

Fostering Quantitative Intuition in Elementary Students: A Case Study on Innovative Math Teaching Practices

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ABSTRACT

In mathematics teaching, the number of intuition of primary school students is a key ability. This research adopts the case study method to explore the effect of innovative teaching practice in cultivating the number of intuition of primary school students. By changing the traditional mathematics teaching mode, introducing more enlightening and experiential teaching methods, it aims to stimulate students interest in learning and thinking depth, and cultivate their ability to deal with quantity problems intuitively. The experimental results show that the innovative teaching practice effectively improves the interest and enthusiasm of primary school students in mathematics, and also significantly improves their quantitative intuition ability. Especially when dealing with some complex mathematical problems, students show a higher problem-solving ability and innovative thinking. This provides a new perspective and teaching method for the field of mathematics education, which helps us to better understand and meet the needs of primary school students for mathematics learning, lay a solid mathematics foundation for them, and prepare for their future study and life.

KEYWORDS

pupil number intuition; innovative teaching practice; mathematics teaching; thinking depth; problem solving ability

Mathematics, as a basic subject, its importance needs to be repeated. However, in the real process of mathematics teaching, we find that primary school students are often not interested in and enthusiastic about mathematics is high, often complain about the difficulty in mathematics. To this end, educators and researchers have been looking for innovative teaching methods. Among the many researched and adopted methods, students have been encouraged and guided to develop quantitative intuition to stimulate their interest in mathematics and improve their problem-solving skills and innovative thinking. Quantitative intuition is an ability that not only allows students to intuitively understand quantities and numbers, but also helps them to use their mathematical skills better when dealing with practical problems. However, there are still many puzzles about how to effectively cultivate the quantitative intuition of primary school students, especially how to encourage students to develop their quantitative intuition under the conventional teaching conditions. Therefore, this study aims to cultivate the quantitative intuition of pupils, and deeply explore the methods and effects of innovative mathematics teaching practice. We hope that through a case study, the effectiveness of innovative teaching practice in stimulating students interest in learning, improving their thinking depth, and cultivating their ability to intuitively deal with quantity problems, and then summarize a set according to the research resultsViable, targeted teaching methods and strategies, as far as possible for primary school mathematics education to provide some new enlightenment and reference.

1 The number of pupils intuition and understanding

1.1 Quantitative intuition of primary school

Primary school is a critical period for the development of childrens quantitative intuition^[1]. Quantitative intuition mainly refers to the individuals ability to intuitively perceive and judge the quantitative relationship and numerical size without relying on accurate calculation. Primary school students gradually begin to have a preliminary experience and understanding of the quantitative relationship in their daily life. This intuitive ability is usually shown by the quick judgment of the quantity of objects, simple arithmetic operation and estimation ability. At this stage, students sensitivity to numbers and the accuracy of quantitative judgment were gradually improved, which laid the foundation for the subsequent learning of complex mathematical concepts. Although the quantitative intuition of primary school students is not yet mature, their thinking reaction and judgment ability in specific situations can obviously be guided and cultivated through targeted teaching practice. Taking this opportunity, educators can develop more innovative teaching strategies to stimulate the development of students quantitative intuition.

1.2 The importance of quantity intuition to elementary school students math learning

Quantitative intuition plays an important role in elementary school math learning. As an ability to help students

intuitively understand and deal with quantitative relations, quantitative intuition is the basis of the development of mathematical logical thinking. Good quantitative intuition can improve students' sensitivity to numbers and numbers, prompting them to do mathematical calculation and problem solving more efficiently. Mathematical learning not only requires logical reasoning, but also requires students to be able to quickly perceive the relationship between numbers, and quantitative intuition just plays an indispensable role in this rapid response.

In the specific learning process, quantitative intuition can help students to participate in the activities of quantitative estimation, number and shape combination and quantity conversion more naturally, improving their understanding of mathematical concepts and models. It is precisely because of the unique role of quantitative intuition that it has long-term promotion significance for the cultivation of complex mathematical ability and the extension of mathematics in the future thinking, and has become the core element of cultivating mathematical literacy.

1.3 Performance and evaluation methods of quantitative intuition

The performance of quantitative intuition mainly includes the intuitive perception of quantitative relationship, the quick judgment of quantitative change, and the ability of qualitative analysis of mathematical problems. This ability is reflected in the students ability to quickly understand the amount of quantity, proportion and simple quantity calculation, and can even reasonably be speculated in the absence of specific values. The evaluation method often evaluates students' sensitivity to quantity by designing situational questions, such as number graph matching, quantity sorting and estimation questions^[2]. Students' thinking path and reaction speed can also be analyzed through dynamic tracking and questionnaire survey, so as to comprehensively evaluate the development level and application ability of their quantitative intuition.

2 The theoretical discussion of innovative mathematics teaching practice

2.1 The theoretical basis of innovative teaching practice

The theoretical basis of innovative mathematics teaching practice comes from the comprehensive support of pedagogy, psychology and modern mathematics education theory. Constructivist learning theory emphasizes the subjectivity of knowledge construction, and believes that students should actively construct knowledge through their own exploration and practice, which provides the basic idea for innovative teaching practice. The theory of multiple intelligences points out that students have unique advantages in different fields, and mathematics teaching should pay attention to the cultivation of the cognitive ability of quantity intuition, so that students can flexibly use intuitive thinking to deal with quantity problems. The theory of critical period in developmental psychology shows that primary school is the golden period for cultivating basic cognitive ability, and the improvement of quantitative intuition has a long-term impact on the formation of mathematical thinking structure. Based on the needs of practical education, modern mathematics education emphasizes the openness and flexibility of teaching, and encourages students to stimulate students learning interest and thinking ability through scenario creation, hands-on practice and cooperative inquiry, so as to further promote the development of quantitative intuition ability. These theories have laid a solid foundation for the implementation of innovative teaching practice in primary school mathematics.

2.2 Application of innovative teaching practice methods in primary school mathematics teaching

The application of innovative teaching practice method in primary school mathematics teaching is mainly reflected in the rich teaching content, flexible teaching forms and diversified evaluation system. By introducing gamified learning, project-based learning and situational teaching, students can enhance their intuitive experience of mathematics and promote their use of quantitative intuition in specific situations. The application of information technology means, such as interactive whiteboard, mathematical software, to stimulate students' interest in learning and independent inquiry ability. The forms based on practical activities and inquiry learning help to cultivate students' critical thinking and problem-solving ability. These methods not only improve students' quantitative intuition, but also enhance their understanding and application of mathematical concepts.

2.3 The influence of innovative teaching practice on students' interest in learning and thinking depth

Innovative teaching practice In primary school mathematics education, through the introduction of enlightening and experiential learning activities, significantly improve students interest in learning and depth of thinking. Innovative teaching methods encourage students to actively participate in an interactive classroom environment, and enhance their

thirst for mathematical knowledge. These teaching practices guide students to think deeply about mathematical problems through problem-driven and project-based learning, so as to develop a more comprehensive and in-depth problem-solving ability. Innovative teaching practice promotes students critical thinking and creativity, allowing students to explore freely in an open learning environment and form a stronger quantitative intuition. This change not only meets the diversified needs of primary school students for mathematics learning, but also provides a reference for the reform of mathematics education.

3 Innovative teaching practice program of cultivating pupils quantity and intuition

3.1 Specific implementation strategies of innovative teaching practice in cultivating the number of intuition of primary school students

The specific implementation strategy of innovative teaching practice in cultivating the number of intuition of primary school students aims to activate students mathematical thinking and intuitive perception through a variety of teaching means. The physical models and visual tools, such as building blocks and graphic cards, are used to embody the abstract quantitative problems and promote students to understand mathematical concepts in operation and observation^[3]. Design interesting puzzle games, embed quantitative questions into actual situations, enhance students interest and participation through the games, and strengthen their sensitivity to quantitative relationships. Through group cooperative learning, students are divided into groups to solve problems together, so as to cultivate their quantitative intuition and teamwork ability in the discussion and cooperation. In this way, interdisciplinary theme activities, such as combining science, art and other courses, to expand the application scope of quantitative intuition and encourage students to use quantitative knowledge in different situations. Flexible use of information technology, the introduction of mathematical software or digital practice platform, to provide immediate feedback, to help students to find deficiencies and improve in the practice of autonomy. Through the above strategies, students can gradually improve their quantitative intuition level in the pleasant and enlightening teaching activities to enhance their confidence and sense of achievement in mathematics learning.

3.2 The characteristics and advantages of innovative teaching practice

The characteristics and advantages of innovative teaching practice are reflected in many aspects. It emphasizes the active participation of students, and improves students interest and enthusiasm in learning through interaction and cooperative learning. By combining examples and practical applications, students understanding and cognition of mathematical problems are enhanced, making the cultivation of quantitative intuition more intuitive and specific. Innovative teaching mode pays attention to personalized guidance, provides differentiated teaching programs according to the learning needs and abilities of different students, and promotes the full development of each student^[4]. Modern educational technologies, such as multimedia and interactive tools, are used to enrich the teaching methods and improve the teaching effect and quality, so as to significantly improve the students quantitative intuition ability.

3.3 Design of innovative teaching practice teaching mode for primary school students

In the innovative teaching practice for primary school students, the teaching mode design should pay attention to the combination of intuition and interaction, aiming to enhance students perception of quantity through gamification learning and practical operation activities. Project learning and group discussion are used to guide students to use quantitative intuition during the problem-solving process. Teachers should play the role of facilitators and collaborators in the classroom, design diversified tasks, and encourage students to explore and think critically independently, so as to improve their quantitative intuition and depth of thinking.

4 Evaluation of the effect of innovative teaching practice in cultivating the intuition of the number of primary school students

4.1 Establishment of the feedback and evaluation system of teaching practice

When establishing the feedback and evaluation system of teaching practice, the multi-dimensional evaluation of students, teachers and education experts should be considered comprehensively. Student feedback can be obtained through classroom observation, questionnaires, and interviews, focusing on student interest in learning, engagement, and self-evaluation of quantitative intuition. Teacher feedback is very important. Through teaching logs, teachers

feelings and improvement suggestions in innovative teaching practice can be understood through interactive discussions and evaluation meetings. Based on the quantitative intuition evaluation method, it is necessary to design scientific and objective quantitative evaluation tools to conduct quantitative analysis of students' quantitative intuition in different teaching stages. Through integrating the above multi-dimensional feedback and evaluation results, a comprehensive evaluation report is formed to provide data support and theoretical basis for the subsequent teaching improvement.

4.2 Data collection and collation of teaching practice effect

During the process of data collection, various methods were adopted to comprehensively evaluate the training effect of innovative teaching practice on the intuitive ability of pupils. The enthusiasm and interaction of students in participating in activities were recorded through classroom observation, and the changing trend of their learning behavior was analyzed^[5]. The standardized evaluation tools are used to pre-test and post-test students' quantitative intuition ability to quantify the difference in teaching effects and reveal the significant improvement of students in students' intuitive understanding and handling of quantity problems through comparison. Questionnaires were distributed to students for their changing interest in teaching innovative mathematics and increased self-perception. Teacher interviews also played an important role in the further verification of the reliability and consistency of the data. After classification and statistical analysis, all the data ensure the scientificity and objectivity of the results, which provides a strong basis for the subsequent interpretation of the results and the formulation of the improvement plan.

4.3 Display and interpretation of the results of teaching practice

The results of the teaching practice show that the innovative mathematics teaching practice has a remarkable effect on the cultivation of pupils' quantity intuition. The analysis of experimental data shows that the primary school students who received the innovative teaching mode performed better than the traditional teaching mode group in the quantitative intuition evaluation, especially in the ability to quick judgment, estimate and the ability to solve complex quantitative problems. Students' participation in class and interest in mathematics learning have been enhanced, and their thinking activity and independent inquiry ability have been effectively stimulated. The results also show that students have gradually established quantitative intuition from perceptual knowledge to rational understanding, and can embody and visualize abstract mathematical problems more intuitively. The implementation of this teaching practice provides a practical reference for mathematics education, and highlights the important value of heuristic and experiential education mode in ability cultivation.

5 Problems and challenges of innovative teaching practice

The teaching practice of innovative mathematics faces some problems and challenges in the implementation process. It is the problem of updating teachers' teaching concept and skills. Some teachers may lack the understanding and recognition of the new teaching mode, and it is difficult to implement it effectively. This requires systematic training and continuous career development support to ensure that they are competent for innovative teaching. Is the problem of the individual differences of the students. Different students have different acceptance and adaptability to the new teaching methods, which need to be more flexible and able to teach students in accordance with their aptitude. Another problem is the support and allocation of teaching resources. Innovative teaching practice often needs more teaching resources and tools, but the current limitation of resources may restrict the wide application of this practice, and it is urgent to strengthen the research and development and investment of teaching resources. It is the adaptability problem of teaching evaluation. The existing teaching evaluation system is mainly based on the traditional teaching mode design, and the evaluation criteria and methods need to be adjusted to better reflect the effectiveness of innovative teaching practice. Solving these problems and challenges will help to further promote the development of innovative teaching practice, and provide a more powerful guarantee for the cultivation of the quantitative and intuitive ability of primary school students.

6 Conclusion

In this study, we explored the effect of innovative mathematics teaching practice in cultivating the intuitive ability of primary school students by using a case study. The results show that by changing the traditional teaching mode and introducing more enlightening and experiential teaching methods, it can effectively stimulate pupils' interest in learning, improve their thinking depth, and then cultivate their ability to deal with quantity problems intuitively. In addition,

innovative teaching methods also have a significant impact on improving students' interest and enthusiasm in mathematics. Especially when dealing with some complex mathematical problems, students show a higher problem-solving ability and innovative thinking. However, the limitation of this study is that, due to the limitation of experimental conditions, only a general study of the influence of innovative teaching practice on the number of primary school students, the specific effects of various teaching practices and the influence of different types of students, which still need to be further studied. At the same time, the samples selected in the experiment cannot fully represent all the primary school students, so there may be a certain deviation, which is also an important direction of future research. This study provides a new perspective and teaching method for the field of mathematics education, which helps us to further understand and meet the needs of primary school students for mathematics learning, and also lays a solid foundation for them. The foundation of mathematics makes them more able to cope with a wider range of fields and more complex problems. It is hoped that there will be more relevant research in the future to continuously deepen and expand the understanding of this field to meet the changing educational needs.

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