Design and Implementation of City-level Smart Mathematics Education Platform Based on Big Data

Nan Wang[*]

Jiangxi Medical College, Jiangxi 334000, China

402028785@qq.com

[*]*corresponding author*

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Abstract: In the context of big data, with the rapid development of cloud computing and mobile networks, smart education has opened up the era of digitization, networking and smart cloud. Smart learning, smart education, interactive online classrooms and personalized learning have become new trends in future education development. The era of big data has had a great impact on my country's education field. A variety of network technologies and smart classrooms have been widely used in the teaching process, realizing large-scale reforms of traditional education models. The realization of the smart education platform can provide students with a learning platform with a personalized learning experience and a good smart learning atmosphere, which greatly improves the traditional teaching and learning mode. This article first analyzes the key points of smart education and provides the design principles of smart math education platform. In order to promote smart education and smart learning, secondly, it designs and implements an open and shared interactive smart math education platform. Provide specific reference materials for researchers in smart service, smart management, smart evaluation, and smart education.

1. Introduction

Wisdom education is a new type of education that combines technological changes, economic globalization and knowledge conflicts. It is also an inevitable stage of educational information technology development [1]. It is the first time to explain the understanding of the essence of wisdom education from a philosophical point of view. The well-known Indian philosopher Christina Muti revealed the essence of education in her essay "Lifelong Learning". Real education should be full of love, freedom and wisdom. And be able to understand oneself, eliminate fear, and reach a state of sober wisdom [2]. In addition, the "smart city" strategy proposed by IBM in 2008 gave birth to the concepts of "smart city", "smart campus" and "smart education". Experts and scholars at home and abroad have conducted in-depth research on the nature, composition system, operation mode, evaluation method and other aspects of "smart education" [3].

At present, most of the education application platforms on the market, scattered resources, low-level repeated construction and other construction standards are very prominent. All countries in the world determine the core factor of the development of education informatization as the application program, and the core of the application lies in the establishment of an application platform. It is of very positive significance to promote the development of education informatization through the establishment and application of regional smart education platforms [4]. The smart education platform can provide learners with a good smart learning environment and personalized learning experience [5]. In the education industry, the deepening of big data technology and the popularization of mobile terminals such as smart phones and tablet computers, as well as the appearance of new education models such as flipped classrooms and MOOCs [6]. The change of technological education model has overturned the existing education method, which is based on the improvement of information technology, and is also a new challenge to the traditional education model [7].

With the continuous application and development of smart education concepts in multiple fields, more and more teachers have begun to use smart education theories in the classroom, and at the same time began the modification and innovation of traditional education methods [8]. Due to the emergence of smart classrooms, the concept of smart education has become a product of the development of classroom education. It has a variety of features such as tool richness, smart tracking, personalized collaboration, and smart activities. Therefore, smart education has been well-received by the education community and the people from all walks of life, Attention and recognition [9]. Mathematics is a basic subject that originates from life and serves life applications and daily life. Mathematics is also a subject for the synthesis, analysis and application of information. In order to improve the education level from their own subject point of view, mathematics teachers should study the methods of using smart education and education platforms, effectively integrate the smart education platform into math classroom education, and master and apply smart classrooms. The purpose of the municipal wisdom math education platform is to enable students and teachers to communicate and communicate better [10]. Not only that, it also provides a platform on which teachers and students can share some learning resources. Nowadays, teachers can use this platform to post some assignments or some relatively important notices for students. They can also use this platform to let parents have a more accurate understanding of the status of students in the school, and they can also Students carry out many tasks such as inspection and testing.

2. Method

2.1. Establishment of Data Standards

The establishment of data standards by the city-level smart education platform should be based on data standards that meet the actual requirements of education to investigate and deal with all the processes, characteristics, rules and practical issues of education. Summarizing the data standards suitable for the industry, the specific composition stages are as follows. 1. Analyze the actual requirements of regional education users, and summarize and classify various data collection points. Summarize the basic data types and basic options of system data suitable for the regional characteristics of education. 2. Compare and segment the collected view data types, and set other data element constituent elements. Set data element standards. 3. Analyze and construct view standards and basic data standards, corresponding to the reach of the system, construct each application mode according to different functions, confirm the structure of each application, and

finally meet the standard. 4. Analyze and filter various data standards, and set the data model that needs to be met according to the basic data standards, and set the E_R diagram of the logical data. 5. In order to distinguish different information data, develop standards, and classify and generalize information according to the rules. 6. Put forward standards for data exchange, and put forward standards for the integration of various data resources used to achieve correct and reasonable data processing.

2.2. Provide Students with a Sustainable Wisdom Tree Education Platform

According to the principle of necessity and sufficient, integrate mathematics teaching content, not only to meet the different needs of students in higher vocational majors for mathematics knowledge, but also to meet the needs of students' personality development, docking and serving the mathematics required in the learning of various professional courses basic concepts, basic principles, theorems, basic mathematics calculation ability, mathematics application ability, etc., to teach according to needs, teach students in accordance with their aptitude, and provide a sustainable development platform for students' personality development and professional growth. And when designing platform teaching resources, it reduces the difficulty, highlights the principles of simplicity and practicality, and does not pursue complex reasoning, proofs, and tedious calculations and artificial skills. It reflects simple logical reasoning, theoretical calculations, and space corresponding to the students' cognitive level. Imagination ability and mathematics application ability are enough, and embody modern mathematics thinking methods, incorporate certain mathematics cultural thoughts, curriculum ideological and political elements, and construct a scientific and reasonable mathematics online open curriculum resource structure. The selection of each module resource reflects a certain degree of flexibility to meet the needs of students at different levels.

2.3. Deep integration with Modern Information Technology

Today's smart terminal devices not only include smart phones, but also smart platforms and other wearable devices, which are very common. On the one hand, these terminals are easy to connect to the Internet, but also convenient for data calculation, information collection and user experience. The application of this kind of intelligent terminal improves the convenience of students' independent learning, and promotes the communication between teachers and students and the interaction between students. When designing an open route for autonomous learning of the smart mathematics education platform, you can rely on the smart technology of the mathematics education platform to strengthen the close integration with modern information technology, strengthen the use of tools, and promote the optimization of course content. Through the application of modern information technology, improve the presentation of educational content, improve educational courses and learning methods, and help students better understand the basic knowledge of mathematics. Improve students' information collection, data processing, mathematical modeling, professional applications and other applications, so as to stimulate students' concern for ability and learning.

2.4. Models and Algorithms

Reliability is an important aspect of the reliability analysis of the scale, and it is of great significance to the application of the scale. This study mainly uses the internal consistency

reliability. The reliability coefficient is the Cronbach a coefficient, and the calculation formula is:

$$\alpha = [K/(K-1)][1-(\textstyle\sum Si2)/S2] \tag{1}$$

$$e = \frac{1}{2}\sum_{o=1}^{q}(d_o(k) - y_o(k))^2 \tag{2}$$

Among them, i=1,2,...,k. In the formula, K is the number of questions in the questionnaire, Si2 is the within-question variance of the score of the i-th question, and S2 is the variance of the total score of all the items. The reference standard for questionnaire reliability evaluation: It is related to the number of questions, and the Cronbach alpha coefficient of the questionnaire is usually required to be greater than 0.8. If the α coefficient is greater than 0.8, it means that the internal consistency is very good. The α coefficient between 0.6 and 0.8 means the reliability is better, and lower than 0.6 means poor. A combined analysis of the teaching effect in the questionnaire found that the Cronbach's α coefficient was 0.926, and the sub-item analysis found that the Cronbach's α coefficient was 0.645-0.823, both greater than 0.6, indicating that the questionnaire has good reliability.

3. Experiment

3.1. Experimental Investigation Objects

In order to have a better understanding of the design and implementation of the city-level smart mathematics education platform in the context of big data, this article chose two schools in City A to conduct experiments, which are divided into experimental classes and control classes. The experimental class has 100 students and the control class has 100 people, after a quarter of study, conduct a questionnaire on the use of the smart math education platform to further improve the design and improvement of the city-level smart math education platform, and understand the current status of the development of mathematics teaching through the use of informatization . To solve the problems existing in the current practice of the city-level smart mathematics education platform, and to study the path and method that conform to the construction of the smart mathematics education platform. This research is aimed at students from two schools in city A. In order to better understand the feedback used by the smart mathematics education platform, it is an important step to improve the construction of the city-level smart mathematics education platform in my country.

3.2. Experimental Design Scheme

This research is for two classes (experimental class and control class) of two schools in City A to conduct experiments. After the experiential learning is completed, they will be tested to compare the satisfaction of the two classes' practical learning, and compare the method and variance. Method for analysis, after distributing the "Questionnaire on Attitudes towards Smart Mathematics Education Platform" to students, a total of 200 questionnaires and 200 valid questionnaires were distributed. The data and text content of the collected questionnaires were analyzed and sorted out to understand the current realization of the wisdom mathematics education platform. This article conducts data analysis and text processing on the answers to the questionnaire. Although the questionnaire can learn a lot of information, there are also cases where the information is insufficient or incomplete. Therefore, on the basis of the questionnaire, this article also uses the literature research method, the purpose is to analyze and discuss the current situation of the municipal intelligent mathematics education platform more comprehensively and accurately.

4. Results

4.1. Experimental Investigation Summary

Table 1. Comparison table of the passing rate of the experimental group and the control group in the past final exams and mathematics application ability exams

| Grouping	Number of people	End of first semester	End of second semester	The number of people who passed the application ability test	Application Ability Test Pass Rate
Test group	100	73.5	78.8	70	70%
Control group	100	72.4	75.2	64	64%

From Table 1, we can observe the following results: the pre-test score (average score) of the students in the experimental class is 1.11 points lower than that of the students in the control class, and the ratio of the two groups' scores is 98.24%; after the experimental class adopts the wisdom mathematics education platform, the first In the second semester, the average score of the experimental class was 3.6 points higher than that of the control class, and the average scores of the two exams were 104.32% and 106.82%. In the mathematics application ability test, the pass rate of the experimental class is 6% higher than that of the control class; the ratio of the pass rate of the experimental class to the control class is 117.28%.
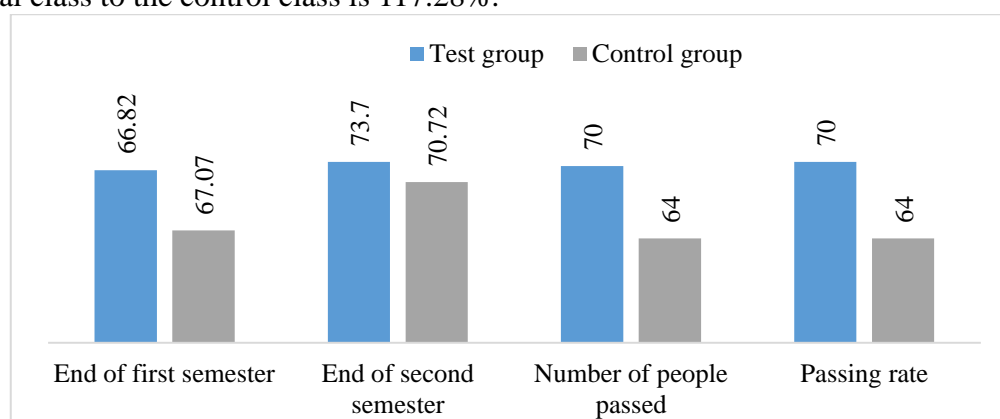
Figure 1. Comparison of the scores and pass rates of the experimental group and the control group in the final mathematics application ability test

From Figure 1, we can observe that the pre-test score of the experimental class is 0.15 points lower than that of the control class, and the ratio between the two is 99.53%. After teaching on the wisdom mathematics education platform in the experimental class, the final score of the second semester, the experimental class was 2.88 points higher than the control class, and the ratio of the two was 103.91%; in the mathematics application ability test, the passing rate of the experimental class was 7.47% higher than that of the control class, the ratio of the two pass rates is 112.65%.

It can be seen that the pre-test scores of the experimental class and the control class are not much different, but after nearly two semesters of separate teaching (the same major is taught by the same teacher), the passing rate of the experimental class students in the second semester and the applied ability test is significantly higher Control class, and the difference is more significant. This fully shows that compared with the original ordinary teaching mode, the auxiliary teaching of the wisdom mathematics education platform can effectively improve students' mathematics performance.
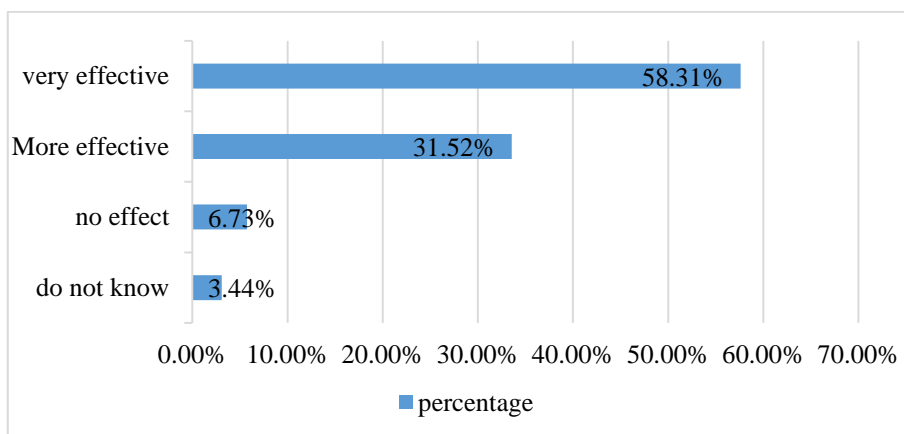
Figure 2. The survey of students' evaluation of the construction of the city-level smart mathematics education platform

According to the statistical chart of the survey on the evaluation of the construction of the city-level smart mathematics education platform by students in Figure 2, for the effectiveness of the construction of the city-level smart mathematics education platform, 89.83% of them choose "very effective" and "more effective". Only 10.17% of the city-level smart mathematics education platform construction has no effect, which shows that students have a high degree of recognition for the city-level smart mathematics education platform construction. In summary, it can be seen from the survey results that although most students hold a positive attitude towards the construction of the municipal wisdom math education platform. But in the actual teaching process, only 20.67% of the students reported that the current municipal wisdom mathematics education platform construction did not have much practical effect. This fully shows that the realization of the municipal wisdom mathematics education platform plays a significant role in the design of mathematics education curriculum, and it has been recognized and supported by the vast majority of students.

5.   Conclusion

Judging from the current application situation, this platform has been recognized by many teachers and parents, and students are also very willing to use this platform for learning. This platform is an innovation and transformation of the traditional teaching mode in the past, which meets the development needs of the times. In summary, with the rapid development of science and technology in the new era, big data, cloud computing, artificial intelligence, etc., as advanced technologies, have occupied an important position in human life, which also laid the foundation for the emergence of smart classrooms. This article conducts a preliminary analysis on the design and implementation of the intelligent mathematics education platform under the background of big data, analyzes the key points of intelligent learning, and then starts from the learning motivation and learning philosophy of students, and focuses on the intelligent learning platform that combines the characteristics of the intelligent campus In terms of construction analysis, discuss how the smart mathematics education platform can help students learn in the era of rapid development of big data. In addition, the smart mathematics education platform will also realize intelligence and data in many aspects such as communication feedback, teaching design, and resource push. This is also a challenge to the design of the smart education platform.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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