

# Professional Development of Elementary School Mathematics Teachers under the New Curriculum Standards

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**Abstract:** In April 2022, the Ministry of Education promulgated the Compulsory Education Curriculum Program and Curriculum Standards (2022 Edition), a document that will serve as a guide for China's education reform and development in the coming period. Elementary school mathematics is an integral part of basic education and the focus of the new round of curriculum reform. And with the release of the "Compulsory Education Mathematics Curriculum Standards (2022 Edition)", it marks the beginning of a new round of teaching and learning reform in mathematics education. As an important factor in promoting curriculum reform and development, "teacher professional development" is a hot topic among teachers in the international arena and an important issue in today's educational development and change. In this paper, we analyze the new changes of mathematics standards, the real dilemma of professional development of elementary school mathematics teachers, and explore the path of professional development of elementary school mathematics teachers.

## 1. Introduction

The Ministry of Education released and implemented the Compulsory Education Curriculum Program and Curriculum Standards (2022 Edition), marking the official launch of a new round of basic education curriculum reform (hereafter referred to as the "new curriculum reform") and its application nationwide. Teachers are the implementers of the curriculum, and the success of the education reform depends on them, because the education reform is not on paper, but takes place in real classroom practice. Mathematics is the foundation of all sciences, and elementary school mathematics plays an important role in primary education. 21st century mathematics education calls for high quality mathematics teachers, and the quality of mathematics teachers should be improved from the professional development of elementary school mathematics teachers, which is also the inevitable result of the new curriculum reform.

## 2. The New Changes in the Mathematics Standard

### 2.1. Establishing Core Literacy-oriented Course Objectives

In the introduction of core literacy in the curriculum objectives, it is further clarified that the core literacy of mathematics is "three skills". This means that students can observe the real world through mathematical eyes, think about the real world through mathematical thinking, and express the real world through mathematical language, highlighting the holistic, consistent and phased nature of the core literacy in mathematics<sup>[1]</sup>. "The 2011 version of the Mathematics Learning Objective is "to build confidence in learning mathematics". "Under this goal, mathematics topics are becoming increasingly difficult, abstract, and tricky. For most children, this can cause them to lose interest in learning. Therefore, the new curriculum standard changes the content of "enhance" to "build". To make students interested in mathematics and curious, we must start from real life, make mathematics and life become closer, let children use their own eyes, to find the life of the The children can use their own eyes to find mathematical relationships and problems in life, and then use their own mathematical knowledge to solve these problems, so that they can develop a strong

curiosity about mathematics and thus develop their interest in mathematics.

## **2.2. More Detailed Objectives for the Academic Period**

In the 2011 edition of the curriculum, primary and secondary schools were divided into two levels, while in the 2022 edition of the new curriculum standards are divided into three levels. The first level is for grades 1 to 2, which requires students to ask simple mathematical problems from daily life under the guidance of teachers; the second level is for grades 3 to 4, which requires students to find and ask problems in their own lives and analyze and solve them independently. The third level, grades five to six, requires students to identify and formulate problems in real-world situations, to investigate basic quantitative relationships, and to combine knowledge from other disciplines such as geometry and logical reasoning, each with its own learning objectives and assessment criteria. The more detailed the division of the school segments, the better the practice and the closer the connection between each stage<sup>[2]</sup>.

## **2.3. Decrease in Difficulty of Knowledge Points**

In the new curriculum standards, some elementary school knowledge, such as negative numbers, equations, and inverse proportions, has been moved to middle school. The difficulty of knowledge points has been reduced, but this does not mean that mathematics will become easier. In accordance with the core literacy requirements, there will be a substantial increase in the problem-solving skills required. While elementary school favors the perception of experience, that is, to observe, discover and perceive in life, middle school places more emphasis on the literacy requirement of practical application by having some understanding of mathematical concepts and being able to apply them correctly. Without the experience and understanding in elementary school, it will be difficult to understand and apply in middle school<sup>[3]</sup>. How to find mathematical problems in everyday life, how to use mathematical knowledge to solve specific problems in practice, how to learn mathematics and other disciplines in an interdisciplinary way, and even whether or not you can understand the presentation of a topic, will be the key to distancing yourself from mathematics<sup>[4-6]</sup>.

## **3. The Realistic Dilemma of Elementary School Mathematics Teachers' Professional Development under the New Curriculum Standards**

### **3.1. Core Literacy Difficulties**

It is clearly stated in the New Curriculum Standards that "core literacy in mathematics is a generalization of the objectives of the mathematics curriculum and a comprehensive reflection of key competencies, essential qualities, and emotional and attitudinal values that have the basic characteristics of mathematics." The levels of core literacy development are also delineated in detail to facilitate the continuity and phased development of students' core literacy. In mathematics classroom teaching, cultivating students' core literacy has become an urgent problem for elementary school mathematics teachers to solve.

### **3.2. The Use of Modern Education Technology Needs to Be Improved**

Multimedia technology, as a new teaching tool, has brought new life to education. However, there are still many misconceptions about the application of modern education technology among elementary school mathematics teachers, which makes it difficult for them to break through the important and difficult points of teaching and to teach effectively. For example, when explaining geometry knowledge, teachers do not have a good grasp of information technology and cannot teach in a targeted way, teaching is too superficial and ignores the essence of knowledge, the imbalance between multimedia and human interaction and a series of other problems, all of which cause teaching to be too superficial, students do not think deeply enough about knowledge, it is difficult to discover the essence of knowledge and cannot break through the difficult points of knowledge<sup>[7]</sup>.

### **3.3. Repetitive Mechanical Teaching, Lack of Vitality**

It is clearly stated in the New Curriculum Standards that "students with creative thinking skills should be cultivated." In the mathematics classroom, teachers should take problem awareness as a guide and be good at finding problems, asking questions, analyzing and solving problems, so as to cultivate students' creativity. However, the current situation is not very good. Some mathematics teachers treat classroom teaching as a fixed process, and when they explain the course content, they respond passively, with much less communication with students, and they avoid the problems that arise in the teaching process. This purely mechanical and repetitive way of teaching can have a negative impact on the physical and mental health of mathematics teachers, their professional development and even the quality of education and teaching in schools and the future development of students.

## **4. The Path of Professional Development of Elementary School Mathematics Teachers under the New Curriculum Standards**

### **4.1. Focus on Core Mathematical Literacy**

Elementary school mathematics teachers should implement the curriculum standards into their teaching to help students better develop their core mathematical literacy. At the elementary level, the core literacies in mathematics are: number sense, symbolic sense, quantity sense, arithmetic ability, spatial concept, geometric intuition, reasoning sense, model sense, data sense, innovation sense, and application sense. Elementary school mathematics teachers should take an in-depth understanding of the curriculum standards as the basis, use the teaching materials as the carrier, integrate mathematical literacy into their own educational activities, reflect and precipitate in their own educational activities, and create a classroom with their own unique style, so as to promote their professional development.

### **4.2. Enhance the Integration of IT and Mathematics Teaching and Learning**

The reasonable use of modern educational technology makes the highly abstract nature of mathematics become more visual and intuitive, fully reflecting the fact that mathematics comes from life practice. In-depth presentation of the whole process of internal movement between things, providing images of real scenes, allowing students to see the evolution of thinking, enhancing interaction and participation in teaching, saving time on teaching boards, etc., makes the learning process richer for students, thus obtaining results that are difficult to achieve in the traditional way<sup>[8]</sup>. Mathematics teachers make a rational choice of mathematics teaching media so that they can stimulate students' interest in learning mathematics, enhance their learning motivation, inspire their thinking and achieve their re-creation, thus improving the effectiveness of classroom teaching.

### **4.3. Focus on Teaching Reflection and Improve Research Ability**

In the context of the new curriculum reform, the teacher is not just a "teacher" anymore, but a "scholar". The teacher has to learn how to reflect, summarize, and study in his or her own classroom, and to continuously study, apply, and study again with the feedback of students. In the past, students' feedback was only used to observe students' learning effects and then adjust their practices accordingly according to different situations; nowadays, the results of students' feedback are the materials we can use to help students learn better, and to apply better and more acceptable methods and cases to teaching based on the results of students' various different feedbacks, which is a long and very potentially a lifelong task for teachers<sup>[9-11]</sup>. Students are constantly changing, as is their body of knowledge, and even the cases they cite<sup>[12]</sup>. Therefore, mathematics teachers need to keep up with the times, better communicate with their students, collect their opinions, and summarize them so that they are well prepared for the next lesson.

## 5. Conclusion

As an elementary school mathematics teacher in the new era, one should focus on the practical application of the knowledge students learn in accordance with the requirements of the new curriculum standards. The use of multimedia to better demonstrate the learning process and application, so as to stimulate students' interest in learning, strengthen their exploration ability, cultivate their multiple ways of thinking, so that they can better apply to real life, so that the value of mathematics can be fully reflected, reflecting the cultural connotation of mathematics, so that the basic functions of mathematics can be better played in the new era.

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