

## The New Reform of the Mathematics Curriculum in the Compulsory Education in China

Ma Yunpeng<sup>1</sup>

Since 1949, especially since 1978, the People's Republic of China has made great achievement in fundamental education. But there are many problems to be solved. Chinese researchers in educational theory and the teachers have began to rethink the mathematics education of China deeply and compare it with the trend and development of international mathematics education reform from 1980's. It is found that there are still many problems in aims, methods and evaluation of mathematics education, which need to be solved in the compulsory education. Because of this since 1999 on the basis of previous research the domestic experts and scholars in different fields have been organized to start a new fundamental education curriculum reform including mathematics curriculum reform. The paper simply introduces the mathematics curriculum reform, mainly the main situation of the curriculum reform of compulsory education, the progress and the existent problems.

### The context of the reform

Chinese mathematics education has achieved some obvious achievements, but still has some problems as the following.

The curriculum aim was relatively haploid. In the past the development of some ability such as the ability of logical thought in the curriculum aim were attached too much importance to. And other functions of mathematics education have been neglected. Especially these aspects such as the development of interest, attitude, and emotion for mathematics and the connection with life and so on were not paid enough attention. And the curriculum content was lacked of flexibility.

The curriculum content was inclined to be difficult and narrow. The content scope that mathematics curriculum involved was inclined to be narrow and some content was too difficult, for example, the calculation of number and the arithmetic word questions.

The syllabus of 1963 prescribed that the total learning time of the school was 1433 hours and the time used to learn calculation was 841 hours including the time of learning calculation with an abacus was 107 hours. The time of learning calculation was 58 percent of the total learning time. The syllabus of 1978 prescribed that the total learning time was 1168 hours for the elementary school whose length of schooling was 5 years and the time for learning calculation was 586 hours, which was 50 percent of the total learning time. That is to say more than half of the time was used to learn calculation during the time the students learning mathematics in elementary school.

In order to adapt to the need of compulsory education, the compulsory education syllabus of 1992 adjusted the requirement of calculation by lowering the degree of difficulty. It described clearly that written addition and subtraction should give first place to the number under 10000, normally not over 10000 and written multiplication and division should give first place to the number under 1000, normally not over 1000. The percentage of the time for learning calculation in the total learning time was decreased too.

The organizational and the presentational way of the content separated from the students' practical life. Pursuing the formalization of mathematics too much there were too much manmade compiled content, which connected with the students' practice too little.

The textbook content lacked of funs and connections with life.

The teacher depended on textbook too much.

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<sup>1</sup> Ph. D, Professor, School of Education, Northeast Normal University, Changchun Jilin China.  
Tel: 86-431-5893470, Fax: 86-431-5676962, E-mail: ypma@public.cc.jl.cn

The teaching model in the classroom was haploid and the teaching way was monotonous.

Rethinking the problems in the Chinese mathematics curriculum and teaching, a basic conclusion can be drawn that in order to adapt to the need of the development of a person, the development of society of China and meet the requirement of the development of personality of children, mathematics curriculum must be changed. Since 1999 many researchers in mathematics education have been organized to study the problems of mathematics education intensively. The National Mathematics Curriculum Standard of the Stage of Compulsory Education was drafted and published at the beginning of 2000. On the basis of seeking the suggestion widely, the experimental manuscript of Standard will be published in the second half year of 2001.

### **The basic ideas of mathematics curriculum reform**

The qualities of element, popularization and development should be emphasized. And it is put forward that mathematics should face all the students and embody that everyone learn valuable mathematics and that everyone obtain necessary mathematics and that different children develop differently in mathematics.

Understanding mathematics and its value from all angles should be emphasized. Mathematics is a kind of instrument for the people's life, work and learning. Mathematics provides language, thought and method for other science. Mathematics is also a kind of culture of human. Mathematics learning should embody all aspects of value of Mathematics.

Providing valuable learning content of mathematics and making mathematics in school more reality, interest and challenge should be emphasized. This will help the student engage in observation, experiment, guess, reasoning and exchanging actively.

Meaningful mathematics learning way should be advocated to provide enough action space and chance of exchanging for the students. Students' positively seeking and learning has been encouraged.

The evaluation system whose evaluation aim is many faceted and evaluation way is various should be founded. By the way of effective evaluation the purpose of knowing students' learning situation, encouraging students' learning and improving teachers' teaching should be reached. Both the learning result and the learning process should be evaluated.

The application of modern science technology in mathematics teaching should be attached importance to. The application of calculator to solve troublesome calculation problem and seek mathematics regulation should be advocated.

### **The main measure of mathematics curriculum reform**

Directed by the basic ideas of curriculum reform as related above Standard has been designed from the aspects of main aim, content structure and implementation suggestions.

### **The general aim of mathematics curriculum**

The general aim defined in the Standard includes 4 aspects.

#### **Knowledge and skill**

It not only prescribes the basic knowledge and skill about number and calculation, space and graph, statistics and probability but also emphasizes that students should know the process of attaining these knowledge and method. It also makes the students experiencing the producing process of the knowledge as a part of knowledge and skill.

#### **Mathematics thinking**

It is emphasized that not only the development of the students' abstract thought ability but also the development of the students' thinking in images and developing the ability of reasoning by the way of observation, experiment and guess to be attached importance to. And the founding of students' primary

feeling of number and symbol also should be valued. It is essential to connect mathematics thinking with mathematics activity and the process of the students' mathematics learning and let the students get specific experience and develop their mathematics consciousness by the way of rich learning activity. This is the need to improve the students' mathematics quality and the need to make the student become the qualified citizens.

### **Solving problem**

Learning how to solve problem is an important aim of mathematics education. And solving problem is also the core of mathematics. It is aimed to make the students learn to raise problem and understand problem from the angle of mathematics and solve problem by using the knowledge learned little by little and learn the basic strategies of solve problem and understand the variety of the strategies of solving problem and develop the students' consciousness of rethinking and self- evaluation.

### **Emotion and attitude**

It is emphasized to let the students take part in the mathematics learning activity actively and develop their curiosity for mathematics. And it is aimed to let the students get the experience of success in mathematics learning and found their confidence of learning mathematics well.

### **The content structure of mathematics curriculum**

This curriculum reform has divided the mathematics of the phase of compulsory education into 3 learning phases. They include the first learning phase, which is from grade 1 to grade 3, the second phase, which is from grade 4 to grade 6 and the third learning phase, which is from grade 7 to grade 9. Now I will mainly introduce the content of the first and the second learning phases.

#### **Number and algebra**

The process of the development of the conception of number is attached importance to.

The development of the students' feeling of number is paid attention to.

Estimation is reinforced, oral calculation is stressed and making the way of calculation varied is advocated.

Doing complicated calculation and seeking regulation with calculator are advocated.

#### **Space and graph**

This area has been divided into 4 aspects in content structure including the understanding of graph, measuring and graph, changing, graph and location. It is attached importance to add the daily problem of the students into the content of this part. For example, the contents of understanding the location, defining location and the translation and rotation of the phase have been added. The connection with the practice of life, understanding graph combining with the situation of life and making the students develop the sense of space have been emphasized in the content of understanding graph. In the way of content presentation, the students' practical operation and raising problem from the practical context and then drawing conclusion have been emphasized.

#### **Statistics and probability**

In this part it is stressed to develop the students' sense of statistics. And let the students experience the process of dealing with data and understand the probability in the detailed situation.

#### **Practice and synthetic application**

The emphasis in the first learning stage is practical activity. The situation that connects with the students' practical life tightly and in which the students can participate in the activity should be designed to let the students collect data, do team discussion and raise and solve problem.

### **The progress and the problem of the reform**

#### **The present study progress**

The textbook for trial has been compiled and it is about to do the trial in more than 30 trial-districts in the whole country from this September. The programmer will be used in all of the country in 2005.

### **The existent problems**

#### **The change of the teachers' ideas**

The new curriculum and textbook need the teachers to have some new educational ideas. But for many years the teachers have developed a fixed idea of curriculum and teaching in the developing model of previous mathematics curriculum and textbook.

#### **The change of teaching style**

The traditional teaching style takes the teachers' teaching and the students' s learning as the main character and emphasizes the teaching in classroom and repeated training of students. But the new curriculum advocates affording the students more chance of participation and communication and letting the students have the chance to seek and discovery combining the discovery learning and acceptance learning. But all of us know that it is difficult to change the traditional style because of the long influence. Furthermore the teachers face higher requirements because of the change of the teaching style.

#### **The difficulty of conditions for the implementation**

The new curriculum implementation needs better conditions including teaching equipments and materials and so on. Because of the difference between the city and the rural there are some areas without the requirements for implementation. There are people in some areas are too poor to reach the material requirement for implementing the new curriculum.