DEVELOPING SCHOOL-BASED CURRICULUM FOR JUNIOR HIGH SCHOOL MATHEMATICS IN INDONESIA

By
Marsigit
Faculty of Mathematics and Science, the State University of Yogyakarta, Indonesia

ABSTRACT

Indonesia Government strive to boot-strapping the latest issues of education and take an action to implement the new curriculum *"school-based curriculum"* for primary and secondary education that effectively starts in the academic year 2006/2007. This policy will logically imply to some of the following aspects: educational autonomy program, developing the syllabi, improving teachers' competencies, learning facilities, educational budgeting, empowering the society, evaluation system and quality assurance. At any socialization of this new curriculum, there was always a program to elaborate the rational, philosophical background, and method for developing the syllabi. The (former) Curriculum 1994 was characterized as consisted of 80 % of national content, content-based approached and employed Trying-out model for its socialization; while the (new) school-based Curriculum is characterized as consisted of 80 % local content, competent-based approach and employs Piloting as a model for its socializations.

Key Word: new curriculum, school-based curriculum, mathematics teaching, junior high school

INTRODUCTION

Raising the intellectual level of the people and furthering general welfare as mandated in the Preamble of the 1945 Constitution have always been major concerns of the Government of Indonesia. The aims of the education system include: (1) enhancing full devotion to God Almighty; (2) developing the intelligence and skills of individuals; (3) fostering positive attitudes of self reliance and development, (4) ensuring that all children are literate. Since 1968/1969, a more systematic approach to develop education in Indonesia has begun to be evident. Since that time up to the late of 1990, the approach to develop education has designed under the assumption that curricular objectives could be logically derived from national and system-wide goals and then broken down into a precise hierarchy of instructional objectives, and that learning could be made

individualized and ‘teacher-proof’ so that students could learn what they needed to learn with minimal assistance from teachers.

However, in 1984, evidences indicated that the approach was perceived not to able to mobilize resources and to embark the model to the nationwide application. It seems that the unsuccessful of the project for promoting educational change in Indonesia due to the constraints such as : (1) the complexity of the educational environment, (2) the limitation of the budget, (3) lack of educational resources and facilities, (4) the divergences of the educational context such as ethnicity, geography, culture and value, (5) lack of teachers’ understanding of the theories of good practice of teaching and how to implement it, and (6) the mediocrity of developing education based on the nature of the fundamental sciences and education, and or based on the need for competing skill in global era.

The currently studies (Herawati Susilo, 2003) on mathematics and sciences education in Indonesia have the indication that children’s achievement in the subjects of mathematics and Science is low, as indicated by the result of the National Leaving Examination year by year both in Primary and Secondary School. Children’s mastery on mathematics concepts and mathematics process skills is still low. This fact may be as the results of: (1) the shortage of laboratory activities; (2) lack of teachers having mastered science process skill approach; (3) contents on Mathematics and Science curriculum too crowded; (4) too many time consuming administration stipulation for teachers; (5) lack of laboratory equipment and laboratory human resource. The study also indicates that mismatch among the objectives education, curriculum, and evaluation system which can be identified by the following: (1) National Leaving Examination assess the children’s ability cognitively only; (2) Streaming in Senior Secondary School starting at grade 3; it is argued that the implementation of this system is late and consider individual differences inappropriately; (3) University Entrance Examination System is considered to trigger Elementary and Secondary School teachers apply goal oriented rather than process oriented in teaching Mathematics and Science, (4) many teachers still have difficulty in elaborating the syllabus, (5) a number of mathematics topics are considered to be difficult for teachers to teach; (6) a significant number of children consider some mathematics topics as difficult to understand, (7) teachers consider that they still need guidelines for conducting teaching process by using science process skills approach.

Current efforts to improve mathematics education in Indonesia covers the collaboration to carry out piloting activities of mathematics teaching in junior high schools in some areas of the country (Marsigit, 2003). These activities meant to develop and try out some teaching models at schools. The lecturers of Teacher Education and teachers worked collaboratively at schools to develop the teaching models needed at field. Basic Strategy for piloting was promoting the new paradigm of mathematics and science education. The objective of piloting is to contribute to the improvement of mathematics and science education in schools by trying out some matters developed in this project which are directly related to schools. The piloting activities were done through collaborative classrooms action researches among lecturers and teachers.

The results of piloting activities come to a suggestion that to improve mathematics and

science teaching in Indonesia, we need to (Herawati Susilo, 2003).: (1) implement more suitable curriculum i.e. more simple and flexible, (2) redefine the role of the teachers i.e. teachers should facilitate students' need to learn, (3) redefine of the role of principals; principals should support the professional development of teachers by allowing them attend and participate in scientific meetings and trainings, (4) redefine the role of schools; schools should promote school-based management, (5) redefine the role of supervisor; the supervisors need to have similar background with the teachers they supervise in order to be able to do academic supervision, (6) improved autonomy of teachers in trying to implement innovations in mathematics and science teaching and learning, and (7) promote better collaboration between school and university; communication among the lecturers and the teachers should be improved; these could be done through collaborative action researches and exchange experiences through seminars and workshops.

THEORETICAL REVIEW

We perceive that curriculum development needs a comprehensive and in-depth study of all the aspects involved; there are at least six principles as a guide (Marsigit, 2003): 1) the chance to learn mathematics for all, 2) curriculum is not just a collection of subject matters but it should reflect mathematical activities coherently, 3) teaching learning of mathematics need a comprehensive theory of students activities, their readiness to learn and teacher role of facilitating their learn, 4) the chance to the learner to develop their mathematical concepts, 5) the needs to develop assessment imbedded to teaching learning processes, 6) employing many kinds of teaching learning sources. The main concern in developing mathematics curriculum is to make sure that the curriculum reflects teaching learning processes that has been intended; therefore, we need to develop: 1) the Guideline for developing its syllabus, 2) the Guideline for curriculum implementation, 3) supporting documents such as handouts, students worksheet, 4) teachers' involvements in developing curriculum, 5) socialization and dissemination developed curriculum, and 6) regular monitoring of its implementations.

Mukminan dkk, (2002) elaborated that school-based curriculum for junior high school stress on students competencies; therefore, the central government have developed national standard for them. The National Standard of Competencies is then to be elaborated to be the Basic-Competencies that is the minimum competencies that should be performed by the students, covering affective, cognitive and psychomotor competencies. Accordingly, Indonesian Government has developed Contextual teaching and learning (CTL) as one of the approach to support School-Based Curriculum implementations; it means that the government encourages the teachers to develop students life skills by employing optimally the environment to support students' activities.

The Adapted Characteristics of School Mathematics and their Implications to Mathematics Teaching

Mathematical activities cannot just be pulled out of a hat; they need to be carefully chosen so that children form concepts, develop skills, learn facts and acquire strategies for investigating and solving problems (Ebbutt, S. and Straker, A., 1995). They insisted that teacher's role in teaching learning of mathematics can be elaborated from the nature of school mathematics as follows:

No	The Nature of School Mathematics	Implications for the Implementation of School-Based Curriculum for Junior High School Mathematics
1.	Mathematics is a search for patterns and relationship	a. Giving the students opportunities to discover and investigate patterns, and to describe and record the relationships they find
		b. Encouraging exploration and experiment and trying things out in as many different ways as possible
		c. Urging the students to look for consistencies or inconsistencies, similarities or differences, for ways of ordering or arranging, for ways of combining or separating.
		d. Helping the students to generalize from their discoveries
		e. Helping the students to understand and see connections between mathematics ideas
2.	Mathematics is a creative activity, involving imagination, intuition and discovery	a. Fostering initiative, originality and divergent thinking
		b. Stimulating curiosity, encouraging questions, conjecture and predictions
		c. Valuing and allowing time for trial-and-adjustment approaches
		d. Viewing unexpected results as a source of further inquiry rather than as mistakes
		e. Encouraging students to create mathematical structure and designs
		f. Helping students to examine other people's mathematical designs
		g. Encouraging students to form and to manipulate mental images
		h. Not prescribing fixed methods, but stressing the importance and lasting value of students finding their own methods
3.	Mathematics is a way of solving problems	a. Providing an interesting and stimulating environment in which mathematical problems are likely to occur
		b. Suggesting students to discover and to invent their own.
		c. Helping the students to identify what information they need to solve a problem and how to obtain it.
		d. Encouraging the students to reason logically, to be consistent, to work

		systematically and to develop recording systems
		e. Making sure that the students develop and can use the mathematical skills and knowledge necessary for solving problems
		f. Helping the students to know how and when to use different mathematical tools.
4.	Mathematics is a means of communicating information or ideas	a. Creating opportunities for describing properties
		b. Making time for both informal conversation and formal discussion
		c. Encouraging the students to read and write about mathematics and to represent and structure their ideas
		d. Valuing and supporting the diverse cultural and linguistic background of all children

The Adapted Characteristics of Mathematics Learners and their Implications for Teacher's Managing Mathematics Classroom.

Ebbutt, S. and Straker, A., 1995, perceived that teaching concerns with the students; teaching is about what happens at the instant- what children think, say and do, and what the teacher think, say and do as a consequence. Further, they characterized the students, as the learner of mathematics; and elaborated their implications for teacher's managing mathematics classroom as follows:

No	The Nature of Students Learn Mathematics	Implications for the Implementation of School-Based Curriculum for Junior High School Mathematics
1.	The students learn best when they are motivated	Making sure that his teaching provides pleasure and enjoyment
		Using student's own interests and ideas as a starting point for mathematical work
		Ensuring that the classroom surroundings are both stimulating and supportive
		Making clear to the students the purpose and relevance of any mathematical activity
		Creating activities which challenge students and which can experience success
		Valuing the achievement of each student
2.	The student learns in a way that is unique	Recognizing each child's mathematical ability i.e. strengths as well as weaknesses
		Recognizing that the students vary considerably both in the rates at which they learn and in the ways in which they learn

		Arranging experiences for each child which match that child's stage of development
		Building upon the knowledge and skills which children have gained formally and informally, both inside and outside the school, but especially at home
		Keeping good records of children's progress and achievements
3.	The students learn both independently and through collaboration	Organizing small group activities so that children can both learn from and collaborate with each other
		Setting whole class activities for the wider exchange and comparison of ideas
		Allowing time for students to pursue their individual trains of thought and gain pleasure from solving problems on their own
		Involving children in making decisions about what to do and how to set about it
		Stressing the importance of learning how to learn
4.	The students consolidate their learning by meeting the same idea in different contexts	Providing a wide variety of apparatus and equipment to help students make sense of what they are doing
		Exploring mathematics in different situations
		Developing awareness that mathematics are used to solve problems in school, at home and at work.
		Valuing the contribution made to mathematics by all cultures
		Helping the students to reflect on each new experience

SCHOOL-BASED CURRICULUM FOR JUNIOR HIGH SCHOOL MATHEMATICS

National Standard Competency for Junior High School Mathematics

National Standard of Competencies for Junior High School mathematics covers:

1. Numbers
   - To understand and held arithmetical operation using numbers to solve problems
2. Measurement and Geometry
   - To understand and use the properties of line, angle, two and three dimensions geometrical shape to solve problems
   - To understand and identify the properties and the component of triangle and use them to solve problems
   - To understand and identify the properties and the component of circle and use them to solve problems

- To identify the properties and the component of non convex edge three dimensions geometrical shape
- To identify the properties and the component of convex edge three dimensions geometrical shape

3. Probability and Statistics
   - To hold statistical activities
4. Algebra

- To understand, hold and use algebraic operations, linear inequalities with one variable and sets to solve problems.
- To understand, hold and use algebraic operations, functions, line equations, and equation systems to solve problems
- To hold operations with negative exponents numbers and logarithm.
- To describe pattern and series of numbers and use them to solve problems.
- To understand and use quadratic equations to solve problems.

Basic Competency, Indicator and Topic

In developing the syllabus, Standard Competency is to be elaborated into Basic Competency such as :

No	Standard Competency	Basic Competency
		Student has some competencies to:
1.	Grade VII Numbers To understand and held arithmetical operation using numbers to solve problems	1.1 Solve operations with integer numbers and identify the properties of operations with integer numbers 1.2 To identify fractions and hold operations with fractions.

For each Basic Competency, there are some indicators in which the student can perform his competencies:

Basic Competency	Indicator	Topic
1. To hold algebraic operation	• To explain algebraic term • To hold algebraic operations: addition, subtraction, multiplication, and exponent • To solve division with similar and different sign of numbers	Factorization algebraic form.

Proposed National Curriculum of Junior High School mathematics consists of the following topics:

1. Integer Numbers
2. Algebra and Social Arithmetic
3. Linear Inequalities with one variable
4. Proportion
5. Line and Angle
6. Plane
7. Convex-sided Three Dimensional Shape
8. Set
9. Factorization Algebraic terms
10. Pythagorean Theorem
11. Lines of a Triangle
12. Circle
13. Concave-sided Three Dimensional Shape
14. Function
15. Straight-line Equation
16. Linear Equation System with Two variables
17. Lines of Intersection
18. Congruence
19. Statistics and Probability
20. Negative exponent
21. Logarithm
22. Quadratic Equation
23. Number Pattern

MONITORING THE IMPLEMENTATION OF SCHOOL-BASED CURRICULUM

Monitoring programs has been set out spreads out to some different region of different Province, to investigate and to identify the extent of the strengths, weaknesses, and constraints of the implementation of the new curriculum. There were found that: (a) many teachers still have problems in performing National Standard Competency and Basic Competency into mathematics teaching learning processes, (b) many teachers still have difficulties in developing various kinds of Student Worksheets, (c) the teachers still have difficulties in developing mathematical contextual problems, (d) many teachers still have difficulties in developing various kinds of teaching aids, (e) the students are more happily in learning mathematics, especially in group discussion, (f) some teachers perceived that Discussion, Practical Work, and Investigational Work are important methods

of mathematics teaching which can support school-based curriculum for mathematics in Junior High School.

The results of the monitoring programs indicated that : (1) socialization of the new curriculum needs to be intensified, (2) participation of teachers, head teachers and supervisors need to be improved, (3) the supporting resources for the new curriculum needs to be developed extensively, (4) it needs to promote classroom based research for the teachers as part of their teaching activities, (5) it needs to disseminate the concepts and the theories as well as the currently paradigms of teaching learning mathematics, (6) the constraints of the implementation of the new curriculum covering the limitation of educational facilities and media as well as the limitation of budget.

CONCLUSION

Currently picture of Indonesian society is dynamically very fast changes of all aspect of life; it offers the hopes and the challenges. School-based curriculum can be the starting point for mathematics teachers in Indonesia to reflect and move their old paradigms of teaching. It encourages the teachers to evaluate the strengths and weaknesses of different approaches in order to make informed choices and, when necessary, should be prepared to learn new skills in the interests of effective teaching learning mathematics. Through this new curriculum, teachers need to be able to respond to individual children as need is identified because the relevant curricular experiences and skills of children vary greatly and they need then in a better position to draw upon support services to enhance their classroom practice; the management of the range of support services should be available to maximize their effect in helping teachers to work towards good practices and to implement new curriculum. It also gives the chance to the government officials of education in Indonesia to look in-depth the implementation of curriculum in the class-room level.

The monitoring of the implementation of school-based curriculum indicated that there are factors from students, teachers and society which have not optimally supported yet the new curriculum. The results of evaluation of the implementation of this new curriculum teach us that while we operate the on-going curriculum we always need to improve it. It also suggested that to improve the quality of mathematics education, the central government needs to: (1) redefine the role of the teachers i.e. they should facilitate students' need to learn, (2) redefine of the role of principals i.e. they should support the professional development of teachers by allowing them to attend and participate in scientific, meetings and trainings, (3) redefine the role of schools i.e. they should promote school-based management, (4) redefine the role of supervisor i.e. they need to have similar background with the teachers they supervise in order to be able to do academic supervision, (5) (6) promote better collaboration between school and university (7) redefine national evaluation system.

Reference :

Conaty, J.C, (1998) *The Educational System in Japan : Case Study Findings* : National Institute of Students Achievement, Curriculum and Assessment, Office of Educational Research and Improvement, USA.

DGSE (2002). *Guideline of National Semiloka for Socialization the Development of Competent-Based Curriculum for Junior High School Mathematics in Yogyakarta.* Jakarta: Department of National Education

Ebbutt, S. and Straker, A. (1995) *'Children and Mathematics', Mathematics in Primary school, Part 1*, London, Collins Educational

Glenn, J, (2000) *A Report to the Nation from the National Commission on Mathematics and Science Teaching for the 21st Century: Before It's Too Late*, Washington: The National Commission on Mathematics and Science.

Herawati Susilo, (2003). *FINAL REPORT: Improvement of Secondary SchoolEducation*, IMSTEP-JICA Project

Marsigit, (2000), *Improving the Quality of Primary Mathematics Teaching in Indonesia*, Journal of Japan Society of Mathematical Education Vol.7 May 2000

Marsigit. (2003). *The Concept of Curriculum 2004 and Competent-Based Syllabus for Junior High School Mathematics. Paper: Presented at National Level of Training* of Trainer (TOT) for Basic Science, in Yogyakarta, 15-20 December 2003

Mukminan dkk. (2002). *Pedoman Umum Pengembangan Silabus Berbasis Kompetensi Siswa Sekolah Lanjutan Tingkat Pertama (SLTP).* Yogyakarta: Program Pascasarjana UNY.