



**MATHEMATICS TEACHERS' PROBLEMS  
IN USING MATHEMATICAL TERMINOLOGY  
AT THE CLASSES OF INTERNATIONAL LEVEL SCHOOL  
(SBI)**

**(a Case of the Mathematics Teachers of SMA Negeri 3 Semarang)**

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submitted in partial fulfillment of the requirements  
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in English

by  
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**Semarang, 26 Januari 2011**

**Yang membuat pernyataan**

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## APPROVAL

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Let's keep running for tomorrow and our future!



To: My beloved parents

My dearest brother and sisters

My best friends in “Widuri Puri Kencana”

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## ABSTRACT

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International Level School or Sekolah Bertaraf Internasional (SBI) is a new program implemented in education world in Indonesia. The main characteristic of SBI is the use of English as a medium of instruction in teaching and learning process. Almost all subjects of teaching are conducted in English; therefore, teachers of SBI should use English in their classes. This final project was conducted to find out mathematics teachers' problems in using mathematical terminology.

In this study, the researcher used qualitative method. This study was conducted in SMA Negeri 3 Semarang. There were two mathematics teachers observed in this study. They were experienced in teaching their object in English for about 4-6 years. In this research, the researcher conducted observation and interview to the observed teachers to gather the data.

It was revealed that the teachers still had problems in using English, especially the mathematical terminologies. There were some mathematical formulas they could not read properly and some mathematical terminologies they could not pronounce well. Besides, they sometimes made errors in using grammar and had misconception in using mathematical terminologies. Moreover, they had some difficulties in finding the correct terminologies related to their subject.

It was also shown that the teachers used bilingual instruction (English-Indonesia) in teaching-learning process. Teacher A mostly used Indonesian in his teaching process (approximately up to 70%) while teacher B mostly used English in his teaching process (approximately up to 60%). In fact, according to Depdiknas, they should use full English in teaching-learning process because the school has conducted SBI program for more than three years.

Referring to the data, the researcher would like to propose some suggestions for the teachers and government. Firstly, the teachers should improve their proficiency of English by joining some trainings or practicing by themselves. They should also pay more attention to their use of English in the class. Besides, the government should carry out more training of English for the teachers of SBI and help the teachers by selecting and providing supplementary books which are appropriate the curriculum for SBI.

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# CHAPTER I

## INTRODUCTION

This chapter presents Background of the Study, Reason for Choosing the Topic, Statement of the Problem, Objective of the Study, Significance of the Study, and Outlines of the Report.

### 1.1 Background of the Study

Communication is one of important parts in our life. Through communication we can build good relationships with others. One thing which is needed in communication is language. Many people have different ideas about the meaning of language. For example, Finocchiaro (1974:3) states that “language is a system of arbitrary vocal symbols which permits all people who have learnt the system of that culture and other people who have learnt the system of that culture to communicate or to interact”. Then Mackey (1981:3) explains as follows:

“To the philosopher, language may be an instrument of thought; to the sociologist, a form of behavior; to the psychologist, a cloudy window through which he glimpses the working of mind; to the logician, it may be a calculus; to the engineer, a series of physical events; to the statistician, a selection choice and chance; to the linguist, a system of arbitrary signs.”

He (1981:3) also states that “for some psychologists, language is a type of symbolism with many functions; for others, it is a man-made instrument of communication”. Furthermore, the purpose of language is to communicate and

one form of communication is interaction (Yusnaini: 1988). Therefore, in communication and interaction, people use language to convey message and express their ideas, feeling, thoughts, arguments, wishes, etc.

As an international language, English plays an important role in this world which helps us to be able to communicate with people from other countries. Brunfit (1982:1) argues that “English is an international language in that it is the most widespread medium of international communication, both because of geographical spread of its speaker and because of the large number of non-native speakers who use it for at least part of their international contact”. English is stated as an international language because the majority of people in this world are English speaking.

It is clear that English is not Indonesian native language. In fact, Indonesians use Indonesian or local languages in their daily speaking. Only a few people are able to speak or mastery English well. For example, in the nationwide test (UN), many students get low grade in their test of English. There are also many people who join English courses to learn English. Nowadays, because of the globalization, many foreign people come to this country for works or tourism and English becomes an important thing to communicate and interact so the population of English learners is growing.

Many learners had studied English in school and course but it only focused on grammar, memorization and drill. It had not provided them with sufficient skills to work in English or to socialite with English speakers. The government realized that learning English three hours in a week in school is not sufficient.

Learners need a scope which enables them to speak, listen, read, write or learn English freely. Then the government tried to create a program which enables learners to develop their high level of English proficiency. The program is International Level School (Sekolah Bertaraf Internasional/SBI). The establishment of SBI is based on UU No. 20 year 2003 article 50 (3) about national education system stated as follows:

“The central government and/or a local government hold at least one unit of education at all levels to be improved as an international standardized unit of education.”

Hence, each regent and mayor has appointed a school in their regency or town (city) as a pilot project to be improved as an international standardized school.

In class activities, such as math, science, social studies, and history, and those outside of the class, such as meals or everyday tasks, are conducted in the target language (English). In the first three years, the teachers and learners are enabled to use bilingual language (English-Indonesia). The following years, all schooling is conducted in English. The school is also equipped with ICT (Information and Communication Technology) tools like LCD projector, VCD player, air conditioner, notebook, television, internet network, etc. Consequently, the students learn not only English but also how to use that multimedia.

The success of this program depends on not only students' ability but also teachers' ability. Myriam (1993) argues that “the successful of this program is characterized by: administrative support, community and parental support, qualified teachers, appropriate materials in the foreign language, time for teachers to prepare instructional materials in the language, and ongoing staff

development”. It means that teachers of SBI should be able to speak English well. They also have to mastery some vocabularies or terminologies related to their subjects. Therefore, in this final project, I try to observe some problems mathematics teachers faced in using mathematical terminologies. I chose mathematics subject because it only has a little scientific terms. Consequently, mathematics teachers have to work hard to learn and memorize all the terminologies deal with the subject.

## **1.2 Reason for Choosing the Topic**

Based on the explanation above, it is clear that teachers and students in International Level School have to use English in teaching-learning process. In learning English process, the teacher may find some problems. It is because they are mathematics teachers who do not have proper English ability. It is also because mathematic is a kind of difficult subject and the mathematical terminology is quite difficult to be learned. Mathematic teachers have to work hard to learn it. If they do not, they cannot give good explanation to their students. In other words, the students will not be clear understanding what is being taught by them.

Therefore, in this case, I would like to find out the mathematic teachers’ problems in understanding and using mathematical terminology because teachers are a vital part in the education of the students. It is important for teachers to give a good and understandable explanation to their students.

### **1.3 Statements of the Problem**

The problems of this study can be stated as follows:

- (1) How well do the mathematic teachers give explanation to their students using mathematical terminologies in teaching International Level School classes?
- (2) What are the mathematic teachers' problems in using and learning mathematical terminologies?

### **1.4 Objective of the Study**

Based on the problems stated above, the objective of this study is:

- (1) To find out how well the mathematic teachers use mathematical terminologies in teaching at International Level School classes.
- (2) To find out the problems which the mathematic teachers as non-English teachers met in using and learning mathematical terminologies.

### **1.5 Significance of the Study**

After doing the research, the writer hopes that the result will give a contribution for non-English teachers especially mathematics teachers in teaching International Level School classes. In other words, the writer hopes that the research can provide better solutions to solve the problems which the mathematic teachers met in teaching International Level School classes so they can give good explanations to their students.



## 1.6 Outline of the Report

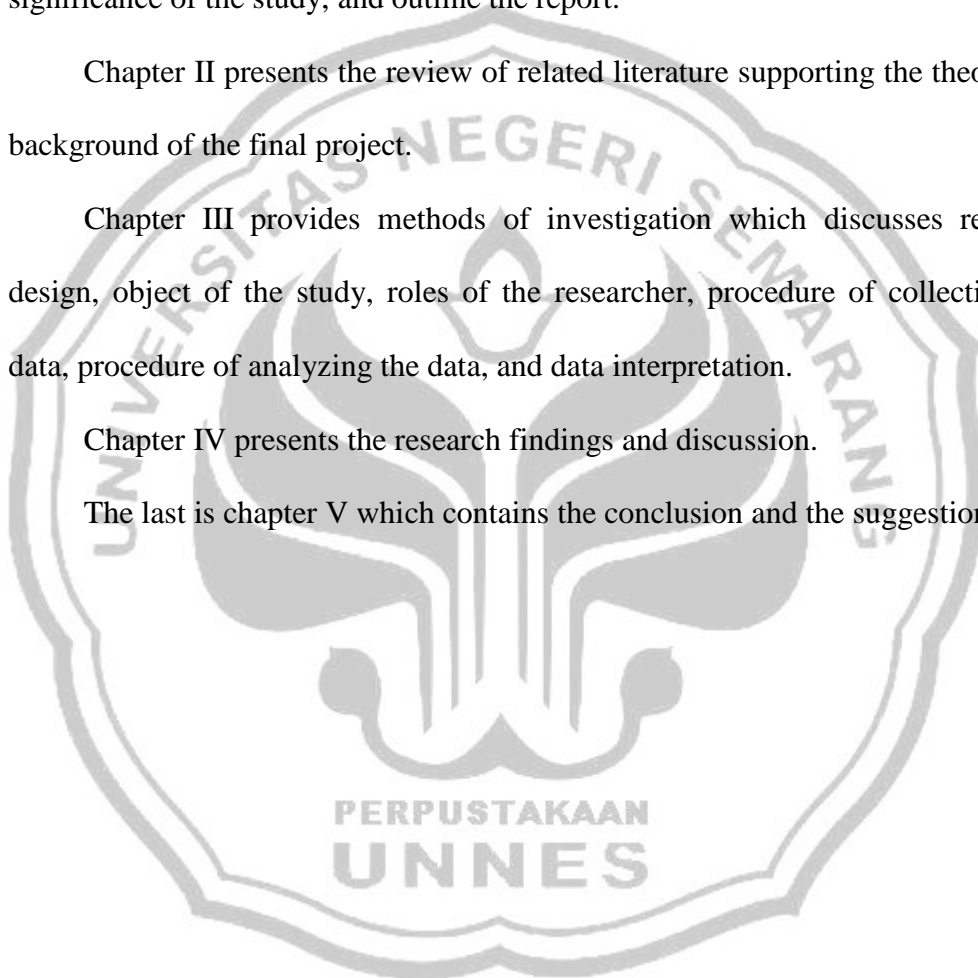
This final project consists of five chapters and starts with the introduction, which is presented in chapter I. Chapter I presents background of the study, reason for choosing the topic, statement of the problem, objective of the study, significance of the study, and outline the report.

Chapter II presents the review of related literature supporting the theoretical background of the final project.

Chapter III provides methods of investigation which discusses research design, object of the study, roles of the researcher, procedure of collecting the data, procedure of analyzing the data, and data interpretation.

Chapter IV presents the research findings and discussion.

The last is chapter V which contains the conclusion and the suggestion.



## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

This chapter deals with some basic theories related to the study. It consists of General Concepts of Teacher, Definition of Terminology, General Concepts of International Level School (SBI), English as a Medium of Instruction, SBI Design Class, Teaching and Learning Process, Teacher in SBI Class, and The Goal of SBI Program.

#### **2.1 General Concepts of Teacher**

Teacher is one of main parts in class. He has certain roles in the process of teaching and learning. The following are some explanations about teacher's definition and the roles of teacher in general.

##### **2.1.1 Definition of Teacher**

One of the important components in teaching and learning activities is teacher. Teacher guides his or her students and helps them to learn something. In the past, people defined teacher as a person who is always right and knows everything. People may also define teacher as the one who imparts knowledge. Actually, teacher has a certain job; he designs and organizes learning activities, and then

gets out of the way so that students can go about their business of communicating and learning (Kern, 2000: 307).

Moreover, a teacher means a person who, in a school, undertakes duties that include the delivery of an educational program or the assessment of student participation in an educational program. Gay (2000) also states that “teachers are cultural organizers, cultural mediators, and orchestrates of social contexts for learning”. Hence, teacher does not only help students to learn, assesses their work, and guides them but also introduce them a culture.

Teachers must have the ability to communicate effectively. Teachers should be able to recognize students with learning difficulties. It is also important for teachers to be able to listen and comprehend well. In order for teachers to share their knowledge with others, they must be able to fully understand all the ways to present the materials to the students. This only can be done through effective communication and comprehension.

### **2.1.2 Roles of Teacher**

Teacher plays several roles; those are interlocking and overlapping. Kenneth (2007:3) suggests that teacher's roles can be divided into three broad categories (1) instructional expert, (2) manager and (3) counselor. Teacher as an instructional expert means that the person who plans, guides, and evaluates learning. As an instructional expert, the teacher must organize the basic information which constitutes the foundation for learning and thinking. Besides, he must make decisions related to what to teach, what teaching materials to use, the best method

to teach the selected content and how to evaluate the intended learning. Moreover, he has to master the subject well.

As a manager, teacher has duties to order and structure the learning environment. Teacher's duties as a manager include (1) make rules and procedures for learning activities; (2) manage a classroom environment includes the classroom space, the way the physical space of the classroom, the seats, decorations, etc; (3) present a positive attitude toward the curriculum and toward school, and learning in general and (4) required to manage and process great amounts of clerical work.

The last role of the teacher in the classroom is to be a counselor. Teacher as counselor means that he or she must assist students who have problems in their learning and development. Teacher also has to have good relations with students, parents, administrators, and colleagues for communication.

Besides, according to Harmer (2002: 58), teacher's roles are controller, organizer, assessor, prompter, participant, resource, tutor and observer. As a controller, the teacher controls the classroom situation in order to make the teaching and learning process conducive and comfortable. As an organizer, the teacher organizes the students to do various activities. He/she gives the students information, directions and instructions and get the students involve in the classroom activities. When the teacher acts as an assessor, he/she offers feedback and correction on the students' performance and grades students in various ways. As a prompter, the teacher prompts and encourages students to think creatively in doing the classroom activities. Then as a participant, the teacher might join in an

activity not as a teacher, but also as a participant by taking part in a discussion, role play or group decision-making activities. As a resource, sometimes the teacher helps students when they do not know how to say or write something or what a word or phrase means. Furthermore, acting as a tutor, the teacher combines the roles of prompter and resource. He/she explains the students what to do in the activities and guides them to do the classroom activities. The last, as an observer, the teacher observes what the students do so that he/she can give them useful group or individual feedback. He/she listens, watches and also takes note on the students' performance.

A teacher is both a friend and a disciplinarian to his/her students. Teachers should learn to be approachable for they are the only ones who can help the students in school. However, teachers should also know when to stop being a friend and start being a disciplinarian to the students. Teachers help, not only in academic growth, but also in physical, emotional, mental, and spiritual growth of their students.

Meanwhile, Hoyle (1969: 62-63) identifies a successful teacher as the one who (1) has the skill to form accurate perceptions of the classroom situation and the changes which occur within this situation; (2) is aware of the teacher roles which are appropriate to different situations and (3) possesses the personality skills which allow him to adapt to changing situations.

In International Level School, subject teachers have to use English as their medium of instruction. It is not easy, of course, because they are not English teacher which have not proper English ability. Makhan (1986:1) states that all

subject teachers need to be aware of (1) the linguistic processes by which their pupils acquire information and understanding, and the implications for the teacher's own use of language and (2) the reading demands of their own subjects, ways in which the pupils can be helped to meet them.

Consequently, teachers of International Level School have to prepare and mastery the materials in the target language well. However, if the students do not understand the explanation, the teachers are able to use bilingual language.

## **1.2 Definition of Terminology**

In teaching mathematics, mathematics teacher may use mathematical terminology. Terminology is the set of technical words or expressions used in a particular subject (Oxford Dictionary:1394). Therefore, it can be said that mathematical terminology is the terms or words used in mathematics subject. Terminology is also defined by context; which is concerned with organizing the terms by the context in which they are used.

There are two types of terminology:

### **(1) Ad hoc terminology**

This terminology deals with a single term or a limited number of terms. Ad hoc terminology is usually used in the translation profession where a translation for a specific term (or group of terms) is required quickly to solve a particular translation problem.

### **(2) Systematic terminology**

It deals with all the terms in a specific subject field or domain activity.

Based on the explanation above, mathematical terminology can be classified as systematic terminology. Terms are words and compound words that are used in specific contexts. Mathematical term relates to arithmetic, number sets, and commonly used math symbol. There are some terms used in mathematical context, for example: average, denominator, exponent, digit, cardinal and ordinal numbers, factor tree, fraction, whole numbers, perfect numbers, etc.

### **1.3 General Concepts of International Level School (SBI)**

Some people might not know about International Level School or Sekolah Bertaraf Internasional (SBI) and its implementation. Here are some explanation about the definition of SBI, the basic of law and the concept.

#### **2.3.1 Definition of SBI**

There is nothing new; of course, about using a second or foreign language as a medium of instruction. There is a bilingual education program before SBI, called immersion. Immersion has influenced bilingual education throughout the world. Immersion bilingual education has been developed in many parts of Europe and in Canada since 1965. Myriam defines “immersion as a method of foreign language instruction in which the regular school curriculum is taught through the medium of the language”. In immersion, the teaching-learning process is conducted in foreign language or target language. The target language is not only English, it may French, Japanese, Indonesian or Chinese. It depends on the school which makes it. Furthermore, Swain and Johnson (1997: xiii) argues that

“immersion programs aim to provide the quantity and quality of involvement in the use of the target language that ensure the development of a high level of proficiency”.

Just like immersion program, International Level School is also a method of teaching and learning a second or foreign language. It uses English as the medium of instruction.

Mike states that “English is not the subject of instruction; rather it is the medium through which a majority of the school’s academic content is taught includes math, science, social studies and other subject areas”. Actually, the subject in this school is divided into two categories: hard science and soft science. Hard science contains mathematics, physics, chemistry, biology and astronomy whereas soft science includes sociology, economy, anthropology, history, foreign language, etc. The subjects are taught through the second language (English) to enrich the second language proficiency. This program also follows the same curricula and uses the same material but it is translated into the target language. Hence, the content of the curriculum becomes the focus for the target language.

Satria Dharma states International Level School (Sekolah Bertaraf Internasional/SBI) is a school which has completed some indicators such as IKKM (Indikator Kinerja Kunci Minimal) and IKKT (Indikator Kinerja Kunci Tambahan) or also called SNP (Standar Nasional Pendidikan) stated by the govenment. Here, SNP includes standard of content, process, graduate competence, teacher and learner, infrastructure, management and assessment. Before going to be International Level School, a school must be a Piloting of



International Level School first. Piloting of International Level School (Rintisan Sekolah Bertaraf Internasional/RSBI) is a school which is in the process to complete all those indicators and can be categorized as SBI if it has completed the indicators.

A school can be appointed an international standardized school (SBI) if it complies with the requirements. First, it is considered the best school in town (city) which has already implemented national standardized school (SSN) or has already implemented bilingual program. Second, a school is successful in implementing SSN program. It is shown by the students' achievement in a level of town (city), province, country, and international world. Besides, the students' achievement in the nationwide test (UN) is considered important. To be selected, the students' average score of UN should be at least 8.0 for English, Mathematics and Bahasa Indonesia. The UN passing percentage of the students also takes into account. A school that has met the requirements will be given SK by Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah Departemen Pendidikan Indonesia.

Hopefully, by following this program, students are able to develop their proficiency of English. They also can read, write, speak understand and use the target language (English) in daily activities.

### **2.3.2 Basic of Law**

The following are some rules which underlie the implementation of SBI program:

(1) UU No. 20 year 2003 section 50 about National Education System:

- a. Subsection (2): The central government determines national policy and education national standard to certify the quality of national education.*
- b. Subsection (3): The central government and/or a local government hold at least one unit of education at all levels to be improved as an international standardized unit of education.*

(2) Government Regulation No. 19 year 2005 section 61 subsection 1:

*The central government in association with the local government holds at least one school at elementary level and at least one school at intermediate level to be improved as an international standardized school.*

(3) Strategic Plan of National Education Department year 2005-2009 chapter V:

- a. Distribution and expansion of access.*
- b. Upgrading, relevance, and competitiveness. One of the developments of international standardized school is to increase nation competitiveness. In this case, the central government needs to develop international standardized school at the level of regency/city through consistent cooperation between the central government and the local government to develop international standardized of elementary school, junior school, senior high school, and vocational school as many 112 units in the Indonesia wide.*
- c. Strengthening of the system, accountability and public imaging.*

### **2.3.3 The Concept of International Level School**

The concept of International Level School is divided into two parts, the philosophy of existentialism and essentialism and SNP + X (OECD).

#### *2.3.3.1 Philosophy of Existentialism and Essentialism*

Philosophy of existentialism and essentialism (functionalism) underlie the implementation of International Level School. The philosophy of existentialism means that education must be able to develop and maximize the existence of students through the use of facility in progressive, creative, innovative, and experimental education process in order to create and foster students' aptitude, interest and ability. It also has an idea that in teaching-learning process, students are subjected to the maximal treatment in order to expand and foster their competence like Intelligence Quotient (IQ), Emotional Quotient (EQ) and Spiritual Quotient (SQ).

Essentialism philosophy emphasizes that education has to be useful and relevant with human needs. By the reason of the competition in a global economy, education has to prepare human resources which enable to compete internationally. Therefore, there are four education pillars underlie our education system: learning to know, learning to do, learning to live together, and learning to be. Those are criterion in the implementation of education practices start from curriculum, teacher, teaching-learning process, infrastructure to assessment.

### 2.3.3.2 *SNP + X (OECD)*

In this formula, SNP stands for Standar Nasional Pendidikan while OECD is abbreviation for Organization for Economic Co-operation and Development. According to Oxford Dictionary, OECD is an organization of industrial countries that encourages trade and economic growth (2000:914). The members of OECD are Australia, Austria, Belgium, Germany, Canada, Czech Republic, Denmark, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States and other developed countries such as: Chile, Estonia, Israel, Russia, Slovenia, Singapore, and Hongkong. Usually all of those countries have the best of education which have been admitted internationally. The formula above means that, besides completing SNP, International Level School needs to adapt and adopt the education system of OECD countries.

### 2.3.3.3 *Characteristics of International Level School*

The characteristics of International Level School can be divided into output, process and input. Output deals with the quality of the graduates of International Level School. Process is related to how the process of the teaching and learning process at SBI classes has to be done while input deals with the infrastructure which the school should be had.

By the implementation of International Level School, it is expected that the graduates of International Level School are able to study abroad, work at

international institutions and get a medal in a various international competition such as science, mathematics, technology, arts and sports.

The process of teaching and learning at SBI classes has to be capable of developing learner's creativity. It also should apply active, creative, effective, and exciting learning model, such as: student centered learning, reflective learning, active learning, enjoyable and joyful learning, cooperative learning, quantum learning, learning revolution and contextual learning. Besides, the use of multimedia equipment in teaching-learning process is needed and the teaching-learning process is conducted in English, especially for mathematics, natural science and technology. Moreover, the assessment system is adopted from OECD countries. The last, the implementation of SBI has to use international management standard.

The last is input. The input of SBI includes the headmaster and 20% percent of the teachers are postgraduate and able to speak English. Besides, they also have to be capable of operating multimedia equipment because each of classrooms is equipped with Information and Communication Technology (ICT) tools.

#### **1.4 English as a Medium of Instruction**

In International Level School, English is used as a medium of instruction in teaching and learning process. Swain and Johnson (1997: 3) explain that in this program (1) student should learn the L2 (English) through its use as the medium of instruction; (2) the curriculum content could be adequately covered through a

language that was in the process of being mastered and (3) the L1 (Indonesian) could be adequately maintained and developed under these circumstances.

Myriam also argues that “the foreign language is the vehicle for content instruction; it’s not the subject of instruction”. English is not a language course but the school uses the target language (English) as a teaching tool or a medium of instruction. Swain and Johnson (1997:6) provide the following meaning of target language or foreign language (also called L2) as the medium of instruction:

“The assumption underlying the use of the L2 as a medium is in other respects essentially that of the communicative approach to language teaching. The use of the L2 as a medium is a means for maximizing the quantity of comprehensible input and purposeful use of the target language in a classroom.”

In the classroom, the teacher uses English as a medium of instruction to teach. Teaching the educational content through the target language (English) can increase the learners’ and teachers’ ability of English and the opportunities they have to communicate in it so they can develop their English ability. English is used as the main language in class from the beginning until the end of the class. However, if the students cannot understand the lesson well, the teachers may translate it into Indonesian so the students are able to catch the idea of what is being said by the teacher. The teacher also uses a lot of visual information (ICT) and non-verbal communication (written) to support meaning.

### **1.5 SBI Class Design**

In SBI, English is used as the instructional language of Mathematics, Natural science and information and communication technology (ICT) subjects. Each SBI

classroom is equipped with a set of computer, television, VCD player and LCD projector in order to help maximizing teaching and learning process. The classrooms are set as comfortable as possible so the students can focus and concentrate while listening to the teachers' explanations.

Usually, International Level School is also applied moving class. It is different with regular class. In moving class system, the students have to find their class by themselves and visit upon their teacher. In changing class, the students are given five minutes to find their class. The students have to leave the class after the class is over and come to another class based on the subject which has been scheduled. Hence, the class is named based on the subject such as Math Class, Biology Class, Chemistry Class, Art Class, etc. The class is also set based on the subject. For example, biology class is fulfilled with biology poster like the poster of anatomy leaf, anatomy animal, etc.

There are some advantages of applying moving class system. It gives students some times to move so they will not get bored. They will get fresher in the class. It can also make the students to be more discipline by coming on time to the class. For teachers, it helps them to have a little time to prepare the material well. Besides, there are also some negative effects of moving class especially for students' awareness. Sometime some students play truant. They also do not pay attention to the cleanness of the class.

The amount of the students in each SBI classroom depends on the school policy. Usually, each classroom consists of 24 students. It is in line with the direction of the government stating that the number of the students in each SBI

classroom is 20-30. It is different with the regular class which consists of 40-45 students. It is because the teacher and the students of SBI need more space to interact each other so that the teaching and learning process can run effectively.

From the explanation above, it can be conclude that SBI classroom must be designed well. It has to be equipped with some ICT equipments. It also applies moving class system. Besides, SBI classroom should consist of 20-30 students.

### **1.6 Teaching and Learning Process**

Besides preparing the class, the school should also prepare the curriculum used in teaching and learning process. Curriculum is the lesson and what material should be taken at school. George A. Beauchamp (1986) argues that “a curriculum is a written document which may contain many ingredients, but basically it is a plan for the education of pupils during their enrollment in school given” (accessed on 7<sup>th</sup> August 2010). The teaching and learning process is still based on School Based Curriculum because the curriculum for SBI classroom was not set up yet.

Teachers use English as the medium of instruction of their subjects. In senior high school, there are seven subjects conducted in English besides English subject itself; they are mathematics, chemistry, physics, biology, geography, history, economy and art.

As mentioned in the catalogue of the implementation of International Level School, in the first year, English is used as 25% of the medium of instruction. The next year, English is used about 50% as the medium of instruction. In the third year, 75% of the teaching and learning process is conducted in English. Hence, in



the year of fourth or more, the teachers should use full English in teaching and learning process.

Moreover, teaching and learning process of SBI should apply learning to know, learning to do, learning to live together and learning to be. The teacher should create atmosphere of the class to be more active, effective and creative so the students will enjoy learning in the class.

### **1.7 Teacher in SBI Class**

Teachers who are responsible for teaching in SBI classroom are selected by the school itself. As the teachers of SBI class, they should not only master the subject well but also have the ability of English both oral and written. They have to learn about some English expressions and gambits like how to open the lesson, to give instructions to the students, to end the lesson, to give compliment, etc. Furthermore, they have to master some terminologies dealing with the subjects they taught. For example mathematics teachers, they have to learn how to read mathematics texts and formulas. Hence, the school has to prepare the selected teachers to be able to speak English. Teachers must get some training. They must learn about four skills in English; listening, speaking, reading and writing.

To teach in SBI classroom, a number of preparations should be done by teachers. One of them, they have to prepare the instructional material written in English. They have to be able to find the materials from any sources by reading some books or using internet. Besides, they have to develop syllabus and lesson plan because the syllabus they have is still written in Bahasa Indonesia.

Consequently, in training, they are trained how to prepare the materials and write the lesson plans. They are also trained how to conduct the teaching and learning process and assess the students' tasks.

However, teachers of SBI classroom should not only master English but also be capable of using ICT facilities during the teaching and learning process. In training, they learn how to use and operate ICT facilities and how to use internet network. Moreover, at least 20% of SBI teachers should be post graduated.

### **1.8 The Goal of SBI Program**

Nowadays, the development in technology and information access becomes faster and faster. Most of technological tools are presented in English so the need of English is getting greater.

Indonesia has the low quality of the schools' graduates in the mastery of science, technology and English. It is because they have limited knowledge on the English written learning sources. They do not have a chance to learn how to use the technological advances and information. Only a few students who have more money are able to buy and use them. Consequently, they cannot optimize the technology based learning sources to support their learning process.

As one of the solutions to the problems, the government has imposed a policy to improve the students' quality in the mastery of science and technology by establishing International Level School (SBI) in elementary school, junior high school, senior high school and vocational school. This school is aimed to increase the education quality in Indonesia in order to compete internationally. Therefore,

SBI among other programs is established to improve the Indonesia's education quality in terms of the students' mastery of English, Mathematics, Science and ICT in order that they have competitiveness in the global world.

International Level School is designed to fulfill three indicators (1) characterizing insights nationality, (2) empowering the full potential of intelligence (multiple intelligences) and (3) increasing global competitiveness. Besides vision, there is also mission of SBI. Mission of SBI is designed to serve as references in preparing /developing plan of program activities, indicators for this mission can be summarized into SMART (1) specific, (2) measurable, (3) achievable (can be achieved), (4) realistic and (5) time bound (obviously time coverage).



## **CHAPTER III**

### **METHOD OF INVESTIGATION**

This chapter discusses Research Design, Object of the Study, Roles of the Researcher, Procedure of Collecting the Data, Procedure of Analyzing the Data, and Data Interpretation.

#### **3.1 Research design**

The objective of this research is to describe the mathematics teachers' problems in using mathematical terminologies. Because of that, in this research, the writer used qualitative method to gather the data, especially descriptive method.

##### **3.1.1 Qualitative Method**

According to Day (1996:44), "there are two broad approaches to observing classrooms, qualitative research and quantitative research". Since the main purpose of this study is to find out mathematic teachers' problem in using mathematical terminology at the classes of International Level School, in this study the writer used qualitative method.

Nunan (1992) argues that "the qualitative research advocates the use of qualitative methods, concerns with the understanding of human behavior from the actor's own frame of reference, explanatory, descriptive and process oriented".

Along with the previous definition, Creswell (1994) states that “qualitative research occurs in natural setting where human behaviors and events occur”. Berg (1989:2) also defines that “the qualitative research refers to the meaning, concepts, definitions, characteristics, metaphors, symbols, and description of things”. Therefore, qualitative research is not dealing with number or accounting, but rather with analyzing and interpreting a phenomenon of life. It describes the subjects’ behaviors, explanations, concepts, characteristics, and also event and process oriented in the form of words.

As quoted by Hartoyo in his handbook of Introduction to Educational Research (2009), there are four philosophical base of qualitative research:

(1) Phenomenology

It maintains that truth about something can be obtained by catching the phenomena coming from research subject.

(2) Symbolic interaction

It is defined as a famous basis of social research used in qualitative research. John Dewey and Blumer also states that symbolic interaction given by the respondent of the research is divided into three principles:

- a. The basis of human action is fulfilling his needs.
- b. The process of human action basically is the product of social process when he or she is interacting with others.
- c. Human action is influenced by other phenomena, which come previously and simultaneously.

### (3) Culture

Culture describes as one of human achievements in the form of behavior or artifact, language, symbol, etc.

### (4) Anthropology

It is a philosophical base which focuses its discussion upon human action, both normative and historical.

This research is not dealing with numbers. It analyzed the problems faced by the mathematics teachers in using mathematical terminologies in the teaching and learning process at SBI classes. Therefore, the researcher used qualitative research.

### 3.1.2 Descriptive Method

Considering the primary data would be obtained were the mathematics teachers' problems in using mathematical terminology, the researcher used descriptive qualitative method.

Key (1997) defines descriptive research as follows:

“Descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation. The methods involved range from the survey which describes the status quo, the correlation study which investigates the relationship between variables, to developmental studies which seek to determine changes over time.”

Gay (1981:153) argues “a descriptive study determines and reports the way things are”. The descriptive method in general and specific types of descriptive research in particular, will be discussed in some details for two major reasons.

First a high percentage reported research studies are descriptive in nature. Second, the descriptive method is useful for investigating a variety of educational problems. In this research, the researcher tried to observe any problems faced by the teachers in using mathematical terminologies in the teaching and learning process. Therefore, in this study, the researcher used descriptive method to investigate various educational problems faced by the mathematics teachers.

### **3.2 The Object of the Study**

As the purpose of this study is to know and find the problems of mathematics teachers in using mathematical terminology, the researcher chose mathematics teachers of SMA Negeri 3 Semarang because the school has been categorized as International Level School since 2003. There were two mathematics teachers who were observed. They were mathematics teachers of the first grade. The researcher chose mathematics teachers because mathematics is belonging to a difficult subject. There is also mathematical terminology which is quite difficult to be learned and understood.

### **3.3 Roles of the Researcher**

Since the research was descriptive qualitative. The roles of the researcher are as an analyzer and observer. As an analyzer the researcher wanted to describes the teachers' problems in using mathematical terminology in teaching International Level School classes. As the observer, the researcher observed the process of how the mathematics teachers gives the explanation to their students using English.

### 3.4 The Profile of the Teachers

There were two observed teachers in this research. As they are not at the same age, they have different and various experiences in mathematics world.

#### 3.4.1 Teacher A

Teacher A was born on January 2<sup>nd</sup> 1968. He was graduated from IKIP Semarang in 1998 majoring in mathematics but he has begun to teach in 1990. Before teaching at SMA N 3 Semarang, he taught mathematics at SEMESTA and SMP N 11 Semarang. Besides, he has ever got training of mathematics development in Australia for two weeks.

Teacher A has ever learned English for four years. First, he began to join a course in LIA. Then, he get training of TOEFL in UNNES and UNDIP. At school, he also got training of English every Wednesday in a week. Now, he still learn English. His job as mathematics teaches of International Level School forces him to learn English, especially mathematical terminologies, more and more.

#### 3.4.2 Teacher B

Teacher B is older than teacher A. He is about 58 years old. He was actually graduated from IKIP Semarang majoring in mathematics and has been becoming a mathematics teacher for 34 years. Till now, he is one of the mathematics teachers in SMA N 3 Semarang who is responsible to teach first and third grade.

His experience in mathematics field leads him to become Semarang city's teacher for four years. At that time, he used three days for teaching and three days for monitoring all schools in Semarang. Then, he became an instructor of



mathematics in Central Java province. His duty was to give mathematics training to mathematics teachers all over Central Java. Actually, to be an instructor, he had to get training in RECSAM (Regional Center Science and Mathematics) in Penang, Malaysia. The training was about the development of science and mathematics teacher. He was one of the three teachers who represented Central Java in the training. As an instructor, he also has to attend a training of education development of mathematics teacher every three weeks in Jogjakarta. Then, he gives training to the mathematics teacher in each regency.

Now SMA N 3 Semarang, the schools where he works at, has been categorized as International Level School. He has to use English or bilingual as a medium of instruction in teaching and learning process. Because of that, he must prepare himself to be able to speak English well. Besides learning English at school and university, teacher A also has ever learned English in a course, LIA. Last year, he also got a training of English, especially English for mathematics, from Semarang State University.

### **3.5 Procedure of Collecting Data**

In order to solve the problem of this study, the researcher needs to collect the data. According to Arikunto (2002:127), “there are some techniques of collecting data”. The techniques are interview, questionnaire, observation, rating scale, and documentation. Therefore, the researcher used observation and interview to collect the data.

### 3.5.1 Observation

Data is one of the important things in research. Without data, there is nothing to be analyzed. In gathering data, observation is one kind of techniques. Observation is the act of watching somebody or something carefully for a period of time, especially to learn something (Oxford dictionary:910). Arikunto (2002:133) also identifies that observation is an activity of centralization a certain object using all senses. It means that the observation can be done using test, questionnaire, or voice recording.

The researcher used voice recording and field notes to gather the data. In this study, the researcher observed how the mathematics teachers using English especially mathematical terminology. The indicators of the observation included frequency, grammar, pronunciation and concept. Frequency means how often the mathematical terminology mentioned or used by the teachers. The grammar relates to how the teachers use the mathematical terminology in a sentence. Pronunciation concerns how the teachers pronounce the mathematical terminology. Lastly, concept correlates whether the terminology is used by the teacher properly based on the context.

### 3.5.2 Interview

Another technique to collect the data is interview. Interview is face-to-face communication. Arikunto (1998:145) defines that “interview is done by the interviewer to get some information from interviewee”. Arikunto (1998:145-146) classifies interview into three types:

(1) Un-guided interview

The interviewer is allowed to ask everything which is needed to gather the data to the interviewee.

(2) Guided interview

The interviewer has a certain topic of the interview and prepares the questions for the interviewee and informs it to him/her before doing the interview.

(3) Free-guided interview.

It is a combination between un-guided and guided interview. The interviewer gives the information occasion to express her idea freely, but the conversation not deviate from the topic.

In this research, the researcher used guided interview because she has prepared some questions for the interviewee. In the interview, the researcher asked the teachers about their difficulties or problems in using mathematical terminology and how they solve their problems. Besides, the researcher used voice recording to gather the data.

### **3.6 Procedures of Analyzing Data**

After collecting the data, the next step is analyzing the data. The researcher went through the following steps:

#### **3.6.1 Transcribing**

From the data collected from observation and interview, the researcher put the data into transcript form to give detailed description and explanation about how the teachers use mathematical terminology in teaching and learning process,

how the teachers introduce mathematical terminology to their students and how they solve their problems in using, finding, and learning mathematical terminology. The researcher would write the teachers' problems occurred in the classroom.

### **3.6.2 Identifying**

Based on the transcript form, the researcher identified the problems or difficulties faced by the teachers in using mathematical terminologies. The researcher identified whether the teachers used English or Indonesian in delivering the material. From the interview transcript, the researcher identified teachers' difficulties in getting and learning mathematical terminologies.

## **3.7 Data Interpretation**

In this study, the researcher would interpret the data she got. Because it was descriptive study, the researcher would describe all the data from the observation and interview she had conducted to know how well the mathematics teachers used English, especially used mathematical terminology.

The collected data were in the form of voice recording and field notes. From the interview, the researcher described teachers' difficulties or problems in using or learning mathematical terminology.

## **CHAPTER IV**

### **RESEARCH FINDINGS AND DISCUSSIONS**

In this chapter, the researcher presents the Whole Processes of Teaching and Learning, Result of Data Analysis, The Interview Results, and Discussion. The data is presented in the descriptive form.

#### **4.1 The Whole Processes of Teaching and Learning**

As it has been stated in the previous chapter that the purpose of the study is to know mathematics teachers' problems in using mathematical terminology, the researcher observed mathematics teachers of SBI classes who taught using English or bilingual (English and Indonesian). In this study, the researcher only observed teachers of first grade because the teachers of third grade now focus on preparing the students to face National Examination (UAN). It is also because the materials given in the first grade use mathematical terminology much more than the materials given in third grade.

The observation was conducted on July 2010. In the observation, the researcher observed the class of mathematics teachers. The researcher just sat on the back seat of the class and watched the teachers in delivering the materials, especially in using mathematical terminologies. After the observation finished, the researcher held an interview. There were two mathematics teachers who were

observed. Teacher A has taught mathematics in SBI classes for six years while teacher B has taught at SBI classrooms for about four years. Actually, teacher B teaches mathematics for first and third grade while teacher A teaches mathematics for first and third grade and Olympiad class.

#### 4.1.1 Classroom Activities

Before presented the data analysis of the observation, the researcher gave some descriptions about the classroom activities conducted by the observed teachers in teaching and learning process.

Teacher A is a mathematics teacher of first and third grade students of State Senior High School 3 Semarang. In teaching and learning process, he mostly used Indonesian. When I came to observe the class, he and his students were discussing about exponents and roots. He has prepared the materials in power point so in the class he did not need to write the materials on the whiteboard. He explained all things which have been written on the screen and translated it if it is needed because all the materials were written in English. Sometimes he also introduced the terminologies first before he started the lesson. He used whiteboard only in giving examples and discussing questions. Moreover, in the end of the lesson he always asked to his students whether they had any questions or not.

Sometimes teacher A played games in the class so that the students did not get bored to the lesson. He pointed toward one of the students to answer his questions as soon as possible. For example:

*Teacher A : Simplify the surd  $\sqrt{8}$*

*Student* : (answered soon)  $2\sqrt{2}$

The teacher played that game in order to refresh the students' mind and so that the students were able to memorize the expressions of surd and kinds of irrational numbers. Besides playing that game, he also gave the students some questions and asked them to write their answers on the white board so that he could see whether the students were able to answer the questions well or not.

Teacher B teaches mathematics to the students of first and third grade. He also used power point in presenting the materials which was written in English. He has prepared all the materials well. In teaching and learning process he always tried to use English both in explaining the materials and discussing questions. He introduced the mathematical terminologies while he was explaining the materials. Similar with teacher A, the topic being discussed in teacher B's class was exponents and roots because both of them taught in the same grade. Even though teacher B always used English in delivering materials, the students never seemed confused. They were able to understand the materials being discussed. If they did not understand the materials, they were never shy to ask to the teacher. Different from teacher A, teacher B did not play game in his class. However, he sometimes pointed toward one of his students to answer the questions he given in front of the class and wrote it on the whiteboard.

## **4.2 Results of Data Analysis**

Based on the real data from video recording and field notes, the researcher presented her findings from the first to fourth observations which is about the

medium of instructions used by the observed teachers whether the teachers English or Indonesian during the teaching and learning process.

Table 1 the Medium of Instructions

Teachers	Language	Observation (in minute)				Total	%
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>		
Teacher A	English	2'	8'	27'	-	37'	27.6
	Indonesian	30'	26'	41'	-	97'	72.4
	Total	32'	34'	68'	-	134'	100
Teacher B	English	23'	11'	37'	15'	86'	55.8
	Indonesian	4'	28'	24'	12'	68'	44.2
	Total	27'	39'	61'	27'	154'	100

From the table above, it can be seen that Indonesian still mostly used by the teachers in delivering the materials. As the medium of instructions, Indonesian took 72.4% and 44.2% while English took 27.6% and 55.8%. It was shown that teacher A and teacher B had a different way in the use of medium of instruction in teaching and learning process. Teacher B used English more than teacher A. Moreover, none of them used full English during the teaching and learning process. In fact, according to Depdiknas (as mentioned in the previous chapter), the teachers should use full English in teaching and learning process since they has taught SBI classes for about 4-6 years.

The teachers still used bilingual instruction (English-Indonesian) in order to make students understand the materials well. In the beginning of the lesson, the



teachers used English to recognize mathematical terminologies and to explain the theories. After that, in giving examples, the teachers used Indonesian. It is because the students did not understand well if the teachers often used English in explaining the examples.

#### **4.2.1. The Teachers' Problems Dealing with the Use of English as a Medium of Instruction in Teaching and Learning Process**

It has been stated before, teachers of SBI classroom use English as a medium of instruction in teaching and learning process. English becomes a companion language. Therefore, the teachers have to master English words especially the terminologies dealing with their subject.

Teacher A has taught at SBI classroom for six years but he still used bilingual instruction in delivering materials. Even, he much often used Indonesian than English. Actually, his English ability was good. It was because they have ever had training of English many times. Before teaching mathematics in SMA Negeri 3 Semarang, he has ever taught mathematics at SEMESTA where the teaching and learning process is conducted in English. Even though he could speak English properly, he rarely used it during the teaching and learning process.

In discussing the theory, he always used English. He gave a model to the students about how to read the English words or sentences, and how to read mathematics symbols. Otherwise, in giving examples and discussing questions he always used Indonesian. He only focused on students' understanding about the lesson. It happened because whenever he taught using English, most of his

students did not understand because of the lack mastery of the students through the lesson. Moreover, he tried to make his class as fun as possible so that the students would not be depressed in learning mathematics.

Different from teacher A, teacher B always tried to use English in the class both in explaining the theory or discussing examples or questions even though his English speaking skills was not good enough. As he is one of mathematics instructors in Semarang city, he always tried to use English in the class. However, sometimes he made error in pronouncing mathematical terminologies. He could not pronounce them well. He also could not create good communication with his students because of his difficulty in teaching his subject using English. Moreover, he never made his students speak English so there was not good communication between them.

From the explanation above, we could see that some teachers still had difficulty in using English during the teaching and learning process. They have not mastered English well. It is better for teachers to improve their English skills because SBI needs qualified teachers for that job.

#### *4.2.1.1 The Teachers' Problems Dealing with Frequency*

As discussed above in chapter 3, frequency relates to the frequency of the teachers in mentioning or using the mathematical terminologies in the teaching and learning process.

Based on the data, the researcher found that the word “*power*” was often called by the teachers. It goes without saying because the material being discussed

in their classes was exponent. It also can be explained that teacher B pronounced mathematical terminologies more often than teacher A. It is because; teacher B often used English in delivering materials. Otherwise, teacher A mostly used Indonesian.

However, there were some mathematical terminologies which were not mentioned by the teachers. Teacher A did not mentioned the words “*value, less than, less than or equal to, greater than or equal to and cube root*” in the lesson since he mentioned those words in Indonesian and actually he did not know the expression of cube root. He also skipped some materials because the materials were quite easy to be learned by the students themselves.

As teacher B used Indonesian in explaining the materials, the words “*rationalize, less than or equal to and numerator*” were not called. Just like teacher A, the term “*cube root*” was not mentioned because he did not know the expression of it.

Even though there were some mathematical terminologies mentioned by the teachers, they have quite mastered the terminologies dealing with the materials. Besides, it was quite difficult to learn and memorize the terminologies related to the mathematics subject.

#### 4.2.1.2 *The Teachers' Problems Dealing with Grammar*

Before teaching mathematics in English, mathematics teachers' of SBI classroom need to learn and memorize a lot of mathematical terminologies. Because they have to use English in communicating in the class, they need to

master English grammar to speak in a clearer and more effective manner. Of course it's not easy because they are non-English teacher. However, as teachers, they have to be good models for their students. Consequently, it is expected that they have to master the grammar well.

Teacher A and teacher B taught in the same grade so the material being discussed in their class was similar. The material was about exponent or power ( $a^n$ ) and roots ( $\sqrt{\phantom{x}}$ ). In mathematics subject, exponentiation is written as  $a^n$ , involving two numbers,  $a$  as the base and  $n$  as the exponent or power. Here, the exponentiation can be read as:  $a$  raised to the  $n$ -th power,  $a$  raised to the power (of)  $n$ ,  $a$  raised to the exponent (of)  $n$ , or more briefly as  $a$  to the  $n$ .

However, sometimes the word “*raised*” is usually omitted, and very often “*power*” as well, so  $a^n$  is typically pronounced “*a to the n-th*” or “*a to the n*”. “*To the n-th*” means  $n$  multiplying three copies. There is another form of exponent. The form  $(2^3)^4$  can be read as  $2^3$  to the  $4^{\text{th}}$  power. Some of exponents have their own pronunciation: for example,  $a^2$  is usually read as a squared and  $a^3$  as a cubed.

Teacher A and teacher B did not read those forms like it should be. Teacher B, for example  $2^x = a$ ; verbally it can be said two to the power of  $x$  equals  $a$  but he read it as two power  $x$  equals  $a$ . Another example:

$$\frac{2^{2x} \cdot 2^2 - 2^4}{2a - 4}$$

Teacher B pronounced it as two power  $x$  times two power two minus two power four divided two  $a$  minus four whereas it should be read as two to the power of

two  $x$  times two squared (two to the second power) minus two to the fourth power divided two  $a$  minus four.

Teacher A also made mistake in reading the forms of exponent or power. He was not able to read the forms in correct way. Here is the example:

$$(a^2b^{-3}c^4)^2$$

Verbally, it can be pronounced as  $a$  squared  $b$  to the power of negative three  $c$  to the fourth power squared. However, he read it as  $a$  power two  $b$  power minus three  $c$  power four power two.

In fact, teacher A and teacher B had the same errors in reading the forms of exponent. As mentioned above, the exponentiation can be read as  $a$  to the power of  $n$  or  $a$  to the  $n$ -th power but they read it as  $a$  power  $n$ . As teachers, they need to be more aware of their use of English in order to the students acquire the correct information and understanding related to the subjects.

Besides exponent or power, teacher A explained root to his students. A squared root of a number is a value that can be multiplied by itself to give the original number. Squared root can be shown by the symbol ( $\sqrt{\phantom{x}}$ ). For example,  $\sqrt{4}$  can be read as squared root of four. There is also ( $\sqrt[n]{a}$ ) besides ( $\sqrt{\phantom{x}}$ ). The form of  $\sqrt[n]{a}$  can be said as  $n$ -th root of  $a$ . For example,  $\sqrt[4]{16}$  can be said as fourth root of sixteen. Moreover,  $\sqrt[3]{a}$  can be pronounced as cubed root of  $a$ . As an example,  $\sqrt[3]{6}$  is cubed root of six. At that time, teacher A explained to his students how to read  $\sqrt[3]{8}$ . He said that it was root of power three from eight. Actually, based on the explanation above, it should be read as cubed root of eight.

Not only in reading the expression of exponent, teacher B made error in reading the expression of division. When he read the form of division, he only used the word “divided”, for example:

*Teacher B: ... if  $2^x$  equals  $a$ , what is the value of  $2^x$  plus  $4$  divided  $4^x$  times  $b^2$ ?*

The grammar he used was incorrect. The word “*divided*” should be followed by the word “*by*”. Therefore, it should be:

*Teacher B: ... if  $2^x$  equals  $a$ , what is the value of  $2^x$  plus  $4$  divided by  $4^x$  times  $b^2$ ?*

Teacher A and teacher B have ever joined English course in LIA. Yet in that course, they only learned the general of English. They did not learn English dealing with their subject. Besides course, they also ever got a training which was carried out by Semarang State University for about a year. In the training they learned some terminologies related to their subject, mathematics, and how to conduct the teaching using English. However, the course and the training they have ever joined did not give them a proper skill to teach mathematics in English. It was such a big mistake they did time after time. Consequently, it could be concluded that they should learn more and more about English for mathematics.

#### 4.2.1.3 *The Teachers' Problems Dealing with Pronunciation*

Pronunciation is one of the language elements that should be considered very important in learning English. Besides learning and memorizing a lot of terminologies dealing with the subjects, teachers of SBI classroom should also

learn how to pronounce that words. It is because their mistakes in pronouncing English words will cause misunderstanding.

Overall, teacher A did not have any problems in pronunciation. He could pronounce the English words properly. However, he used Indonesian more often than English in teaching and learning process. Besides introducing mathematical terminologies, teacher A also taught the students how to pronounce the terms. Although his pronunciation was good, sometimes he made error in pronunciation. For example, he pronounced the word “*surd*” as [‘sa:d]. Actually, that word should be pronounced as [sə:d]. Actually, teacher B also had a problem in pronouncing the word “*surd*” like teacher A.

In teaching and learning process, teacher B used English more often than teacher A. However, sometimes teacher B made errors in pronouncing English words as follows:

*Teacher B: ... a times b power two multiplied three a power two times b divided a times c power two...*

In the transcript above, it could be seen that teacher B made error in pronouncing the words multiplied [‘multiplɪd] and divided [‘divɪdɪd]. However, they should be pronounced as [‘mʌltiplaɪd] and [dɪˈvaɪdɪd]. Besides, teacher B was unable to pronounce the word “called” well. He said:

*Teacher B: Sifat perpangkatan is called exponentiation property.*

He pronounced the word “called” as [‘kɒ:lɪd] whereas it should be [‘kɒ:lɪd].

Teacher A and teacher B made the same errors in pronouncing the words “*denominator, positive and negative*”. They read those words like they read in

Indonesian. It was totally wrong. Those words should be pronounced as “[dʒ’nɑmɪneɪtə], [[pɑːzətɪv] and [ˈnɜgətɪv]”.

#### 4.2.1.4 The Teachers’ Problems Dealing with Concept

The concept here relates to the use of the mathematical terminology in the sentence or speech, whether it is correct or incorrect.

In the class, teacher B told to the students about the dissimilarity between “*minus*” and “*negative*” through the example below:

- a)  $4 - 8 = -4$  ----- four minus eight equals minus four
- b)  $4 - 8 = -4$  ----- four minus eight equals negative four

He said to the students that statement (a) was totally wrong and the right one was statement (b). However, according to Wikipedia, a negative number is written by putting a minus sign, “-”, in front of a positive number. For example, “-2” is a negative number. It is read “*negative two*” or “*minus two*” and it means the opposite of 2.

From the explanation above, it could be seen that there was no difference of the use of the words “*minus*” and “*negative*”. In mathematics, both of them are same. It can be said that both statement (a) and (b) are similar and right. Just like teacher A who at that time read “-6” as “*minus six*”.



#### **4.2.2 Students' Understanding of Teachers' Use of English as a Medium of Instruction**

As explained in the previous chapter, teachers' of SBI classroom should use English as a medium of instruction. In facts, the teachers used bilingual in teaching and learning process. It is because the students would not understand the materials well if the teacher always used English during the teaching and learning process. It will also impact to their school grade.

International Level School is intended to develop students speaking skill in order to enable them to communicate actively on the target language which is applied in the classroom. It gives the students space to speak English freely. However, during the teaching and learning process the teachers also never got the students to speak English. They always used Indonesian in asking and answering questions from the teacher. It means that the students never tried to speak English in the class.

As explained before in the previous sub chapter, the teachers sometimes pronounced English words incorrectly. They also were not able to read mathematics formulas or symbols properly. However, the students never realized about that. They only focused on the lessons. They did not know if the teachers made mistakes in speaking English.

### 4.3 The Interview Results

Besides conducted observations, the teacher also conducted an interview to the observed teacher. The researcher asked some questions to the interviewees. The questions could be seen in the appendix.

In this chapter, the researcher presented the interview results as follows. Teacher A has joined training of English many times. He has learned English for about four years. First, he has finished English course in LIA. He also joined TOEFL training in UNDIP and UNNES. Furthermore, last year he followed the English training held by the school every week. It means that he has learned English a lot and has mastered many English vocabularies.

The source of book and materials for the teaching and learning process should be in English but sometimes teachers use bilingual books. Teacher A used book from the school itself, Australia and Turkey for teaching. He also made a module or handbook by himself. Actually, teacher A had some difficulties in getting the material for teaching. The curriculum used in Indonesia was different with the curriculum used in Australia and Turkey. He could not find a book which appropriate with Indonesia curriculum. Sometimes what being taught in Indonesia was not taught in Australia or Turkey. Otherwise, what being taught in Australia or Turkey was not taught in Indonesia. Therefore, he used Indonesian book which has been translated into English.

Moreover, teacher A faced some problems in learning mathematical terminologies. There are some mathematical terminologies he did not know and understand. He also had problems in finding some English terminologies dealing

with the subjects he taught like the words “*statistik lima serangkai*”. Then he found it in Singaporean book. It is “*five based statistics*” in English.

Some teachers used google translator to solve their problems. Actually, google translator was not always accurate. For example, “*jari-jari*” in English is “*radius*” but google translator translated it as “*finger-finger*”. To solve his problem, he browsed mathematical terminologies anywhere.

Teacher B had joined English training only once. He joined English training in LIA. In LIA he learned about grammar and held a microteaching. Just like teacher A, he also ever got training of English for mathematics at the school. He got the materials from some bilingual books and internet. After he got and corrected it, he represented it using power point. Whenever he got difficulties in learning mathematical terminologies, he always used internet. Different from teacher A, he liked to use google translator. He rarely discussed his problems with English teacher because English teacher also did not master mathematical terminologies properly. Moreover, sometimes the students asked him to use Indonesian in delivering the materials. Hence, he used bilingual instruction in teaching and learning process.

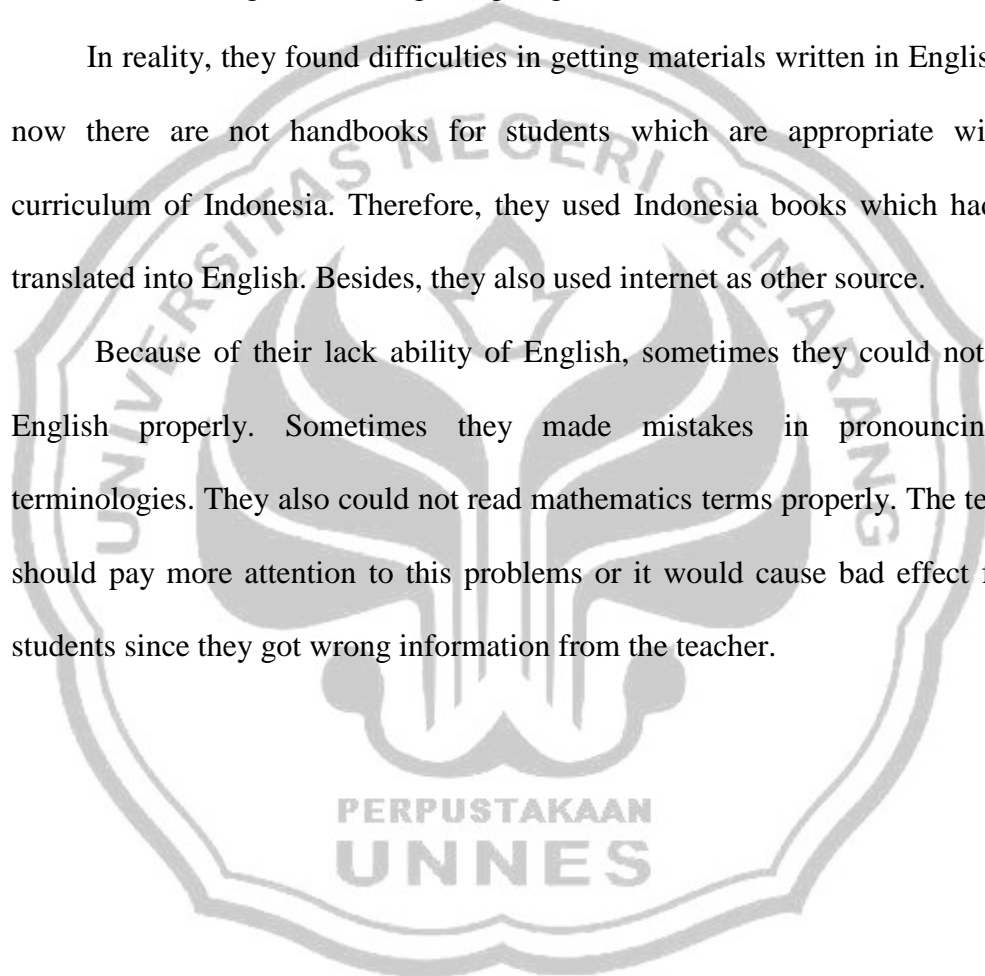
#### **4.4 Discussion**

International Level School is a new program in education world of Indonesia. It applies learning process in English. Teachers of certain subjects are demanded to use English in teaching and learning process. Of course, it is not an easy job for them because they are not English teacher who has high level proficiency of

English. Furthermore, they have to learn a lot of terminologies deal with their subjects. It is such a difficult thing because it is different from English generally and not all of English teachers come to know those terminologies. Consequently, the subject teachers begin to follow English training. They learn English and how to conduct teaching and learning using English.

In reality, they found difficulties in getting materials written in English. Till now there are not handbooks for students which are appropriate with the curriculum of Indonesia. Therefore, they used Indonesia books which had been translated into English. Besides, they also used internet as other source.

Because of their lack ability of English, sometimes they could not speak English properly. Sometimes they made mistakes in pronouncing the terminologies. They also could not read mathematics terms properly. The teachers should pay more attention to this problems or it would cause bad effect for the students since they got wrong information from the teacher.



## **CHAPTER V**

### **CONCLUSIONS AND SUGGESTIONS**

This chapter discusses the conclusions and suggestions of this final project. The conclusions reflect the result of the observation conducted before which have discussed in the previous chapter.

#### **5.1 Conclusions**

From this study, we can conclude that teachers still had difficulties in using mathematical terminology. Some problems occurred during the teaching and learning process because the teachers have not mastered English well, especially mathematical terminologies.

The teachers used bilingual (English-Indonesian) as the medium of instruction in teaching and learning process. The students did not understand the lesson well if the teacher always used English in delivering the materials. Besides, they used bilingual instruction to avoid making error in speaking English because they were lack ability of English.

Some of the teachers sometimes still made errors in pronouncing English words. They did not know how to pronounce some words with the right pronunciation. Moreover, sometimes they made errors in reading mathematics formulas and symbols. Not only that, the teachers also still made errors in

applying the mathematical terminologies in sentences and had misconception in the use of some mathematical terminologies.

Besides that, the teachers also faced other problem dealing with the implementation of SBI. The available supplementary books were not appropriate with the curriculum of SBI. They usually used Indonesian books which have been translated into English. Furthermore, they found difficulties in getting some terminologies related to the materials. Hence, some teachers looked for many references about the vocabularies or terminologies related to the lessons from dictionary, internet or other books.

## **5.2 Suggestions**

From the explanation above, the researcher proposed some suggestions. First, the teachers should get more training in order to improve their ability of English. Then they should pay more attention to their use of English in delivering the materials because they sometimes made error in pronouncing English words and reading mathematics formulas and symbols. Besides, the government also ought to hold more training for the teachers to prepare them to teach in the class of SBI and should pay more attention to the implementation of SBI by supplying the supplementary books which are appropriate with the curriculum of SBI.

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## APPENDIX 1

### OBSERVATION

#### Teacher A

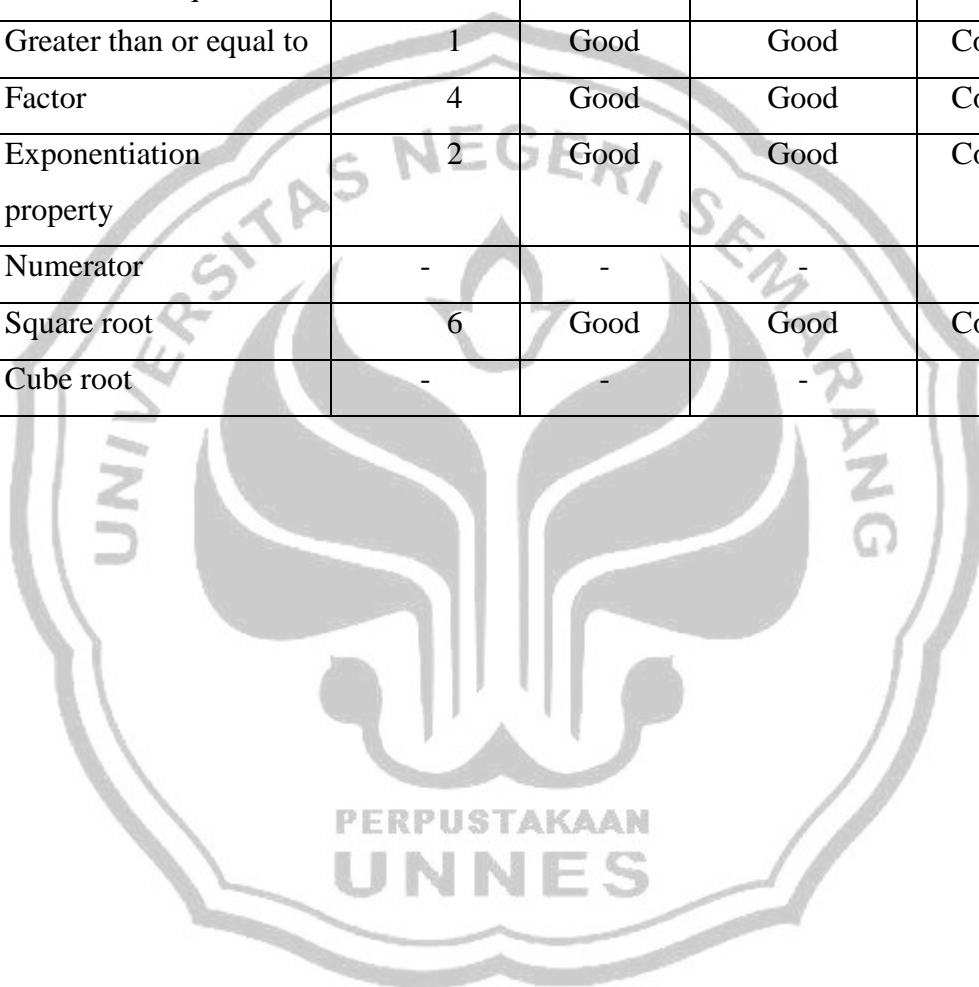
Terminologies	Indicators			
	Frequency	Grammar	Pronunciation	Concept
Base	4	Good	Good	Correct
Power	27	Poor	Good	Correct
Notation	3	Good	Good	Correct
Equals	9	Good	Good	Correct
Multiplied	15	Good	Good	Correct
Integers	5	Good	Good	Correct
Exponent	8	Good	Good	Correct
Divided	11	Good	Good	Correct
Rationalize	1	Good	Good	Correct
Denominator	2	Good	Poor	Correct
Division	4	Good	Good	Correct
Surd	8	Good	Poor	Correct
Negative	4	Good	Poor	Correct
Positive	5	Good	Poor	Correct
Times	3	Good	Good	Correct
Multiplication	8	Good	Good	Correct
Exponentiation	2	Good	Good	Correct
Minus	6	Good	Good	Correct
Plus	4	Good	Good	Correct
Number	21	Good	Good	Correct
Element	1	Good	Good	Correct

Rational	8	Good	Good	Correct
Irrational	9	Good	Good	Correct
Root	14	Poor	Good	Correct
Decimal	7	Good	Good	Correct
Natural number	2	Good	Good	Correct
Whole number	3	Good	Good	Correct
Fraction	3	Good	Good	Correct
Value	-	-	-	-
Real number	2	Good	Good	Correct
Less than	-	-	-	-
Less than or equal to	-	-	-	-
Greater than or equal to	-	-	-	-
Factor	4	Good	Good	Correct
Exponentiation property	2	Good	Good	Correct
Numerator	1	Good	Good	Correct
Square root	4	Good	Good	Correct
Cube root	-	-	-	-

**Teacher B**

Terminologies	Indicator			
	Frequency	Grammar	Pronunciation	Concept
Base	5	Good	Good	Correct
Power	62	Poor	Good	Correct
Notation	2	Good	Good	Correct
Equals	17	Good	Good	Correct
Multiplied	10	Good	Poor	Correct
Integers	2	Good	Good	Correct
Exponent	11	Good	Good	Correct
Divided	16	Poor	Poor	Correct
Rationalize	-	-	-	-
Denominator	2	Good	Poor	Correct
Division	5	Good	Good	Correct
Surd	10	Good	Poor	Correct
Negative	14	Good	Poor	Incorrect
Positive	6	Good	Poor	Correct
Times	28	Good	Good	Correct
Multiplication	3	Good	Good	Correct
Exponentiation	2	Good	Good	Correct
Minus	20	Good	Good	Incorrect
Plus	17	Good	Good	Correct
Number	9	Good	Good	Correct
Element	2	Good	Good	Correct
Rational	7	Good	Good	Correct
Irrational	12	Good	Good	Correct
Root	5	Good	Good	Correct
Decimal	6	Good	Good	Correct
Natural number	4	Good	Good	Correct

Whole number	2	Good	Good	Correct
Fraction	2	Good	Good	Correct
Value	1	Good	Good	Correct
Real number	1	Good	Good	Correct
Less than	1	Good	Good	Correct
Less than or equal to	-	-	-	-
Greater than or equal to	1	Good	Good	Correct
Factor	4	Good	Good	Correct
Exponentiation property	2	Good	Good	Correct
Numerator	-	-	-	-
Square root	6	Good	Good	Correct
Cube root	-	-	-	-



## APPENDIX 2

### INTERVIEW RESULTS

#### Teacher A

1. Apakah Bapak/Ibu pernah mengikuti pelatihan bahasa inggris?

*Ya, sangat banyak.*

2. Berapa kali Bapak/Ibu mengikuti pelatihan?

*Banyak. Jadi saya kursus di LIA itu sampai tamat. Terus sampai conversation 2 tamat. Terus sampai bosan saya. Terus pelatihan TOEFL di UNDIP, pelatihan TOEFL di UNNES. Empat tahun ya, saya belajar bahasa Inggris itu hampir 4 tahun mulai 2003 sampai sekarang. Terus ada pendampingan disini.*

3. Siapakah yang memberi pelatihan?

*Itu pernah ada pelatihan dari UNNES.*

4. Apa saja yang diajarkan dalam pelatihan yang Bapak/Ibu ikuti?

*Mengajar menggunakan bahasa Inggris*

5. Darimana Bapak/Ibu mendapat bahan ajar?

*Itu dari buku dari Australia, terus dari buku sekolah. Tapi kalau sekarang saya pakai buku dari Australia. Terus buku dari Turki.*

6. Apakah Bapak/Ibu mempunyai kesulitan mendapatkan bahan ajar?

*Oo... Banyak kesulitannya karena kurikulumnya berbeda. Saya harus ngambil sana sini. Yang diajarkan di sini tidak diajarkan di sana yang*

*diajarkan di sana tidak diajarkan di sini, sehingga kadang menemui tidak ada materi yang pas. Jadi kita jangan menyalahkan kalau akhirnya kita yang ada menerjemahkan buku bahasa Indonesia ke bahasa Inggris. Ini kan sebenarnya menerjemahkan karena memang susah mencari bahannya yang sesuai dengan silabus Indonesia.*

7. Sebelum mengambil bahan ajar dari buku atau internet apakah Bapak/Ibu mengoreksinya terlebih dahulu?

*Betul. Kalau dari Australia banyak soal ceritanya, kalau Indonesia tidak suka soal cerita. Jadi langsung to the point. Di Australia kebanyakan soal cerita, di Turki soalnya kebanyakan olimpiade. Jadi saya bingung. Soal yang kelas tengah-tengah itu mengambil dari yang namanya “o level” dari Singapura. Tapi itu juga kerendahan, jadi memang susah.*

8. Ada berapa buku panduan yang Bapak/Ibu gunakan dalam mengajar?

*Saya buat modul sendiri. Ya paling tiga dari Australia, Singapura terus Turki.*

9. Kendala apa saja yang Bapak/Ibu temui dalam mempelajari terminologi/istilah matematika?

*Banyak. Banyak yang kita tidak tahu. Guru-guru bahasa Inggrisnya pun tidak tahu. Contoh misalnya, statistik lima serangkai. Ya itu guru bahasa Inggris tidak tahu, saya mencari tidak ketemu. Tapi akhirnya saya menemukan di buku milik Singapore, five based statistic. Jadinya kan meleset jauh, bahkan teman-teman yang non matematika sering menggunakan translate google ya.*

*Tapi itu masalah, menjadi bahan tertawaan anak. Contohnya jari-jari, dalam fisika itu kan harusnya “radius” tapi di situ “finger-finger”.*

10. Bagaimana cara Bapak/Ibu mengatasi kendala tersebut?

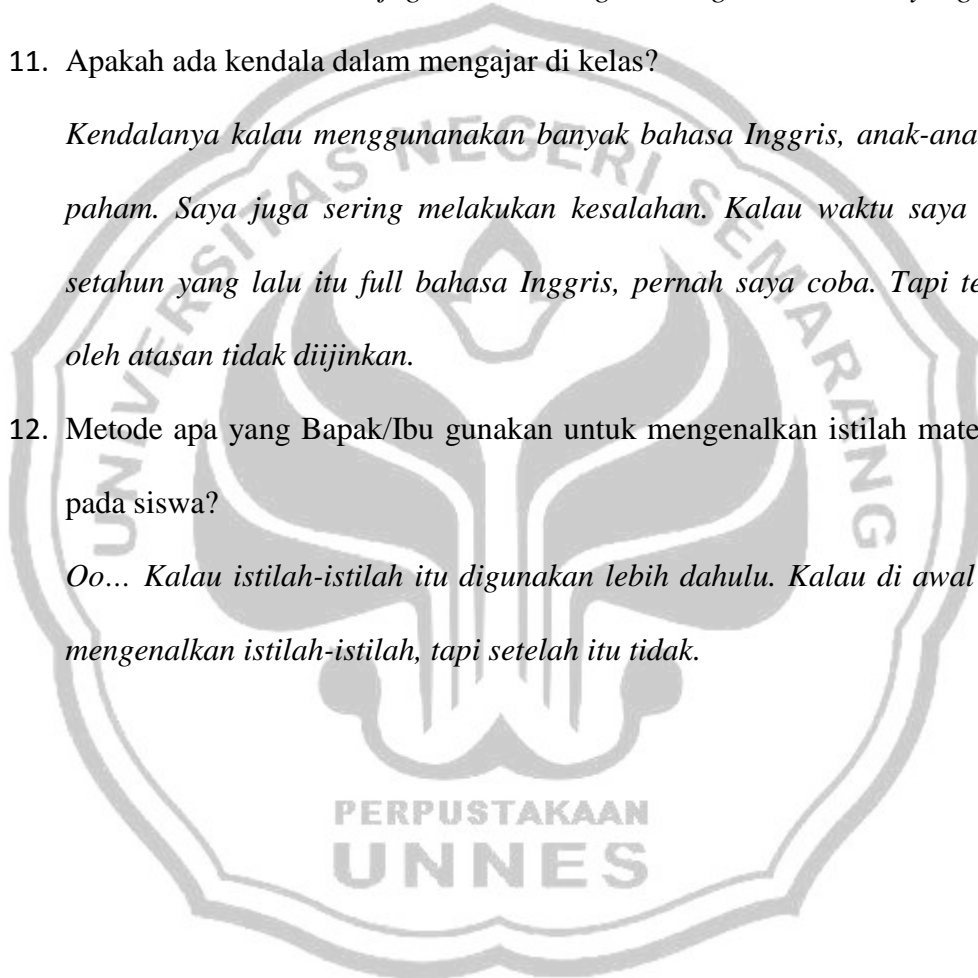
*Ya cara mengatasinya harus sering cari istilah matematika dimana saja. Nanti baru menemukan, juga membandingkan dengan buku-buku yang ada.*

11. Apakah ada kendala dalam mengajar di kelas?

*Kendalanya kalau menggunakan banyak bahasa Inggris, anak-anak tidak paham. Saya juga sering melakukan kesalahan. Kalau waktu saya ngajar setahun yang lalu itu full bahasa Inggris, pernah saya coba. Tapi ternyata oleh atasan tidak diijinkan.*

12. Metode apa yang Bapak/Ibu gunakan untuk mengenalkan istilah matematika pada siswa?

*Oo... Kalau istilah-istilah itu digunakan lebih dahulu. Kalau di awal paling mengenalkan istilah-istilah, tapi setelah itu tidak.*



**Teacher B**

1. Apakah Bapak/Ibu pernah mengikuti pelatihan bahasa Inggris?

*Sudah*

2. Berapa kali Bapak/Ibu mengikuti pelatihan?

*Sekali*

3. Siapakah yang memberi pelatihan?

*LIA*

4. Apa saja yang diajarkan dalam pelatihan yang Bapak/Ibu ikuti?

*Grammar. Kami juga diminta untuk menampilkan pelajaran dalam bahasa Inggris.*

5. Darimana Bapak/Ibu mendapat bahan ajar?

*Dari buku dan kadang download dari internet, disesuaikan dengan silabi.*

6. Apakah Bapak/Ibu mempunyai kesulitan mendapatkan bahan ajar?

*Ya ada, tapi dengan google translate itu sangat membantu.*

7. Sebelum mengambil bahan ajar dari buku atau internet apakah Bapak/Ibu mengoreksinya terlebih dahulu?

*Sudah kami sesuaikan dengan materi lalu kita bikin power point.*

8. Ada berapa buku panduan yang Bapak/Ibu gunakan dalam mengajar?

*Saya ada tiga, salah satunya pakai bahasa Indonesia.*

9. Kendala apa saja yang Bapak/Ibu temui dalam mempelajari terminologi/istilah matematika?



*Ya memang ada kendala tapi kita tertolong dengan internet. Kemarin kita ngomong dengan guru bahasa Inggris tapi matematikanya tidak nyambung gitu, tidak bunyi.*

10. Bagaimana cara Bapak/Ibu mengatasi kendala tersebut?

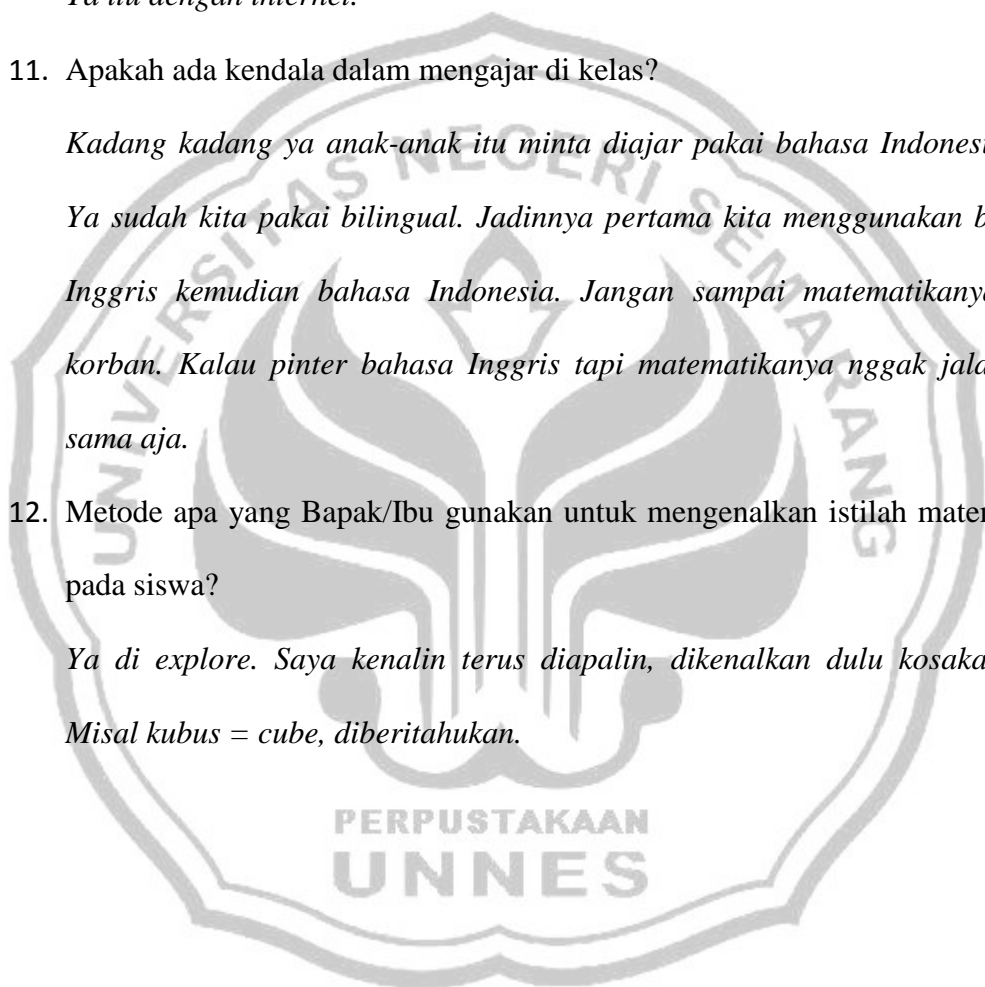
*Ya itu dengan internet.*

11. Apakah ada kendala dalam mengajar di kelas?

*Kadang kadang ya anak-anak itu minta diajar pakai bahasa Indonesia aja. Ya sudah kita pakai bilingual. Jadinnya pertama kita menggunakan bahasa Inggris kemudian bahasa Indonesia. Jangan sampai matematikanya jadi korban. Kalau pinter bahasa Inggris tapi matematikanya nggak jalan kan sama aja.*

12. Metode apa yang Bapak/Ibu gunakan untuk mengenalkan istilah matematika pada siswa?

*Ya di explore. Saya kenalin terus diapalin, dikenalkan dulu kosakatanya. Misal kubus = cube, diberitahukan.*



## APPENDIX 3

### STANDAR KOMPETENSI DAN KOMPETENSI DASAR

Mata pelajaran : Matematika

Jenjang sekolah : SMA/MA

Kelas/Semester : X/1

Standar kompetensi	Kompetensi dasar
<b>Aljabar</b> 1. Memecahkan masalah yang berkaitan dengan bentuk pangkat, akar, dan logaritma	1.1 Menggunakan aturan pangkat, akar, dan logaritma
	1.2 Melakukan manipulasi aljabar dalam perhitungan yang melibatkan pangkat, akar, dan logaritma
2. Memecahkan masalah yang berkaitan dengan fungsi, persamaan dan fungsi serta pertidaksamaan kuadrat	2.1 Memahami konsep fungsi
	2.2 Menggambar grafik fungsi aljabar sederhana dan fungsi kuadrat
	2.3 Menggunakan sifat dan aturan tentang persamaan dan pertidaksamaan kuadrat
	2.4 Melakukan manipulasi aljabar dalam perhitungan yang berkaitan dengan persamaan dan pertidaksamaan kuadrat
	2.5 Merancang model matematika dari masalah yang berkaitan dengan persamaan dan/atau fungsi kuadrat
	2.6 Menyelesaikan model matematika dari masalah yang berkaitan dengan persamaan dan/atau fungsi kuadrat dan penafsirannya
3. Memecahkan masalah yang	3.1 Menyelesaikan sistem persamaan linear

berkaitan dengan sistem persamaan linear dan pertidaksamaan satu variabel	dan persamaan campuran linear dan kuadrat dalam dua variabel
	3.2 Merancang model matematika dari masalah yang berkaitan dengan sistem persamaan linear
	3.3 Menyelesaikan model matematika dari masalah yang berkaitan dengan sistem persamaan linear dan penafsirannya
	3.4 Menyelesaikan pertidaksamaan satu variabel yang melibatkan bentuk pecahan aljabar
	3.5 Merancang model matematika dari masalah yang berkaitan dengan pertidaksamaan satu variabel
	3.6 Menyelesaikan model matematika dari masalah yang berkaitan dengan pertidaksamaan satu variabel dan penafsirannya