

The Application of Big Data Thinking in Mathematics Teaching

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Abstract: The arrival of the era of big data has a profound impact on mathematics teaching. Mathematics teaching, from the perspective of big data, refers to the decision-making based on data to provide strong support for all aspects of teaching and help teachers to re-evaluate the teaching content and the actual situation of students' development. Mathematics curriculum advocates the organic integration of information technology and curriculum content, advocates the use of information technology to present curriculum content, which is difficult to present in previous teaching, and strengthens the combination of mathematics teaching and information technology. The mathematics classroom is characterized by complexity and difficulty, and students feel a little boring when they study. With the rapid development of information technology, data collection and processing becomes easier, faster, more comprehensive and accurate. The arrival of the era of big data can fully mobilize the enthusiasm of students to learn mathematics and optimize the classroom structure. In turn, the utilization rate of classroom time is improved, and the optimization rate of thinking quality is improved.

1. Introduction

With the rapid development of science and technology in China, various advanced technologies have entered classroom teaching and achieved good results [1]. The emergence of "big data" and the development of science and technology enable students to acquire a large amount of information and knowledge more quickly and conveniently [2]. To enable teachers and students to communicate at any time and anywhere, and further improve learning efficiency. Mathematics teaching from the perspective of big data refers to the decision-making based on data to provide strong support for all aspects of teaching and help teachers to re-evaluate the teaching content and the actual situation of students' development [3]. Always use the new curriculum reform outline as an effective teaching reform guidance basis, which makes the development of teaching practice activities more relevant, and inappropriate teaching reform will make the development of practical activities encounter difficulties [4]. The mathematics curriculum advocates the organic integration of information technology and course content, and advocates the use of information technology to present course content that is difficult to present in previous teachings, and strengthen the combination of mathematics teaching and information technology [5]. In the mathematics classroom, it is mainly advocated to combine various technologies with teaching content. In this way, the difficulties in teaching can be presented, and the concept of innovation must be incorporated.

In the teaching process, combined with the characteristics of mathematics. Using modern science and technology teaching methods to visually show students the connection between mathematics and life, creating conditions for the students' ability to develop mathematical thinking [6]. The mathematics classroom is characterized by complexity and difficulty, and students feel a little boring when they study. Using the form of big data can make mathematics classrooms more vivid [7]. With the rapid development of information technology, data acquisition and processing has become easier, faster, more comprehensive and accurate [8]. It provides a basis and injects new vitality into mathematics teaching. The combination of mathematics teaching and information technology will be an inevitable trend. This paper analyses the innovative application of mathematical thinking in the era of big data.

2. Innovative Application of Mathematical Thinking in the Age of Big Data

Make use of the visual dynamic effect of network environment and graphics to let every student experience the occurrence and development of knowledge firsthand. Under the background of big data, teachers should be good at controlling their own emotions and keeping them in a happy and exciting state. Big data provides real-time and comprehensive students' academic information, and teachers can perceive the overall learning needs of class students. In the process of learning, students can also cultivate team consciousness and really understand the process of solving mathematical problems. In the reform of the application of modern information technology, the application of new teaching methods and the construction of teaching platform become the main direction. Learning knowledge and training thinking are both different and inextricably linked. They are synchronized in the process of mathematics teaching. If there is no data feedback, the teacher can easily focus on the analysis of the quantitative relationship when commenting on this question. Only when the overall quality of the teacher is improved can more knowledge be passed on to the students. Schools should also pay more attention to classroom teaching, and create more teaching facilities to provide students with the best learning environment.

In the context of rapid development in the information age, mathematics needs to pay more attention to student learning, and pay more attention to the development of students' ability and knowledge. The new curriculum standards emphasize more on the use of mathematical vision to capture mathematical problems from life, actively use mathematical knowledge to analyze life phenomena, and autonomously solve practical problems in life. In the context of data, the process of mathematics teaching should be the process of cultivating students' thinking ability. The research and judgment provided by big data helps teachers to develop school-based assignments more scientifically and accurately. In the new curriculum standards, it is clearly stated that students should use mathematics to treat life. Students should learn to find mathematics in their lives [9]. In this way, when students learn mathematics knowledge, they will be able to connect with the actual life, and will actively analyze the problems in learning. With the development of socialist market economy and the rapid development of electronic information age, teaching needs to focus on teaching reform. Then according to the needs of the times, using big data to promote the reform of mathematics classroom teaching.

With the arrival of the era of big data, the use of advanced technologies can make classroom teaching more lively and interesting, and also bring some fresh materials to complex mathematical problems. In teaching, students' social development is mainly achieved through communication and cooperation. The communication and cooperation between students and students, students and teachers are conducive to students' social development. The interactive relationship of students' social development is shown in Figure 1.

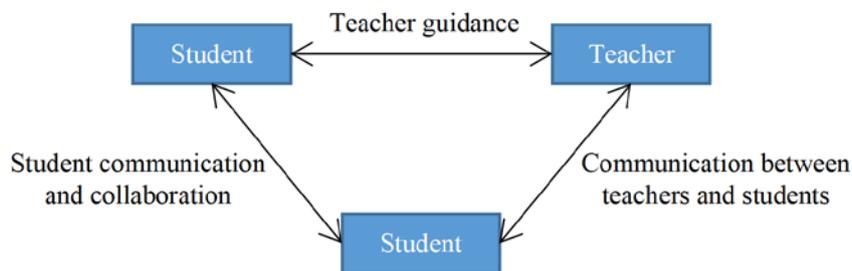


Fig.1. Interactive relationship of students' social development

Each class will have some strong learning ability, for the knowledge in the classroom, can quickly grasp and flexible use. However, some students are weak in learning ability and can not solve problems well. For classes with abnormal data, whether high or low, it is worth further analysis and research. Teaching reform requires teachers to practise, apply teaching experience and teaching tact to classroom construction, and then change their concepts and teaching methods in time to highlight students' learning. If you develop students' mathematical thinking ability, it will help solve the problem of students' differences in learning ability. There are differences in the speed

of formation and the situation of knowledge forgetting due to different students' abilities. Therefore, according to the teaching content, the staged review of key knowledge and important ability in the development of the work should be reproduced or advanced.

3. Cultivation of Students' Mathematical Thinking Ability

In the context of big data, only by cultivating students' thinking ability can they achieve the goal of lifelong learning and be able to adapt to the development of society. From the perspective of big data thinking, people will no longer be bound by traditional development concepts and values. Significant changes can be made in thinking, living and working. In the efforts to cultivate students' mathematical thinking ability, we must not only study mathematics science in depth, but also make full use of the convenience conditions that big data brings to us and cultivate students' mathematical thinking ability [10]. Big data makes differential teaching and personalized counseling more precise. Among them, the wrong way is the common and typical way of personalized counseling. As a teacher, we should create a relatively relaxed learning environment for students, so as to mobilize students' enthusiasm and initiative in mathematics learning to a certain extent. Teachers should make rational use of the resources of big data to enrich the teaching content and make students learn more easily. In teaching, we should combine the times and school conditions to improve the goal of personnel training. And the innovation of classroom teaching idea, mode and method is carried out.

A simple and effective way to analyze the differences in mathematics teaching is to test the hypothesis of two independent sample methods. A university instructor teaches the same course in three classes at the same time. In student assessment, the teacher's assessment data are shown in the table.

Table 1 Student evaluation data of two independent sample means

Sample size	The average score	Sample standard deviation
68	83	4.8
62	75	4.2
59	82	5.1

To cultivate students' innovative consciousness through mathematics teaching, it is necessary to cultivate students' innovative spirit and ability in mathematics classroom teaching. Big data software is based on the collection process of data sets to automatically generate the wrong questions, which is convenient and efficient. At the same time, students can mark each wrong question for the wrong reasons. It is a long-term and arduous task to cultivate students' mathematical thinking ability. Teachers need to carry out the activities of cultivating students' thinking through daily teaching. In the environment of big data thinking, scientific research is more in-depth and efficient, and the shackles of traditional thinking no longer have an impact. When students learn mathematics, the process is often more important than the ending. The arrival of the era of big data will make every lesson more exciting, and it will also mobilize the enthusiasm of students to learn mathematics. Contemporary education in the context of big data is mainly for the majority of students. With the goal of improving the quality of all students, we will use modern technology to give full play to the charm of mathematics and cultivate students' mathematical thinking ability and development creativity.

4. Conclusions

The economy is developing very fast, and people need to find useful information in a large amount of data. Mathematical thinking is the ability that people must possess, and it also has certain practical significance in social application. In the era of big data, education and teaching will rely more on data and analysis than on intuition and experience. Education and teaching work will be based on data mining and analysis. As an educator, we should pay attention to the development of this aspect. The government should invest material and financial resources to provide support. Schools should also introduce more advanced technology, improve the school's teaching team, so

that mathematics teaching can get better development in the context of the big data era. With the continuous development of technology and the deepening of data mining and analysis in education, data decision-making will play an important role in all aspects of mathematics teaching. The arrival of the era of big data can make every class fresh, fully mobilize the enthusiasm of students to learn mathematics knowledge, and optimize the classroom structure. Furthermore, it can improve the utilization rate of classroom time, the students' absorption rate of knowledge, the mathematics teaching wit and the optimization rate of thinking quality.

References

- [1] Carbonneau K J, Marley S C, Selig J P. A meta-analysis of the efficacy of teaching mathematics with concrete manipulatives.. *Journal of Educational Psychology*, 2013, 105(2):380-400.
- [2] Andrews P, Ryve A, Hemmi K, et al. PISA, TIMSS and Finnish mathematics teaching: an enigma in search of an explanation. *Educational Studies in Mathematics*, 2014, 87(1):7-26.
- [3] Goodchild S, Fuglestad A B, Jaworski B. Critical Alignment in Inquiry-Based Practice in Developing Mathematics Teaching.. *Educational Studies in Mathematics*, 2013, 84(3):393-412.
- [4] Ottmar E R, Rimm-Kaufman S E, Larsen R A, et al. Mathematical Knowledge for Teaching, Standards-Based Mathematics Teaching Practices, and Student Achievement in the Context of the Responsive Classroom Approach. *American Educational Research Journal*, 2015, 52(4):787-821.
- [5] Andrews P, Hatch G. A New Look at Secondary Teachers' Conceptions of Mathematics and its Teaching. *British Educational Research Journal*, 1999, 25(2):203-223.
- [6] Blazar D. Effective teaching in elementary mathematics: Identifying classroom practices that support student achievement. *Economics of Education Review*, 2015, 48:16-29.
- [7] Joubert, Marie. Using digital technologies in mathematics teaching: developing an understanding of the landscape using three "grand challenge" themes. *Educational Studies in Mathematics*, 2013, 82(3):341-359.
- [8] Pepin B, Xu B, Trouche L, et al. Developing a deeper understanding of mathematics teaching expertise: an examination of three Chinese mathematics teachers' resource systems as windows into their work and expertise. *Educational Studies in Mathematics*, 2017, 94(3):257-274.
- [9] Yeh C, Santagata R. Preservice Teachers' Learning to Generate Evidence-Based Hypotheses About the Impact of Mathematics Teaching on Learning. *Journal of Teacher Education*, 2014, 66(1):1-14.
- [10] Riccomini P J, Smith G W, Hughes E M, et al. The Language of Mathematics: The Importance of Teaching and Learning Mathematical Vocabulary. *Reading & Writing Quarterly*, 2015, 31(3):235-252.