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Improving The Quality Of The Mathematics Education: The Malaysian Experience

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ABSTRACT

Improving the quality of teaching and learning of mathematics has always been a major concern of mathematics educators. The four recurring and inter-related issues often raised in the development of a mathematics curriculum are: "What type of mathematics ought to be taught?", "Why do we need to teach mathematics?", "How should mathematics curriculum be planned and arranged?" and " How can teacher ensure that what is transmitted to the pupils is as planned in the curriculum?".The relatively brief history of mathematics education in Malaysia can be said to have developed in three distinct phases. In the first phase, the traditional approach, which emphasized mainly on basic skills (predominantly computational), was the focus of the national syllabus. In the late 70's, in consonance with the world-wide educational reform, the modern mathematics program (MMP) was introduced in schools. Understanding of basic concepts rather than attaining computational efficiency was the underlying theme of the syllabus. Finally, in the late 80's the mathematics curriculum was further revised. It is part of the national educational reform that saw the introduction of the national integrated curriculum (KBSM) both at the primary and secondary levels. This mathematics curriculum, which has undergone several minor changes periodically, is presently implemented in schools. The curriculum also emphasizes on the importance of context in problem solving. These three syllabi, as in any other curricular development, can be seen to have evolved from changing perspectives on the content, psychological and pedagogical considerations in teaching and learning of mathematics. In this paper, I will trace the development of the Malaysian mathematics curriculum from the psychological, content and pedagogical perspectives in relation to the recurring issues. I will argue that the development has in many ways attempted to make mathematics more meaningful and thus friendlier for students both at the primary and secondary levels. There has been also a marked improvement on the quality of mathematics education in Malaysia

Within at least the last 5 decades, the mathematics curriculum has undergone some significant changes. From the content perspective, the change can be viewed to have undergone in three phases; the traditional (absolutist in nature), the modern mathematics era and finally to those related to the constructivist notions about mathematics (see Paul Ernest, 2005).The main problem in curriculum development is the selection and decision of what is suitable mathematics for students to learn (Kliebard, 1972; Olivia, 1997; Marsch, 2009). In general, the development of the mathematics curriculum parallels to that of the educational development which is further influenced by the needs of society and in actual fact is seeking for answers to four main continuing issues. The issues are:

1) What mathematics should be taught in schools?
2) Why do we need to teach mathematics?
3) How should we plan and sequence the mathematics curriculum?

4) The role of educators, teachers in particular, in transmitting the mathematical knowledge (Weaver dan DeVault, 1970; Romberg, 1992; Noor Azlan, 2008).

The above issues are highly connected with one another. In any curriculum change or innovation, curriculum developers who are responsible in determining what needs to be taught in the classrooms, is in reality, directly or indirectly, attempting to seek answers to questions arising from the mentioned issues, although at certain times, certain issues are more emphasized over the others. Lately, for example, the Malaysian mathematics curriculum developers tend to be more focused to the question of how mathematics should be taught in schools. The question of "why mathematics should be taught in schools" is seldom raised since the mathematics syllabus has traditionally existed in the school curriculum since schooling history. Nevertheless, this does not imply that the question why mathematics should be taught in schools be ignored. Careful analyses would provide guidelines for future curriculum development. In the history of mathematics education in Malaysia, we have been addressing the four recurring issues and will continue to do so in the future (Noor Azlan, 2005).

Curriculum

In this paper, the mathematics curriculum is defined as the planned operational plans for teaching and learning that outlines:

1) the mathematical knowledge that students need to know.
2) the methodology on how the goals and objectives of the curriculum can be achieved by the students.
3) what teachers need to do in order to help students to build the mathematical knowledge in an environment where teaching and learning occurs. (National Council of Teachers of Mathematics, 1989, 2000; Marsh, 2009).

The planned curriculum is often referred to as the, intended curriculum (Noor Azlan Ahmad Zanzali, 1987; Robitaille, 1980, Dossey, Giordano, McCrone and Weir, 2002), as contained in the syllabi, text books recognized by the Ministry of Education, or the accompanying materials (such as teacher guides) produced by the curriculum developers. The intended or the planned curriculum must be differentiated with the implemented (or the enacted) curriculum (Dossey, Giordano, McCrone, Weir, 2002; Marsch and Willis, 2007,). In this context, the constraints arising from social and

environment faced by teachers in implementing the intended curriculum need to be considered. (see Stephens, 1982; Donovan, 1983; Noor Azlan Ahmad Zanzali, 1987, 1994, 2007; Marsh, 2009). What actually happen in the classroom is often referred to as the experienced curriculum (Smith and Lovat, 2003). This is similar to the observation that:

1. the teaching of mathematics occurs in a social context.
2. Mathematics teaching must emphasize "what mathematics is being taught."
3. effective mathematics teaching should take into account on how students discover and learn mathematics.
4. mathematics teaching can be conducted efficiently if the environmental aspects are considered (Bishop, 2001; Chien Chin, Yuh-Chyn Leu and Fou-Lai Lin 2001)

The above observations encompass the four issues mentioned above. In this paper, the continuing issues in mathematics education related to the kind of mathematics that should be taught in schools, followed by a discussion why mathematics is taught in schools, analyzing how the topics are structured and finally discuss the role of teachers in the teaching and learning of mathematics will be discussed. The quality of mathematics education, is fact, how the curriculum is planned and implemented based on the above four issues.

What mathematics should be taught in schools?

In the Malaysian context, the mathematics curriculum has undergone several significant changes. From the content perspective, the content of the curriculum before the 70's focused on "traditional mathematics" with intense emphases on computation. In this curriculum, the abilities to compute fast and accurate were emphasized. All calculations or algorithmic procedures including Euclid geometry must follow certain rules or procedures. The approach is based on the assumptions of the behaviorist theory of learning. The focus of the theory is on the type of human behavior influenced by a/or a set of stimuli (Tall, 1991; Ernest 2005). This teaching-learning approach is effective in enhancing the abilities of students in replicating or repeating algorithms but is ineffective in the inculcation of mathematical thinking. Consequently teaching presents students with the product of mathematical thought and not the process of mathematical

thought (Skemp, 1971; Tall 1991, Ernest 2005), or students are exposed to the "record of knowledge" and not "knowledge" itself (Dewey, 1912)

In the late seventies a major curriculum reform saw the introduction of the modern mathematics program. In this syllabus, the elements of modern mathematics are introduced in the Malaysian schools (Asiah Abu Samah, 1982). "Modern" topics such as set, statistics, matrix, vector etc. began to be taught to Malaysian students. Euclidean geometry was considered to be obsolete and hence was taken out of the syllabus. This was replaced by the transformational geometry. Teaching approach that begins with understanding of concepts, with similar emphases on computation, based on the appreciation of structure of mathematics begun to be implemented in the Malaysian schools. Teachers are encouraged to use the inquiry method in teaching. Students are exposed to the processes of mathematics to produce certain results in mathematics.

In the 80's the content of the mathematics curriculum experience yet another change. The change was said to be suitable with the philosophy and goals of mathematics education both at the primary and secondary levels. The syllabus was designed to strike balance between skills and understanding. Problem solving particular those related to everyday experiences of learners was given special emphasis. This is based on the assumption that the main aim of learning mathematics is to solve problems. (see also, Branca, 1980; National Council of Teaches of Mathematics, 1982:2000, Kantowski, 1981; Romberg, 1984; Schoenfeld, 1985; NCTM, 1982, 2000}

Each curriculum change is planned so as to be in consonant with the current societal and economic changes which requires more complex and sophisticated understanding of mathematics. The advent of technology, especially in the information technology, requires students to possess skills not limited to the abilities to carry out procedures as contained in the traditional mathematics, but higher order thinking skills (example, see Bloom's educational taxonomies in the cognitive domain, (1979]). The effective use of computers requires theoretical knowledge of mathematics, not limited to computation or the ability to carry out certain procedures in mathematics. In an environment that emphasize on the use of computers, certain concepts that seem to be important at present may be obsolete and most likely new concepts are needed (Christiansen, Howson dan Otte , 1986; Pusat Perkembangan Kurikulum, 2000, National Council of Mathematics, 2000). What is emphasized here is that in the future world, we need to

acquire mathematics skills and understanding –in forms significantly different from the present. Hence we need to teach our children mathematics that will be useful in the future and obviously not limited to those presently taught in schools.

What is mathematics?

Seeking answers to the question of what is mathematics is not an easy one. The answers to this question are complex and most answers will be "cyclical." Nevertheless, mathematics educators must examine this question and provide explanations to the question of "what is mathematics" for three reasons.

First, most non-mathematicians such as sociologists, psychologists, school administrators and even mathematics teachers regard mathematics as a static and thus limited to computation as contained in most school mathematics textbooks (since Barbeau, 1989; Noor Azlan 2007). This view reflects a major part of the mathematics taught in schools. Mathematics is often viewed as what is determined by textbooks and written out in the syllabus. The teacher's responsibility is to transmit this record of mathematical knowledge using the most efficient pedagogy (Noor Azlan Ahmad Zanzali, 1993, 2005). Students are expected to "absorb" in the most efficient manner, the mathematical content transmitted by the teachers. Teaching and learning of mathematics is conducted in a static manner (Noor Azlan Ahmad Zanzali, 2005). In a survey conducted (Noor Azlan, 2005), it was found that most students and teachers regard mathematics as fixed and static, difficult to learn, uninteresting and useless. In a similar survey, when teachers and administrators were asked on what mathematics ought to be taught in schools, most responses reflect this static view of mathematics (Romberg (1992); Noor Azlan Ahmad Zanzali, 1993, 2005).

Second, is the realization amongst mathematics educators on the importance of presenting the intrinsic worth and wholeness of mathematics. This effort aims at popularizing mathematics to the public (see Freudenthal, 1978; Cockroft, 1982; Chritiansen, Howson and Otte; 1986, Schonefeld, 1987; NCTM, 1989; Shaharil Mohd Zain, 2005, Ubiratan D'Ambrosio, 2010). The need to paint the true picture of mathematics arises from the need to reject this limited view of mathematics. The final aim is to generate an alternative view of mathematics with its unique features and its usefulness appreciated by the public.

Third, it is clear that mathematics can be viewed from different perspectives. One could define mathematics as the queen of science, or a form of language, possesses a certain logical structure, as a branch of knowledge that seeks to understand numbers, shapes, relations and space, as a series of procedures to reach certain conclusions, or as a form of activity that is challenging one's intellect (Ernest, 2004). The different conception of mathematics can also be viewed from two extremes. At one end, as in the formalist view, (Lakatos, 1976), mathematics can be regarded as consisting of statements in system of axioms subjected to certain rules (Dossey, 1991). Such view emphasizes to the formal rules rather than mathematics itself (Ernest, 1985; 2004). At the other end, mathematics can be seen as containing the process of research looking into new ideas, creating new structures and challenging the creativity, the power of imagination and the intuition of mathematicians (Schoenfeld, 2010). It is important that we understand the different conceptions of mathematics since the emphasis of mathematics educators can be seen in the design and implementation of the mathematics curriculum. This also depends on the era in which the mathematics curriculum is designed. The Malaysian mathematics KBSM, for example, emphasizes on the dynamic nature of mathematics, its integrated nature. We need mathematics to solve our problems {Pusat Perkembangan Kurikulum (PPK), 1990; 2000). That is, a view that attempts to shift from the formalist view of mathematics. Looking at these different perspectives also helps mathematics educators in achieving deeper understanding about mathematics that should be taught in schools.

School Mathematical knowledge

The questions of what mathematics ought to be taught in schools and the assumptions underlying the process of teaching and learning must be analyzed carefully. The view that mathematics is static, existed naturally and divorced from our daily experiences has been questioned by many educators. Majority view mathematics as human invention and thus is continuously expanding (see Freudenthal, 1978; Cockroft, 1982; Christianse, Howson and Otte; 1986, Schoefeld, 1987; Steen, 1986; NCTM, 1989; Shahril Mohd Zain, 1989; Ubiratan D'Ambrosio, 2010).

However, what is more relevant is the question of "What does it means to know mathematics?"

Dewey (1916) differentiates between "knowledge" and the "record of knowledge". Mathematics as the record of knowledge has expanded into a huge area. The biggest area is in the field of real number system such as natural numbers, fractions, and irrational numbers. Arithmetic, algebra, basic functions, calculus, differential equations and those related to calculus are areas of study expanded from the number system. Similarly, branches in geometry, such as Euclidean geometry, are all part of the record of mathematical knowledge. Generally, majority of educators regard this wide area as mathematical knowledge and not as the record of knowledge. The record of knowledge is produced through series of inquiries and thus is humanly created (Dewey, 1916, p. 186-187).

School mathematics divorced from its wider applications is record of knowledge. The computational processes often taught in schools, for example, without looking at its origins and attempts to relate to applications is actually a record of knowledge. As a result, what are taught in schools is the product of mathematics thought and not the process of mathematical thought (Skemp, 1971; Tall, 1991; Noor Azlan 2007). The processes in which students are expected to memorize those things listed in the textbooks without looking at its uses in the wider context is the process of absorbing the record of knowledge (Dewey, 1902) and limited to those activities of replicating what was done previously (Stephens, 1982; Nik Azis Nik Pa, 1985/86; Skemp, 1971).

Poyla (1954, 1967, 1973) viewed knowing mathematics means that students acquire problem solving skills of non-routine problems. He often stress that reasoning can often be developed to mathematical assertions. He regards that this mental operations (often referred to as heuristics) are very important in problem solving. Although many other researchers (such as Mason, 1982; Schoenfeld, 1985, Kantowski, 1981) feels the need to state the heuristics in more detail, but basically agree on the need of problem solving as an important component in any mathematics curriculum.

Other than the problem solving approach to be incorporated in the secondary school mathematics curriculum Steen (1988) believe that all students should be given experiences in looking for patterns in all levels of mathematics education. This view is based on the belief that mathematics learning is associated with the science of looking for patterns. He further suggested that looking for patterns is the basic activity in

learning mathematics. This implies that mathematics is forever changing and not static and developed according to the experiences of mathematicians.

Finally, Romberg (1983) believes to **know** mathematics means be able to **do** mathematic, regardless of the levels of complexities of mathematics learning. This means that in mathematics learning, one gathers information, finds relationships, and discovers new knowledge in the planned activities. Learning in this context involves four activities: abstracting, discovering, proving and applications. Abstracting is something that is and often done in mathematics and has three properties. First, it involves patterns. Second, abstraction is a process from simple to more complex. And third, abstraction occurs in conceptual space and involves the relationship between abstract concepts based on some connections, rules or relationships. This is often followed by activities to prove the relationships. Mathematical predictions or propositions in mathematics need to be proven using logical arguments. Lastly, mathematics has wide applications. We use mathematics in our daily lives, industries and in fact in all aspects of life.

All mathematicians or mathematics educators view that mathematics are collection of ideas arising from human rational thinking. This is true, regardless whether we emphasize problem solving, looks at patterns, abstraction, discovering, proving, or applications in the learning of mathematics. All these are the basic activities of mathematicians. Note that all the mathematics educators do not stress conceptual understanding or computational skills in learning mathematics. This does not mean that these two factors are not important in mathematical learning, but implies that all the skills and understanding acquired in the learning of mathematics does not give meaning unless they are used in doing or building mathematics. All routine skills must be used fully to do mathematics.

The main question often asked by mathematics educators is how much of the dynamic nature of mathematics espoused by them is implemented in the classroom? Is the content taught in the classroom reflects the above considerations? How do we relate what mathematicians do with those students in the mathematics classroom? How did the mathematics that is considered to be beautiful, possess its own dynamism, becomes and dull uninteresting when disseminated to students in the classroom? Related to this:

1) Is it possible to teach students to solve non-routine problems, find patterns, and build models or mathematizing?
2) If it is possible, how do we implement it?
3) Is it possible for students to acquire skills and understand concepts though project works that reflects what mathematicians do?

The above discussions are of the opinion that teaching and learning should encompass more than just knowing mathematics as a record of knowledge. Students should be trained so that they are capable to do mathematics and appreciate the mathematical thinking processes.

Why do we teach mathematics in schools?

In general, all educators without exception, agree that mathematics is an important area of study in the school curriculum (Cockroft 1982). In the Malaysian system, a student is often pressured to perform better in mathematics, than in any other subjects (see also Christiansen, Howson dan Otte, 1982). Every parent wishes that their children attain good performances in mathematics.

Since the last century, the subject mathematics has been an important part of the curriculum at all levels of study. However, its justification as an important part of the curriculum is seldom discussed. We need to discuss and agree on the role of mathematics in the school curriculum, why it is included and other related issues since the bases of justification changes according to current developments in education.

There exist a large amount of literature (such as DeVault dan Weaver, 1970; Freudanthal, 1973; National Council of Teachers of Mathematics, 1980 dan 1989; Pusat Perkembangan Kurikulum, 1990: 2003) that have directly or indirectly discuss on the justification of mathematics in the school curriculum. Most are of the opinion that to be able to function effectively in the twenty-first or the coming centuries, one needs to have a good understanding of mathematics (Christiansen, Howson and Otte, 1986, Cockcroft, 1982).

Goals of teaching mathematics from utility perspective.

A justification often stated by mathematics educators why mathematics should be taught in schools is that the knowledge of mathematics will play an important role in students'

future world of work (Trafton 1980). Although most work requires the application of mathematics in one form or the other, but only a limited number will really need to use advanced mathematics. Most would only need nothing beyond computation or carrying out certain procedures. Hence, justification of usefulness in the future world of work, although maybe be true to a certain extent, cannot be used as the main justification as to why mathematics should be taught in schools.

Further, the utility rational does not answer the question of "what mathematics is needed by all?" The Malaysian curriculum development centre (PPK, 2000) views that mathematics education should consist of content that is suitable for everybody based on life experiences with respect to three elements: Number, Shapes and Relations, and Space. Mathematics education provides with knowledge and opportunities for students to understand the development that is occurring in the society.

In the context of a developing nation, the mathematical knowledge that is different and deeper than what is currently taught, is needed by its future citizens. In this context, the mathematical knowledge not only helps one to understand the current development, but also be able to do mathematics and maybe suggest improved ways to solve current problems mathematically (Stringer 1979).

General Justification

Apart from the utility justification, rational often used in including mathematics in school is based on the assumption that; "Those who are by nature good at calculations are, as one might say, naturally sharp in every other study, and… those who are slow at it, if they are educated and exercised in this study, nevertheless an become sharper than they were" (Grube, 1974). Mathematics learning can be said to increase one's ability to think logically, accurately and make interpretations on space. The study of mathematics helps to achieve these goals, but its effectiveness is still debatable. Similarly it is often argued that the study of mathematics develop sharper and systematic minds. The rational that is based on the argument that the learning of mathematics can increase one's mental capabilities is an implausible one.

It is also often said that mathematics possesses an inherent beauty. The procedures, algorithm and the confusing axioms that one has to master in order to solve certain mathematical problems, can be intriguing to some people. But on the other hand, it can

be boring, confusing and a source of bewilderment to some other people. Nevertheless, to most students mathematics is seen to be difficult, confusing and thus provide little motivation. Most students in Malaysia, has no choice but to endure the agony of learning the subject all throughout their learning years in school (Noor Azlan Ahmad Zanzali, 1987; Ng See Ngean, 1983)

In general, mathematics is taught in schools because it is a very important area of study and all students at all levels should be taught mathematics as a way to prepare our future citizens. What is important to note is that different groups of people provide different rationale to the justification. The rationale depends on the current thinking and needs of society. This means that different types of mathematics are taught at different times. For example, in Malaysia, just after obtaining independence, a good citizen would only require the basic mathematical (mainly arithmetical) skills. Hence the curriculum is centered on computational skills. This situation has changed since then. The presence of computers and advanced technology changed much of our life style (Naisbitt, 1982). Although more research is needed to study the implications of Information Computer Technology (ICT) on mathematics education, I believe that the presence of machines that can help us to compute makes teaching of arithmetical operations large numbers as obsolete. This, however, does not mean that there is no need to teach the basic arithmetical operations in school mathematics. What is needed is the teaching approach that emphasizes on those skills need to be changed. The time spent on training students to calculate big numbers, involving many decimal places can be more productively used to see its applications in human daily problems. The calculators or computers can also be used to explore other interesting properties of numbers.

Thus, it can be said that majority of researchers used the changing needs of society as the main justification for teaching mathematics in schools. These needs also help educators to understand the roles of mathematics education in producing the next generation in more technologically advanced situation. All educators should accept the fact that justification and roles of mathematics education in schools, as in the development and uses of mathematics itself are continuously changing. Structuring the curriculum to enhance teaching and at the same time reflect the rational in the justification of teaching mathematics must done carefully

Structure of the mathematics curriculum

The structuring of the curriculum is a continuous problem often faced by curriculum developers. Different approaches have been used. The traditional mathematics curriculum, for example, is based on computational skills. It starts with the calculations in the four basic operations, expanding to calculations using logarithmic tables, logarithmic tables and finally calculations in trigonometry and so on. In the mathematics modern syllabus, the content is arranged according to the structure of mathematics (see Bruner, 1976), based on the basic themes of mathematics. Set is a theme that has been used to structure the curriculum. In the primary school mathematics (KBSR) the mathematics syllabus is arranged according to the hierarchy of computing skills, while in the secondary school curriculum (KBSM), the content of the curriculum is arranged to the common occurrence in our daily lives specifically Numbers, Shapes and Relations, and Space. Thus the approach or method used in structuring the school curriculum changes each time the curriculum is changed according to the changes and needs of the current mathematics education.

Structure of mathematical knowledge in the syllabus.

The approach used in arranging the syllabus is based on the assumptions underlying the mathematical knowledge that students need to learn, pedagogy or methodology most suitable and psychology on how do students learn mathematics (Noor Azlan, 2004). Generally, in the traditional mathematics, the syllabus is arranged as collections of skills and concepts in a hierarchical fashion. The objectives based on behaviorist theory or nature of learning, divides mathematics to hundreds of parts and each part is taught one by one (Asiah Abu Samah, 1982). One has to divide and arrange each part in order of difficulty or complexity. The scope and arrangement is written in agreement to the topics that students need to absorb at each level. The main goal of learning is for students to acquire the speed and accuracy of computation. Students spend a considerable amount of time in absorbing and replicating mathematical procedures and not building or constructing knowledge (Romberg and Carpenter, 1987, Nik Aziz Nik Pa, 1989).

The main aim in learning is for students to acquire the skills one by one. In addition, students are expected to obtain answers to problems that have been previously defined

for them. This approach has produced, indirectly, the view that mathematics consist parts that has a definite arrangement. Mathematics thus becomes something that is formal and not as a method used in the analysis and understanding of the world around us (Dossey et. Al, 2001).

In the modern mathematics program, a slightly different approach in curriculum design is used. The Modern mathematics program curriculum is designed based on the need for students to be more involved in the teaching and learning processes. This maybe achieved through guided discovery or the project methods approach. In addition, the modern topics require the use of aids or materials. The aim is help students acquire mastery in the concepts and at the same develop positive interest and attitude towards the subject. (PPK, 2000)

The teaching and learning of mathematics were modified so as to be more focused in giving meaning to the topics being taught. The structuring of the modern mathematics curriculum was carried out in a slightly different manner than before. In this program, the topics were presented in a more integrated manner based on several themes:

1. set – this concept is used as the basis of all mathematics learning.
2. Relations as in algebra, transformational geometry, trigonometry and arithmetic.
3. Coordinate and graph in geometry, algebra, arithmetic, trigonometry and statistics (PPK, 2000)
4. The mathematics curriculum was structured based on the above themes with the assumption that there exist a unique structure of mathematics.

A slightly different picture emerged in the KBSR (primary school level) and KBSM mathematics (secondary school level). In KBSR, the emphasis is on the mastery of spontaneous computation followed by understanding. Students are expected to master a collection of skills from one level to the next. The topics are interrelated in an integrated manner in the context of problem solving. At the secondary school level, the integrated concept in mathematics is enhanced. Mathematics is taught in an integrated manner within the various topics, mathematics itself and with other subject. The mathematics syllabus is arranged in three areas, Numbers, Shapes and Relations and Space. These three elements are used based on the belief that in real life experiences, one is exposed to these three elements (Pusat Perkembangan Kurikulum, 2000).

In the above explanation, it can be seen that the content, pedagogical and psychological perspectives changes for each curriculum. In general, traditional mathematics is based on the behaviorist model of learning. In the modern mathematics curriculum, mathematical structures and inquiry learning are emphasized. Finally, the KBSR and KBSM mathematics seeks the balance between skills and understanding.

The continuous problem faced by curriculum developers is that the implemented curriculum is often different, sometimes diametrically opposite to the intended curriculum. Many reasons can be listed. The main reason often cited by research reports is that most teachers could not appreciate the type of mathematics to be implemented (Saunder and Vulliamy, 1983; Donovan, 1983; Stepehs, 1984; Noor Azlan Ahmad Zanzali, 1987; and others).

Mathematics should be taught as an integrated subject, with its own unique structure and is the result of human activities in the process of seeking solutions to everyday problems but in an exam oriented environment the traditional approach in the form of drill and practice still persist. Hence, mathematics is still presented aas consisting of arithmetical skills to be acquired in the most efficient manner.

Role of teachers.

The role of teachers and students are complimentary. The main role of the mathematics teacher is to translate the contents of the syllabus in the form that can be understood by his/her students (Fernstermacher, 1986). The main responsibility of students is to learn mathematics.

If the main aim of learning is to know the “product mathematical thought” and not the “process of mathematical thought”, teaching then should not be conducted in the form of drill and practice. On the other hand, in the traditional approach, the job of teaching consists mainly of transmitting or transferring information while the job of students is to accept and absorb what is being delivered. When needed, as in the examination, students will regurgitate in the form similar to what has been absorb. Students becomes the receiver of information and act in ways suitable with that function (Skemp, 1979)

The work of teachers also involves controlling students in his class so that they sit quietly in neat in rows and columns. This situation is suitable in the context of teachers

as transmitters of the record of knowledge. The most effective way is when students sit and listen passively absorbing what is delivered by the teacher. This process can happen in situations where the degree of control is high and becomes easier if students sit in a particular place in neat rows. In a class of 40 minutes, most of the time is spent on listening what the teacher is saying. In this controlled situation that has existed and will continue to exist in the Malaysian context, mathematics is taught in one way as suggested by the textbooks. This situation is further exaggerated when teachers are further burdened by other administrative responsibilities which allow limited opportunities for teachers to reflect on what should be delivered to students

The above description is a normal practice in most Malaysian schools, although much effort has been carried out to change the situation. Overall, classroom situations that are routine and predictable is still the norm in most classrooms. Since teachers are the important links in the successful implementation of the curriculum, they are often blamed if the teaching of mathematics is not conducted as intended. Although there maybe some truth in the assertion, but we need to look deeper and more critically. As a result of their wide ranging duties, teachers in Malaysia have a very limited opportunity to analyze and thus plan steps to implement the intentions of the curriculum. In most cases teachers understand and support the ideas of the curriculum but due to constraints beyond their control, conducive atmosphere needed for successful implementation of the curriculum cannot be created (see Noor Azlan Ahmad Zanzali, 2004).

In summary, it can be said that mathematics teaching is still conducted in traditional ways, but to change this is not an easy task. All kinds of change need time. Other than that, change also need the support and commitment of all parties involved. For successful implementation of the curriculum, all those involved need to reconceptualize the mathematics content, teaching and the goals of mathematics education. Change cannot occur by itself. It is often mentioned that the conceptualization and understanding of what is mathematics is the pre condition for successful implementation. (see also Dosey, 1991).

Summary

At the beginning of this paper, four questions related to the content, goals, structuring and the teaching of mathematics are raised. The four continuing issues must be analyzed

to obtain a better picture on the issues or problems faced by curriculum developers. The basic proposal raised is that we need to reconceptualize on what is meant by mathematics, and what form of mathematics should be taught to students. We need to look mathematics from the constructivist perspective and not from the absolutist perspective. Teaching activities must be conducted in manners that allow students to construct mathematics and not just to replicate what others (or previous mathematicians) had done. These are the fundamental questions that mathematics educators need to address in order to improve the quality of mathematics education in the future. These questions were addressed by the Malaysian Curriculum Development for the last 5 decades as we began to improve the quality of mathematics education. I am of the opinion that the mathematics education has come a long way in improving the quality of mathematics education in Malaysia and will continue to do so in the next decades.

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