The Role of Cloud Computing Technology in Resource Sharing of Mathematics Subject in High School

Haomin Liu

College of Information Science and Engineering, University of Jinan, Jinan City, Shandong Province, China

309598269@qq.com

Abstract. The purpose of this study is to explore innovative approaches, teaching ideas, and educational experiences for high school mathematics education in the context of the new college entrance examination reform. Four experiments were proposed in the experimental section to evaluate the teaching effectiveness of innovative education paths. In the comparative experiment of academic performance, the experimental group of students using the innovative education path increased their math scores from 70 to 78, while the control group of students increased their scores from 70 to 72. In the learning participation experiment, the experimental group showed a 50%, 66.7%, and 100% increase in login frequency, online learning duration, and interaction frequency compared to the control group, respectively. In the learning satisfaction experiment, the experimental group students scored 4.5 points on the satisfaction score of the interactive platform. From the data conclusion, it can be concluded that innovative education paths can effectively improve the academic performance of high school mathematics students, while significantly enhancing their innovative thinking and problem-solving abilities.

Keywords: Subject Education; High School Mathematics; Mathematics Education; Teaching Methods; New College Entrance Examination Reform.

1 Introduction

Nowadays, high school mathematics teaching is facing unprecedented challenges and opportunities. Educators and researchers are seeking more efficient and flexible teaching methods to adapt to this new educational requirement. The purpose of this article is to explore the application of innovative education paths in high school mathematics teaching and how to promote the comprehensive development of students' abilities.

The main contribution of this article is to systematically analyze the impact of innovative education paths on the teaching effectiveness of high school mathematics, including academic performance, learning participation, learning satisfaction, and the improvement of innovative thinking and problem-solving abilities. In the experimental

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stage, the effectiveness of the innovative education path was verified by designing corresponding experiments and collecting data.

The introduction section first introduces the background of the new college entrance examination reform and the necessity of research. Secondly, in the methodology section, the construction of cloud resource library and hybrid teaching mode were elaborated in detail. Then, in the experimental phase, the experimental data and discussion conclusions were presented. Finally, the main findings of the article are summarized in the conclusion section, and prospects for future research directions are proposed.

2 Related Works

In the new era, many educators and scholars have begun to explore teaching methods and educational experiences that are more suitable for new requirements. For example, based on various tools and platforms, Xu Yixin proposed a project-based learning method for primary school mathematics teaching to improve the teaching methods of primary school mathematics [1]. Zheng Jun utilizes the portability of graphic calculators and the professional functions of mathematics to guide students in project-based learning of middle school mathematics [2]. Liu Fang fully grasps the essential attributes of mathematics and constructs a lively mathematical learning environment for students by creating scenarios and other methods[3]. CAI Yuyan analyzed in detail the necessity of integrating big data into primary school mathematics education to realize informatization, and conducted an in-depth discussion on the possible problems and solutions under this mode [4]. These studies show that in the context of the new college entrance examination reform, the traditional education model is gradually changing to a more open, interactive and student-centered direction.

Although multiple studies have attempted to address the challenges posed by the current context, these studies still have certain limitations. For example, Wang Yong analyzed in detail the current problems in teaching and proposed effective strategies for teaching primary school mathematics under the new curriculum standards [5]. In this case, cloud computing technology provides the possibility to solve this problem with its efficient resource sharing ability, powerful data processing ability and convenient access.

3 Methods

3.1 Cloud Resource Library Construction

This article proposes an innovative educational path aimed at improving the teaching effectiveness of high school mathematics and the personalization of student learning. Building a cloud resource library is a great approach. This resource library contains various teaching and learning materials, and also utilizes cloud computing technology to achieve efficient management and personalized recommendations of these resources. One of the characteristics of cloud resource libraries is personalized learning paths. Through data analysis and learning algorithms, the platform can recommend

personalized learning content and paths based on students' learning history and preferences[6-7]. Specifically represented by formula (1):

$$\hat{y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n \quad (1)$$

In formula (1), where $\hat{y}$ represents the predicted learning effect, $X_1, X_2, \ldots, X_n$ represents different learning characteristics, and $\beta_0, \beta_1, \ldots, \beta_n$ represents model parameters. In addition, to ensure that all students have easy access to the resources they need, ease of use and accessibility are often taken into account when building cloud repositories [8-9].

3.2 Mixed Teaching Mode

The development of blended learning mode in this study aims to combine traditional face-to-face teaching with modern online learning platforms to improve teaching effectiveness and student learning experience. The most important thing is to divide knowledge points into online learning modules and offline interactive teaching modules. The online learning module mainly includes basic concept explanations, etc., which can help students learn independently and consolidate knowledge. The offline teaching module focuses on solving complex problems, group discussions, etc., promoting the cultivation of students' deep thinking and innovative abilities [10].

The construction of a technology platform is crucial for the implementation of blended learning mode. A dedicated online learning platform can be developed. Students can learn according to their own pace and receive timely feedback and guidance from teachers. At the same time, the construction of the above technology platform can provide convenience for teaching and enhance the flexibility of student learning.

4 Results and Discussion

4.1 Comparative Experiment of Academic Performance

In the comparison experiment of academic performance, the purpose of the experiment is to evaluate the impact of innovative education paths on high school students' mathematical performance under the background of the new college entrance examination reform. In the experiment, 100 students will be assigned as the experimental group and the control group. The experimental group adopts an innovative education path that combines cloud computing technology and blended learning mode, while the control group adopts traditional teaching methods. The math scores of both groups were tested before and after the experiment. In this experiment, tests were used to compare the performance differences between the experimental group and the control group, as shown in formula (2):

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}} \tag{2}$$

In formula (2), the average scores of the experimental and control groups are represented by X_1 and X_2respectively, then s_1 and s_2 represent their respective variances, and the sample sizes of each group are N_1 and N_2, respectively.

From Figure 1, it can be seen that after adopting the innovative education path, the average math score of the experimental group significantly increased from 70 points before the experiment to 78 points after the experiment. The average score of the control group only slightly increased from 70 points to 72 points during the same period. From the above data differences, it can be seen that innovative education paths have a significant positive effect on improving students' math grades. As shown in Figure 1:

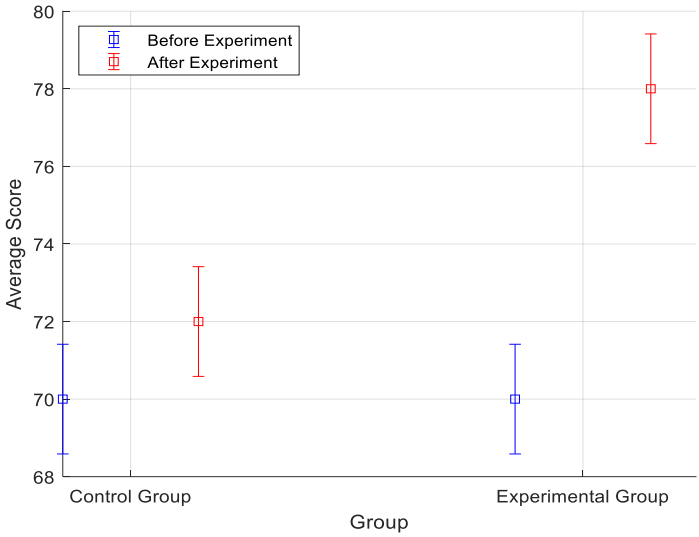

Fig. 1. Comparative assessment of academic performance

4.2 Survey and Evaluation of Learning Engagement

The purpose of the study engagement survey experiment is to evaluate the impact of innovative education paths on the learning engagement of high school students. In the experiment, 100 high school students were randomly divided into two groups. The experimental group used an educational path that combines cloud computing technology and blended learning, while the control group used traditional teaching methods. Specifically, as shown in Figure 2:

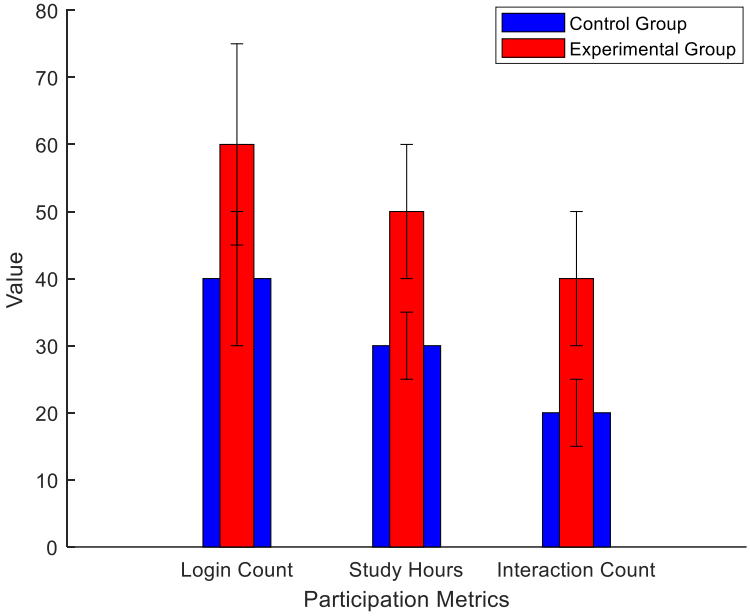

Fig. 2. Assessment of learning engagement

In Figure 2, the average login frequency of students using the innovative education path increased from 40 times in the control group to 60 times; The duration of online learning increased from 30 hours in the control group to 50 hours; The number of interactions increased from 20 in the control group to 40. From the above data conclusions, it can be seen that innovative education paths can effectively improve students' learning engagement.

4.3 Study Satisfaction Survey

In the study satisfaction survey, the purpose of the experiment is to evaluate the high school students' satisfaction with the application of traditional teaching methods and innovative education paths in mathematics. The 100 participating students were randomly divided into the control group and the experimental group. The experimental group adopted traditional teaching and the control group implemented innovative education paths.

As can be seen from Figure 3, the average score of students who adopt the innovative path in teaching content satisfaction is 4.0, while that of traditional teaching is 3.0. On the satisfaction index of interactive platform, the average score of innovative path students reached 4.5 points, while that of traditional teaching was 2.5 points. In the satisfaction index of teaching resources, the innovative path is 4.0 points, and the traditional teaching is 3.0 points. It can be seen that combining innovative educational

methods such as cloud computing and blended learning can significantly improve students' teaching satisfaction, as shown in Figure 3:

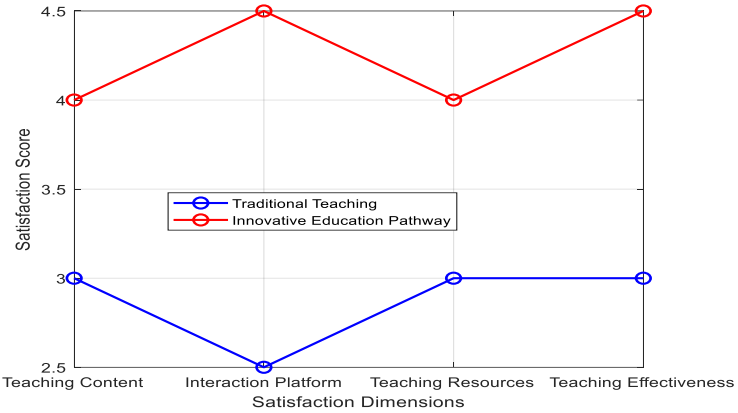

Fig. 3. Comparative analysis of learning satisfaction

4.4 Evaluation of Innovative Thinking and Problem Solving Ability

In the experiment of evaluating innovative thinking and problem-solving abilities, the purpose of the experiment is to evaluate the impact of innovative education paths on the innovative thinking and problem-solving abilities of high school mathematics students. The experimental group adopted innovative teaching methods such as project-based learning and flipped classroom, while the control group maintained the traditional teaching mode. The specific data details are shown in Table 1:

Table 1. Evaluation of innovative thinking and problem solving ability

Group	Innovative Thinking (Pre-test)	Problem Solving (Pre-test)	Adaptive Thinking (Pre-test)	Innovative Thinking (Post-test)	Problem Solving (Post-test)	Adaptive Thinking (Post-test)
Experimental	75	70	65	90	87.5000	74.7500
Control	75	70	65	75	70	65

As can be seen from Table 1, students in the experimental group who implemented the innovative education path showed significant improvement in innovative thinking and problem solving ability. The calculation formula of capability improvement percentage can be shown in formula (3):

$$\mathrm{AIP} = \left(\frac{OAS - RAS}{RAS}\right) X100\% \tag{3}$$

In formula (3), OAS is used to represent the average score of the post-test and RAS is used to represent the average score of the pre-test. Specifically, the experimental group students showed an average improvement of 20% in their innovative thinking

ability and 25% in their problem-solving ability in the post test. The above results indicate that innovative education paths can effectively promote high school mathematics students to demonstrate higher levels of thinking ability and adaptability when facing mathematical problems.

5 Conclusion

In this study, we discussed how to utilize innovative educational pathways to enhance the teaching effectiveness of high school mathematics, which is an important exploration in the current environment. To this end, various innovative teaching methods have been adopted, including cloud computing technology, blended learning, and project-based learning, in order to cultivate students' innovative thinking, problem-solving ability, and adaptive thinking. However, this study also has certain limitations, such as sample size limitations that may affect the universality of the results. Future research can further verify the effectiveness and feasibility of innovative education paths in high school mathematics teaching by expanding the sample size and exploring more diverse innovative teaching methods.

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