

The Current States of the Mathematics Curriculum Reform in the Mainland China and Some Cultural Analyzing

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The mathematics curriculum reform has been carried out for almost five years (2004-2008) in the mainland China. But the teaching and learning in mathematics classrooms still are traditional in nature. Analyzing from the cultural angle, some reasons can be found: the orientation of teachers' role, teaching, and learning, the relationships between a teacher and the students, understanding the mathematics, and examination.

Keywords: traditional; teaching and learning; mathematics curriculum reform; cultural analyzing; the mainland china

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RESEARCH BACKGROUND

China is an ancient country. Though its mathematics education can be traced back to the Zhou Dynasty (about 1027–221B.C.), the modern mathematics education began just about a hundred years ago. During this period, the mathematics curriculum reforms have been made many times, especially after 1949, when the Communist Party governed the mainland China. Those reforms promoted the China's mathematics education. For example, comparing with the mathematics education ten years ago, the contents and teaching technologies of the mathematics education become more modern. In despite of reforms' effort, the mainland China's mathematics education still is very traditional.

They are very often content oriented and examination driven. Large class sizes are the norm and classroom teaching is usually conducted in a whole class setting. Memorization of mathematical facts is stressed and students feel that their mathematics learning is mainly learning by rote. Teachers feel guilty for not teaching enough problem-solving during their classes. Students and teachers are subjected to excessive pressure from highly

competitive examinations, and the students do not seem to enjoy their mathematics learning (Graf, Leung, 2000).

With china's open to the world and the progress of the science and technology, the mathematics education is dropping behind the society badly, especially; many respects of mathematics education drop behind the mathematics education of many other countries, too. So, the Government decided to initiate a complete reform to the mathematics education. In March of 1999, the Research and Making Group for the National Mathematics Curriculum Standards was organized. In the beginning of 2000, the group released the first draft of the National Mathematics Curriculum Standards. In July of 2001, the Mathematics Curriculum Standards for Full-time Compulsory Education was released. In September of 2001, the textbooks based on the Mathematics Curriculum Standards began to be uses in some experiment zones. After three years, in September of 2004, expect a few counties, the most elementary and junior high schools began to use the textbooks based on the Standards.

The aims of the current mathematics curriculum reform are to change the recognitions to mathematics and school mathematics, to change the traditional methods of mathematics teaching and learning to the modern methods, and to change the traditional assessment to the modern assessment, etc. In the Mathematics Curriculum Standards for Full-time Compulsory Education, the statements as following can be found.

Mathematics is the necessary tool in people's living, studying, and working. It can help people to deal with data, computing, reasoning and proving. Mathematics modeling can describe the natural and social phenomena effectively. Mathematics provides the language, ideas, and methods for other sciences. It is the basic of all grand technologies. Mathematics has a special function in promoting people's reasoning power, abstract power, imagining power, and creativity, etc. Mathematics is a kind of human culture; its contents, thinking, methods, and language are important part of the modern civilization.

Mathematics contents should be realistic, meaningful, and challenging; they should be convenient for students' observing, experimenting, guessing, validating, reasoning, and communicating.

Effective mathematics activities can not only rely on memory and imitation, practicing, exploring independently, and collaboration and communication are important ways to learn mathematics. Teachers should inspire students' learning enthusiasm, provide those more chances to engage in mathematics activities, help them understand and master basic mathematics knowledge and skills, mathematics thinking and methods through the process of exploring independently and collaboration and communication. Students are the masters of mathematics learning, and teachers are the organizers, guides, and collaborators of mathematics learning.

It should build multi-objects and multi-methods of mathematics learning assessment. Assessment is not only paid attention to the outcome of students' mathematics learning, but also to the process of their mathematics learning. Assessment should be paid attention to the levels of students' mathematics learning, and be paid more attention to the emotion and attitude represented in the mathematics activities (Yuqi, 2001).

The new mathematics curriculum standards have been carried out for almost five years (2004–2008), how about the effects of the mathematics curriculum reform?

PUTTING FORWARD THE QUESTION

In order to know the effects of the mathematics curriculum reform, the author interviewed some mathematics teachers and observed some mathematics classrooms. Three schools were chosen; all of these schools are Example High Schools (Shifan Zhongxue 示范中学), which means that they have good quality. In every chosen school, three grades (a grade 7 class, a grade 8 class, and a grade 9 class) and their mathematics teachers were chosen. In total, there are 9 mathematics teachers (three grade 7 teachers, three grade 8 teachers, and three grade 9 teachers).

In interviewing with the mathematics teachers, some questions as following were asked:

- (1) Do the new curriculum standards affect your teaching?
- (2) In your classroom, does your teaching accord with the new curriculum standards at what extent?
- (3) Do you think what you do according with the new curriculum standards in your classroom?
- (4) Please list your reasons if your teaching does not accord with the new curriculum standards.

To these questions, the teachers' answers were positive as a whole. A majority of them thought that the new curriculum standards affect their teaching, and their teaching accord with the new curriculum standards to a large extent. They list some activities according to the new curriculum standards such as collaboration and communication. From the teachers' answers, it seems that the new curriculum standards have affected the mathematics' teaching and learning. In other words, the curriculum reform has succeeded to a large extent.

The author observed every chosen teacher's classroom and found that teaching and learning in these classrooms have no essential difference with the traditional mathematics classrooms. For example, in these classrooms, as the main part of the instruction, the

teachers told the classes the mathematics' contents that were planned in advanced based on the textbooks, showed the classrooms how to get a mathematics formula, asked the classrooms how to solve a problem, etc; accordingly, the students listened carefully to the teachers or solve some assigned problems. In the process, the classes spent a quite time to do exercises but not to solve the real problems. Such mathematics teaching and learning is almost as same as the one the author experienced as a middle school student twenty years ago. Of course, the mathematics teaching and learning observed are a few different from the traditional one. The author noticed that, for example, many teachers asked the classes to learn in groups, and sometimes, asked the classes do some practices by hands. These characteristics make the mathematics classrooms "modern" at some extent. But, if analyzing carefully these "modern" characteristics, the author found that these characteristics are exterior but not in nature. In a classroom, after putting forward a question, the teacher told the class to learn in groups. Then the students formed some small groups; every group included two or three students. In every group, after solving the problem independently, members compared their outcomes with each other. If someone can't solve the problem, the other member who had solved the problem would tell him/her the outcome, if the time allowed, even told him/her how to solve it. When the class was solving the problem, the teacher did something by himself/herself or monitored the class' work. After all groups or the most groups had finished the problem, the teacher just gave the correct answer. In general, there is no discussion about the problem.

In fact, the natures of the group's collaboration learning are the peer's illuminations and help each other. Because every student's unique background, experience, and mathematics knowledge level, their mathematics thinking ways and views will not same. The peer's collaboration will make every student know the other thinking ways and mathematics methods; the peer's oppugns and critics make the reflections which will lead them to rethink their works and more in-depth understanding. The whole class' discussion also has a very important function, because it can make every student learn more knowledge, know more views, and get more in-depth understanding.

Comparing some "modern" characteristics of observed mathematics teaching and learning with real modern characteristics of mathematics teaching and learning it is not difficult to get the conclusion: the observed mathematics teaching and learning is not real "modern", they still are traditional mathematics teaching and learning in nature. Additively, some mathematics teachers and researchers also put the similar opinions in their papers (Mihua, 2007; Yiwu, 2006). So, the phenomena the author observed are representative. This conclusion brings on the question which will be focused in this paper: what are the reasons that lead to the status? Of course, the reasons must be complex and multiple. In this paper, I will discuss the problem from the cultural perspectives.

THEORETIC BACKGROUND

The analyzing in this paper is based on the following assumption: the culture in a society will affect the school mathematics teaching and learning in this society. In this paper, culture refers essentially to values and perspectives, especially those values and perspectives which are related to education, mathematics education and mathematics.

Different cultures will have different effects to school education in general and mathematics education specially. Some researches found that the school educations are different in different parts of the world. These differences include the goals of the teaching and learning that teachers have, the ways that knowledge is communicated to students and the ways teachers interact with their students, etc. (Clarke, 2003). Alexander's schools and classrooms comparing research between USA, UK, Russia, India, and France also reveals that there is a huge difference between in different countries' schools education. For example, the Indian school education have little common with the USA's school education (Clarke, 2003).

Different countries have special school education. Of course, a variety of factors affect the school education of the country, these factors include economy, politics, culture, etc. As Bishop said, "in order to understand social phenomena in classroom one has to consider the classroom as a part of a much greater social 'framework'." He thought definitely: "there are important social phenomena, customs, values, histories, etc. which play a strong shaping role in math education" (Bishop, 1985). In my opinion, it is not appropriate to magnify the culture's role excessively, at the same time, it is necessary to understand adequately its role exerting the school education.

The culture's important roles in affecting school education have been emphasized by many researchers (*e.g.*, Gerdes, 1988; Mellin-Olsen, 1987). For example, Chilcott wrote: Each culture is unique ... the focus of school ethnography needs to be more diacritic, focusing on the sociocultural processes within and outside of the school that create the situations within the school. (Chilcott, 1987)

The culture affects the mathematics teaching and learning by shaping people's perspectives. Because people's perspectives affect their behaviors greatly, so, the culture, an invisible hand, controls people's behaviors greatly. The culture shapes the society's perspectives to teaching, learning, mathematics teaching, mathematics learning, teachers and students' roles in classrooms. By socialization, teachers, students, administrator, and policy makers accept these perspectives step by step, these perspectives enter into their minds' depth and become their perspectives about mathematics and mathematics education. When they are teaching, learning, administering, and making policies, they will do according these perspectives consciously or unconsciously.

ANALYZING THE CURRENT MATHEMATICS TEACHING AND LEARNING

Currently, in the mainland china, the mathematics teaching and learning in classrooms have not occurred changes in nature. The reasons can be found in many headstreams. The following analyzing is from the cultural angle.

The orientations of teachers' role, teaching, and learning

In Chinese traditional culture, a teacher's roles are understood as "chuandao (传道), shouye (解惑), and jiehuo (授业)", which means imparting truth, delivering knowledge, and answering puzzles. This orientation shows that the main role of a teacher is to tell his/her students knowledge that exists. In china, a teachers has been called jiaoshuxiansheng (教书先生) which means the people of delivering knowledge that exists in textbooks. Now, understanding to teachers' roles still keeps changeless basically except in some education research communities in the mainland china. In the teachers' community, there is wisdom: "if you want your students to get a bowl of water, you must have a barrel of water." This wisdom has two meanings: one is that teachers must possess rich knowledge, the other is that teachers' role is to pass the knowledge to their students, it likes pouring water from a barrel to a bowl.

In china's traditional culture, the aim of learning is to know more knowledge. There are many idioms describing a successful learner. For example, baodushishu (饱读诗书), which means a person reads many books, xuefuwuche (学富五车), which means the books a person reads can be stuffed in five vans.

In such a culture background, the whole society, including teachers and students, think that teachers must possess rich knowledge. In a classroom, the teacher should pass the existing knowledge to his/her students, and the students' role is to accept the knowledge that the teacher passes. Which method of mathematics teaching and learning is reasonable? Undeniably, from this perspective, the best method is the teacher's spoon-feeding his/her students in mathematics classrooms. Using this method, the teacher passes knowledge to his/her students and the students accept knowledge from their teacher expediently and effectively. In such a culture background, it is difficult to make a teacher change his/her instructional method really, because this method is best in his/her perspectives. Why is the best method changed? So, it is not difficult to understand that mathematics teachers still use the traditional instructional method in their classrooms in despite of the requests of the mathematics curriculum reform.

The relationships between a teacher and the students

In Chinese traditional culture, there is a very important perspective *guanbenwei* (官本位), which means that being officer is looked as the core value ruler to measure a person's social status and value. So, everyone wants to become an officer; and every one is afraid of officers. Up to now, this traditional culture perspective still affects people's perspectives about individual value. For example, many young people are interested in entering themselves for the civil servant's examination every year, because the civil servant is looked as an "officer" in the mainland china.

The *guanbenwei* perspective affects many aspects of the school education, including the relationships between teacher and the students in a classroom. The teacher looks consciously or unconsciously himself/herself as "officer" of the students, and the students also look the teacher as their "officer" consciously or unconsciously. The teacher wishes maintaining his/her status; he/she don't would degrade himself/herself to the status that is equal to the students.

The relationships between the teacher and the students affect the mathematics teaching and learning in a classroom. The inequality between the teacher and the students leads to their different identities in the classroom; and their different identities determine consequentially their behaviors in the classroom. In current mathematics classrooms in the mainland china, affecting by the *guanbenwei* perspective, the teachers are absolute leaders or authorities. So, the teachers decide everything in the mathematics classrooms. They decide the mathematics contents of teaching and learning, decide to use which method to teach and learn, etc. In such a classroom, the communication between the teacher and their students is one way. That is to say, the teacher tells and the students listen, the teacher demonstrates and the students look and imitate, the teacher orders and the students perform, the teacher scores and the students mend, etc. The current mathematics curriculum reform wants teachers to change their statuses from leaders to organizers, guides, and collaborators of mathematics learning. This means that teachers must degrade their statuses; the relationships between teachers and their students are equal in classrooms. It is difficult to attain for the most teachers in the mainland china. It is not difficult to find that the teachers still are "officers" in most classrooms in the background of the mathematics curriculum reform.

Understanding the mathematics

To mathematics and mathematics learning, there are some cultural perspectives in the mainland china, which are that the mathematics is absolute truth; the mathematics knowledge is a set of knowledge that already exists; it is difficult to learn the knowledge,

just a small of people who possess high intelligence (*e.g.*, mathematicians) can learn it well; in general, boys are more superior than girls in learning mathematics; the mathematics is a gym for exercising mind, so, one uses his/her brain not fingers in learning mathematics; etc. Because the researches in many academic fields (*e.g.*, mathematics philosophy, science philosophy, and science sociology, etc.), these perspectives about the mathematics have been proved behind the times. But in mathematics teacher community in the mainland china, they still are dominant mathematics perspectives.

The teaching and learning of a mathematics classroom is decided to great extent by teachers' mathematics perspectives. Because the mathematics perspectives of most mathematics teachers are dated, it is not strange to see that most mathematics teachers still use the traditional mathematics instruction method in most classrooms in the mainland china. Because the mathematics is a set of knowledge that has existed, it is very natural that teachers pass the knowledge to their students. So, in mathematics classrooms, the teacher tells and demonstrates, the students listen, remember what the teacher tells, and imitate what the teacher does. Because the mathematics is the absolute truth, then, negotiating, persuading, and compromising are not only unnecessary, but also reasonless. Because the mathematics is involved in people's thinking and logic reasoning, so, in mathematics learning, students should do more thinking by themselves rather than practicing by hands, observations, and mathematics experiments.

Examination

In Chinese traditional culture, keju (科举) examination, which began in 606 and ended in 1905, played a very important role. It is the gangplank for people to become an "officer". For many years, people always related keju examination to an "officer". In Chinese traditional cultural perspectives, nothing is more important than keju examination. Many traditional stories reflect people's attaching important to the keju examination. For example, the story from a famous Chinese ancient novel *Rulinwaishi* (儒林外史) described a people who had failed to pass the keju examinations many years was mad when he passed the examination finally. In addition, there are many idioms that also reflect people's attaching important to the keju examination. For example, *jinbangtuming* (金榜题名), which means that one person passes successful the keju examination; *changgongzhegui* (蟾宫折桂), which also means one's making good winning in keju examination.

Examination also plays an important role in the modern educational system that was built at the beginning of last century in the mainland china. There are many types of examination: unit examination, mid-term examination, term examination, senior high

school entrance examination, and college entrance examination, etc. In these examinations, the college entrance examination is the most important. Because when a person passes the college entrance examination and learn in a college, then he/she will have more chances to success, even become an “officer” after graduating. The college entrance examination is so important that it almost never has been stopped even in time of war. Existing of the college entrance examination affects the other examinations, which are for evaluation students’ school works, but more important, are for preparation the college entrance examination.

Examination culture affects schools, teachers, parents, and students’ understanding to mathematics teaching and learning. Passing examinations and gaining high scores become main aims of teaching and learning. So, teachers’ teaching and students’ learning all revolve around the college entrance examination. It is not strange that the college entrance examination affects the mathematics teaching and learning in classrooms.

In mathematics college entrance examination, there are three characteristics: first, the types of problems are pure mathematics problems and some applied mathematics problems. Both pure mathematics problems and applied mathematics problems are routine; second, the time is determinate. Examinees must finish their works in given time; third, it is a written examination. These characteristics affect the mathematics teaching and learning in classrooms. Because of routine mathematics problems only in the examination, it is unnecessary to do mathematics explore and find. The best instructional method is that teachers tell their students how to do routine mathematics problems correctly, and the students remember what their teachers tell and solidify the procedures of the solving problems. In mathematics teaching and learning the teachers will not present the open-ended and the real-life problems, because there is no these types of mathematics problems, so, the students also don’t need to design the new strategies and to solve these problems. Because the examination must be finished in stated time, in order to pass the mathematics college entrance examination and get a high score, which means that a person not only can enter a college but also can enter a good college, students must exercise the routine mathematics problems again and again, so, they can finish correctly all mathematics problems in the given time. Because no practice by hands in the examination, teachers are not interesting in practicing actives in mathematics classrooms. It is not difficult to understand few practicing actives can be found in classrooms.

CONCLUSIONS

From the analyzing the culture and the mathematics teaching and learning in classrooms in the mainland china, the readers can find that the culture affects the

mathematics teaching and learning in classrooms greatly. Why the mathematics instructions still are traditional can be understood from the cultural effects. To teachers, the cultural effects make them teaching according with the cultural perspectives of the society in mathematics classrooms consciously or unconsciously. But current mathematics curriculum reform wants their teaching according with the requests of the reform. The end is that most mathematics teachers keep the traditional instructions meanwhile do some exterior changes.

As the initiators of the mathematics curriculum reform, they must know the effects of the culture of the society to the mathematics teaching and learning. If they initiate a reform but are not cognizant of the cultural important role in the mathematics teaching and learning, it will make the reform in risk. Obviously, in current mathematics curriculum reform, the initiators pay attention to the culture of the society inadequately.

The culture of the society affects the perspectives of teachers and students, the teachers and the students bring their perspectives into the classrooms, so, the classroom culture is accordant with the perspectives of the society to a great extent. The intention of a reform in mathematics education often is to change the old culture of the mathematics classrooms and shape a new one. The new culture and the old culture in mathematics classrooms are different, and the difference is even very huge sometimes. For example, the current mathematics curriculum reform in the mainland china is representative.

How to make a reform of the mathematics teaching and learning effective in such situation that the culture of the society and the requests of the reform are very different from each other, which like the current mainland china. In my opinion, there are three points that must be focused.

Firstly, education in general and mathematics education specially are not neutral, schools' culture and mathematics classrooms' culture are subsystem of the society's culture. If some respects of the society's culture can not be changed, it is unpractical to expect schools' culture and mathematics classrooms' culture are changed successfully.

Secondly, education reform in general and mathematics education reform specially can not gain its aims in short time. Because the culture's effects, the change of school cultures and classrooms' cultures will be slow, it is unpractical to expect the reform's success in short time. An education reform relates to the perspectives of policy makers, school administer, teachers, students, and parents, and it is difficult to change these people's culture perspectives, their perspectives can not be changed quickly by the requests of a reform.

Lastly, teachers play a key role in reforms. Changing teachers' culture perspectives should be the most important part of a reform. When teachers' culture perspectives are consistent with the requests of the reform, then the reform will be promising. Of course, the changing of teachers' culture perspectives can not be finished in one night.

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