REVIEW AND REFLECTION ON THE REFORM OF MATHEMATICS EDUCATION IN PRIMARY AND SECONDARY SCHOOLS IN CHINA

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ABSTRACT

Driven by the wave of the knowledge economy and the development of The Times, the reform of mathematics education in primary and secondary schools is a key issue in China's basic education. This article systematically reviews the reform process of mathematics education in primary and secondary schools in China by using various methods such as literature research and historical research. Since the founding of the People's Republic of China, mathematics education has undergone multiple reforms. From drawing on the Soviet model and emphasizing the cultivation of "basic knowledge and basic skills", to the new curriculum reform advocating independent exploration, and now to the education stage oriented towards core literacy, the reforms have been continuously advancing. At present, the reform of mathematics education has achieved remarkable results in aspects such as teaching concepts, curriculum contents, and evaluation systems. However, there are still problems such as insufficient implementation of concepts, uneven regional development, interference from examination pressure, and disconnection between teaching materials and teaching.

Keywords: Mathematics education in Primary and Secondary schools Educational reform, Reform effectiveness Optimize the path.

INTRODUCTION

In the current era of the continuous impact of The Times and the vigorous development of the knowledge economy, mathematics, as the cornerstone of science and technology and the core carrier of thinking training, its educational quality profoundly affects a country's talent reserve and potential for innovative development. The primary and secondary school stage, as a crucial period for the enlightenment of mathematical thinking and the construction of the knowledge system, the reform of mathematics education has always been one of the core issues in the field of basic education in China. From the update and iteration of teaching content, the innovation of teaching methods,

to the continuous optimization of curriculum standards, each reform has carried the response to the demands of The Times, the exploration of educational laws, and the re-examination of talent cultivation goals. These reform measures not only bear witness to the unremitting efforts of China's basic education in adapting to social development and aligning with international educational concepts but also have accumulated valuable experience and profound lessons in the process of practice. However, with the advent of the era of artificial intelligence, the establishment of core competency-oriented educational goals, and the formation of new educational ecosystems such as the "double reduction" policy, it is necessary to conduct a systematic review and reflection on the process of mathematics education reform in primary and secondary schools in China. By sorting out the background, driving forces, main contents and implementation effects of mathematics education reform in different historical periods, and analyzing the contradictions and disputes existing in the reform process, it can not only clarify the development trajectory of mathematics education in China, but also provide experience reference and theoretical support for the future direction of education reform, thereby promoting the high-quality development of mathematics education in primary and secondary schools in China under the background of the new era. Cultivate compound talents with both solid mathematical foundation and innovative thinking ability.

Chapter One: Introduction

1.1 The reform stage and concept development of domestic research status

From the late 1970s to 1988, it was a period of rectifying wrongs and restoring fine traditions such as the "basic knowledge of mathematics". In the 1990s, guided by quality-oriented education and innovative education, advanced Western mathematical educational ideas . At the beginning of the 21st century, the "Mathematics Curriculum Standards for Full-time Compulsory Education (Experimental Draft)" was released, emphasizing "autonomy, inquiry and cooperation". However, problems such as the neglect of traditional educational concepts emerged during its implementation. Revision began in 2006.

Based on the analysis of teaching achievement awards: The number of award-winning achievements in the category of mathematics education in the national teaching achievement awards for basic education is on the rise, covering a relatively complete range of educational stages.

1.2 The current research status abroad

The United States began to promote the reform of mathematics education in the 1980s, emphasizing problem-solving and students' active learning. In 1989, the American Council of Mathematics Teachers proposed "constructive mathematics", emphasizing students' autonomous discovery of knowledge and concepts. In 2000, the National Committee of Mathematics Teachers revised and published "Principles and Standards of School Mathematics", adopting a more balanced perspective and still emphasizing conceptual thinking and problem-solving.

Other countries: The mathematics education in Japan, Russia, the United Kingdom and other countries has its own characteristics in terms of curriculum standards, textbooks, classroom teaching and teaching evaluation.

1.3 Practical significance

Providing reference for the current mathematics education reform

A systematic review of past mathematics education reforms, summarizing successful experiences and lessons learned from failures, can provide direct references for the ongoing mathematics education reform. Help educational decision-makers, researchers and front-line teachers understand which reform measures are effective and which need improvement, to avoid repeating past mistakes, improve reform efficiency and avoid detours.

Guide front-line mathematics teaching practice

Deeply reflect on the problems in aspects such as course content, teaching methods, and evaluation systems during the process of mathematics education reform and be able to provide specific directions and suggestions for front-line teachers. Based on these reflection results, teachers can adjust their teaching strategies, optimize the teaching process, improve the quality of mathematics classroom teaching, and better cultivate students' core mathematical literacy and comprehensive abilities.

1.4 Adapt to the demands of social development

Literature Research Method

Data collection: Through library resources, academic databases such as China National Knowledge Infrastructure (CNKI), Wan fang Data, and VIP Information, as well as official websites of government education departments, extensive literature and materials related to the reform of mathematics education in primary and secondary schools in China are collected, including curriculum standards, policy documents, academic papers, research reports, textbooks.

Historical Research Method

Historical stage division: Based on the characteristics of China's social development, educational policy changes, and the development of mathematics education itself, the reform of mathematics education in primary and secondary schools is divided into different historical stages, such as the foundational stage of mathematics education in the early days of the founding of the People's Republic of China, the rapid development stage of mathematics education after the reform and opening up, and the new curriculum reform stage, etc.

Analysis of Reform events: For each historical stage, conduct a detailed study of significant mathematics education reform events, including the reasons for initiating the reforms, the decision-making process, the implementation process, and the resulting impacts.

Investigation and Research Method

Questionnaire survey: Design a questionnaire survey targeting mathematics teachers, educational administrators, students and parents in front-line primary and secondary schools. Ask teachers about their cognition of mathematics education reform in different periods, their feelings in teaching practice and the problems they encounter; Inquire with educational administrators about the formulation and implementation of reform policies.

Interview survey: Select representative experts in mathematics education, outstanding front-line teachers, and educational administrative personnel for in-depth interviews.

Case Study Method

Case selection: Select typical cases from different regions and types of schools during the process of mathematics education reform, including pilot schools for curriculum reform and experimental schools for innovative teaching methods, etc. These cases should cover different aspects of mathematics education reform, such as cases of curriculum content reform, cases of innovative teaching models, and cases of evaluation system reform, etc.

Case analysis: Conduct an in-depth analysis of the selected cases, using methods such as observation, interview, and text analysis to gain a detailed understanding of the background, process, measures, achievements, and existing problems of the case implementation.

Comparative Research Method

Domestic regional comparison: Compare the implementation of mathematics education reform in primary and secondary schools in different regions of China (such as the eastern, central, and western regions), and analyze the differences in economic development levels and educational resources.

Chapter Two: Reform of Mathematics Education Abroad

2.1 Historical Evolution of the United Kingdom

In the early 19th century, mathematics was regarded as a compulsory education subject. Reforms began in the middle of the 19th century, and relevant associations were established in 1870 to update the teaching content. In the early 20th century, efforts were made to modernize mathematics education. In 1944, the scope of compulsory education was expanded, and modern mathematics was introduced in 1961. Current educational situation: Nowadays, mathematics education in the UK is constantly evolving, exploring the use of new technologies in teaching and attaching great importance to the professional development of teachers.

The United States has incorporated programming into K12 education. Obama once called for "everyone learning programming". This reflects the emphasis on students' computational thinking and digital skills. Through programming education, students'

problem-solving abilities and innovative thinking are cultivated, closely integrating mathematics education with the development of modern technology.

2.2 Singapore

Singapore enhances students' mathematical literacy and innovation ability by implementing stratified mathematics teaching and strengthening teacher training. Stratified teaching can better meet the learning needs of different students and enable every student to achieve full development in mathematics learning. Strengthening teacher training ensures that teachers have good teaching abilities to meet the requirements of mathematics education reform.

Chapter Three: The Reform Process of Mathematics Education in China

3.1 Ancient Times

A In the early Tang Dynasty, the Imperial College established a Mathematics Academy, which had mathematics doctors and teaching assistants. It used the "Ten Books of Mathematics Classics" compiled and annotated . The mathematics examinations in the Ming Dynasty also relied on these teaching materials.

3.2 Modern Times

In 1903, the GUI MAO school system was promulgated, abolishing the imperial examination system and establishing primary and secondary schools. Primary schools offered arithmetic courses, while secondary schools offered mathematics courses. In 1912, the middle school period was changed from five years to four years, and bookkeeping was no longer taught in mathematics courses. In 1922, changing both primary and secondary schools to six years, each divided into junior and senior levels. This school system was basically in use until 1949.

In 1960, the Second representative conference of the Chinese Mathematical Society was held, putting forward issues such as setting lofty aspirations to catch up with and surpass the world's advanced level and modernizing the mathematics curriculum. In the late 1980s, Shanghai carried out a phase of curriculum reform. The 21st century: Since 2000, the reform of mathematics curriculum has begun, and profound changes have taken place in the curriculum content, teaching methods, etc. The standard officially released in December 2011 developed the "two Basics" into the "Four Basics", emphasizing the cultivation of students' mathematical literacy.

Chapter Four: Thoughts on the Reform of Mathematics Education

4.1 Review of the Reform Process of Mathematics Education in Primary and Secondary Schools in China

In the 1980s, with the advancement of reform and opening up, emphasis began to be placed on cultivating students' "two basics" (basic knowledge and basic skills). In recent years, the promulgation of the core competency-oriented curriculum standards marks that mathematics education has entered a new stage where both ability

cultivation and value shaping are given equal importance.

4.2 Achievements in the Reform of Mathematics Education Innovation in teaching concepts

Shifting from the traditional "knowledge imparting" to "quality-oriented", emphasizing the cultivation of mathematical thinking abilities (such as logical reasoning and mathematical modeling) and innovative consciousness, the classroom has gradually become a place for interaction and joint exploration between teachers and students.

4.3 Existing Problems in Mathematics Education Reform

1.Inadequate Implementation of Concepts: Some teachers have a shallow understanding of the connotation of core literacy. Classroom teaching still mainly focuses on lecturing, and cooperative exploration is merely a formality, failing to truly achieve the transformation from "teaching knowledge" to "cultivating abilities

CONCLUSION

The reform of mathematics education in primary and secondary schools in China is closely linked to the development of The Times and is of great significance for improving the quality of basic education. After the founding of the People's Republic of China, mathematics education has undergone many changes: In the 1950s, it drew on the Soviet model and emphasized the system of knowledge; In the 1980s, emphasis was placed on the cultivation of "basic knowledge and basic skills". The new curriculum reform in the early 21st century was guided by construct and advocated autonomous learning. In recent years, the core competency-oriented curriculum standards have led mathematics education to a new height. These reforms have achieved remarkable results. The teaching concept has shifted from "knowledge indoctrination" to "competency-oriented", and the classroom interactivity has been enhanced. The course content reduces outdated knowledge, incorporates modern mathematical elements and real-life cases, and enhances students' application abilities. The evaluation system also tends to be diversified, focusing on the all-round development of students. There is a large gap in educational resources between urban and rural areas and among different regions, and the advancement of reforms is unbalanced. The pressure of examinations leads to an excessive academic burden on students and affects the cultivation of their qualities. The disconnection between teaching materials and actual teaching increases the difficulty of teaching. To this end, a series of optimization measures need to be taken. Strengthen teacher training and enhance professional capabilities; Utilize Internet technology to promote the equalization of educational resources; Deepen the reform of examination and evaluation to guide the direction of teaching; Optimize the construction of course materials and enhance their practicality; Build a collaborative mechanism among families, schools and communities, create a favorable educational ecosystem, and promote the high-quality development of mathematics education in primary and secondary schools.

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