CURRENT PRACTICES AND ISSUES OF TEACHING AND LEARNING BIOLOGY USING ENGLISH AT PILOT INTERNATIONAL STANDARD SCHOOLS IN INDONESIA

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

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ABSTRACT

This study aimed at examining the current practices and issues of Biology teaching and learning using English at seven Pilot International Standard School (PISS) in South Sumatra Province, Indonesia. The study also focus on language and learning resources, teacher's problems, student's perceptions on learning of Biology using English, and application of effective Content Language Integrated Learning (CLIL) pedagogy using the Second Language Acquisition (SLA) penta-pie tool. This study employed qualitative approach in the form of naturalistic inquiry supported by qualitative and quantitative data. The qualitative data were obtained from individual and focus group interviews among seven teachers, 21 groups of five students, seven headmasters, and six program coordinators who were selected purposively. Data were collected from classroom observations on 21 Biology lessons and documents used during teaching and learning. Interview data on problems of teaching and learning of Biology using English were analyzed using thematic analysis. Quantitative data were collected using the Views of Teaching Biology Through English (VoTBE) questionnaire administered to 633 students selected by purposive sampling. Questionnaire data were analyzed descriptively using SPSS 16.0.version. The findings showed the average percentage of teachers and students talk using English during teaching and learning was 21.7 % and 10.9 % respectively. Additionally, most teachers used Power Point slides followed by videos as learning resources. The lack of English proficiency and government's support on teacher's professional development were found as the main problems faced by teachers in implementing the PISS program. The students view that joining English courses, using various teaching strategies and learning resources and also support from parents were strongly needed to learn Biology using English. The teachers were mainly focused on the meaning focused-processing category of the SLA penta-pie. They barely applied the other categories of the SLA penta-pie when conducting lessons, and hence did not implement an effective CLIL pedagogy. In conclusion, teachers had not fulfilled the requirements specified in the PISS program guideline especially English competency and proficiency, as well as the use of Information and Communication Technology (ICT)-based teaching and learning resources. The implication of this study suggests that effective practice of teaching and learning of Biology using English must be through continuous teacher's professional development.

AMALAN SEMASA DAN ISU PENGAJARAN DAN PEMBELAJARAN BIOLOGI MENGGUNAKAN BAHASA INGGERIS DI SEKOLAH RINTIS STANDARD ANTARABANGSA DI INDONESIA

ABSTRAK

Kajian ini bertujuan untuk mengkaji amalan semasa dan isu pengajaran dan pembelajaran Biologi menggunakan bahasa Inggeris di tujuh buah Sekolah Rintis Standard Antarabangsa (PISS) di wilayah Sumatera Selatan, Indonesia. Kajian ini juga memberi tumpuan kepada bahasa dan media yang digunakan dalam perlaksanaan pengajaran dan pembelajaran, masalah-masalah guru, persepsi pelajar terhadap pembelajaran Biologi menggunakan Bahasa Inggeris dan pedagogi Pembelajaran Integrasi Konten dan Bahasa (CLIL) berkesan menggunakan alat penta-pie Pemerolehan Bahasa Kedua (SLA). Kajian ini menerapkan pendekatan kualitatif dalam bentuk kajian naturalistik yang disokong oleh data kualitatif dan kuantitatif. Data kualitatif dikumpul daripada temu bual individu dan kumpulan berfokus dalam kalangan tujuh orang guru, 21 kumpulan pelajar, tujuh orang guru besar dan enam penyelaras program yang dipilih secara bertujuan. Data dikumpul melalui pemerhatian di bilik darjah terhadap 21 sesi pengajaran Biologi dan dokumen yang digunakan semasa pengajaran dan pembelajaran. Data temu bual mengenai masalah pengajaran dan pembelajaran Biologi menggunakan bahasa Inggeris dianalisis dengan menggunakan analisis tematik. Data kuantitatif dikumpul menggunakan soal selidik Pandangan Terhadap Pengajaran Biologi melalui Bahasa Inggeris (VoTBE) yang ditadbirkan ke atas 633 orang pelajar yang telah dipilih secara persampelan bertujuan. Data soal selidik dianalisis secara deskriptif menggunakan persisian SPSS Versi 16.0. Dapatan kajian menunjukkan purata peratusan komunikasi guru dan pelajar menggunakan Bahasa Inggeris semasa pengajaran dan pembelajaran adalah masing-masing 21.7 % dan 10.9 %. Kebanyakan guru menggunakan slaid Power Point diikuti video sebagai bahan pengajaran. Kekurangan penguasaan Bahasa Inggeris dan sokongan kerajaan terhadap pembangunan profesional guru didapati sebagai masalah utama yang dihadapi oleh guru-guru dalam melaksanakan program PISS. Pelajar berpendapat bahawa bergabung dengan kursus bahasa Inggeris, penggunaan strategi mengajar dan bahan pengajaran yang bervariasi serta sokongan orangtua sangat diperlukan untuk pembelajaran Biologi menggunakan Bahasa Inggeris. Guru-guru memberikan fokus utama kepada kategori pemprosesan fokus-makna pada SLA penta-pie. Mereka jarang mengaplikasi kategori-kategori lain pada SLA penta-pie semasa melaksanakan pengajaran dan seterusnya tidak melaksanakan pedagogi CLIL berkesan. Kesimpulannya, guru belum melengkapkan keperluan yang dinyatakan dalam garis panduan program PISS terutamanya kemahiran dan kecekapan Bahasa Inggeris serta penggunaan sumber pengajaran dan pembelajaran berasaskan teknologi maklumat dan komunikasi (ICT). Implikasi kajian ini mencadangkan bahawa amalan pengajaran dan pembelajaran Biologi menggunakan Bahasa Inggeris berkesan haruslah melalui pembangunan profesional guru yang berterusan.

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LIST OF ABBREVIATIONS

BI	Bahasa Indonesia (Indonesian Language)
BPPN BPS	The National Development Planning Agency Central Bureau of Statistics
BPS SUMSEL	The Central Statistics Agency of South Sumatra Province
BSNP	Badan Standar Nasional Pendidikan (Board of National Education Standards)
CEFR	Common European Framework of Reference
CIE	Cambridge International Examination
CKI	Cohen's Kappa Index
CLIL	Content Language Integrated Learning
CS	Code-switching
Depdiknas	Departemen Pendidikan Nasional (Department of National Education)
Dirjen Dikdasmen	Direktorat Jenderal Pendidikan Dasar dan Menengah (Directorate General of Primary and Secondary Education)
EMI	English Medium of Instruction
HOTS	Higher Order Thinking Skills
ICT	Information Communication and Technology
IELTS	International English Language System
IPA	Ilmu Pengetahuan Alam (Natural Science)
ISS	International Standard School
Kemendiknas	Kementerian Pendidikan Nasional (Ministry of National Education)
KTSP	Kurikulum Tingkat Satuan Pendidikan (School Based Curriculum
LPTK	Lembaga Pendidikan Tenaga Kependidikan (School of Teacher Training and Education)
MGMP	Musyawarah Guru Mata Pelajaran (Subject Teacher Association)

MoNE	Ministry of National Education
MORA	Ministry of Religious Affairs
MoU	Memorandum of Understanding
NDE	National Department of Education
NES	National Education Standards
OECD	Organization for Economic Co-operation and Development
PIMSTE	Program of International Mathematics and Science Teacher Education
PISA	Programme for International Student Assessment
PISS	Pilot International Standard School
RPJPN	Rencana Pembangunan Jangka Panjang (National Long-Term Development Plan)
RSBI	Rintisan Sekolah Bertaraf Internasional (Pilot International Standard School)
SAVI	Somatic, Auditory, Visual and Intellectual
SBC	School-Based Curriculum
Sisdiknas	Sistem Pendidikan Nasional (The National Education System)
SLA Penta-Pie	Second Language Acquisition Penta-Pie
SMPN	Sekolah Menengah Pertama Negeri (Public Junior High School)
SMAN	Sekolah Menengah Atas Negeri (Public Senior High School)
SMK	Sekolah Menengah Kejuruan (Vocational High School)
SNP	National Education Standard
STA	Subject Teacher Association
SPSS	Statistical Package for the Social Sciences
TOEFL	Test of English as a Foreign Language
TOEIC	Test of English in Communication
ZPD	Zone of Proximal Development

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Education has an important role to develop a country. To make it better, the Indonesian government has many innovations to improve the quality of education in producing qualified students to continue to higher and better education. One of the innovations made by the government was to develop the International Standard School (ISS) program. It is the implementation of the law of the National Education No 20 Year 2003 (*Republik Indonesia*, 2003), making it compulsory for each region to have ISS program. This law covers all aspects of the Indonesian education system, including its functions and aims, the rights and obligations of learners, parents, community and government; the pathways, types and levels of education; the curriculum; the medium of instruction; the national education standards; educational facilities and equipment; evaluation, accreditation and certification; and supervision.

In South Sumatera, one of the 34 provinces in Indonesia, the ISS program was started in 2006. From the year 2006 to the year 2012, out of 17 Regents and Cities, there were 10 schools designated by Ministry of National Education (MoNE) to implement the PISS program. After several years of the implementation, some issues arisen which lead to do this current study.

This chapter presents a brief explanation on the background of the study, followed by statement of problems. Next, the purposes of the study are explained followed by the research questions, and significance of study is defended. This chapter further discusses the theoretical framework for this study and the justifications for limitations of this study. Definitions of terms used in this study were also explained, ending with a summary of the chapter.

1.2 Background of the Study

As the government attempts to improve the quality of the national education, the *Republik Indonesia* (2010) has documented three strategic plans to namely (1) increase access and equity of compulsory education, (2) improve quality, efficiency, relevance, and competitiveness, and (3) improve management, accountability to ensure the government transparency.

In response to these strategic plans, the Indonesian government has established the ISS program for both public and private schools at the elementary and secondary

levels of education, mandating the implementation in every regencies and cities that fulfill the selection criteria.

One reason for the initiation of the ISS program is globalization. The era of globalization requires strong competitiveness in technology, management and human resources. In the ISS program for instance, excellence in management can influence and determine whether or not a school that performs and excellence in human resources high competitiveness at the international level possesses its own advantages in this era of globalization (*Republik Indonesia*, 2009).

The influence of globalization, which is mainly based on Information Communication and Technology (ICT) developments and steps toward a global economic system, demands the use of English as the main language of communications between nations. Indonesia can be a developed nation by being able to interact with other countries and create innovations in technology through education. This era of globalization implies that the system needs to provide knowledgeable, innovative, and creative human resource.

Another reason for the introduction of the ISS program is the quality of the Indonesian education which is still left behind other developed countries. The findings of the 2009 Program for International Student Assessment (PISA) survey showed that, in reading ability, out of 64 countries Indonesia comes at 56th place. While in Mathematics and Science, Indonesia was at 59 th place (OECD, 2010).

Based on the justifications given above, the government of Indonesia had to reform the education system to produce students that are able to compete with their peers among the developed countries (Kustulasari, 2009). That is why the government implemented the ISS program at all levels of education.

Implementation of the ISS program started in 2006. The Law of National Education No 20 Year 2003 (*Republik Indonesia*, 2003) has mandated the establishment of international standard education, with the purpose of preparing students to compete globally. In addition to the law, the ISS program was governed by several government regulations namely the *Peraturan Menteri Pendidikan Nasional* RI No 19 Year 2005 (*Republik Indonesia*, 2005a) on National Education Standards (NES) and the *Peraturan Menteri Pendidikan Nasional* RI No 78 Year 2009 (*Republik Indonesia*, 2009a) which was about operational regulations of the ISS program.

In order to achieve the ISS status, the government introduced the Pilot International Standard School (PISS) program at primary and secondary education all over Indonesia. It is a requirement for schools to fulfill the criteria to be selected to implement the PISS program before qualifying to the ISS status. Achieving the PISS status was not an end in itself but a transition process whereby good regular schools were identified to receive special treatment in order to achieve or be certified as ISS schools.

The PISS program requires the incorporation of an international standard curriculum adopted from the Organization for Economic Cooperation and

Development (OECD) member countries. In addition, the program also requires the use of English as the Medium of Instruction (EMI) in the teaching of content subjects such as Mathematics and Science (Biology, Physics, and Chemistry). In this present study the science subject referred to Biology taught at the secondary level (class 10-12) among 16-18 year old.

Since PISS program is a new innovation in the Indonesia education system, the implementation was faced with several problems and challenges. The use of English in the teaching and learning processes for instance, is one of the main barriers. Other concerns raised by the public concerning the PISS program includes funding, support, resources and teacher training which lead to the current study and a more detailed explanation surrounding the issues are explained in the next section of this chapter.

1.3 Context for the Current Study

The Republic of Indonesia is one of the Southeast Asian countries. The country is a highly-diverse island archipelago consisting of around 17508 islands along the equator between Asia and Australia. The five principal islands are Sumatera, Java, Kalimantan, Sulawesi and Papua (the western part of New Guinea island). It has a population of 255,461 million (*Badan Pusat Statistik*, 2015) that comprises about 3000 ethnic groups. The national language is *Bahasa Indonesia* (BI), but about 7 000 different regional languages are spoken in Indonesia, eight of which are considered major ones namely Javanese, Sundanese, Madurese, Batak, Minang, Balinese, Bugis,

and Banjar. These local languages are mainly used as effective communication tools in everyday life. Despite the huge size of Indonesia and ethnic diversity, language barriers do not exist among the people. This is due to the fact that BI has been accepted by all the citizens as the national language while English is considered as a foreign language. Article 33 of *Undang-Undang* No. 20 Year 2003 (*Republik Indonesia*, 2003) specifies that BI as the language of the nation shall be the medium of instruction in the national education. However, local languages can be used as a medium of instruction in the early stages of education if needed in the delivery of a particular knowledge and skills.

Considering the size and population of Indonesia, the education system is very complex. With over 60 million students and almost four million teachers in some 340 000 educational institutions, it is the third largest education system in the Asia region and the fourth largest in the world, after the People's Republic of China, India and the United States (OECD/Asian Development Bank, 2015).

Prior to independence, Indonesia had three kinds of education: Dutch government schools, indigenous secular schools and religious schools. The government schools were established to facilitate a proper education for Dutch children and indigenous elites, while indigenous secular schools were established by local activists to provide access to education for less privileged indigenous Indonesians. These secular schools instilled a spirit of nationalism into young people. Religious schools were established with the aim of maintaining religious values in society. Following independence in 1945, the Indonesian government adopted the secular system as the country education system, but also retained religious schools.

This was considered important because during the early post-independence era there was intense debate over various issues, including whether the country should be based on religion or should be secular. Likewise, there was a rigorous debate over the place of religious education in Indonesia. To satisfy the education demands of all major groups, the country established two parallel structures of education management: the MoNE and the Ministry of Religious Affairs (MoRA).

Based upon *Undang-Undang* No 20 Year 2003 on the National education system (*Republik Indonesia*, 2003), education in Indonesia is defined as a planned effort to establish a conducive environment and an educational process so that students actively develop their own capability in gaining religious and spiritual awareness, consciousness, personality, intelligence, behavior and creativity of the citizens.

According to *Undang-undang* No 20/ 2003, there are three different pathways for Indonesian citizen to gain educational qualification: formal, non-formal and informal schooling. The schooling system comprises primary, secondary, and higher education levels. Formal and non-formal schools are established and operated either by the government or private organizations while informal education is run by the community. The MoNE and MoRA are responsible for managing education in Indonesia. Figure 1.1 shows the structure of the current Indonesian Education System at the early childhood, primary and secondary levels.

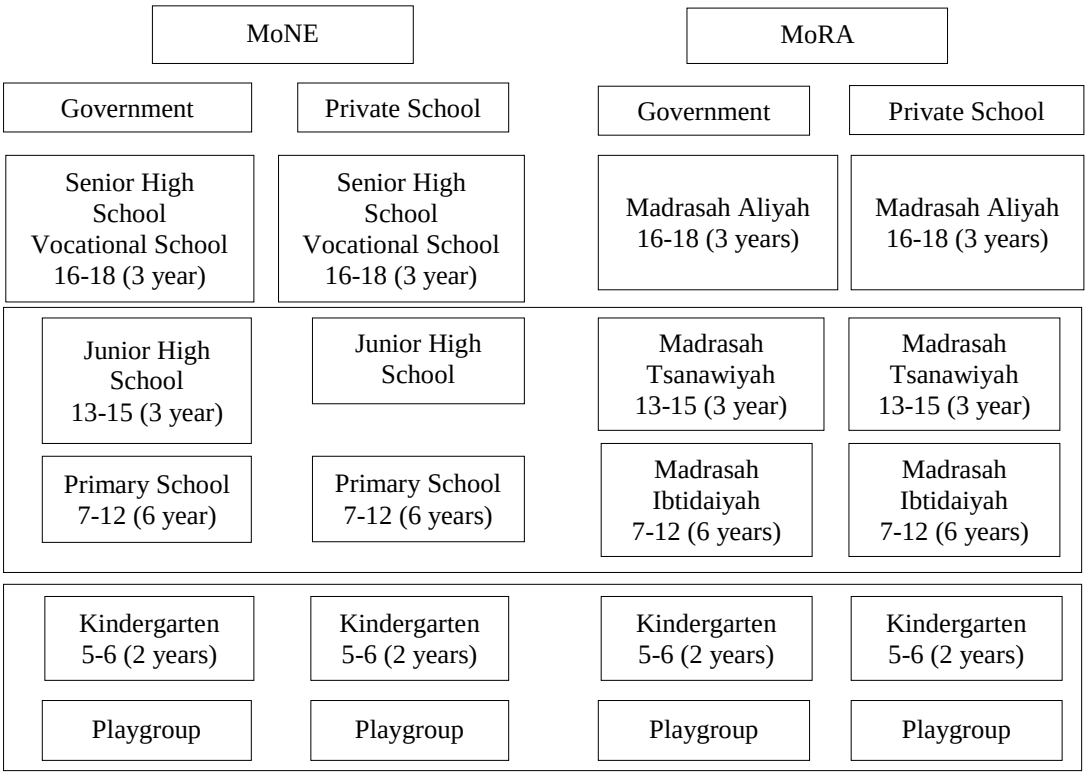

Figure 1.1. Indonesian Formal Primary and Secondary Education Levels
Source: UNESCO Asia and Pacific Regional Bureau for Education (2010)

From Figure 1.1, it can be clearly seen that MoNE is solely responsible for managing public and private non-religious schools from pre-school to senior high school, meanwhile MoRA manages religious education at all levels of education. In terms of the number of schools managed by the two ministries, OECD/Asian Development Bank, (2015) reported that 84% of the schools in Indonesia are under the MoNE and the remaining 16% are under MoRA.

Pre-school is provided for children from four to six years old for a one to two years period of education, while play group is attended by children ages 3 years and below. Pre-school education aims at stimulating physical and mental growth of students outside the family circumstances before entering primary education. The objective of the pre-school education is to provide an early basis for growth and

development of attitudes, knowledge, skills and creativity. Among the types of early years education available are kindergarten and play groups. The majority of kindergartens (99.4%) are privately operated, while others are under the government.

Primary schooling on the other hand, is provided for children age seven to twelve years old for a period of six years. After completing the primary level, students ages 13 to 15 enter junior high school. Since 1994, these two levels of education is called the basic education which has been declared as a nine-year compulsory education as stated in the *Undang-Undang* No 20 Year 2003 (*Republik Indonesia*, 2003). The goal of basic education is to provide the students with basic skills to develop themselves as responsible individuals, good citizens as well as to prepare them to pursue their study into general senior high school or vocational senior high school.

Senior high school is provided for students' ages 16 to 18 over a three years period. There are two kinds of senior high school namely general senior high school and vocational senior high school. Senior high school is made available to provide students a chance to expand their knowledge and develop life skills. In addition, the senior high school level is also intended to prepare students to continue their studies into the tertiary level of education. Meanwhile students in vocational senior high school (*Sekolah Menengah Kejuruan*/SMK) are prepared to be ready for work after completing their studies.

In order to increase the quality of the Indonesian education, the *Republik Indonesia* (2009) categorizes schools into three types namely Standard Schools,

Independent Schools, and ISS. The discussion that follows provides information of these types of school. Based on *Undang-Undang* No. 20 Year 2003 (*Republik Indonesia*, 2003) on the national education system Article (2) and (3) explain the basic functions, and national education goals. The government categorizes schools based on the NES. NES covers eight standards for Indonesian education: *Standar kompetensi lulusan* (graduate competency standard), *Standar isi* (contents standard), *Standar proses* (process of teaching and learning standard), *Standar pendidik dan tenaga kependidikan* (teacher and support staff standard), *Standar sarana dan prasarana* (facilities standard), *Standar pengelolaan* (management standard), *Standar pembiayaan* (budgeting standard), and *Standar penilaian* (assessment and evaluation standard) (*Republik Indonesia*, 2005a). The NES functions as minimum criteria to be fulfilled by schools at all levels of education. With regard to the three types of schools, the explanation for each type is explained further.

Standard schools are schools which have shortcomings to meet the criteria of the NES. Generally, the standard schools are in remote areas and can only meet a few of the NES standards in terms of contents, and process of teaching and learning. The shortcomings to meet the NES standards were caused by problems in relation to the infrastructure, resources and teacher training that impacted the quality of learning and students' achievements.

Basically, the standard schools can be upgraded to independent schools if all eight standards of the NES are fulfilled. Schools are encouraged to use the Strength, Weakness, Opportunity, and Threat (SWOT) analysis along with the formulation of clear targets to become independent schools. They should be able to implement and

manage learning using credit semester system. This means that the quality of education in independent schools is nationally competitive. By meeting eight standards of the NES, independent schools can apply to achieve PISS status.

PISS as schools similar to independent schools must meet all eight standards of the NES and also apply the credit semester system. In order to increase the competitiveness, PISS need to identify a sister school from any developed OECD countries which is at par with them. In addition, performance indicator such as ICT-based administration and implementation of EMI practice in Mathematics and Science subjects (Biology, Physics and Chemistry) are also required.

In relation to the teaching and learning process, there were two compliances that have to be accomplished namely EMI and incorporation of ICT (*Republik Indonesia*, 2009). The aim of introducing EMI in the PISS program is to promote English language learning. The reason for this is Indonesia does not want to be left behind in terms of English proficiency because it is increasingly important to compete in the 21st century. In addition, the PISS program is intended to produce students with appropriate competency standards which is at par with the sister school from the list of accredited schools in the OECD member countries. Moreover, this program is intended to produce students with the ability to exhibit excellence at the local international levels. The program also enables students to have the ability to compete in international competitions and later secure jobs overseas and possesses a broader perspective of the world in terms of the economic, social, cultural and environmental aspects. The PISS program also strives to develop students' ICT skills through the teaching and learning Mathematics, Physics, Chemistry and Biology with EMI. In

addition the PISS program required students to take the Cambridge examination and upon successful fulfillment of input, process and education result the schools implementing the PISS program were awarded certification from one of the OECD member countries. It is for these requirements this study is intended to investigate the use of EMI and ICT based learning resources in Biology lesson.

1.4 Statement of the Problem

The learning process in Biology at secondary education implementing the PISS program had been implemented in several Indonesian schools. It was introduced in 2006, when The MoNE, through its *Direktorat Jenderal Pendidikan Dasar dan Menengah* initiated the PISS program. Out of 450 schools that met the requirements, 112 were selected and then established as PISS, 10 of them were secondary schools in South Sumatera (*Republik Indonesia*, 2009).

The implementation of the PISS program had recently raised public polemics. Strong objections came from educators, social media, parent-teacher associations, and parents themselves. Issues raised includes the vagueness of the legal basis of the program, readiness in terms of the implementation of the program, lack of transparency in financial management, high-costs of such schools, lack of human resources, and the existing competencies of the teachers and students (Zamjani, 2011). Hence, it can be seen that the MoNE did not have a comprehensive plan before embarking on the PISS program. It is for this reason, the current study is undertaken

to investigate some of the issues that contribute to the issues regarding the PISS program.

After several years of implementing the PISS program, there were issues concerning the proficiency of teachers which received serious attention by the MoNE. Statements were made in the newspapers concerning teachers' competencies in conducting the teaching and learning process through English which demanded the MoNE to strategically initiate policies in solving the problem and bringing success to the implementation. However, Sumintono, Zunia & Siti (2013) argued that there was a lack of availability of clear policy details about EMI from the MoNE which contributed to the occurring of the problems. There are several research on the implementation of the PISS program which showed the gap between the compliances and the actual practices. In terms of the PISS policy, Zamjani (2011), Sumintono, Zunia & Siti (2013), and Ipnugraha (2013) reported that there were so many problems surrounding the PISS program. In terms of language use in the teaching and learning process, there were problems about teacher capability in using English. Teachers lack English proficiency including pronunciation, grammar, and also vocabularies (Harsuciningsih, 2009; Fitriati, 2010; Sari, 2010; Setyorini & Ahmad, 2011; Astika & Anton, 2012; Hidayat & Mirjam, 2012; Puspitaningsih, 2013; Masruroh, 2012). Moreover, Haryanto (2012) reported that administrators in the PISS program moderately agreed with the use of EMI. This indicated that the administrators admitted that the teachers did not fully used English as the medium of instruction because they were not proficient in the language. Most of the studies were independent cases.

The effectiveness of the use of EMI in the PISS program was faced with problems related to students' and teachers' English proficiency. Vizconde (2006) and Ya (2006) found out that the use of EMI affected the strategies/approaches teachers used. This was supported by other studies on the PISS program which showed that most of the teachers were lacking in terms of English proficiency (Kustulasari, 2009; Coleman, 2010; Sundusiyah, 2010; Haryanto, 2011 & Sultan, Helen & Bill, 2012). In addition, evidence from the Test of English as Foreign Language (TOEFL) conducted on 260 officers involved in the PISS programs showed that the headmasters scored less than 245 out of the maximum score of 600. Furthermore, Sultan, Helen & Bill (2012) reported that, only ten percent achieved good results while International English Language Testing System (IELTS) test results for PISS teachers showed that 80% scored between 2.5 – 3.5 from a maximum score of 7.0, while only 20 % scored 4.0 – 4.5.

Similarly, the Coleman (2007) reported that the Test of English in Communication (TOEIC) results among the PISS headmasters and teachers showed that only 32.1 % are at the elementary level while 51 % of the headmasters are at the novice level. If headmasters are not proficient in using English, they cannot give advice or feedbacks to teachers to do corrections for their teaching practices in terms of English used during lessons. Another study by Hadisantosa et al. (2010) on the TOEIC test showed that 40% of the Mathematics and Science teachers are at the novice level while 36% were at the elementary level. These studies indicate that there were still problems and discontent of the teachers who do not know exactly how to conduct teaching and learning Mathematics and Science content using EMI nor do the students understand the most effective way to learn the content subject through

English throughout the period of implementation. There was a doubt whether the teachers were able to adapt with the language changes after a long time using only BI in teaching Biology subjects and suddenly have to use EMI. Hence this study was conducted to investigate the use of EMI in teaching and learning of Biology and identify problems encountered during the teaching and learning process.

The poor results of the TOEFL, IELTS and TOEIC tests posed serious problems in the teaching and learning of Mathematics and Science in the PISS program because the results of standardized tests do not even meet the minimum requirements for competency in English. The teachers and headmasters poor command of the English language will affect the teaching and learning process and finally cause poor students' achievements. Findings from other researchers from countries other than Indonesia also indicated that the use EMI has failed to facilitate the learning of the Mathematics and Science especially in comprehending the scientific and non-scientific terms (Hashimah Zubir, 2003; Saidi Samsudin & Zurida Haji Ismail, 2004; Isahak, et al., 2008). More specifically, Sopia, Md Yassin et al. (2010) conducted a study to find out the levels of cognitive processes students were engaged with during lessons. She found out that most students (98.8%) were engaged at lower cognitive levels (remembering and understanding) of the Revised Bloom Taxonomy. In another study by Nordin (2005) on the teaching of Mathematics and Science using English, unfamiliarity of concepts being taught to students were observed and influenced their understanding. Meanwhile, Crandal cited by Tan (2011) showed that the mastery of language of mathematical and scientific terms became more complicated when the students were learning these subjects in their second

language. Hence part of this study is to determine problems faced by teachers, students, headmasters, and program coordinators in implementing the PISS program.

Another key characteristic of the PISS program (*Republik Indonesia*, 2009) is the implementation of the international curriculum standards used by any of the developed OECD countries. However, there were no specific guidelines for the PISS program in selecting and implementing the international curriculum standard of the chosen country. Kustulasari (2009) stated that to enrich the standard related to content of the NES, the PISS Program is allowed to choose whether to adapt or adopt the curriculum from the OECD countries. Unfortunately, there was no clear explanation on how the adaptation or adoption should be carried out. The only instruction found in relation to this matter is that the adaptation/adoption must not be against the national *Pancasila* principles. Because of the absence of a clear guideline, the implementation of the PISS program were not uniform and let to some schools failing to fulfill the PISS program requirements.

The government disbursed grants to help teachers develop learning tools, providing English courses, and sending teachers to foreign countries to gain experiences of teaching and learning Science and Mathematics. In addition, schools received assistance of ICT equipments to facilitate the teachers in implementing ICT-based learning. However there were still doubts as to whether the teachers were able to implement the outcomes of the training. Because of the limited funding allocated for professional development on English and use of ICT, the focus of this study was also to investigate the use of ICT based learning resources by the PISS teachers in South Sumatera Province. This study wants to investigate whether there was a gap

between the compliances of the PISS program and the actual practices in the classroom settings. Having a broader research location, the findings of the study would be beneficial for the educational policy makers at the provincial level because this is in line with *Undang-Undang* No 32 Year 2004 on the autonomy of local government (*Republik Indonesia*, 2004) which states that local government has a right to manage the educational needs of its own province.

As the PISS program in South Sumatera was at the beginning stage, and considering the problems encountered, it is important to determine the problems faced by teachers in the teaching and learning of Biology through English. Teachers have a significant role in the teaching and learning process, particularly when delivering and explaining new concepts. Hence, an effective use of the language is crucial because if teachers are not competent in mastering the language, misunderstanding of Biology concepts can happen.

There are several factors that affect student learning. In terms of Biology learning, some researchers identified factors that affect students' interest namely 1) curriculum content; students' interest in learning Biology was affected by the curriculum content. Students' diminishing interest in learning was due to the overloaded curriculum content and not related to working life (Osborne & Collins (2001); 2) classroom learning environment; this factor is closely related to students' perceptions and their success (Fraser, 1998); 3) the nature of Biological science which is generally more on memorization of abstract concepts, events, and facts, therefore making students difficult to understand (Saka, 2006; Durmaz, 2007); 4) teaching methods and techniques employed by teachers during teaching; when students are not

comfortable with the methods that Biology was taught, they become disinterested and showed negative attitudes toward Biology and its teaching (Çimer, 2004). In addition, there is a crucial factor that negatively affects students' learning. Understanding students' perceptions on what makes their Biology learning effective is critical, as many researchers suggest that in order to improve the quality of teaching and learning in schools, students' views must be taken into consideration by researchers, teacher educators, schools and teachers (Çimer, 2004; Ekici, 2010). They argue that what students say about teaching, learning and schooling is not only worth listening to but provides an important foundation for thinking about ways of improving teaching and learning. For instance, Phoenix (2000) stated that students' views of teaching reflected the ways they learn best. Indeed, schools that acknowledged the significance of students' views have found that these views can make a meaningful contribution to classroom management, learning and teaching, and the school as a social and learning place (Macbeath et al., 2000). Therefore, understanding students' views of Biology teaching and learning will help teachers, policy makers and teacher educators arrange more effective teaching activities to help students learn Biology better, hence students will have positive attitudes toward Biology.

During the teaching and learning process in a classroom, teachers interact with students using language as a tool for communication. The students perceive things differently from teachers. Teachers expect to meet the needs of all students. However, the heterogeneous mixing of student population in terms of their language proficiency challenges teachers with different needs of the students. In order to alter the way teachers interact with students, teachers need to have information relating to new innovative program implemented in their schools. What the students' perceptions on

teaching strategies and their understanding of new approaches and its implementation are also considered to be worthwhile addressing because what they perceived influences the role they play in the classrooms. Therefore, one of the purposes of the current study is to determine the students' perceptions toward the teaching and learning of Biology through English. This will provide a knowledge base for policy-makers and teacher educators in the implementation of the new innovation in teaching and learning of Biology. Understanding students' views on the benefits of teaching and learning Biology through English, students' understanding when teaching and learning Biology through English, usage of English, teacher strategies, and supports to learn of Biology through English, facilitate the implementation of the new curriculum and help policy-makers and teachers to update it in line with students' learning needs. Additionally, teachers can see their weak and strong areas regarding teaching Biology through English which is not their mother tongue.

Teaching of Biology through English under the PISS program is considered similar to Content Language Integrated Learning (CLIL). Both teaching approaches integrate a non-language subject with a target language. In the PISS program, the non-language subjects are Mathematics and Science (Chemistry, Physics, and Biology), meanwhile the target language is English. Many policy-makers are in favor of CLIL because this approach integrates both language and content. However in implementing the PISS program, teachers were not provided with the methodological competences needed to ensure the quality of teaching and learning.

Most CLIL schools offer in-service teacher training to increase the language proficiency ranging from classroom English to advance English language learning

programs supported in the schools by English teachers or English teachers from English courses. This is similar to teaching of Biology through English which has been carried out in Indonesia under the PISS program. The English teachers in the PISS program were intended to provide language help for Biology teachers by sitting in together to develop lesson plans and learn English vocabularies in the content subject even though this was not done intensively and the practice were varied among the PISS schools. In addition, PISS teachers can also take an English course in institutions that offer these courses to increase teachers' English proficiency under the PISS program financial support.

Both teaching approaches promote Higher Order Thinking Skills (HOTS). CLIL and the PISS program demand students not to think superficially. Both teaching approaches also promote HOTS which is indicated by providing inputs that should be authentic, meaningful and challenging. Unfortunately, teachers in the PISS program were not trained to apply CLIL methodology. There was never been a research conducted in a province as in this study which involved many schools implementing the PISS program. Integrating non language-subject using a second or foreign language needs a pedagogy of its own. For that reason this current study focuses on the application of the effective CLIL pedagogy whereby the PISS program is benchmarked. In relation to the implementation of the CLIL approach, there is not much research done in Indonesian classroom settings. It is important to know how CLIL pedagogy with English as a medium of instruction was implemented in the classroom. Therefore, this study provides a lens of the current state at the micro level of the bilingual program implementation in Indonesia.

From the problems discussed and the relationship with this study, it can be summed up that there is a need to investigate the implementation of the PISS program in terms of the language used during teaching and learning processes, resources used during lessons, problems encountered by teachers, students' perception on the teaching and learning of Biology through English, and the application of effective CLIL pedagogy.

1.5 Purpose of the Study

The purposes of the current study are to:

1.5.1 Examine existing practices of teaching and learning of Biology through English at the PISS program in terms of the language used during lessons.

1.5.2 Examine existing practices of teaching and learning of Biology through English at the PISS program in terms of the teaching and learning resources used during lessons.

1.5.3 Determine problems encountered in the teaching and learning of Biology through English at the PISS program.

1.5.4 Identify students' perceptions of teaching and learning of Biology through English at the PISS program.

1.5.5 Determine to what extent teachers apply CLIL effective pedagogy using the Second Language Acquisition (SLA) Penta - pie tool.

1.6 Research Questions

Considering the purposes of the study and the problem statement aforementioned, the research questions for this study are:

1.6.1 To what extent do teachers use English in the teaching and learning of Biology in selected Biology lessons at the PISS program?

1.6.2 What types of ICT based and other forms of teaching and learning resources were used by teachers at the PISS program?

1.6.3 What are the problems encountered in the teaching and learning of Biology through English in selected Biology lessons at the PISS program perceived by teachers, headmasters, school program coordinators, and students?

1.6.4 What are students' views of teaching and learning of Biology through English at the PISS program in terms of benefits, students' understanding, usage of English, teachers' strategies, and support in using English?

1.6.5 To what extent do teachers apply effective CLIL pedagogy using the SLA penta- pie tool?

1.7 Significance of the Study

Findings from this study are beneficial to the National Department of Education (NDE) and Program of International Mathematics and Science Teacher Education (PIMSTE), in particular, curriculum developers and teachers, as they should provide vital information for them on the current practices and issues of the teaching of

Biology through English in selected Biology classroom at PISS at South Sumatera province.

Specifically, the findings of this study contribute in terms of the teaching and learning activities in showing curriculum developers how to integrate content and language in Biology lessons. It is envisaged that through this study, the public's general understanding and acceptance of innovative national policies related to the teaching of Mathematics and Science through English can be improved, and help change their mindsets and views toward the use of English other than their mother tongue language. The results of this research will also contribute to a better implementation of the PISS program in Indonesia, especially in South Sumatera province. This study also aimed at providing clues for school administrators in justifying the needs for professional development among in-service teachers under the PISS program. The results of this current study also provide information on the urgent needs of prospective teachers which require the attention from the schools of education in institutions responsible for training these teachers.

The Biology teachers who are using English to teach will benefit from the findings of this study because they are the ones who are directly involved in the delivery of the lessons, and are responsible for the teaching learning process. The findings of this study provide teachers insights on how to integrate content and language in the Biology through English. It is very important for teachers to know that the methodology they use in their classes reflects the objectives of the teaching practice, and contribute to achieve the teaching and learning objectives. Hence, the

teachers under the PISS program need to do self-evaluation of their teaching practices to see whether their teaching practices meet the expectations of the program.

The findings of the present study are also useful for the enrichment of the body of knowledge on CLIL pedagogy by providing in-depth understanding for integrating content and language learning in the Indonesian context. These aspects point toward the need for contextualized practices, especially in dealing with ideal conditions, and types of classroom activities. The classroom practice of selected teachers in implementing the PISS program, problems encountered by teachers and students during lessons and alternative ways to solve the problems when using CLIL pedagogy can be an example of other teachers who are teaching in the schools designated as PISS or other private schools which are trying to modify their curriculum by conducting some content subjects through English. Moreover, the problems faced by teachers during lessons and students' perceptions toward the teaching and learning of Biology through English can be a motivation to learn from and become effective practitioners.

1.8 Limitations of the Study

The findings of this study were analyzed and interpreted within the context of several limitations. While the findings from this study have useful implications for the practice of teaching and learning of Biology through English, it is important to recognize the limitations. Among the limitations are the sample sizes, time allocation

for gathering data, instruments for data collection, school facilities for doing classroom observations and also generalization of the results.

This research was conducted in seven out of ten PISS at the secondary level in South Sumatera Province among students in Grades 10 and 11. Even though the schools were limited to only seven schools, it is supposed to be representative of the different educational contexts of Indonesia. Accordingly, seven Biology teachers were involved in the classroom observations, to gather in-depth data on the implementation of the PISS program. Similarly, respondents comprising seven teachers, headmasters, program coordinators and 105 students were interviewed to gather data on problems encountered throughout the teaching and learning of Biology through English. Therefore, due to the limited sample size and considering the huge population in the Indonesia education system, the findings can only be relevant to the settings of similar contexts and background.

Although the seven selected schools are in one province which is South Sumatera, geographically the schools are far apart. For instance, it takes about seven hours to travel to Lubuk Linggau. Hence time was a constraint and therefore a tight schedule was drafted to complete the observations which were not possible to achieve if all seven schools were to be covered in a week. However, all the teachers were observed three times to establish saturation of data.

Due to the lack of ICT based facilities in the schools, observing Biology lessons were not in the separate room equipped with audio visual tools. The presence

of the researcher in the same room affected attention and preparation of teachers and students.

The use of survey questionnaire as one of the methods of data collection posed instrumentation limitation. Although the survey instrument were validated and tested for reliability, other factors may have influenced students' responses to the survey items. By nature, self report is subjective and is also prone to less precision in terms of the constructs measured. This is because students respond differently according to their perceptions. As pointed out by Cole and Gonyea (2010), when surveys are based on attitudinal data (as in this study) as opposed to factual data, the researcher must rely on the participants to respond to the questions honestly. However, there is a possibility that some students did not take the survey seriously and just marked the same responses in the survey. There are also students who did not respond truthfully or their responses did not reflect the intended response due to misinterpretation of the questions. In addition, the information utilized by this study is restricted to the years 2011 through 2013, and may not be applicable to the current social and political situations.

1.9 Definition of Terms

Definitions of key terms are essential to avoid ambiguity and semantic diversion. Usually definitions are provided to avoid confusion by establishing shared meanings about ideas to be communicated to others. Therefore, the definitions of key terms used in this study were developed with regard to the purpose, concepts and

perspectives related to this study. The Definitions provided are mainly for the purpose of a working definition in this study. Key terms and definitions used for this study are as follows.

CLIL

According to Marsh et al. (2010) CLIL is a dual-focused educational approach in which an additional language is used for the teaching and learning of content and language with the objective of promoting both content and language mastery to predefined levels. Meanwhile, according to Graddol (2006) CLIL is an approach to bilingual education in which both subject content and English are taught together. CLIL is also a pedagogical approach which has a dual integrated aim: learning of the content knowledge and learning of a second, foreign or target language used as the medium of instruction.

Marsh, Maljers & Hartiala (2001) stated that CLIL is about using languages to learn. It gives opportunity for students to think about these innovative skills. In general CLIL can be seen as a possible solution which includes different methodologies and language during the EMI classes. In this study, CLIL is defined as a dual purpose educational approach in which EMI is used for the teaching and learning Biology in the secondary level PISS program.

ICT Integration

ICT is the integration of communication of telecommunication tools such as telephones lines and wireless signals, and computers as well as the software. In this study, ICT integration is defined as the use of ICT to introduce, reinforce, supplement, and extend skills needed in the teaching and learning of Biology in the secondary level PISS program.

PISS

PISS are schools in Indonesia that have already met all the NES on each aspect namely students, content, process, educators and educational staff, infrastructure, fund, management, and also evaluation competencies. In addition, the implementation of the PISS program produced students with international characteristics, developed a school culture and environment which support the achievement of the criteria to become as ISS (*Republik Indonesia*, 2009). In this type of schools, the teaching and learning process for Mathematics and Science (Biology, Physics, and Chemistry) uses English and ICT based teaching and learning resources.

Target Language

The target language is the language students are studying because they want to learn or the teachers want them to learn (British Council, 2007). The language used as a medium of instruction in the PISS program which is English and is also a foreign language both for teachers and students known as EMI in the Indonesian context. In

this study the target language refers to the English language which is used by the teachers and students in the teaching and learning of Biology learning of Biology in the PISS program.

Current Practices of Teaching Biology through English

Current practices of teaching Biology through English in this study means the existing practices of teaching and learning of Biology in PISS including the language and media used during lessons throughout the duration of collecting data for this study,

1.10 Summary

This chapter provides a brief explanation on the background of the study as it is essential for understanding the implementation of the PISS program in the Indonesia education system. The sections that follow discuss the purposes of the study and the research questions related to the nature of the existing practices of teaching and learning of Biology through English, students' perceptions on the teaching and learning of Biology through English, and the extent to which teachers apply CLIL effective pedagogy using the SLA penta-pie tool. This chapter ends with a discussion on the limitations of the study and provides an operational definition of selected terms used throughout out the thesis.