platform in the lecture and evaluation class of high school mathematics

3.3.1. Precise analysis to determine the key points of evaluation

In the traditional lecture and evaluation, teachers often explain students' wrong questions according to their own experience, which lacks pertinence. The intelligent education platform can accurately analyze the answer data of students, and teachers can understand the correct rate of each question and the distribution of error types of students through the platform. For example, after the exponential function test, the platform data showed that questions about the monotonic application of the function had a higher error rate. According to this data, teachers decide to take the application of function monotonicity as the key content of teaching and evaluation, and make targeted explanations and expansions to improve the efficiency of teaching and evaluation.

3.3.2. Diversified explanation and expansion of problem-solving ideas

In lecture and evaluation classes, the intelligent education platform can provide teachers with diversified explanations. Teachers can use the platform's screen-recording function to record the explanation videos of typical errors in advance for students to learn independently after class. For some complex problems, teachers can also use animation demonstration, geometric drawing board and other tools on the platform to dynamically show the problem solving process to help students better understand the problem solving ideas. For example, when explaining the position relationship between a straight line and a conic curve in "analytic geometry", teachers can intuitively show the dynamic process of the intersection, tangent and separation of a straight line and a conic curve through the geometric drawing board, so that students can clearly see the changes of relevant parameters under different position relations, so as to expand students' problem-solving ideas[4].

3.3.3. Interactive communication to promote students' reflection

Lecture and evaluation should not only be one-way explanation by teachers, but also focus on students' participation and reflection. Intelligent education platforms support interaction between teachers and students as well as between students. After explaining the wrong questions, teachers can initiate discussion topics on the platform, allowing students to share their ideas and reasons for their mistakes, and other students can comment and add. This kind of interactive communication can enable students to think about problems from different angles, promote students' self-reflection and improve students' problem-solving ability. At the same time, the teacher can further understand the students' thinking process and find the problems in teaching through the students' speech.

4. Case analysis based on the teaching mode of intelligent education platform

4.1. Case Background

Two parallel classes were selected from a high school in Shandong Province as experimental subjects, one of which was an experimental class (46 students). In mathematics teaching, the intelligent education platform was fully utilized to carry out new classes, review classes and lecture and evaluation classes. The other class was the comparison class (43 students), which adopted the traditional teaching methods and means.

4.2. Teaching implementation process

Before the beginning of the teaching experiment, the scores of sophomore class were taken as the pre-test data and analyzed by SPSS19.0, as shown in Table 1. According to the results of Levene variance homogeneity test in Table 1, the corresponding significance sig was shown. The value is 0.001, which is below the critical value of 0.05. Therefore, it can be concluded that the mathematical results of the experimental class and the control class do not meet the hypothesis of variance homogeneity. Therefore, the bilateral significance sig of the second line "hypothesized variance is not equal" should be referred to when conducting the T-test. Value, which is 0.613, above the critical value of 0.05. This indicated that there was no statistically significant difference between the math scores of the students in the two classes, which met the requirements of the experimental design.

Table 1: Independent sample T-test between control class and experimental class pre-test.

		Levene test of variance equation		T-test for mean equation				
		F	Sig.	t	df	Sig.(both sides)	95% confidence interval for the difference	
							Lower bound	Upper limit
Grades	Assumed equal variance	11.432	.001	-.515	87	.608	-7.507	4.415
	Assume the variances are not equal			-.508	70.375	.613	-7.614	4.522

In the whole teaching experiment process, the following schemes are implemented specifically for different lesson types. In the new teaching stage, the teachers of the experimental class use the intelligent education platform to create scenarios, intuitively demonstrate knowledge, and organize classroom interaction; The teachers of the control class use the traditional blackboard writing and explanation methods. In the review class, the experimental class used the platform for knowledge combing, personalized review and mock examination; The control class mainly relies on the teacher's class summary and unified review materials for review. In the lecture and evaluation class, the experimental class uses the platform's accurate analysis function to determine the key points of the lecture and evaluation, and adopts diversified explanation methods and interactive communication modes; In the control class, teachers explain wrong questions according to their own experience, and students passively accept them.

4.3. Evaluation of teaching effect

After a semester of teaching practice, a unified math test was carried out on the two classes. The test paper was the final exam questions of sophomore high school. The following data were obtained by analyzing Excel2010 and SPSS19.0. From Table 2, we can see the data of the number of examinations, excellent number and proportion, good number and proportion, passing number and proportion of the comparison class and experimental class in the pre-test and post-test, and further intuitively present the change of the results of the two classes. The test results show that the excellent rate, good rate and pass rate of the experimental class have increased by 26.09%, 36.96% and 2.18% respectively, while the good rate of the control class has decreased, and the other two items have no significant change.

Table 2: Comparison class and experimental class before and after math test score proportion table.

Classes	Number of test takers	Excellent number/proportion	Good number/proportion	Passing number/percentage
Comparison class (pre-test)	43	9/20.93%	23/53.49%	36/83.72%
Control class (post-test)	43	9/20.93%	18/41.86%	37/86.05%
Experimental class (pre-test)	46	8/17.39%	21/45.65%	42/91.30%
Experimental class (post-test)	46	20/43.48%	38/82.61%	43/93.48%

According to the results of Levene test in Table 3, the sig. value of homogeneity of variance is 0.010, which is less than 0.05, indicating that the mathematical results of the experimental class and the control class do not meet the hypothesis of homogeneity of variance. Therefore, the results of the T-test should refer to the sig. (bilateral) value of the hypothesis of unequal variance, which is 0.004 and less than 0.05, indicating that there are significant differences in the math scores of the students in the two classes. This indicates that the integration of the intelligent education platform into teaching is conducive to improving the learning effect and development of students.

Table 3: Independent sample T-test between in control class and experimental class post-test.

		Levene test for variance equation		T-test for mean equation				
		F	Sig.	t	df	Sig.(both sides)	95% confidence interval for the difference	
							Lower bound	Upper limit
Grades	Assumed equal variance	6.851	.010	-2.948	87	.004	-17.848	-3.474
	Suppose the variances are not equal			-2.973	84.380	.004	-17.792	-3.530

Through the interview results, it is further understood that students in the experimental class have higher interest and satisfaction in math learning than those in the control class. Most of the students believe that the application of the intelligent education platform makes them more active in class, have a deeper understanding and mastery of knowledge, and significantly improve their comprehensive knowledge application ability, information acquisition and processing ability, critical thinking and logical reasoning ability.

5. Conclusion and Prospect

The intelligent education platform has significant advantages in the new class, review class, lecture and evaluation class of high school mathematics, which can effectively improve the teaching effect and promote students' learning and development. By creating scenarios, intuitive demonstration, real-time interaction and other functions, the intelligent education platform has

injected new vitality into the new classes; With the help of knowledge combing, personalized review, mock examination and other means, the intelligent education platform makes the review class more efficient and accurate; By means of accurate analysis, diversified explanation and interactive communication, the intelligent education platform makes the lecture and evaluation classes more targeted and effective.

However, the application of intelligent education platform in high school mathematics teaching still faces some challenges, such as teachers' familiarity with the platform functions needs to be improved, and the adaptability of platform resources to teaching practice needs to be further optimized. In the future, with the continuous development of information technology, the intelligent education platform will continue to improve and innovate. Education departments and schools should strengthen the training of teachers and improve their ability to use the intelligent education platform; The platform developers should have a deep understanding of the needs of high school mathematics teaching, continuously optimize the platform functions and resources, and jointly promote the development of high school mathematics teaching to a more efficient and high-quality direction.

References

[1] Ministry of Education. Curriculum Standards of Mathematics for General High School (2017 edition, 2020 revision) [M]. Beijing: People's Education Press, 2020.

[2] Jiang Dawei. Teaching Strategies of senior high School Mathematics Review under the background of New College Entrance Examination [J]. College Entrance Examination, 2025,(07):6-8.

[3] Wan Junfang. Teaching Practice supported by the National Intelligent Education Platform [J]. Hubei Education (Government Propaganda),2024,(08):82-83.

[4] Jin Meihua. High School Mathematics Teaching Practice Based on AI- Intelligent Education Platform [J]. Second Classroom (D),2024,(09):34-35.