

On Trend of Mathematics Education Reform in China

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The traditional Chinese mathematics education is examination-contended and has its disadvantages. The mathematics education reform today is undergoing in a wider era and faces its attention on innovation education individually education, flexible and diversified education, give prominence to integration of the curriculum, the integration of teaching content and information technology, and the changing of learning methods and teaching methods. These are all the new trends in the mathematics education reform in China

0. INTRODUCTION

Mathematics education is a social civilization phenomenon, and its sociality decided that the mathematics education should go along with the time, and keep innovating.

The teaching objection, content, teaching, etc. in mathematics education will all change with the development of the society. We should consider the background of mathematics education reform from at least 9 aspects:

- Knowledge of economy
- Social relationship
- Family pressure
- International trend
- Examination reform
- "Use science to develop the country"
- Deepen universalize compulsory education, and
- The development of science.

Mathematics education reform is the strong point throughout it is whole process and the core issue of the mathematics education often located at the beginning of the mathematics education reform.

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The mathematics education modernization movement during the end of 19th century and the beginning of 21st century and the "new mathematics movement" during 1960s' all illustrate this point. The idea of mathematics education reform and a series of general plan of the reform will all be reflected from the teaching materials. From the 17th century to the 19th century, due to the development of transportation industry (especially machine production), astronomy, geography, physics, chemistry, etc., more and more people who grasp mathematics will be needed, that's why we offered during the arithmetic, algebra, geometry and trigonometry in schooling. After the 1940s', atomic energy, electronic, computer, space technology, genetic engineering and other advanced science technology appeared one after another, and it made the social production entered into high mechanization, electrification and automation.

The traditional mathematics curriculum which was formed in the "industrialization" during the 18th century has been challenged by the "New Mathematics Movement" during the 1960s', obviously it can not meet the requirement of the "information" society of today. From 1990s' until now, people realized that the mathematics methods were widely used in the rapid development of the science technology, especially the computer application and information science, and this made the mathematics and other subjects and techniques get more closed, and the use value of mathematics improved dramatically, while the status out of the mathematics education could not meet the development of the present era, so the reform in the ideology, content, method, and theory of mathematics education are necessary to improve the quality of mathematics education, thus train the talents who can meet the requirement of the modern society. In the 21st century today, the practice activity of mathematics education is waged under the wider era background; mathematics education has become an irrevocable international trend (cf. Civil, 2006; Howley, Howley & Helm, 2007; Kitchen, 2003; Drake, 2006). Here, we do not intend to discuss the background of the reform, but give a brief account of the trend of mathematic education reform as follows:

1. SET UP THE NEW IDEA OF QUALITY EDUCATION AIMED WITH FOSTER INNOVATION ESSENCE AND PRACTICE ABILITY

Innovative spirit and practice ability as our core objective. Over the years, mathematics education was examination-centered, and it has become a hurdle of the development of mathematics education in China.

Under the examination centered system, a "learning mathematics for entering a high school"

theory was formed which violate the law of mathematics teaching, and this needs to the wrong teaching system and practice, that is, teachers ask the students to do more than necessary homework to grasp the knowledge, and lots of training which is "type plus imitation" mode.

Teachers pay more attention to the teaching of the mathematics knowledge and technique, while overlook the process of the building up mathematics knowledge and its characteristics, failed to find the mathematics education system which can fit the students, or we can say they failed to find the construction process of the psychological structure behind the mathematics knowledge and made it become the mathematics learning system for students the teaching system was made according to the system of the mathematics knowledge this made the knowledge last it's contact with reality , therefore the students can not use mathematics knowledge to understand the world and solve their daily problems and the teaching method can only take it form as a "pass on "model ,and the learning model will be "recitation-plus exercise" pattern.

This pattern is in its nature are "learning - and - answer" mode, in order to answer the question, recitation and large amount of imitation exercise became a reasonable and the most effective learning method .Since the questions under the "learning-and - answering" mode are mainly come from the textbook, which has little connection with the realistic, the students do not need to have innovation thinking during the process. It is thus clear that the fatal disadvantage of the mathematic education under the examination-oriented, so theory is that it lacks innovation operation and the ability in using it in the real situation, or we can say that the traditional way of education is a kind of education which pays little attention to the cultivation of the innovative ability of the students.

While the prosperity of a country or a nation, it's all development and progress needs innovation. If we want to meet the challenge of the rapid progress of the science technology and the knowledge economy, the most important thing for us to do is to keep innovating; innovation is the soul of a nation. It is the impetus for a nation to keep its prosperity. The key to innovation is depending on talents, and the key to cultivation of the talents is depending on education.

We must take improve the ability of innovative, ability of our nation as a key issue which concerns the life-and-death of our country. Education takes its responsibility for cultivating, the innovation spirit of our nation and innovative talents. We must change the education idea and models which hinder the development of the innovative spirit and ability of the students, especially the standard of the teachers use the score to judge, their teaching results in their

teaching producers, and the education system which is too standardized.

The purpose of quality education is to fully implement the education policy, improve the quality of the all citizens and cultivate the innovation and practice ability. Innovation is the soul of education, the core objection of the quality education is innovation.

Therefore, change the idea of the traditional education; focus on innovation education has become an urgent mission in present education reform. To implement the quality education fully, we must set up a new mathematics education idea which focused on cultivating the innovation spirit and practice ability.

2. EFFECTIVE INTEGRATION ON TEACHING CONTENTS

Mathematics education innovation must change the old curriculum structure that serve only for examination and create a new curriculum system which can stimulate students' capability. Subjects' knowledge system with people's cognition structure our traditional curriculum structures are monotonous. Content are abstract, narrow, over detailed on subjects dividing and more value study textbook in classes, and over emphasized first place of subject too many categories.

While integration is very little, they neglected to foster students' consciousness and ability of study mathematics after class and cultivate nice character, curriculum innovation should begin with students' study and life. Change structure of that only give first place to subject knowledge system basically .diverse to synthesis mathematic curriculum which coincide with peoples' knowledge regular pattern and based on peoples' development make students'knowledge experience, mathematic knowledge integrate with society developing. Make mathematics curriculum structure have characteristic of balance between popularity, synthesis, choice, development and open to the world.

Curriculum integration is needed based on multiple studies. Students' multiple practices and teaching contents' society adaptation are draw support from modern education skills to design renewal curriculum integration based on multimedia. Strengthen multiple studying on subject itself and other subjects. Changing flexible inter- infiltrate and inter-change information give prominence to relation of curriculum content with students' study life and modern society.

Technology development pays attention to students' interesting and experiences selecting basic knowledge seriously including information technology for student study needs. Beside this, this integration not only means knowledge with knowledge, subjects with subjects but also including capability, emotion, wills and characteristic. Call on student should have active study attitude,

make study process to be process of helping student learn study and to form truth value.

3. STUDY MODEL TRANSFORMATION

Students' mathematics study model reform transformation is one of trend with virtually meaning. A good study active should start with four rules:

1. The relationship of learner with nature;
2. The learner with society and other people;
3. Learner with culture; and
4. Learner with learner.

Speaking carefully, they reflect four study models that follow:

3.1. Study Model based on "resource"

Students mathematic study model reform transformation is one of trend with virtually meaning way from text book to study model based on "resource".In this model, teachers give lots of related information or address of information resource. Students use information tools to research different information, during researching process; according to ways of reading and observation to feel, selecting, evaluation, organization and expression to judge quality and trust worthy files and data the inference of this not only logic deduction but also related to use files and data of them.

3.2. The study model based on task and exploring question.

The effective mathematics study didn't only depends on imitation and memory study not only listing but also based on discovery researching, test (experimentation) practice by hands, objective researching and co-operation communication are important ways of mathematics learning. In researching study model ,teacher give one or several questions to students or difficult circumstances but no direct answer .students practice by hands according to question on papers researching and analyze with teachers or inter-communicate with classmates to settle question. In this process, teachers'task was diverse information resource to knowledge and help student observe information from resource to accelerate student construct knowledge form of themselves.

3.3. The study Model based on co-operation

In this study model the co-operation relation between students and teachers, experts (or scholars) and students are very important. Its help to achieve high level of recognize personal communication skills and emotion attitude. The consciousness and ability of co-operation should be basic quality of modern people. This study model would construct a education environment which helps personal communication and co-operation make students learn to interchange and share information, achievements of new ideas, and developing their team co-operation spirit.

3.4 The study model based on individual character

The meaningful mathematics study must be based on students' subjectivity aspiration and knowledge experience, meanwhile, the outcome of mathematic learning were restricted by the culture environment family background and thinking pattern, of them. for this will be raise, divergences will results to different student shows different mathematics learning trends, so, we should give students chance s to choose according to their different interesting.

4. MATHEMATICS EDUCATIONS PERSONALITY, DIVERSIFY, AND ELASTICITY

Mathematic is one of important subjects of fundamental education. Mathematics education of middle school need to be reflecting its foundation and development popularization makes mathematics education face all students. Realize everyone study worthy mathematics and everyone can get necessary mathematics knowledge and different people got different development in mathematics field.

Chinas' traditional mathematics subjects and teaching method usually are mechanize one-track over modernize lacking of adaptation.

This model seems open to all students but the outcome was not. Objective situation reflect that there are normal divergences between different districts .Schools and students to these divergence, text books and teaching theory should be with quality of elasticity. Support students to choice. The old study model not good to train person of ability developing of all direction are not average developing trust worthy of education was accelerate personal characters for this, mathematics education must be design mathematics close with elasticity including subjective study content and objective contents.

Every student has themselves "mathematics realization." In order to teach students attain

"realization": Question "mathematics" one side, and let students achieve "realization." Question "mathematics" another side according to "mathematics realization" and students' knowledge foundation. Mathematics level life experiences are teachers' "realization" study contents must be good to students' objective go in for observation, experimentation, guess, test, inference communication and activities of contents presentation should be according to different study times, knowledge backgrounds and different cognition level to take different expression way to supply study needs.

On Harvard University ceremony of three hundred and fifty years somebody asked what best pride thing of Harvard was. Headmaster replied what Harvard best pride thing was not fostered six presidents, thirty-six winner of Nobel but give each student chance of selecting and developing space. Let each gold glitter. So, individuation, diversification, and elasticity education is important trend of education.

5. INTEGRATION OF INFORMATION TECHNOLOGY AND TEACHING SKILL

At present information technology changing people life way and study mode ,with surprising speed and internet and computer .adapting digital new living surrounding becoming necessary basic living ability of people .From computer to multimedia is innovation on quality. Nowadays computers not only are used to process mathematics logical operation and process words limited. Beside these .added functions such as process voice, photos, movies and three-D cartoon. Most of these functions can communicate with people.

After computer adaptation expanded in all fields of society, data, data evaluations, and all aspects of society life connection and transformation made our society life more and more digitalize. So mathematics education had to integrate with other courses and life education. We had owned many experiences on ability of calculating training. We had need effective way of mathematics thoughts, mathematics methods, and mathematics adaptation education. Information technology education popularized in primary school and high school made students' quality of information formed. Collecting and processing ability were raised. It has historic meaning.

Development of modern information technology will give important affection on mathematics education, objective, Contents and study way.

This demand of information technology should adapt and integrate with education new way information technology. Drive reform of curriculum system education contents and method of

education to realize integration of Information technology with mathematics education technology. Mathematics curriculums take modern technology seriously especially to computer [calculating device]. Take modern technology as students' study tools to learn mathematics and deal with problem. Make students release from complex calculating. Give much more energy to researching mathematics active, use Information Technology to foster their innovation spirit and practice capability.

6. TRANSFORMATION OF MATHEMATICS TEACHING MODEL

Teachers were people pass on skill no longer but recognizer and accelerator of students' study activities.

After determined teaching target and teaching program, the method of teaching becomes essential factor on raising teaching quality.

Advanced education thought and good curriculum text book rely on teaching method. So the model of method teaching is more important but our traditional mathematics teaching model – "teach by teacher, students only listening and taking notes" and "teacher give models and students imitate" is one-way "model of information passing. Was effect on foster students' ability of bringing forth new ideas seriously?"

Theory of modern mathematics teaching emphasize create new way "co-operation by students and teachers" of interaction. Mathematics teaching should be start with students' life experiences and knowledge background, supplying enough chances to inter- exchange and helping them to understand and to possess basic mathematics knowledge skills. Thoughts and ways as well as got lots of mathematics experiences during researching of themselves. Teachers are designator of students construct activity and should be organizer, participator, accelerator, but not knowledge passer. These quality including understood deeply on thoughts activity and ideology foundation. In order to according students' knowledge situation to teach, accelerate their active, objective quality and supply nice study surrounding for they study life.

Under quality education thought appears some new teaching models .their basic process reflected some model characteristic: background – process-adaptation or install teaching situation – ask-question-resolve question-related with adoption. It's a process that students collecting information files according to researching. Processing and resale question get knowledge. The contents including:

- 1) collecting dates and achieve mathematics knowledge by themselves,
- 2) extending mathematics questions of text book and got new knowledge, and
- 3) researching mathematics model,

deal with informal mathematics application questions.

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