

# **Developing Teacher Training Textbooks for Lesson Study in Indonesia**

By

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## **ABSTRACT**

In the last decade, the Government of Indonesia (GOI) has a drastically effort on doing innovations for all aspects of education. In collaboration with many educational consortiums, since the early of the year 2000, we conduct many programs of educational innovations, starting from reviewing the legal formal of educational law and then implementing to a more descriptive one. With a large number of people, students and teachers, Indonesia faces the challenges of improving the quality of teaching. Hence, the GOI strive to accelerate teachers' certification in the schema of teachers' professional development. A great change of educational perception leads to move the theories and paradigms of teaching to a more progressive one. All sides of educational system in Indonesia understand the need of changes. At all level of educational system there are always introduction to the new theory and philosophy of education. The ultimate conditions of educational perceptions lead to two main characteristics as: 1. the highly commitment of government to promote high quality of education, and 2. the more consciousness of educational practitioners to implement education progressively. This implies to the need for facilitating educational practices with various methods and resources. The needs of developing good quality of textbook for junior mathematics emerge at each Lesson Study activity. Therefore, the writer put a concern to investigate the possibility in which the teachers are able to develop their own textbooks. However, it needs a high skill and extended experiences for the teacher to do so. So, the next main concern is how to educate them to prepare their own textbooks through many kinds of educational training, workshops and Lesson Study activities.

**Key Word:** textbook, junior mathematics, Lesson Study

## A. Introduction

Massive improvement of qualification, competence, and certification of teachers and educational personnel in Indonesia ( Based on Law No. 14 /2005) puts teachers' professional development as the main pillar, aiming at: teachers should meet qualification of at least 4-year Bachelor; lectures should meet qualification of at least Master/Ph.D. level; and teachers and lectures should have teaching certificates. Accordingly, educational reform in Indonesia commits for the next 10 years time: 1.75 million teachers should achieve qualification of 4-year bachelor; 150.000 lectures should achieve qualification of Master/Ph.D; 2.7 million teachers and 130.000 full time lectures should have teaching certificates; and the salary of educators should increase by about two fold.

Up to the year of 2009, the Ministry of national Education has carried out the program: to provide scholarship to 350.000 teachers for academic upgrading; to upgrade the qualification of 81.800 teachers to 4-year bachelor; to upgrade the qualification of 8.540 lectures to Master/Ph.D; and to certify of 147.217 teachers.

No.	Level of Schooling	Number of Teacher
1	Kindergarten	174,429
2	Primary School	1,454,806
3	Junior Secondary	668,015
4	Special Ed School	10,154
5	Senior Secondary	320,156
6	Vocational School	155,761
	<b>Total</b>	<b>2,783,321</b>

Table 1: Number of Indonesian Teacher in the Year 2009

For the large number of teachers, the legal framework for educational reform in Indonesia needs a comprehensively regulating all aspects of education at all level. It also needs to adapt the paradigm of 'education for human as a whole' rather than 'education for Human Recourse Development'. The concept of long life education is always relevant within the schema of providing an extensive opportunity for society participation. The situation leads to the striking conclusion that a mass programs needs always to be promoted to cover the extension of educational practices.

Providing books or textbook is one of the crucial policies to improve the quality of teaching learning processes. The ideal program for providing the needs of large scale of the books should not in the means of monopoly by one or some institutions, but let the schools to choose their own needs of textbook to be used at schools. It was also to be suggested that the students have their right to select and by their own books without much intervention by the teacher or by the school. However, the situation is that it is still far away for the teachers to produce their own books. The main reason is lack of skill to write and produce good quality of textbooks. In the case of providing textbooks, we face with the large number of students who could not buy the books because of the very low on its social economical background. So, there is an expectation from the teachers, the students and the society that the government is able to provide the books with the lower prices.

## **B. School-Based Curriculum as the Bases for Developing Mathematical Textbook**

The currently studies (Marsigit, 2006) on mathematics 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.

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. We 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.

In our School-Based Curriculum, it was stated that mathematics in primary and secondary school should encourage the students to think logically, analytically, systematically, critically, creatively and be able to collaborate with others. The implementations of primary and secondary mathematics curriculum in class-rooms need to develop problem solving skills covering both closed and open problems. In solving the problems, students need to creatively develop many ways and alternatives, to develop mathematical models, and to estimate the results. Contextual and realistic approaches are recommended to be developed by the teachers to encourage mathematical thinking in primary schools. With these approaches, there is a hope that the students step-by-step learn and master mathematics enthusiastically. To make their teaching learning of primary mathematics more effective, teachers also need to develop resources such as information technology, teaching aids and other media. The curriculum outlines the aims of teaching learning of mathematics are as follows: (1) to understand the concepts of mathematics, to explain the relationships among them and to apply them to solve the problems accurately and efficiently, (2) to develop thinking skills to learn patterns and characteristics of mathematics, to manipulate them in order to generalize, to proof and to explain ideas and mathematics propositions, (3) to develop problems solving skills which covers understanding the problems, outlining mathematical models, solving them and estimating the outcomes, (3) to communicate mathematics ideas using symbols, tables, diagrams and other media, and (4) to develop appreciations of the uses of mathematics in daily lives, curiosity, consideration, and willingness to learn mathematics as well as tough and self-confidence.

## **C. Lesson Study Activities and Mathematical Textbooks**

### **1. Lesson Study Activities**

A series of Lesson Study activities may be thought of as constituting a set of culturally organized activities carried out by teacher or a group of teacher to promote children's mathematical thinking. Many small group activities are flexible and do not have a clear end point, predetermined by the teacher. However, small group discussions offer an interesting

context in which to explore the participation of children interacting among the others in naturally occurring open ended thinking. In general, when a task has a clear end point, it has been assumed that the children were thinking towards that point. These series of studies were particularly interested in the attitude and method to which the students develop mathematical thinking to learn mathematics. Experience indicates that teachers can employ Lesson Study to promote mathematical thinking. Teacher is perceived to be the subject of the research as well as to be the researcher. By proposing planning, doing and seeing, the study expected to uncover the aspects of students' mathematical thinking.

Students' interactions with adults and among themselves may promote complex cognitive processes in the form of mathematical thinking. The context in which tasks are performed has begun to form a significant aspect of analysis, it has been interpreted in a variety of ways, sometimes in very local terms, to refer to the conditions under which a particular task is performed, or a particular mathematical thinking is produced. A wider view suggested that the aspect of students' mathematical thinking offers a variety of potential meanings and interpretations, and that mathematical thinking involves a negotiation of shared context. Mathematical thinking happens in the context of teaching learning processes. Group discussion based on principles of promoting children's growth and development through play activities may encourage the students to explore, experiment, question, and talk. Teacher's efforts to facilitate their students to find various patterns of mathematical content can be seen as consistent with extending the students' experiences of mathematical thinking and encouraging social interaction among them. Ultimately, these efforts lead the teachers to develop the mathematical textbooks that meet both theoretical and practical aspects of good practice of teaching learning of mathematics.

As part of their professional developments, at the occasions of Training of Trainer (TOT) , Marsigit (2009) has recently conducted a medium scaled survey to investigate teachers' perception on what is called good textbook for mathematics for Junior High School students. The respondents consists of both novice and experience teachers coming from Jawa, Kalimantan, Sulawesi, Nusa Tenggara, and Maluku. Novice Teacher is a teacher who does not has any experience of teaching or ha experience of teaching for less than one year. Experience Teacher is

a teacher who has experienced of teaching mathematics at Junior High School for more than one year.

The number of respondents is 60 teachers consist of: 1) 15 Novice Teachers who do not have experiences in Lesson Study activities, 2) 15 Novice Teachers who has experienced in Lesson Study activities, 3) 15 Experienced Teachers who do not have experiences in Lesson Study activities, and 4) Experienced Teachers who has experienced in Lesson Study activities. The Unstructured Questionnaire consists of open answers of the following questions: 1. What do you perceive about the criteria of good textbook for mathematics for Junior High School students?, 2. If you are expected to produce the textbook for mathematics for Junior High School, what do you expect the constraints you will face.

## **2. Teachers' Perception on Good Textbook for Junior Mathematics**

Fifteen Novice Teacher who have not any experience in Lesson Study activities delivered unstructured perception on good textbook for mathematics. All of them (100.00%) have perception that good textbook for junior mathematics should be understandable, meaningful, and contains of good examples. Most of them (80.00%) expressed that good textbook should use simple, communicative and standardized language. More than a half of them (53.34%) indicated that good textbook for junior mathematics should be comprehensive in term of mathematical content and students' competencies (affective, psychomotor, and cognitive). Small number of them (not more than 20.00%) indicated that good textbook of junior mathematics should meet the following criteria: it should be systematic; it should be completed by good exercises; it should be completed by good assessment system; it should be interesting in display, performance and good illustration and good layout; it should be relevant and applicable to daily life; it should be contextual textbook; it should be curriculum-based textbook; it should contain good problem solving; and it should promote active learners. (See Appendices)

Fifteen Novice Teachers who have experiences in Lesson Study activities delivered unstructured perceptions on good textbook for junior mathematics. All of them (100.00%) have perception that good textbook for junior mathematics should be understandable, meaningful, and contains of good examples. Most of them (80.00%) perceived that it should be relevant and

applicable to daily life. A large number of them (66.67%) indicated that it should be able to facilitate the students' needs and promote self-learner /self-using. One-fifth of them (20.00%) indicated that a good textbook for junior mathematics should be contextual, interesting in display, performance, good illustration and layout, cheap; it should also promote mathematical thinking and creativity. Some of them (26.67%) perceived that it should be curriculum-based textbook. While, a small number of them (13.34%) perceived that this textbook should use simple, communicative and standardized language; It should be comprehensive in terms of content and students' competence (affective, psychomotor and cognitive); It should consider the psychological aspect of students e.g. students' motivation; It should facilitate students' activities; It should contain good problem solving; It should promote active learners; and It should be completed by students' worksheet. (See Appendices)

Fifteen Experienced Teachers who have not any experienced in Lesson Study activities insisted that a good textbook for junior mathematics should be understandable and meaningful to the students (80.00%); it should use simple, informative, communicative and standardize language (66.6%). Some of them indicated that it should be interesting in display, performance, good illustration and layout (26.67%); it should be a curriculum-based textbook, relevant and applicable to daily life. A small number of them (13.34%) indicated that a good textbook for junior mathematics should not bias in gender, ethnicity, and concern with human rights; it needs also to be completed with good quality of exercises and interactive CD or internet. Still, these teachers perceived that a good textbook for junior mathematics should be comprehensive in terms of content and students' competences (affective, psychomotor and cognitive); it should promote contextual teaching learning of mathematics. (See Appendices)

All fifteen Experienced Teachers who have experienced in Lesson Study activities (100.00%) perceived that a good textbook for junior mathematics should be understandable and meaningful to the students, relevant, and applicable to daily life. Most of them (80.00%) indicated that it should promote cooperative teaching learning processes. Accordingly, it should be a contextual textbook, relevant and applicable to daily life, and can be used as individual book (self-learner purpose) (73.34%). A large number of them (66.67%) believed that a good textbook for junior mathematics should use simple, informative, communicative and standardized language; it should be comprehensive in terms of content and students' competence (affective, psychomotor and



cognitive); it should be interesting in display, performance and good illustration and layout; it should promote students involvement and participations; it should also promote constructive approach of teaching, and promote mathematical thinking and creativity; and, it should also facilitate various students competences and needs. More than a half of them believed that a good textbook for junior mathematics should be based on curriculum, completed by interactive CD or internet, and assessment system (60.00%). Accordingly, it should be completed by problem solving activities, problem posing activities, open –ended activities, and students’ worksheets (53.34%). A small number of them believed that it should be a scientific book (46.67%); It should be cheap (20.00%); and it should not bias in gender, ethnicity, and should concerns with human rights (13.34%). (See Appendices)

### **3. The Constraints of Developing Textbook for Junior Mathematics**

Fifteen Novice Teacher who have not any experience in Lesson Study activities delivered unstructured indications of the constraints for developing textbook for junior mathematics. The most difficulties they feel to face if they should develop textbook for junior mathematics is about their lack of skill and knowledge of writing mathematical textbook (53.34%). The others big problems are the difficulties in managing and allocating the time (40.00%). They stated others constraints as: it needs a budget (33.34%); it is not easy to determine the theme of the book (33.34%); it is not easy to collect supporting data (26,67% ); it is difficult to develop interesting and good illustration textbook (20,00% ); it is difficult to dig up the idea or concepts of textbook and its paradigm (20,00%); it is not easy how to develop curriculum-based textbook (20,00%); It is difficult to develop comprehensive textbook (13,34%); and, it is not easy how to use simple, communicative and standardized language (13,34%). Small of them (6.67%) indicated that they still have difficulties in developing thematic textbook; difficulties in developing textbook as students’ guide to learn; difficulties in developing problem solving activities; difficulties in promoting students as active learner; as well as, it is not easy how to adapt psychological aspect of students learning mathematics e.g. students’ motivation.

Fifteen Novice Teacher who has experiences in Lesson Study activities delivered unstructured indications of the constraints for developing textbook for junior mathematics. For

them, the most difficulties is to develop textbook based on educational paradigm, and the curriculum (40.00%). They felt it is not easy to develop contextual text book for junior mathematics (33.34%). However, lack of skill to write good textbook is still perceived to be the problem (33.34%). It is also not easy to determine the theme of the book (26.67%). Further, they indicate others constraint as: the difficulties in facilitating students characteristic and students' needs (26.67%); the difficulties in adapting educational theories (26.67%); the difficulties in providing problem solving activities (20.00% ); the difficulties in developing textbook with simple, communicative and standardized language (20.00%); the difficulties in adapting psychological aspect of students e.g students' motivation (20.00%); and the difficulties in promoting mathematical thinking and creativity (20.00%). Some of them perceived that managing and allocating the time (13.34%) and providing supporting references (6.67%) are still their constraint. A few of them (6.67%) perceived that their stumbling blocks arise from getting the budget, facilitating the students' competencies, getting standardized textbooks, promoting students to be an active learner; and producing the textbooks for all students.(See Appendices)

Fifteen Experienced Teachers who have not any experience in Lesson Study activities delivered unstructured indications of the constraints for developing textbook for junior mathematics. For them, the most challenging in providing textbook is how to make it based on curriculum (53.34%). Some of them (26.67%) perceived that the constraints come from un-supporting government policy, managing and allocating the time, producing contemporary textbook, and supporting the textbook with various references. They also acknowledged that it is not easy to facilitate various students' competencies in a certain textbook (20.00%). They (13.34%) felt that further constraints arise from unsupported publisher's perception of good book, lack of sponsorship, lack of skill to use simple, communicative and standardized language, and providing interactive textbook. The rest (13.34%) stated that it is still a big problem how to develop textbook in the means of promoting life-skill approach and contextual teaching learning of mathematics.

Fifteen Experienced Teachers who have experiences in Lesson Study activities delivered unstructured indications of the constraints for developing textbook for junior mathematics. All of them (100.00%) indicated that the most challenging is how to develop contextual textbook. Most of them (80.00%) felt to have a need to develop interactive textbook e.g. completed by CD or

link to internet. They felt it is not easy to produce contemporary mathematical textbook (73.34%). Curriculum-based textbook needs to be in-depth studied (66.67%). They felt (60.00%) to have difficulties in how to use simple, communicative and standardized language. They (60.00%) expected the stumbling blocks arise when they develop life-skill approach textbook; when they promote the students to be active learners; and when they provide the textbook as the media for the students to learn mathematics by themselves. However, more than a half of them (53.34%) perceived that they still have a problem in getting the references for a good textbook for junior mathematics as well as in providing the textbook with assessment system and students' worksheets. Some of them (40.00%) perceived that, while it is still difficult to manage the time, the constraints arise when they strive to develop innovative textbooks that are able to facilitate students' competencies and needs. They (20.00%) concerned with, while feeling the difficulties to get sponsorship, the need of providing standardized textbook for junior mathematics that are interesting in display, performance and good illustration and layout. The rest (13.34%) perceived the constraint of promoting mathematical thinking and creativity through their developed textbook. (See Appendices)

## **D. The Expected-Competences of Junior Mathematics Students**

### **1. National Standard of Competencies for Junior High School mathematics in**

#### **Indonesia covers:**

- a. Numbers
  - To understand and held arithmetical operation using numbers to solve problems
- b. 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
- c. Probability and Statistics
  - To hold statistical activities

- d. 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.

## 2. Standard Competency, Basic Competency, Indicator and Topic

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

Standard Competency	Basic Competency	
	Student has some competencies to:	
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.

Tabel 2: Standard Competency and Basic Competency

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

Basic Competency	Indicator	Theme/Topic
To hold algebraic operation	<ul style="list-style-type: none"> <li>• To explain algebraic term</li> <li>• To hold algebraic operations: addition, subtraction, multiplication, and exponent</li> <li>• To solve division with similar and different sign of numbers</li> </ul>	Factorization of algebraic form.

Tabel 3: Basic Competency, Indicator and Theme

Themes or topics implied from the National Curriculum of Junior High School mathematics consists of the following:

1. Integer Numbers
2. Algebra and Social Arithmetic
3. Linear Inequalities with one variable
4. Proportion
5. Line and Angle
12. Circle
13. Concave-sided Three Dimensional Shape
14. Function
15. Straight-line Equation
16. Linear Equation System with Two variables

- |   |                                |
|---|--------------------------------|
| 6. Plane                                | 17. Lines of Intersection      |
| 7. Convex-sided Three Dimensional Shape | 18. Congruence                 |
| 8. Set                                  | 19. Statistics and Probability |
| 9. Factorization Algebraic terms        | 20. Negative exponent          |
| 10. Pythagorean Theorem                 | 21. Logarithm                  |
| 11. Lines of a Triangle                 | 22. Quadratic Equation         |
|   | 23. Number Pattern             |

Hence The National Center for Book develops instrument for evaluating the quality of the textbook procured by Government or affiliated Publishers. Following is the instrument

Standard Competency	Basic Competency	Number of Pages	Matching the Among the Content, Standard Competency, and Basic Competency					
			Completeness		Comprehensiveness		In-depthness	
			A	N/A	Yes	No	Yes	No
Grade VII Numbers To understand and held arithmetical operation using numbers to solve problems	Solve operations with integer numbers and identify the properties of operations with integer numbers	.....	.....	.....	.....	.....	.....	.....
	To identify fractions and hold operations with fractions.	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....

**Table 4: Instrument for Evaluating the Quality of Textbook**

## **E. The Sample of Experience of Textbook Development in Junior High School**

### **Step 1: Getting the Idea**

Think about preparing to write textbook for junior mathematics Grade 7. If it should be based on curriculum then we need to make sure about what the standard competencies and basic competencies need to be achieved?.

Having in-depth study of these competencies and finding the related theme or topic e.g. The Integer, we then start to think about the expected teaching learning processes, the Lesson Plan, the teaching aids, the structure of the class, the schema of interaction, the schema of achieving students' competencies, the developing assessment method.

Then we found our keeping records, the records of the reflection of Lesson Study activities; and the inputs from other teachers for improving teaching learning processes.

### **Step 2: Preparing informal Plan**

While, for collecting something important related to my teaching, I then strive to collect and arrange all the data and references that needed to be used for developing mathematics textbook. From the now on I start to storage systematically all our references while I continue my classroom research as well as Lesson Study activities.

### **Step 3: Just trying the first writing**

After making a whole plan for writing the textbook, I then to decide to have first start to write Chapter I with the theme of Integer.

## **CHAPTER 1: The Integer**

### **Basic Competency:**

- To do arithmetic operation on integer and fraction
- To apply the properties of arithmetic operation on integer and fraction to solve mathematical problems

### **Context :**

Some places in this world have extremely low or high temperature. For instance, the Antarctic temperature ranges from  $-85^{\circ}\text{C}$  to  $15^{\circ}\text{C}$  and the Sahara desert is about  $58^{\circ}\text{C}$ . Do you know the coldest temperature and the hottest temperature that ever recorded? The coldest temperature ever recorded by human is  $-89.2^{\circ}\text{C}$ . It was happened on July 21, 1983 in Vostok (Antarctic). The hottest temperature ever recorded by human is  $58^{\circ}\text{C}$ . It was happened on September 13, 1922 in Al Aziziyah (Libya).

### **Problem:**

What is your classroom's temperature today?

### **Purpose:**

Numbers related to the above statement are the examples of integers that you will learn in this chapter.

What will you learn in this chapter?

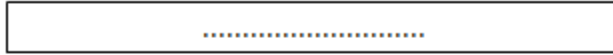
- To understand the integer
- To do arithmetic operations on integer
- To do arithmetic operations on exponential integer
- To find out the square and square root of the integer
- To find out the cubed of integer and the cubed root of integer

St

### 1. Definition of the Integer

Integer numbers consist of whole numbers and negative numbers such as ... -3, -2, -1, 0, 1, 2, 3..

The integer can be illustrated in the form of line number as shown in the following:



- The numbers in the right side of 0, i.e. 1, 2, 3, ... are called positive integer.
- The numbers in the left side of 0, i.e. -1, -2, -3, ... are called negative integer.

### Please Remember :

Natural number is any whole number greater than zero. So natural number consists of 1, 2, 3, ... While whole number is number that consist of 0 and natural numbers. Negative number is the opposite of natural number.

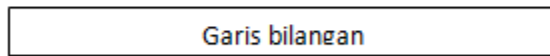
### Examples:

Indicate on the number line:

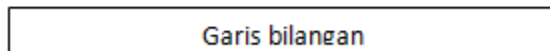
1. Integers between 1 and 8;
2. Integers starting from 1 to 8

### Solution:

1. Numbers located between 1 and 8 are 2, 3, 4, 5, 6, 7. Thus the numbers line can be figured as follow.



2. Numbers from 1 to 8 are 1, 2, 3, 4, 5, 6, 7, 8.



### Exercise:

1. a. If 5 indicate to increase 5 steps, what is the meaning of -5?  
b. If H-5 indicates 5 days before Idul Fitri, what is the meaning of H+5?
2. After decreased by 7°C, the thermometer indicates the following last temperature. Find out the initial temperature indicated by that thermometer!  
a. 7°C    b. -23°C

### Step 5: Collaborating with the Publisher

It is a bit a gambling to pursue collaboration with Publisher in order to publish a certain textbook. The combination among the criteria of a good textbook, trust, evidences and the future prospect of the benefits are crucial things. The writer should perform, indicate and build continuously his various experiences stretching from teaching, curriculum development, educational research activities, educational innovation

activities, etc. The writer should be able to convince the Publisher the importance of the proposed textbook together with its theoretical and philosophical background.



Figure 1: Sample of Developed Textbook for Junior Mathematics

The developed textbooks can always be updated by assessing them through e.g. research and development activities. Lesson Study activities can also be perceived as the chance for developing the textbook through the steps of preliminary study, developing the product and evaluating the developed textbooks.

## F. Conclusion

The efforts of developing textbook for junior mathematics should always put the concern of the criteria of good textbook. While the life dynamically and greatly changes from time to time, the style of life and the needs of people also change. So, for a certain time and a certain context, there is no fixed-criteria for good textbook. However, we may pursue the general theories and assumptions, share and exchange them in order to provide the preferable textbook. The efforts of developing textbook should in line with the course programs and the accurateness of their proposed activities. Still the questions behind the developing the textbook for junior mathematics: what is the nature of teaching learning of mathematics?, what is the nature of school mathematics?, what is the nature of students' learn mathematics?, what is the nature of the aim of mathematics teaching?, what is the nature of teaching resources?, what is the nature of assessment?, and what is the nature of mathematical thinking?



Specifically, for the needs to develop textbook for junior mathematics we need to have a clear picture on how to plan and implement activities in the classroom the following: problem solving activities, reasoning and proof, mathematical communication, mathematical connections, mathematical representation, the role of technology and ICT, content arrangement and skills development, content appropriate and relevant, wide range of student interests and abilities, and materials easy to follow and understand. In the case of developing the layout or design of textbook we may consider the following: the objectives given for each section; exercises and activities relevant to learning objectives; developing the relevant and useful graph, tables, charts, visuals; cross-curricular learning exhibited; clearly and appropriately defined some key terms; and reading level and language use appropriate to students.

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## APPENDICES:

### 1. Novice Teachers' Perception on Good Textbook for Mathematics

No	Novice Teacher who do not have experienced in Lesson Study Activities (N Total = 15)		Novice Teacher who has experienced in Lesson Study Activities (N Total = 15)	
	Unstructured Perceptions		Unstructured Perceptions	
1.	The textbook should be systematic	20,00%		
2.	The <u>Textbook</u> should be completed by exercise	13,34%		
3.	It should be completed by good assessment	13,34%		
4.	There should be a remedial activity	13,34%		
5.	The textbook should be understandable, meaningful, and consist of good example	100,00 %	The textbook should be understandable, meaningful, and consist of good example	100,00 %
6.	The textbook should have a good design	13,34%	The textbook should have a good design	13,34%
7.	The textbook should use simple, communicative and standard language	80,00%	The textbook should use simple, communicative and standard language	13,34%
8.	It should comprehensive in term of content and students' competence (affective, psychomotor and cognitive)	53,34%	It should comprehensive in term of content and students' competence (affective, psychomotor and cognitive)	13,34%
9.	It should be interesting in display , performance and good illustration and good layout	20,00%	It should be interesting in display , performance and good illustration and good layout	20,00%
10.	It should be relevant and applicable to daily life	20,00%	It should be relevant and applicable to daily life	80,00%
11.	It should be innovative	20,00%	It should be innovative	20,00%
12.	It should facilitate students' activities		It should facilitate students' activities	13,34%
13.	It should be contextual textbook	13,34%	It should be contextual textbook	20,00%
14.	Psychological aspect of students e.g to motivate the students	13,34%	Psychological aspect of students e.g to motivate the students	13,34%
15.	It should be curriculum-based textbook	13,34%	It should be curriculum-based textbook	26,67%
16.	It should contain good problem solving	13,34%	It should contain good problem solving	13,34%
17.	It should promote active learners	13,34%	It should promote active learners	13,34%
18.			It should be supported by references	13,34%
19.			It should be cheap	20,00%
20.			It should facilitate students' need	66,67%
21.			It promotes self learner /self using	66,67%
22.			It needs to promote mathematical thinking	20,00%
23.			How to develop contextual textbook	20,00%
24.			It should completed by students worksheet	13,34%
25.			It should meet with students, need	20,00%

### 2. Experienced Teachers' Perception on Good Textbook for Mathematics

No	Experienced Teacher who has not experienced in Lesson Study Activities (N Total = 15)		Experienced Teachers who has experienced in Lesson Study Activities (N Total = 15)	
	Unstructured Perceptions		Unstructured Perceptions	
1.	It should not gender, ethnic bias and shoul concern with human rights	13,34%	It should not gender, ethnic bias and shoul concern with human rights	13,34%
2.	It should be cheap	40,00%	It should be cheap	20,00%
3.	The textbook should be understandable/ meaningful	80,00%	The textbook should be understandable/ meaningful	100,00%
4.	The textbook should use simple, informative, communicative and standard language	66,67%	The textbook should use simple, informative, communicative and standard language	60,00%
5.	The <u>Textbook</u> should be completed by exercise	13,34%	The <u>Textbook</u> should be completed by exercise	53,34%
6.	It should be relevant and applicable	13,34%	It should be relevant and applicable	100,00%
7.	It should comprehensive in term of content and students' competence (affective, psychomotor and cognitive)	13,34%	It should comprehensive in term of content and students' competence (affective, psychomotor and cognitive)	60,00%
8.	It should be interactive textbook e.g. completed by CD	13,34%	It should be interactive textbook e.g. completed by CD	60,00%
9.	It should be interesting in display , performance and good illustration and good layout	26,67%	It should be interesting in display , performance and good illustration and good layout	66,67%
10.	How to develop curriculum-based textbook	26,67%	How to develop curriculum-based textbook	60,00%
11.	How to develop contextual textbook	13,34%	How to develop contextual textbook	73,34%
12.	It should be relevant and applicable to daily life	26,67%	It should be relevant and applicable to daily life	73,34%
13.			It should promote constructive approach	66,67%
14.			It should promote students involvement and participation	66,67%
15.			It promotes self learner /self using	73,34%
16.			It should promote cooperative learning	80,00%
17.			It should promote mathematical thinking and creativity	53,34%
18.			It needs to develop assessment	60,00%
19.			It should match with students competencies (needs)	66,67%
20.			It should be a life-skill approach textbook	66,67%
21.			It should be completed with problem solving activities	53,34%
22.			It should be completed with problem posing activities	53,34%
23.			It should be completed with open ended activities	53,34%
24.			It promotes self learner /self using	73,34%
25.			It should be a scientific book	46,67%
26.			It should be completed by students worksheet	53,34%

### 3. Novice Teachers' Perception of the Constraints of Developing Textbook for Mathematics

	Novice Teacher who do not has experienced in Lesson Study Activities (N Total = 15)		Novice Teacher who has experienced in Lesson Study Activities (N Total = 15)	
No	Unstructured Indications		Unstructured Indications	
1.	Difficult to develop the design of textbook	6,67%		
2.	It is difficult to develop comprehensive textbook	13,34%		
3.	It is difficult to develop interesting and good illustration textbook	20,00%		
4.	How to develop thematic textbook	6,67%		
5.	Textbook as a guide book for students	6,67%		
6.	Difficult to determine the theme of textbook	33,34%	Difficult to determine the theme of textbook	26,67%
7.	Difficult to collect references	26,67%	Difficult to collect references	6,67%
8.	Difficult to manage/allocate the time	40,00%	Difficult to manage/allocate the time	13,34%
9.	It need to budget	33,34%	It need to budget	6,67%
10.	It lack of skill to write or produce good textbook	53,34%	It lack of skill to write or produce good textbook	33,34%
11.	The idea or concepts of textbook and its paradigm	20,00%	The idea or concepts of textbook and its paradigm	40,00%
12.	How it content problem solving	6,67%	How it content problem solving	20,00%
13.	How it uses simple, communicative and standard language	13,34%	How it uses simple, communicative and standard language	20,00%
14.	How to develop curriculum-based textbook	20,00%	How to develop curriculum-based textbook	40,00%
15.	Psychological aspect of students e.g to motivate the students	6,67%	Psychological aspect of students e.g to motivate the students	20,00%
16.	How it promotes students as active learners	6,67%	How it promotes students as active learners/	6,67%
17.			How to meet with students characteristic and students' need	26,67%
18.			How to make it as contextual textbook	33,34%
19.			How it adapts the theory of education	26,67%
20.			How it promotes mathematical thinking	20,00%
21.			How it can be used by all students/	6,67%
22.			How to make it as a standardized textbook	6,67%
23.			How to facilitate students competences	6,67%

4. **Experienced Teachers' Perception of the Constraints of Developing Textbook for Mathematics**

	Experienced Teacher who do not have experienced in Lesson Study Activities (N Total = 15)		Experienced Teacher who has experienced in Lesson Study Activities (N Total = 15)	
No	Unstructured Indications		Unstructured Indications	
1.	Unsupported Publisher Perception/	13,34%		
2.	It need supporting beaucracy/system (it need supporting regulation from the gov.)	26,67%		
3.	It is difficult to find sponsorship or counterpart/	13,34%	It is difficult to find sponsorship or counterpart//	20,00%
4.	Difficult to manage/allocate the time	26,67%	Difficult to manage/allocate the time	40,00%
5.	How it uses simple, communicative and standard language	13,34%	How it uses simple, communicative and standard language	60,00%
6.	How to develop curriculum-based textbook	53,34%	How to develop curriculum-based textbook	66,67%
7.	How to match with students competencies (needs)	20,00%	How to match with students competencies (needs)	40,00%
8.	How to develop life-skill approach textbook	13,34%	How to develop life-skill approach textbook	60,00%
9.	How to develop contemporary textbook	26,67%	How to develop contemporary textbook	73,34%
10.	How to develop textbook as student media to learn	13,34%	How to develop textbook as student media to learn	60,00%
11.	How to develop contextual textbook	13,34%	How to develop contextual textbook	100,00%
12.	How to develop interactive textbook e.g. completed by CD or link to internet	13,34%	How to develop interactive textbook e.g. completed by CD or link to internet	80,00%
13.	It lack of references	26,67%	It lack of references	53,34%
14.	It needs to develop assessment	13,34%	It needs to develop assessment	53,34%
15.			How it promotes active learner	60,00%
16.			How to develop its students worksheet	53,34%
17.			How to develop innovative <u>textboo</u>	40,00%
18.			It should be interesting in display , performance and good illustration and good layout	20,00%
19.			How to develop standardized textbook	20,00%
20.			How to promote mathematical thinking and creativity	13,34%