Science and Mathematics Education Centre

Indonesian Primary School Science in Practice: Challenges between the Intended and Implemented Curriculum

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

To the best of my knowledge and belief this thesis contain no material previously published by any other person except where due acknowledgement has been made.

Signature: 

Abstract

This study investigated the educational practices in urban and rural primary school science classrooms of Bengkulu province, Indonesia. Directed by six research questions, the study focused on the implementation of the School Based Curriculum, which resulted in increasingly greater responsibility at the school level in implementing the curriculum. In this study, the refined typology curriculum representations proposed by van den Akker (2003) was used to identify and explain any discrepancies between the intended and the implemented curriculum.

To achieve the research aims, the study was conducted in two stages and used two research methods. The first stage scrutinized any observed discrepancies between the intended and implemented Indonesian primary school science curriculum through critical reading of the official curriculum documents and the analysis of the syllabus and lesson plans produced by teachers. The results of the document analysis are summarised in terms of five selected curriculum components. To some extent, for instructional strategies the observed discrepancies between the intention and the actual practices ranged from small in urban schools to intermediate in rural schools; material and resource discrepancies ranged from small in urban schools to large in rural schools. In terms of rationale and content, there were no observable discrepancies between the intended and implemented curriculum. However, large discrepancies were observed between the intended and the implemented assessment in both urban and rural school clusters.

The second stage of the study involved investigations of the perceptions of 647 primary school teachers in relation to the new curriculum and the perceptions of 159 primary school students in terms of their classroom learning environment using the questionnaire as a research method. The teacher questionnaire was developed and validated with a sample of 367 primary school teachers. The questionnaire has high reliability and convergent validity to measure the ways in which teachers perceived their implementation of the new curriculum, particularly with regard to learning activities and the teachers' role, syllabus design, student assessment, learning material, and professional development. The results confirmed that no statistically significant differences were found across the scales with data analysed by gender or years of implementing though a statistically significant differences were observed in

three scales across three different educational attainment groups. The results of interviews, used to investigate teachers' and superintendent's perception of the curriculum in more depth, suggested that teachers and superintendent possessed different perceptions of the intended curriculum as expressed in their preferences towards curriculum metaphors.

This study also reported that cross-validation results for an Indonesian-language version of a modified form of the *My Class Inventory* (MCI) questionnaire and its use in investigating the nature of the science classroom learning environment. In total, 611 primary school students participated in this study to develop and validate the Indonesian version of modified MCI. The results of this study were statistically summarized as three assertions. First, the instrument has a satisfactory factor structure for a refined three-scale version of the MCI assessing satisfaction, friction and cohesiveness. Also each scale displayed satisfactory internal consistency reliability and discriminant validity and was able to differentiate between perceptions of students in different classes. Second, there were statistically significant differences between students' perception of the actual and preferred learning environment, with students tending to prefer a more favourable classroom learning environment than the one which they actually experienced. Finally, overall students in rural schools possess perceptions slightly more favourable than the students in urban schools for all three scales.

It is intended that the findings of this study can provide practitioners in the field with significant information for comprehending the present state of educational practices in urban and rural primary school science classrooms of Bengkulu province; the opportunities to question and rethink the challenges faced by teachers to implement a new curriculum in their classrooms. By providing validation for teachers' perceptions on the new curriculum, this study has provided the local or central government with instruments that can be used to assess how the teachers adopt, adapt and implement the new curriculum in their classrooms. Moreover, this research could be practically valuable for gathering information that may guide primary school teachers to improve the nature of the science classroom learning environment.

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CHAPTER 1

INTRODUCTION

As in many other developing countries, the education system in Indonesian has been undergoing reform (Raihani, 2007). Recently, considerable effort is being made to implement educational reform of teaching practices at the primary school level that align with the National Education Standards (particularly the Content Standard in Decree of Educational Minister No. 22/2006, the Graduate Competency Standard in Decree of Educational Minister No. 23/2006 and the Process Standard in Decree of Educational Minister No. 41/2007). These standards support KTSP (in *Bahasa* Indonesia : *Kurikulum Tingkat Satuan Pendidikan* or School-Based Curriculum) or Curriculum 2006. The KTSP is a competency based curriculum, highlighting a shared responsibility between school and government and calling for a change in the teaching-learning process. The government set up the standards of competency and basic competencies for students at all levels of education. All schools throughout Indonesia are required to adhere to the standards and to have implemented them by the end of the academic year of 2009-2010 (Ministry of National Education, 2008a).

The research aim of this study is to investigate and understand the issues and challenges surrounding the implementation of the KTSP in primary schools in Bengkulu province, Indonesia. This investigation has two main points of focus. The first point is the identification and explanation of any observed discrepancies between the intended and implemented primary school science curriculum. The second point is an investigation of teachers' perceptions of the curriculum reform. Both points are keys for enhancing the quality of science teaching in Indonesian primary schools, which in turn promotes achievement of the intentions of the primary science curriculum.

This chapter begins with the background of this study in Section 1.1, including an overview of Indonesia and Bengkulu province in order to provide information where this current study happened. Section 1.2 provides the rationale for the study. Section 1.3 presents the research questions that function as the driving force for the study. Following the research question, Section 1.4 addresses the significance of the study

and an overview of the thesis which is presented in Section 1.5. Finally, Section 1.6 provides the limitations of study as well as explanations of the terms in Section 1.7 used throughout this thesis ends this chapter.

1.1 Background of Study

As a nation, the Republic of Indonesia is an archipelago state with more than 17,500 islands bridging two continents, Asia and Australia. The geographical location of Indonesia is on the equator extending from the Indian Ocean to the Pacific Ocean with a length of 5,110 kilometres (3,997 miles). The total land area of Indonesia is nearly two million square kilometres, 81% of it is sea and the rest land. It has a diverse geography, ranging from swamps to tropical rain forests. These geographical conditions cause many areas are very difficult to reach because they are separated by dense forests, swamps, and mountains, or seas.

Source: http://asiamaya.com/peta/Indonesia, htm, (08-04-2011)

Figure 1.1 Indonesia Map: Location of Bengkulu Province in Indonesia

With the break-up of the Soviet Union in 1991, Indonesia is the world's fourth most populous country, with a total population of 225.4 million in 2007, up from 205.1 million in 2000 and 147.5 million in 1980 (Indonesian Statistics, 2007). It is predicted that the Indonesian total population will increase up to 273.1 million by 2025. The population is ethnically and linguistically diverse, of whom approximately 36 per cent are under 15 years of age. Almost 46% of the people live in urban areas and 54% in rural areas. There are also more than 300 ethnic groups within the nation which speak almost 600 different languages and exhibit a diverse range of cultures (Marion, 2002); however, *Bahasa* Indonesia is the national and official language, which is spoken throughout the country. For the purposes of administration, Indonesia is divided into 33 provinces and 445 districts, and 4000 subdistricts (Purwadi & Muljoatmodjo, 2000).

Bengkulu (see Figure 1.1), a province of Indonesia, is on the southwest coast of the island of Sumatra, and borders the provinces of West Sumatra, Jambi, South Sumatra and Lampung. The capital and largest city of the province is Bengkulu City. It was formerly the site of a British garrison, which they called *Bencoolen*. Bengkulu province covers an area of 32,365.60 square kilometres comprising sea (12,335.20 sq. km) and land (20,030.40 sq.km).

The province of Bengkulu consists of eight districts and one municipal city and 110 sub-districts. In accordance with the 2008 census, this province had more than 1.7 million people who are unequally distributed. On average, most districts only have 74 people per square kilometer (or 191/sq. mi) while Bengkulu city has approximately 3000 people per square kilometer. This inequality generates a problem for the Bengkulu government in providing both equity and quality improvement programmes in education.

In urban and suburban areas, people have benefited from various types of development, whereas in rural and remote areas many people are deprived of access to information and education. The less privileged-area are deprived of fast development due to delivery problems. They cannot be easily and adequately equipped with textbooks, curriculum guidelines and laboratories as well as other

types of equipment. Certain schools in less privileged areas are infrequently visited by their superintendents due to their remoteness. For many reasons teachers in these areas rarely have the opportunity to attend in-service training.

Accordingly, Indonesia as a country of great diversity in term of geographical location, history and culture faces considerable challenges for implementation educational policy so as to enhance the citizens' welfare. Programmes involving change in education at the national level are enormous in scope and complexity, including the provision of basic educational services and the improvement of education quality throughout the country. Over recent decades, there has been a massive effort by the Indonesian government to improve the quality of and access to education at primary and secondary school levels. For instance, in July 2003, the Indonesian House Representatives (DPR) responded by passing a new education act into Law No. 20 of 2003 on the National Education System and supporting an appropriate budgeting, namely, 20% of the State Budget (Laksono, 2008). In addition, the Ministry of National Education (MoNE) has recently adopted the standards-based approach to education reform in order to promote both quality of and access to education. To sum up, the intentions of all effort are to offer more equitable educational opportunities and improve the quality of learning, which lead to better achievement to students.

In 1984, the government decided to implement a plan of six-year compulsory education for primary school age children. The compulsory education program was extended into a Nine-Year Universal Basic Education (NYUBE) program in 1994. The major intention of this program was to improve access and equity to the service of quality and affordable basic education for all children aged 7 to 15 years, so that all children acquired ample opportunities to continue their education at least until they graduated from junior high school (or grade 9). In 2000, the government ratified UNESCO's Education For All 2015 program, which commits Indonesia to provide basic education for all children by 2015 (Dharma, 2008). In 2003, the Indonesian House of Representatives (DPR) passed a new education act into Law No. 20 of 2003 on the National Education System, which supports the "Education for All" concept.

1.2 Rationale for Study

Primary education, as the first formal educational institution in the Indonesian education system, is seen as the most important basic education institution in Indonesia. Therefore, its quality is an important concern for the government in order to lay a strong foundation for further learning capacity of primary graduates. The major goal of primary education is to develop the lives of children as individuals, members of society, citizens and members of humankind, as well as to prepare them to pursue their studies in secondary education (National Education System Law No. 20 of 2003). The knowledge made available to the children and the value system established during the primary schools have long term effects and become a prerequisite for learning throughout life (Delors, 1999). Improving the quality of education for students in primary schools is a prerequisite for developing the human resource base needed to meet the changing technology demands of the 21st century. It was further argued that basic education is a central building block for development and that there is general acknowledgement recently of basic education as empowering people to enhance the path of their own growth. For these reasons, Natawijaya (1998) contends that success in conveying quality education at the next higher school level is mostly dependent upon the quality of the teaching-learning process at the primary school level.

To date, it is acknowledged that government commitment to providing primary education on the broadest possible scale is now the standard across the country through the implementation of the nine-year basic education program in 1994 and the introduction of free basic education (FBE) policy for all Indonesian citizens in 2005. It was further observed that whilst the quantitative expansion of schools has provided better access to primary schooling, there were initiatives for substantial improvement in the quality of schooling as well. The most universal strategies in Indonesian's education reform history are replacing the prior curriculum with the new one. The curriculum developers make use of the results from educational research implemented in previous years, and are directed by the 1945 Constitution to develop the curriculum for each level and each type of school. The curriculum development is thus based on *expert judgment,* not through a *pilot study*, except for the Curriculum

2004. Therefore, there is only one kind of curriculum for one type of school and for all schools; no alternatives have been prepared (UNESCO, 2006a).

Since 1975 the national curriculum has been reformed four times (Curriculum 1975, 1984, 1994 and 2004), nearly every ten years. Each curriculum employed a different approach and each was explained as an ideal curriculum (Goodlad, 1994). For example, Curriculum 1984 focused on students' active learning, yet Curriculum 1994 concentrated on problem solving. However, the changes from one curriculum to another did not lead to considerable improvement in students' learning outcomes. Policymakers have generally measured the effects of policy initiatives, such as the implement of new curricula, on student achievement without being aware of what happened in the actual classroom. This notion is supported by Porter, Polikoff and Smithson's (2009) study that the curriculum reform initiatives should have placed greater attention on what occurs behind the classroom door. This means that the significant efforts have to be devoted to investigate and to reduce the incongruence between the intended outcomes of curriculum and what take place within the actual classroom, what is experienced by students, and what is to be attained.

Curriculum change has traditionally been viewed as the preferred vehicle for educational reform. Thus, the development of new curricula is a common event in countries across the globe. In many cases, these curricula are well-designed and what they are intended to achieve is worthy. In addition, each of these curricula was intended to be an improvement on the preceding one. However, despite the attempts made, the implemented curricula were still unable to fulfil the government intentions. As Goodlad, Klein and Tye (1979) stated, this is a phenomenon in most countries and has been problematic ever since the beginning of modern curriculum development. For instance, when the 1984 and 1994 curricula implemented in primary schools are studied, discrepancies between the intentions and implementation were realised. This intended curriculum aimed at greater student involvement and focused on the process of learning as well as the mastery of content. Yet most learning activities in primary classrooms are mainly intended to enhance student's ability to answer questions in student workbooks or paper tests, which is known as '*teaching to the test'* approach.

Improving science education is often considered as a high priority for most developing countries, including Indonesia, in order to uphold long term economic development and future advancement of the nation. Thus initiatives, both government and foreign-aid sponsored, are intended to improve the quality of science education. However, all too often the focus of reform initiatives is limited to the development of science curricula (Blazely, 1999), or the provision of science teacher training (Thair & Treagust, 1997, 2003), or the placement of more physical inputs into schools, such as books or writing material availability and laboratory equipment (Fuller, 1987). Meanwhile, the details of how the curricula will be implemented at the classroom level are frequently neglected. As indicated in Bybee (1993, pp. 133-134), "curriculum policies are in fact much easier to make recommendations for reform than to change school programs and classroom practices". Although, Fuller's study (1987) revealed that student achievement in developing countries may correlate with the material factors in schools such as text books, he argued that "little is known about the ways in which material resources are managed and what skills teachers draw upon to strengthen the social structure of classroom" (p. 288). Consequently, the review of evidence from school effectiveness studies in developing countries reveals that there is a scarcity of studies that have looked at instructional processes and learning in the classroom (Fuller, 1987; Scheerens, 2001).

Primary school science has been a problematic area of reform in the curriculum of most countries. Indeed, many curricula have been written in the last 20 years. Nevertheless, there is frequently a discrepancy between the written aims and the actual implementation of the aims in real practice (van den Akker, 1998; Yager, 1993). This phenomenon can be seen both in Western Countries and in non-Western countries. The literature suggests that this gap between the intended aims and actual practice is likely to exist in Indonesia as well (Beeby, 1979; Yager, 1993). Moreover, many of the reported problems with schools in the USA (Yager & Penick, 1983) and in The Netherlands (van den Akker, 1988) are also (or even more severely) present in Indonesia (Balzano, 1991; Theisen, Hughes & Spector, 1990).

The 2004 school science curriculum reform set the benchmark for standardizing basic competency in science achievement in Indonesian school*s*. Due to the approved

implementation throughout Indonesian schools in 2004, this new curriculum is known as the Curriculum 2004 or Competence-Based Curriculum (CBC). This reform is a significant departure from the description of the prescribed learning experiences stated in the 1994 science syllabi and is in line with the implementation of Law No. 22, 1999, on Regional Autonomy, by which education becomes the responsibility of each district. These districts now have more flexibility in adapting the science curriculum to optimize learning skills amongst students. As a result, educational personnel in the district levels in general, and classroom teachers in particular, have greater flexibility in transferring curricula at the classroom level. The teacher's role in curriculum decision-making in individual schools requires a greater level of expertise.

The Curriculum 2004 originally comprised specified indicators for each competency. However, teachers focused excessively on teaching to achieve the indicators rather than developing student competencies. As result, the indicators were removed and schools were given the freedom and responsibility of developing their own curriculum with the aim of developing these competencies in a locally suitable manner (Weston, 2008). It implies that schools are expected to develop their own syllabus using guidelines for curriculum development provided by the central government. The guidelines contain the national framework of competencies that specifies what students are expected to complete in each grade. However, to date these changes in the actual curriculum have not been transformed into significant changes in the curriculum delivered to students.

There are a number of causes for this lack of significant improvement. Firstly, the curriculum reforms used a top-down approach in which the initiative to change the curriculum derived from the government or a group of people who are not those responsible for providing inputs on the real needs and capabilities of students (Weston, 2008). Meanwhile, the need for change, especially at the school level, was never explored in detail. For instance, questions such as "what was wrong with the previous curriculum?", or "what happened when the old curriculum was being implemented?" could not be answered satisfactorily when the government altered the curriculum. Secondly, each curriculum that was introduced to schools lacked an implementation strategy and the needed support for teachers (Balzano, 1991;

Weston, 2008). Further, the in-service training provided for teachers to implement a curriculum appears not to have been successful. Most teachers who had completed the in-service training often "got lost" when they tried to implement the new ideas or new skills in their classroom (Thair & Treagust, 2003). For instance, the active learning techniques which emphasize problem solving, process skills and the active involvement in the science primary education have great promise but this inquiry method can waste time unless teachers have sufficient knowledge and skills to prepare and direct the students' activities.

A number of curriculum studies revealed that a common strand running through the change of curricula was the argument that further attention should be assigned to the practical problems faced by individual teachers in the implementation process of a curriculum (van den Akker, 1988). From an implementation perspective, van den Akker (1988) points out that many factors can influence a teacher's actual use of curriculum documents. Fullan (2007) summarizes these factors as follows: the development of clear and validated materials; active administrative support and leadership at the school level; ongoing in-service or staff-development activities; the development of collegiality and other interaction-based conditions at the school level; and the selective use of external resources (both people and materials). Nonetheless, improving the quality of Indonesian's school system is not an easy task because education is a multi-output process, characterized by multiple goals, and operated under the influences of an unlimited number of inputs (Bjork, 2004; Firman & Tola, 2008). Although improving the quality of the school system is a demanding task, assessing the relationships between what is taught and what is desired to be taught is essential to identify the effective practices of teachers in science classrooms in Bengkulu province at selected primary schools.

To date, there is insufficient information on the process of curriculum implementation in terms of classroom context: the extent to which teachers carry out the curriculum innovation as intended by the developers, how they go about moulding the innovation to their own context, the strategies that they use during the implementation process and how their students respond to the curriculum innovation (Ministry of National Education, 2008a). However, this study does not make an effort to assess and examine science education in primary schools as a whole, but

rather to deal with a critical aspect of the larger problem linked with the status of the curriculum implementation process.

1.3 Research Questions

Based on the rationale for the study, the research questions to be addressed in this research are as follows:

(1) What is the focus of the current intended primary school science curriculum?

(2) How is the current intended primary school science curriculum actually implemented?

(3) How do teachers perceive the intended science curriculum in primary schools?

(4) How do students in primary schools perceive their science classroom learning environment?

(5) Which discrepancies can be observed between the intended and implemented primary school science curriculum?

(6) How can the observed discrepancies between the intended and implemented primary school science curriculum be explained?

1.4 Significance of the Study

Studies of Indonesian educational reform show that with the previous national curriculum, teachers and administrators reported enjoyment in implementing the government mandated curriculum. Nevertheless, the impact of reform has not produced meaningful changes in terms of the quality of education (Bjork, 2001). In addition, research and report have provided no in-depth study of teachers' perspectives about the implementation of the KTSP or Curriculum 2006, although teachers are considered as key stakeholders in implementing the national curriculum reform. In order to provide the in-depth study, this study was focused on six teachers at primary school level as the case study and 647 primary school teachers as the survey study. It was designed to generate preliminary findings on teachers' views in primary schools in implementation of the new curriculum, and it sought to contribute to theory and reform practice in two ways.

The study is significant for several reasons. First, to researcher's knowledge, the majority of literature on curriculum development in Indonesia is based on previous curricula. No study has been found yet, which studied the currently used curriculum. This study contributes by enriching perspective of curriculum implementation by adding a small body of existing literature on how primary school teachers make sense of the policy implementation thorough their prior knowledge, expertise, values, beliefs, and experiences (Spillane, Reiser, & Reimer, 2002).

Second, this study provides insight into implementation process by clarifying how the intended curriculum can be adopted and/or adapted during the implementation process. In this regard, this study aims at making more up-to-date statements about discrepancies between the currently intended and implemented primary schools science curriculum. Analysing and explaining the observed discrepancies can produce results able to form a preliminary base from which future educational development can begin. In light of this aim, the findings of the evaluation are likely to provide information about policy and practices related to public primary school context in Indonesia, which can be used to guide decision-making and improve basic education for the future.

Third, it is intended that the outcomes of this study will enhance the researcher's own knowledge of the reform and will be of interest to the Indonesian Ministry of Education. As the researcher is assigned to University where teachers are trained, he will use the findings to improve the course for training teachers (pre-service and in-service teachers) in the primary science program. This will enable University and Curriculum Development Centre to design and develop an improved program for primary school teachers. With this modified program, the intention is that the problems faced and mistakes made by teachers in the past will not be repeated by newly qualified teachers. In this way the quality improvement of primary science professional development in Indonesia is ensured.

Fourth, the conclusions in this study will help to understand the complex issues and challenges involved in the implementation of curriculum reform in Indonesian primary schools as well as in other countries. By having a better understanding of these issues and challenges, solutions can be formulated to overcome the problems,

which will inevitably enhance the quality of science teaching and learning in primary schools.

Fifth, the study will offer an instrument to measure the degree of KTSP implementation by Indonesia primary school teachers. This instrument is called the Teacher Perspective on Curriculum Reform (TPCR). It was developed based on teacher responds to the implementation of KTSP, particularly issues like learning materials, syllabus design, and student assessment. Even though the KTSP is mandated to implement by the end of the academic year of 2009 - 2010 (Ministry of National Education, 2008b), neither the National Education Department nor any other educational institution has developed an instrument regarding the implementation of KTSP in classroom by primary school teachers.

Finally, another outcome of the study is that it led to development and validation of the MCI questionnaire available in the Indonesian language for assessing classroom environment in primary classrooms.

1.5 Limitations of the Study

Possible limitations in the study are provided to identify the potential weakness of the study, even if it is often difficult to identify the weakness in a study before it has begun (Creswell, 2003). Nonetheless, the current study used a sample of convenience reducing the generalizability of the findings this study to the population of all primary school teachers in Indonesia. However, it is reasonable to assume that some interpretations made from the study's findings may apply to primary teachers, in general, and primary science teachers, in particular. There is also potential for replication of this study in other settings using the same research questions.

The study was limited to the context of six primary schools, therefore only naturalistic generalizations can be drawn to other situations and they can be applied to other contexts to the extent that does not go beyond resemblance to the context of the given study (Stake, 2005). Fullan (2007) argued that the uniqueness of the individual setting is a critical factor to explain what works in one situation may or may not work in another.

A second limitation is that because of time constraints it was possible for this researcher to interview a small sample of teachers to collect more in-depth data concerning their practice related to the implementation of the intended primary school science curriculum, some practices being used by teachers may not have been accurately represented on the questionnaire. However, despite these limitations, the study did collect useful and valuable data on teacher perspectives on the implementation of the school-based curriculum (KTSP).

1.6 Overview of Thesis

The conceptualization, design, implementation, results and conclusions of this research study are described in detail in nine chapters. Following this introduction, Chapter Two presents a scholarly review of research literature on the basic concept of curricula, the conceptual framework for this study, conceptualising selected curriculum components, curriculum development in Indonesia, and current curriculum reform. The context of the research and the methods used to collect and analyse the data are discussed in Chapter Three. The development and validation of two survey instruments used in collecting the quantitative data is concisely explained in Chapter Four. An analysis of the data and results from the six research questions are presented in Chapter Four, Five, Six, Seven and Eight respectively. Finally, Chapter nine discusses the overall findings from the study, explores implications of the research, and makes recommendations for future research related to the study. An overview of the chapters in this thesis is simplified in Figure 1.2.

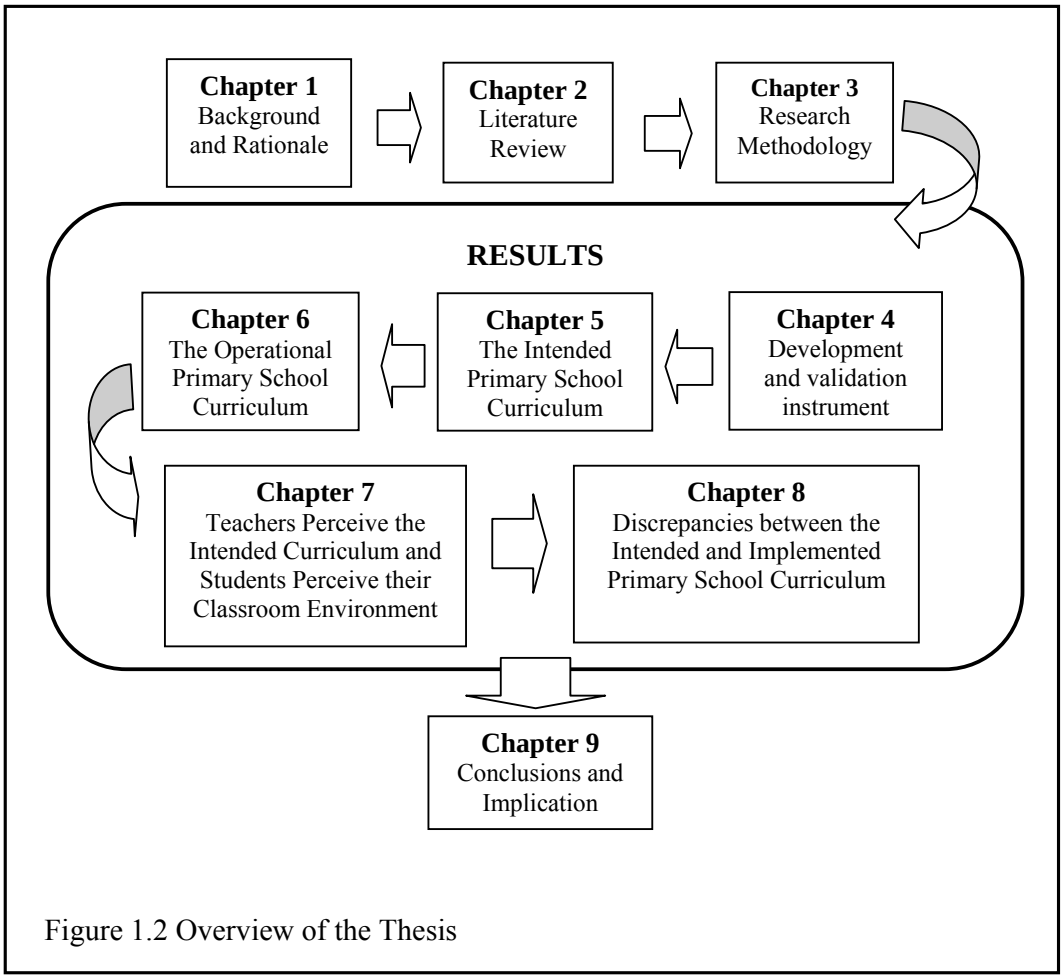

Figure 1.2 Overview of the Thesis

1.7 Definition of Terms

In order to be specified about the study, the following are descriptions of terms utilized in the entire of study.

1. The Intended Curriculum is the intentions of the people who write the curriculum. In this study, the content standard, known as National curriculum, is considered to be the intended curriculum designed by central government as the foundation of developing KTSP (*Kurikulum Tingkat Satuan Pendidikan* or School-Based Curriculum) or Curriculum 2006 and syllabus.

2. *Kurikulum Tingkat Satuan Pendidikan* (KTSP): A national curriculum in which the content is suitable for students' needs and potential and it is to be designed appropriately to meet national demands as well as local concerns. In order to address diverse local needs, the government transferred its power of curriculum

development to each provincial level up to twenty percent (developed by local government). Eighty percent is allocated for core subjects and is developed by the central government. KTSP is an improvement of the previous curriculum, Competence-Based Curriculum (CBC). Both curriculum aims to shift from the centralized to the decentralized curriculum system in Indonesia.

3. National Curriculum refers to a set of plans and regulations regarding the aims, content and material of lessons and the method employed as the guidelines for the implementation of learning activities in order to achieve given education objectives (Ministry of National Education, 2003, p. 7).

4. Competency-Based Curriculum (CBC): A series of plans and regulations pertaining to standardized-students' competence, i.e., the least amount of learning required to be achieved, expertise for each type of material taught, and how it should be achieved according to the local and potential conditions (Ministry of National Education, 2003).

5. The Implemented Curriculum is the curriculum that is transformed into actual action.

6. National Education is defined as education based on *Pancasila* and the 1945 Constitution; it is rooted in the religious values and national cultures of Indonesia, and is responsive to the needs of an ever-changing era (Ministry of National Education, 2003, p. 6).

7. National Education Standards refer to the minimal criteria for the education system in whole jurisdiction of the Republic of Indonesia (Ministry of National Education, 2003, p. 7). The Decree explains further "(1) National education standards consist of the standard of the content, process, graduate outcomes, educational personnel, facilities and equipment, management, funding, and educational assessment, which should be improved systematically and regularly; (2) national educational standards are used as guidelines for the development of curriculum, development of educational personnel, provision of facilities and equipment, management, and funding" (Ministry of National Education, 2003, p. 21).

8. *Badan Standard Nasional Pendidikan* or BSNP (National Education Standard Board) is an independent and professional institution that aims to develop, monitor, and evaluate the implementation of the national education standard.

9. Competences refer to knowledge, skill, attitude, and value that can be realized in the ways of thinking and acting (Government Regulation, no. 19 of 2005 article 4, 2004).

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

The purpose of this chapter is to review the literature on educational issues related to the study. The literature was selected and applied to the study as its theoretical base. The relevant literature in this chapter is organized into six main areas. Chapter Two begins with the discussion of basic concepts of curricula in Section 2.2. Section 2.3 describes an outline of the theoretical framework that is used to guide the data collection and analyses that follow in the next chapter. Section 2.4 provides the conceptualizing of the selected curriculum components. Following discussion of the curriculum components, Section 2.5 describes a more focused, albeit brief, discussion of curriculum development in Indonesia. Finally, Section 2.6 provides a review of the research literature on curriculum reform**.** The six areas are not independent of each other but were linked where appropriate to put the research questions in context through the insights acquired from other researchers.

2.2 Basic Concept of Curricula

Defining the word "curriculum" is not simple and it has multiple meanings (Porter & Smithson, 2001). Schubert (as cited in Fraser & Bosanquet, 2006) argued the term curriculum "remains contentious in terms of definition and delineation" amongst curriculum theorists (p. 26, 1986). Similarly, Goodlad (1979) insists, there is no definite definition of the word curriculum. Many curriculum writers use their own preferred definitions of curriculum – each emphasising other meanings or connotations (Marsh, 2004). Similarly, Goodlad (1994) stated that as a field of study, it is complex and tempting to know exactly what curriculum is. However, van den Akker (1998) suggested that the notion of curriculum as a 'plan for learning' coined by Taba (1962) is a concise and general definition. Another generic definition of curriculum about the nature of a plan for learning, proposed by Walker (2003, p.11) is 'The curriculum refers to a particular ways of ordering contents and purposes for

teaching and learning in schools'. Knowing that many different definitions can be found in the literature, it is desirable to define the intended meaning, scope and context of term 'curriculum' for this research is the following:

> A set of plans and regulations regarding the aims, content and material of lessons and the method employed as the guidelines for the implementation of learning activities in order to achieve given objectives (Ministry of National Education, 2003, p.7).

Regarding the proposed definition, the concept of curriculum can be seen as a noun and a verb. As a '*noun'*, for example, curriculum can be associated with *'a set of plans and regulations'*. In this case, curriculum is taken to indicate an official document of stated curriculum intention. Another version understands curriculum as a '*verb'* that is as *'learning activities'* involving the interaction of teachers and students in the classroom and other social contexts, rather than as a set of documents. Hence, curriculum covers what actually happens as students learn as well as what teachers do to arrange that learning. This definition implicitly states that not only curricula should be carefully planned but also the final aim of the curriculum is that learners really *learn*. In this context, teaching is perceived as a path to learning. However, the definition does not inform specific plans for teaching and learning. It also is not specified what actually takes place in the classroom; it is only a plan or an arrangement. Due to the difficulty in defining and using the term curriculum properly, more tools are thus needed to give a more comprehensive view of curricula by means of categorizing curriculum into its representation and specificity.

2.3 The Conceptual Framework for this Study

The development of the conceptual framework used in this study has its origin in curriculum inquiry research. Goodlad (1994), in his work towards conceptualising a curriculum, proposed three different perspectives when talking about a curriculum issue:

- Substantive, focusing on the classical curriculum question about what knowledge is of most worth for inclusion in teaching and learning.
- Technical-professional, referring to how to address concrete tasks of curriculum development.
- Socio-political, referring to the curriculum decision-making process, where values and interest of many different individuals and agencies are at stake.

Although, these perspectives are limited to the notion of curriculum as a plan for learning in schools, from a primary concern in curriculum improvement, the three

perspectives seem useful and appropriate (van den Akker, 2010). Rosier and Keeves (1991) viewed the curriculum in terms of three sequential stages - the *intended* curriculum, the *implemented* curriculum, the *achieved* curriculum - which was associated with three groups of mediators involved in science education, namely the curriculum developers, the teachers and the students. These three aspects of the curriculum sequence have temporal and logical correlations to each other. For instance, changes in the intended curriculum should create changes in the implemented curriculum and the achieved curriculum. Conversely, some of the difference in science achievement between school and classroom groups of students should be able to be explained in terms of the intended curriculum to which they are exposed.

An extension of the three sequential stage of curriculum – the intended, implemented, and attained curriculum – is the refined typology of curriculum representations (van den Akker, 2003) summarized in Table 2.1.

Table 2.1
Typology of Curriculum Representations

Intended	Ideal	Vision; rationale or basic philosophy underlying curriculum
	Formal/written	Intentions as specified in curriculum document and/or materials
Implemented	Perceived	Curriculum as interpreted by teachers
	Operational	Actual process of teaching and learning
Attained	Experiential	Learning experiences as perceived by students
	Learned	Resulting learning outcomes of students

(Adapted from van den Akker, 2010: 180)

The ideal and formal/written curricula jointly constitute the intended curriculum. The Ideal Curriculum represents the original vision, basic philosophy, rationale, or mission underlying a curriculum. The implemented curriculum can be divided into the perceived and the operational curriculum. The Perceived Curriculum gives the description of the curriculum as users' interpretation, particularly teachers. The Operational Curriculum represents the actual instruction process in the classroom, as guided by previous representations (also often referred to as the curriculum-in-action or the enacted curriculum).

Identifying the implemented curriculum is particularly useful when seeking to understand the challenges of curricular change which is stated by Fullan (1991, p.111) as follows: “educational change depends on what teachers do and think – it’s simple and complex as that”. The experiential and learned curriculums address the learners. The Experiential Curriculum described the actual learning experiences of the students, and the Attained Curriculum represents the resulting learning outcomes of the students.

This typology of curriculum representations is an effective analytical tool where there is incongruence between curriculum principles, what takes place within the classroom, what is experienced by students, and what is attained (van den Akker, 2003). For the purpose of this study, the word intended curriculum and implemented curriculum are used instead of the first two and last two types of curriculum typologies, respectively.

Research on curriculum reveals that the failure of curriculum reform in the past is commonly due to lack of appropriate interpretation of findings in terms of the curriculum level or presentation. For example, directly comparing the students’ outcomes at the ‘micro’ level (the learned curriculum) with policy intentions at the ‘macro’ level (the ideal curriculum) by neglecting all intermediate process, such as perceived and operational curriculum, will mislead the explanation. It has been shown that there is a large gap between the intended (ideal with formal curriculum) and implemented (perceived or operational) curriculum, which lead to an unsatisfactory attained (experiential) curriculum (van den Akker, 1998). Therefore, a worthy focus of this study is to investigate the discrepancies between the *intended* and *implemented* curriculum and to investigate the teacher’s perceptions on the intended curriculum.

Closely related to the representations of curriculum, Thomas (1991) distinguished between different degrees of specificity within the formal or written curriculum. On the one end, the curriculum may only state the subject titles, such as science, social science, mathematics and the like. On the other end, the curriculum may prescribe the entire course, including methods to be used, (chapters of) books to be discussed, and the evaluation approach for each lesson.

In keeping with the relatively simple curriculum definition proposed by Walker (2003), comprising three major planning elements that is content, purpose and organisation of learning, van den Akker (2003) provides an additional framework. This framework deals with the various components of a curriculum (see Table 2.2) which address ten specific questions regarding the planning of student learning.

Table 2.2
Curriculum Components and Associated Sample Questions

Rationale or vision	Why are students learning?
Aims and objectives	Toward which goals are the students learning?
Content	What are students learning?
Learning activities	How are students learning?
Teacher role	How is the teacher facilitating learning?
Materials and resources	With what are students learning?
Grouping	With whom are students learning?
Location	Where are students learning?
Time	When are students learning?
Assessment	How far has learning progressed?

(Adapted from van den Akker, 2010, p. 181)

However, the curriculum components dealt with in this study are rationale or vision, aims and objectives, content, learning activities, teacher role, materials and resources, and assessment.

The three approaches to curriculum, specifically representation, specificity, and component, are tools that can make possible the analysis of the intended and implemented curricula from generic to specific curricula. It is significant to think about these curriculum components when one had to examine curriculum documents. Nevertheless, it is widely acknowledged that curriculum development is a dynamic process in which every curriculum aspect (representation, specificity, and component) is influenced by a decision process, which is in turn influenced by the social environment in which people are situated.

2.4 Conceptualising the Selected Curriculum Components

2.4.1 Rationale or Vision and Mission

According to Hallinger and Heck (1996), the "school's goals" should be reflected in its vision and mission. Although closely related, the vision usually is a further elaboration on the mission. Kirk and Jones (2004) proposed that clear school vision and mission, as one of unique characteristic of effective schools, is correlated with student success. Moreover, Hallinger (2011) highlighted vision and goals as one of the most significant avenue that must contain an academic focus. Above all, the mission and vision not only become important but also describe a set of ideal characteristics that schools strive to achieve as well.

2.4.2 Aims and Objectives

Aims reflect the anticipated outcomes of teaching and learning, while objectives refer to the actual outcomes that teacher and students should achieve (Klein, 1991). However, Beeby (1979) contended that when the discussion on the aims of education often become distorted because no distinction is made between aims and objectives. In a quite similar vein, DeYoung (2003) argued that objectives are used for all activities that took place within a classroom, course, session, or curriculum. Similarly, Pinar (2012) mentioned that articles on educational theory use many terms as synonyms such as "outcome", "goals", "aims", "purposes".

The aims of the schools are statements of qualities, skills, knowledge, and attitudes that should be developed in its students before they leave. Objectives are usually stated in terms of expected outcomes but are more specific. In practice the distinction between "aims" and "objectives" is very loose, but on the whole "aims" indicate more abstract, general and value-oriented goals whereas "objective" more specific and descriptive goals (Taylor, 1970). In addition, it is important to note that there are no standardisation rules: aims and objectives can be global or specific (Eash, 1991). Eisner (1967) argued that there are at least three reasons why educational objectives need to be clearly specified; providing the goals toward which the curriculum is aimed; facilitating the selection and organization of content; evaluating the outcomes of the curriculum.

Bloom (1956) attempted to devise some means that would permit greater precision of communication with respect to educational objectives. During the 1970s, Bloom began exploring the possibility objectives in terms of cognitive, affective and psychomotor behaviours. The most common classification of objectives relating to three domains are those of Bloom (1956); Krathwohl, Bloom and Masia (1964) and Harrow (1972), each of whom developed a taxonomy of educational objectives in the cognitive (reasoning, thinking), affective (feeling, valuing) and psychomotor (physical movement) domains. The taxonomy of educational objectives is a framework for classifying statements of what a teacher expect students to learn through the content they learn (Krathwohl, 2002). The revision of this framework in the cognitive domain provides a complexity hierarchy that orders cognitive process from simple remembering to higher order critical and creative thinking. The revised levels from the simple to complex thinking are Remember; Understand; Apply; Analyse; Evaluate; and Create (Anderson & Krathwohl, 2001). Moreover, one of the most innovative additions to the revision is the inclusion of metacognition as a component of a two dimensional matrix across all levels of the cognitive process (Krathwohl, 2002).

2.4.3 Content

Taba (1962) points out it is very important to clarify some significant issues regarding two curriculum components; the content (subject matter) and learning experience which indicate the mental operations that students employ in learning content. The relationship between content and the learning experiences is of necessity a close one, but while there are changeable interactions in the actual learning, the two may be considered as separated components of curriculum and each can be judged according to different criteria. For example, choice of content may satisfy all selection criteria, yet learning experiences may not follow. In the same way, the effective learning experiences cannot praise insignificant content to the level of important learning. As a result, the rational to select the content with accompanying learning experience is one of the pivotal decisions in curriculum making (Lunenburg, 2011).

When selecting content for a school science curriculum, it will be important to be clear about how much time can be realistically allocated to science and, within this

time allocation, determine what is an appropriate range of science concepts and skills for learning experiences in primary school. Selection of content should recognise the importance of the big ideas of science that students ought to understand in order to build a strong base of scientific knowledge; the importance of exposure to a range of science experiences relevant for each stage of learning; and the importance of understanding the major concepts from the different sciences.

Content refers to the academic content that should be delivered to learners. Since science curricula vary widely among countries, the need for worldwide curriculum frameworks is unavoidable when the study of curriculum reform is carried out. As indicated by Ledermann (1992), "no consensus exists regarding the specific content to be included in science courses or even the methods/strategies of instruction to be used" (p. 331). One framework that is utilized in large-scale assessment and comparative international educational studies on science achievement is the TIMMS advanced 2008 framework (Garden et al., 2006). In this framework, the academic content is sub-divided into Earth science, Life science, Physical science, Environmental issues, and nature of science. This framework can scaffold the description of the academic content of the curriculum.

2.4.4 Learning Activities and Teacher's Role: Teaching Strategies

Teaching is so closely associated to learning that one may argue that the two should be regarded as an integrated whole, instead of separate phenomena. Teacher practices in the classroom are key factors in promoting learning, learning principles (learning) and teacher roles (teaching); collectively they form the curriculum component "teaching strategy".

2.4.4.1 Learning principles

Research shows that learning-centred education enhances students' learning (Lambert & McCombs, 1997), yet most teachers in primary classrooms continue to hold to their teacher-centred methodologies (Tobin, 1997). The theory behind teacher-centred education is behaviourism. From this perspective, the teacher's task is to provide a set of stimuli and reinforcements that are expected to get students to replicate certain behaviour (Yager, 2000). Moreover, Fosnot (1996) described the job of a teacher as taking fixed knowledge and sequencing it into parts to deliver to

students. To carry out this task, the teachers organize their structured lesson plans that are usually delivered in a didactic format (Singer, 1996). Accordingly, students are required to comply with the teacher's instructional prescriptions. The locus of control of learning activities is believed to belong to the teacher only.

In contrast to teacher-centred education, learning-centred education is based on the constructivism theory. Although there are many forms of constructivism (Phillips, 2000), a common theme is that learning is an active process of knowledge construction and meaning making by the learner. In particular, knowledge is not plainly received from the outside but that knowledge is constructed in the brain, through interpretation of what is perceived (through hearing, seeing, feeling etc.). As argued by von Glasersfeld (1990, p. 22), constructivism means, "knowledge is not passively received, knowledge is actively built up by the subject." Accordingly, this approach to teaching and learning emphasises the active process of learning rather than teaching activities and instructional methods. In this sense, the activities of the learner are considered to be of great importance, whereas the presentation and provision of information by the teacher is of less importance.

From a constructivist perspective, the individual learner has a primary role in determining what will be learned. Emphasis is placed on providing students with opportunities to develop skills and knowledge which they can connect with their prior knowledge and future utility. Consequently, the role of teacher in the science classroom changes within a constructivist paradigm. The teacher becomes more of an investigator, trying to understand how his or her students are constructing knowledge, so opportunities for developing and modifying understanding, making connections and negotiating with others are available. (Seidel & Shavelson, 2007).

2.4.4.2 Learning Activities

Learning is a multifaceted construct that is not easy to describe (Peterson, Brown, & Irving, 2010). However, Bednar, Cunningham, Duffy and Perry (1991) affirm that "learning" is an active, constructive and self-directed process in which learners develop new understandings based on the interpretations on their own learning experiences. More recently, the concept of learning is usually associated with knowledge construction and meaning making by the learner (Nie & Lau, 2010). This view implies that a learner cannot 'just sit and consume knowledge'. Instead, the

learners have to perform certain tasks that enable them to learn. The tasks that facilitate learning are known as learning activities. Vermunt and Verloop (1999) differentiate three main types of learning activities: cognitive, affective and metacognitive (regulative). The cognitive processing activities directed towards learning outcomes in terms of changes in a student's knowledge, understanding and skills. The affective learning involves activities dealing with emotions that arise during learning and lead to a mood that can influence the progress of the learning process in positive, neutral or negative ways. The metacognitive regulation of the learning process refers to exerting control over student cognitive and affective processing of subject matter. Metacognitive activities, therefore, indirectly lead to learning outcomes.

2.4.4.3 Teacher's Role

The abovementioned learning activities, that is cognitive, affective, metacognitive, can be addressed through several ways. The teacher's role is of great importance for the ways in which these learning activities are delivered. As stated by Vermunt and Verloop (1999), "learning and teaching activities are one another's mirror image and may be described in the same terms" (p. 265).

It is useful to deem the teacher's role as a continuum. One end of the continuum is the teacher-centred role, in which the teacher is presenting the knowledge to be learned, and is directing the learning process of the students. At the other end of the continuum, that is the student-centred role, the students are left free to discover and to construct knowledge on their own. In this case, the intervention of the teacher should be minimal – all cognitive, affective, and regulative learning activities reside with the learners themselves. In the extreme case, teachers limit themselves to presenting the subject matter and assessing the learning outcomes. Consequently, the role of teacher will shift from that of a classroom director-knowledge deliverer to that of a classroom facilitator-knowledge resource (Hannafin, Hill & Land, 1997).

2.4.4.4 Teaching Strategies

Promoting learning in classrooms has a clear influence on teachers' roles (Niemi, 2002). Concerning how teachers can help learners develop knowledge or skill, Marzano (2003) points out that "no single teaching strategy is effective all the time for all learners" (p.18) The main reason is that teaching and learning are very

complex processes that are influenced by many different factors, only some of which are under teachers' control and none of which are fully understood (Killen, 2007).

Concurrent interest in learning guided by a constructivist perspective has directed renewed interest in student-centred learning (Land & Hannafin, 2000). Student-centred approaches are defined by contrasting them with traditional instructional approach characterized by greater teacher control (Hannafin, Land & Oliver, 1999). Consequently, the degree of teacher-centeredness compared with student-centeredness of the methods can be utilized as the organizing theme for the identification of teaching methods and strategies (Treagust, 2007). Further discussions focused on various perceived benefits of instructional methods and strategies in teaching science in primary schools, specifically, demonstration, classroom explanations and talk, questioning, group learning and cooperative learning, and discovery learning.

Demonstrations

Classroom demonstrations that stimulate students' interest have the potential to help students learn science by combining demonstrations with teachers' explanations (Crouch, Fagen, Callan & Mazur, 2004). Although, there is clearly much discussion devoted to the use of science demonstration, including differences of opinion regarding their merits (see Beall, 1996), Crouch et al. (2004, p. 853) examined three different modes of presentation as shown in Table 2.3.

Table 2.3
Three Different Modes of Presentation

Modes	Learning activities
Observe	Students watch the demonstration and hear the teacher's explanation.
Predict	Students record their prediction of the demonstration outcomes, observe the demonstration, and hear the teacher's explanation.
Discussion	Students record their predictions, observe the demonstration, discuss it with classmates, and finally hear the teacher's explanation

Crouch et al.'s (2004) work on the three modes of presentation led to two clear conclusions: First, students learn little from traditionally presented classroom demonstrations. Second, giving students a few minutes to think and record their prediction, without discussion, yields better understanding. Furthermore, using

Predict-Observe-Explain (POE) activities can be an effective way to identify students' knowledge and to understand their science conceptions and their process skills development (Palmer, 1995).

Classroom Explanation

As stated by Chin and Brown (2000), explanations refer to how or why something or a phenomenon occurs. Generating explanations drives the acquisition of knowledge that is retained in the long term and produces a depth of understanding that gives students the basis to transfer and generalize to new situations (Sandoval & Reiser, 2004). With regard to the role of teachers in helping students construct a deeper understanding of content knowledge, Treagust and Harrison (1999) emphasized the importance of teachers' effective explanations about scientific phenomena in the classroom.

Engaging students in scientific explanation is a fundamental aspect of scientific inquiry (Duschl & Osborne, 2002). A key objective for science education is to help students seek evidence and reasons for the ideas of knowledge claims that scientists draw in science (Driver, Newton & Osborne, 2000). As indicated by McNeill and Krajcik (2008), having students engage in this practice may shift their views about science away from science as a static set of facts to science as a social process where knowledge is constructed. Teachers used four instructional practices during their instruction of a scientific explanation such as defining a scientific explanation, making the rationale of a scientific explanation explicit, modelling a scientific explanation, and making a scientific explanation or everyday explanation (McNeill & Krajcik, 2008).

Questioning

In classroom settings, the questioning process is an essential part of instruction in that it allows teachers to focus students' attention, provide rehearsal of information, stimulate conceptual change or prompt students to elaborate on information learned (O'Donnel, 1999). Frequently, a lesson is "composed of countless questions that often require minimal effort and low-level thinking to answer" (Cooper, 2010, p. 192). Consequently, it is important to present students with questions that encourage reasoning and that allow them to draw from their prior knowledge rather than accepting a "yes or no" response. As indicated by Chin, O'Donnel, and Jinks (2000),

the quality of students' reasoning is clearly influenced by the level of the questions they are asked.

Researchers on questioning strategies speak of two kinds of wait time (Rowe, 1974): "wait-time 1" refers to the amount of time the teacher allows to elapse after he/she has posed a question and before a student begins to speak; and "wait-time 2 refers to the amount of time a teacher waits after a student has stopped speaking before saying anything. However, research has focused more on wait-time 1 than wait-time 2. Because research has established a positive relationship between the amount of instructional content covered and student achievement, researchers have recommended that teachers keep up brisk instructional pacing (Carlsen, 1991).

Group Learning and Cooperative Learning

Over the past 20 years, group working between students has been promoted in many countries as a key component of primary science. Yager (2000) points out that since knowledge cannot be acquired passively, teachers have to promote group work in which three or four students come to agreement on a given problem with little or no interference from the teacher.

In general, cooperative learning can be defined as a structured form of group work where students pursue common goals while being assessed individually (Slavin, 1999). The review of the significant research conducted by Johnson and Johnson (2002) suggests that the benefits of cooperative learning activities hold for students at all age levels, for all subject areas, and for a wide range of tasks, such as those involving rote-decoding, retention, and memory skills, as well as problem solving ability. At the same time, cooperative learning methods seem to promote positive interpersonal relations, motivation to learn, and self-esteem among students. More recently, the research has successfully demonstrated that the positive effects of small-group methods on student achievement, specifically compared to other forms of instruction that involve less interaction between student. (O'Donnel, 1999).

Cooperative learning may be described as a "structured, systematic instructional strategy in which small groups work together toward a common goal" (Cooper & Mueck, 1990, p. 68). According to Johnson and Johnson (2002), procedures that characterize cooperative learning include communicating a common goal to group

members, offering reward to group members for achieving their group's goal, assigning interrelated and complementary roles and tasks to individuals within each group, holding each individual in each group accountable for his/her learning, providing team-building activities or elaborating on the social skills needed for effective group work, and discussing ways in which each group's work could be accomplished more effectively.

Inductive Teaching Method

Inquiry-based science instruction has been defined in a variety of ways, however fundamentally, according to Minner, Levy and Century (2010, p. 479), inquiry instruction can be indicated by three aspects

(1) The presence of science content.
(2) Student engagement with science content.
(3) Student responsibility for learning, student active thinking, or student motivation within at least one component of instruction—question, design, data, conclusion, or communication.

From the leaner's perspective, the National Research Council describes "five essential features of classroom inquiry" (National Research Council, 2000, p. 25) as the following:

(1) Learners are engaged by scientifically oriented questions.
(2) Learners give priority to evidence, which allows them to develop and evaluate explanations that address scientifically oriented questions.
(3) Learners formulate explanations from evidence to address scientifically oriented questions.
(4) Learners evaluate their explanation in light of alternative explanations, particularly those reflecting scientific understanding.
(5) Learners communicate and justify their proposed explanations.

Inquiry instruction has frequently been found to be more effective than traditional science instruction at improving academic achievement and the development of thinking, problem solving, and laboratory skills (McCreary, Golde & Koeske, 2006).

2.4.5 Materials and Resource

Appleton (2007) identifies three main types of instructional materials used by primary school teachers such as textbook, teacher guides and resources, and supplementary materials. Although the role of the textbook in the learning process in schools has been long criticized for many shortcomings, textbooks appear to be the favoured educational resources for disseminating information in classrooms (Goldman & Bisanz, 2002). In this regard, teachers tend to rely on the textbooks for their teaching practices regardless of their limitations.

In addition to the use of textbooks as an important learning resource, science kits are increasingly being used in primary schools as the main curricular material for inquiry-based science instruction (Dickerson, Clark, Dawkins & Horne, 2006). Since each science kit was aligned to specific outcomes in the curriculum and provided a complete set of materials and guidelines for classroom use (Sherman & MacDonald, 2008), it can help teachers overcome instructional roadblocks to teaching science (Jones, Robertson, Gardner, Sharon & Blanchard, 2012).

2.5 Curriculum Development in Indonesia

Since Indonesia proclaimed its independence in 1945, curriculum development has been centralized in nature and involves different agents at the pre-school, primary, and secondary levels of education system. These agents contribute to the recommended curriculum at different levels of specificity (Thomas, 1991). The word "agents" refers to groups or an individual that may take part in the curriculum decision, such as individual or members in the parliament, non-government organizations (NGO), scientists, scholars, government and private institutions, community leaders or community figures. These agents, in determining the curriculum, examine the content in an attempt to determine its political significance and the kind of expertise necessary for making decisions about the content of a particular subject such as religious education, moral education, mathematics, science and the Indonesian language.

From the time when the first education minister of the new Republic of Indonesia issued the first national curriculum in 1947, two years after the country's

proclamation, the national curriculum was reconsidered and amended in 1952, 1964, 1968, 1975, 1984, 1994, and the most recently in 2004 (Tilaar, 1995). The curriculum reform is due to a logical consequence of the change of the political system, social, cultural, economic, and science and technology. However, the intact national curriculum is designed based on the same foundation, i.e., *Pancasila* and the 1945 Constitution. The difference is the emphasis on the basic education goals and implementation approach. Further discussion on the brief overview of curriculum development in Indonesian educational system is presented in the following sections.

2.5.1 The Curriculum Review, Circa 1960

The role of education in Indonesia has been shaped by the country's colonial history, geographical size, cultural diversity and other social, political and economic factors. This shape can be seen in the first national curriculum, which was known as the Instructional Plan. The framework of the Instructional Plan was designed with a Dutch orientation toward serving a national interest. For instance, the educational principle behind the Instructional Plan was *Pancasila*, which consisted of the five pillars of Indonesia's ideology. Generally, the Instructional Plan focused more on aspects such as national character building, nation-state building, life experience-based arts, and physical education than on the science and mathematics. The term curriculum was not used in the educational system until 1968.

The Instructional Plan then developed into the Specified Instructional Plan in 1952, in which every syllabus clearly specified every topic that teachers should deliver in the classroom. This curriculum, known as Curriculum 1964, focused on subjects that should develop human creativity, sensitivity, and morality. The subjects were classified into five core areas such as civics, intelligence, arts, skills, and physical activity. The focus of the curriculum was primarily to meet the needs of a rural society and acknowledged the importance of vocational skills and further education. Additionally, the school curriculum, particularly the school science curriculum, was subject-oriented and encouraged a teacher-centred approach in the classroom. With the aim of maintaining political stability, the political perspective of the second presidency (1966-1998) influenced the educational changes. As a result, Curriculum 1968 focused on theory rather than experience and comprised three curricular

groups: *Pancasila*, basic science, and particular skills. In 1968, the term curriculum was introduced into the educational system.

2.5.2 The Curriculum Review, Circa 1970

The curriculum reform in the early 1970s placed emphasis on the teaching and development of science and technology so as to improve the effectiveness and efficiency in the education system. This reform resulted in the 1975 curricula for pre-primary, primary and secondary education. The new curriculum, known as Curriculum 1975, was introduced increasingly into the schools between 1976 and 1978. Under the curriculum guidelines of the Procedures for Developing Instructional System, every topic was broken down into more detailed aspects: general goals, specific instructional goals, instructional contents, instructional facilities, teaching-learning activities, and evaluation.

Curriculum 1975 adopted a student-centred approach, instead of the teacher-centred approach within the previous curriculum that had dominated teaching and learning process for a long period. Within this curriculum, science subjects were highlighted to provide factual knowledge as well as for students to develop various process skills through hands-on activities in the laboratories and the classroom. However, these curricula were later criticized for being overly objective-oriented, too rigid and overloaded (Balzano, 1991).

2.5.3 The Curriculum Review, Circa 1980

Curriculum 1975 then became Curriculum 1984. The philosophy underlying the development of this curriculum was that learning was a continuous process and that learning materials were supposed to be updated to suit the development and the need of the society (Abdullah, 2007). The 1984 curricula attempted to eliminate the weakness identified; the new syllabi were not too detailed in order to provide flexibility for teachers in managing the teaching-learning activities. This revision also introduced a new approach to teaching and learning activities called the Process Skill Approach. In this curriculum, students were expected to learn through a model of Student Active Learning (SAL) by observing, categorizing, discussing, and reporting on the topic as well (Yulaelawati, 1995). This curriculum was perceived as a theoretically sound concept of learning, and it worked well in the schools where the

approach was piloted but failed when it was applied nationally. The negative response of this model was the creation of Curriculum 1994.

2.5.4 The Curriculum Review, Circa 1990

Curriculum reform was conducted 10 years later in response to the weakness of the Curricula 1984, which resulted in the 1994 curriculum. When the Curriculum 1984 was being implemented, there was already a discourse among educational experts on integrating local component into the national curriculum. Later, in a national conference of the Centred for Curriculum Development in 1986, members were proposing this idea (Abdullah, 2007). In the following year, the Ministry of Education (then the Ministry of Education and Culture) issued a degree mandating the implementation of Local Content Curriculum nationally (Bjork, 2005). The pilot was unfortunately not very successful; then in 1994, a new version of Local Content Curriculum was made a formal component of the new national curriculum called the Objective Based Curriculum that was issued in the same year (Bjork, 2005). Within the concept of local curriculum content, schools were given freedom to allocate up to 20% of the lesson to subjects relevant to their students. However, this curriculum received a lot of criticism as being too packed and too heavy (Abdullah, 2007), and schools did not seem to be able to achieve the intended objectives (Bjork, 2005).

Curriculum 1994 was proposed to integrate the goal approach of Curriculum 1975 with the process emphasis of Curriculum 1984. Earlier curricula had been much more focused of students acquiring knowledge, although attempts were made in 1994 to encourage 'student active learning' as a means of acquiring knowledge. Within the 1994 curriculum, schooling was changed from two semesters to three terms in a year. Consequently, teachers needed to conduct more assessment. Moreover, a new teaching approach in science, namely, Science Technology and Society was presented in the educational process. This approach aimed at enabling students to learn science in a meaningful way related to daily occurrences in the student's society and environment. However, there were shortcomings of the 1994 curriculum such as (1) the curriculum was overloaded and unintegrated, with the intention that students were not able to learn optimally. They learnt everything but it was not in-depth. In addition, some content coincided horizontally among some subject matters and vertically among levels; (2) Learning processes in the classroom were simply

emphasizes on the cognitive domain, without affective and less psychomotor domains. Teachers tended to demand rote learning; and (3) Teachers were seen as central to learning, not students. Given those facts, the central government via the Ministry of National Education proposed a revised version of Curriculum 1994 and developed a National Competency-Based Curriculum and assessment framework designed to sustain unity but allowing for diversity.

2.5.5 The Curriculum Review, Circa 2000

Since 1975, there have been major revisions of the curriculum approximately every ten years, the last major revision taking place in 2004 with the introduction of the competency based curriculum (the CBC). The CBC provides a new paradigm with which to create a working mechanism regarding curriculum decision-making in schools. The CBC has been piloted in several provinces at selected schools and implemented gradually in the academic years from 2001/2002 to 2005, by replacing the Curriculum 1994. The original plant was that the CBC would be fully implemented by 2004. Therefore, it was called Curriculum 2004.

The CBC is a framework that defines what students are expected to achieve in each grade. Each level of competency is a step in the students' progress towards higher levels of competence. The definition of student competency at each grade is stated in general terms allowing for provincial and local diversities in subject matters as well as for diversities in local facilities and student's abilities. Accordingly, the central government gave the opportunity for local governments to develop the local curriculum as a supplement to those mandated nationally. The curriculum provides flexibility and choice for teachers and students. The factors that influence this choice include school and community context, local learning opportunities, contemporary and local issues and available learning resources. In managing this choice, a balanced curriculum should engage every student while catering for a broad cohort of students and a range of delivery contexts.

The CBC was diversified according to the level of education, local potential, and student's learning. Schools became more autonomous; teachers consequently acquired flexibility in term of developing a syllabus, designing materials, selecting the teaching and learning methodology, and evaluating the students' progress. These

circumstances created a new paradigm in curriculum implementation; schools with respect to implementing a national curriculum are obliged to follow one government policy in terms of competency, but schools have also the autonomy to develop their own syllabus and teaching materials needed to cater to local needs and potentials as well as individual schools.

In company with the Curriculum 2004 document, guidelines that include detailed indicators for each competency were provided for teachers as directions to design teaching and learning activities in the classrooms. However, the instructions that occur in the classroom are more focused on teaching indicators rather than developing student competencies. The last major revision in 2004 attempted to make the curriculum more concentrated on competencies and skills rather than the indicators. As the result, the indicators are removed and schools are given the autonomy and responsibility of developing their own curriculum (KTSP) in order to develop these competencies in a locally appropriate manner. Although, this curriculum introduced levels of competence and skills that students should achieve in their grades, it was criticized for being deficient in its capacity to sufficiently measure the student learning outcomes, since both the national examination and the leaving school examinations only contain multiple-choice questions. Critics argued that, if competencies are the target of learning, an assessment of learning needs to measure student achievement and contain open-ended questions to better measure student competences.

The original curriculum 2004 has been revised by the Curriculum Development Centre and presented to BSNP (National Education Standards Body). After revisiting some keys changes in terms of life skills and local relevance, the curriculum was socialized from January 2006 and should be implemented in July 2006. In other words, the current curriculum document is called the Curriculum 2006 or School based Curriculum (KTSP). The Curriculum 2006 claimed to implement the Law 20/2003 of the National Education System and adopt the standard-based reform. The characteristic of the standards-based reform can be seen from new government regulations, which describe the need to implement standards of education such as standards of content, standards of process, standards of graduate competence,

standards for teachers and education staff, standards for facilities, standards for management and finance, and standards for assessment.

2.6 The Current Curriculum Reform

2.6.1 Standards-Based Reform

The rationale for curriculum reform in Indonesia has changed over the years from the need to create national unity, with its centralized control, to one of socio-economic empowerment through decentralization. Subsequent to decentralization, in 2003, the Ministry of National Education (MoNE) produced a new education law, and several regulations and instructions, which have a profound impact on the delivery of education throughout the nation. The recent attempt to increase excellence of education is carried out by adopting known standards-based reform. The adoption of the standard-based reform was strongly indicated in the new educational Act No. 20/2003, the law of the National Education System.

To implement the reform, the central government has not only issued a number of regulations, particularly about standardization of education, but also established a Board for National Standards in Education in 2005. This board has the responsibility to develop, monitor the implementation of, evaluate and report against the national standard for education. In addition, the board also assesses textbooks and undertakes the development of the national examination. National education standards cover eight key areas of input, process and output of the education system as shown in Table 2.4.

Table 2.4
National Education Standards

Input	Process	Output
Content	Process (teaching and learning)	Graduate competence
Facilities	Management	Assessment
Teacher and education staff		
Finance		

Under Act No. 20/2003, the central government adopted two components of standards-based reform, i.e., National Education Standards and the National

Assessment. However, the presence of content standards as a part of education standards is not sufficient to ensure curricula that lead to high-quality instruction and achievement (Schmidt, Wang & McKnight, 2005). The inadequate amount of resources (facilities and infrastructure) and teachers in Indonesia is of great concern. The inequality of the provision of educational resources negatively affects the quality of education, as can be seen from both PISA and TIMMS International test results. The World Bank report of 1998 noted that students leaving basic education generally lacked essential competency skills in numeracy, reading, and reasoning. The World Bank suggested that the poor quality of education input was the primary reason for the poor quality of education. A UNESCO report (2006b) also indicates that the Education For All (EFA) challenge focused on the issues of quality, geographic inequalities, resource shortage, and teacher quality.

2.6.2 The Implementation of Curriculum Reform

Education has continuously been a dynamic field. This is especially so in relation to changes that occurs in the school curriculum. A basic reason for revising a school curriculum is to provide better learning opportunities for students; for example, higher achievement levels in terms of understanding, skills and values. When a new curriculum is introduced into schools, besides the revised goals for students there are also changes in the structures, programmes and practices for the teachers and for the schools' organisation. More specifically, teachers are the most important person in the curriculum implementation process. With their knowledge, experience and competencies, teachers are central to any curriculum improvement effort. Regardless of which philosophical belief the education system is based on, there is no denying that teachers influence students' learning. Teachers are the most knowledgeable about the practice of teaching and are responsible for introducing the curriculum in the classroom.

Fullan (2001) proposes a three-part model of any educational change process composed of initiation, implementation, and continuation. Phase initiation comprises the process that leads up to and includes a decision to adopt or proceed with a change. Phase implementation involves the first experiences of attempting to put reform into practice. Phase continuation in which the change gets as an ongoing part of the system or disappears by way of a decision to discard or through attrition

(Fullan, 2001). When used in the context of the implementation of curriculum reform, the three phases are equally important in the change process (Cheung & Wong, 2012).

Since this study is focused on the 'how' of desired educational change to be achieved, instead of the 'what', the implementation phase is of particularly interest. According to Fullan and Pomfret (1977), there are four reasons for studying implementation. First, to conceptualise and measure implementation, so that changes can be identified. Second, to understand some of the reasons why many educational changes fail. Third, to ensure that the implementation phase is not ignored or confused with other aspects of the process of change, such as adoption. Finally, to interpret learning outcomes and to relate these to possible determinants. Hence, educationalists and others involved within the education domain have to examine factors that influence the implementation of curriculum reform and find out key strategies to address the challenges. More specifically, the core of this thesis was to examine key hindering and facilitating factors in implementing of curriculum reform at the primary school classroom level.

In any evaluation of curriculum reform, a main factor will be the teachers themselves, usually referred to as the agents of change during the curriculum implementation phase. As stated by Fullan and Pomfret (1977), implementation refers to the actual use of a new curriculum or what it consists of in practice. This means that it is essential to examine how change agents perceive the new curriculum and put it into practice. The change agents themselves are the most important group involved in the curriculum reform process because they are the ones who provide the communication link between the developer and the clients (Marsh, 2004). Since, change agents in an educational context are the teachers who will implement the reform, it is of interest and of considerable importance to focus on them and how they implement or cope with reform.

2.6.3 Factors influencing Curricular Reform Implementation

School based curriculum (in *Bahasa* Indonesia: *Kurikulum Tingkat Satuan Pendidikan*) or the Curriculum 2006 is flexible in its implementation, giving more autonomy to local schools to determine their own direction. Schools, more specifically, have greater freedom of choice over curriculum decisions. The accountability for each school that exercises autonomy at the local level may include the challenge of finding human resources and faculty who are competent and experienced. Not all schools in Indonesia have similarly qualified personnel according to their credentials and teaching experiences. Indeed, a growing body of research have indicated that the teacher plays a critical role in how the curriculum is implemented in the classroom and emphasized that the influence of the teacher should not be ignored (Blank, 2002; Marzano, 2003). Consequently, curriculum autonomy becomes a challenge for local administrators and school stakeholders in defining and implementing their own curricula (Bjork, 2005).

In addition to the above-mentioned challenge, the literature on the management of change (e.g. Fullan, 2007) suggested that a number of factors that may affect the implementation of curriculum reform. The following sub-sections briefly discussed four aspects that seem particularly influential for teachers to implement curriculum reform in the classroom, namely time constraints, teacher's expertise, teacher involvement and teachers' resistance to educational change.

2.6.3.1 Time

Research suggests that teachers are unlikely to use any curriculum in which they do not feel competent. To comprehend a new paradigm of curriculum change, school teachers need ample time to prepare and plan for implementation (Penuel, Fishmann, Gallagher, Korbak & Lopez-Prado, 2008). Research conducted by Adleman and Walking-Eagle (1997), which focused on a key element in implementing an innovation, found that teachers need time in order to comprehend the purpose of the innovation, review the outcomes that might be expected, discuss the proposed new approach among their colleagues, and practice using the innovations themselves. Research also identified that the failure of implementation, especially in the large scale, is frequently associated to the decision to introduce the change rather rapidly, without allowing time for proper preparation and practice (Darling-Hammond,

2003). Therefore, it is evident that teacher change is a long process that needs both time and effort.

2.6.3.2 Teachers' Expertise

To some extent, the process of implementing curriculum change needs the teacher's expertise about the reform. For the realization of the reform, the school stakeholders particularly the teachers should conceived the reform process, accept the reform, and have a willingness to adopt it. In regards to this assertion, Fullan and Hargreaves (1992) argued that the reform affects a teacher's perceptions of his or her expertise. In this aspect, Bandura (1977) stated that teachers are considered to be self-efficacious. More specifically, Tschanne-Moran, Woolfolk Hoy and Hoy (1998) have defined teacher efficacy as "the teacher's belief in his or her capability to organize and execute courses of action to successfully accomplish a specific teaching task in a particular context" (p. 233). Within the reform context, self-efficacy can be described as teacher's perceived ability to plan and execute the action to achieve the reform goals (Charalambous & Philipppu, 2010).

Moreover, Bandura (1977) noted that efficacy expectations were a major determinant in people's choices of activities: how much effort they spend and how long they will keep trying in stressful situations. Teacher efficacy concerning the curriculum reform affects the teachers themselves, their acceptance of it and their understanding of the results of the change (Charalambous & Philippou, 2010). As Tell (2000) contended, "Teachers, regardless of their years of experience, need the opportunity to develop their expertise as educators" (p. 1-8). Consequently, teachers' expertise in curriculum reform implementation is crucial.

2.6.3.3 Teachers' Involvement

In light of the curriculum implementation policy, the nature of teachers (Penuel, Fishman, Gallagher, Korbak, & Lopez-Prado, 2008) has to be considered important despite their roles in the implementation of curriculum reform policy and the complex nature of the implementation process. Cheung and Wong (2012) give an account that educational reforms with the agreement and support of teachers tend to have a greater chance of succeeding. Similarly, successful implementation is deeply rooted in an understanding of the concerns of the individuals delivering the innovation (Hall & Hord, 2001).

As the implementers of change, teachers endure the burden of responsibility for its success. In curriculum reform, according to Penuel et al. (2008), the largest share of responsibility for implementation and improvement is placed on those who deliver the curriculum. However, their role and expertise in the reform is often limited to the classroom, with no real opportunity to participate in the development of the new curriculum (Carl, 2009).

According to van den Akker (2010), the discrepancies between the intended and implemented curriculum influenced significantly the intentions of curriculum reform. One of the reasons given for this lack of alignment is that teachers were not involved in the decision-making and their opinions and participation were not invited (Penuel, et al., 2008). Darling-Hammond, Hightower, Husbands, LaFors, Young and Christopher (2005) stated that teachers should have the right to participate in curriculum and pedagogical decisions. Furthermore, given the involvement in the adoption, adaptation, and implementation process, Barab and Luehmann (2003) consider that teachers are more than receivers of curriculum.

Nevertheless, curriculum is often designed without considering the role of the teacher as decision-maker (Schoen, Cabulla, Finn & Fi, 2003) Thus, it is believed that when teachers are involved in decision-making, they will be more committed to implementing and supporting the decision, and a sense of ownership in the school will result (Goldring & Greenfield, 2002). To sum up, teachers' involvement in the process of curriculum change is critical for teachers believing that their expertise and opinions are valued by the school administration.

2.6.3.4 Teachers' Resistance to Educational Change

In the process of curriculum reform, schools have been strongly resistant to any reorientation that is markedly different from what has been accomplished previously. As pointed out by Fullan (2001), teachers resist doing whatever is being proposed because they want to adhere to their old ways. The literature review highlighted that teachers tend to reject pedagogical strategies or teaching methods that are different from what they are currently using (Davis, 2003). In other words, they are reluctant to change or modify their current instructional strategies.

Teachers' attitudes obviously affect their behaviour in the classroom. When their attitudes are congruent with the innovation, then they are likely to be positively disposed towards its implementation. If the innovation, however, is incompatible with teachers' existing attitudes, resistance to change is likely to occur (Waugh & Godfrey, 1993).

2.7 Summary of the Chapter

Because the main impetus of this study was to identify and explain any observed discrepancies between the intended and implemented primary school science curriculum, this chapter reviewed six main areas of literature pertinent to this task. A review was provided of literature on basic concept of curricula and also highlighted important aspects of each of the three sequential stages of curriculum – the intended, implemented, and attained curriculum. The review then considered studies in the literature about Indonesian curriculum development, which begin from circa 1960 to circa 2000. The following chapter reports on the methods and data collection procedures.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology, which primarily relates to the way in which the researcher structured or configured the research project on the basis of the aims of the study. The methodology includes not only the theoretical framework or research paradigm for understanding the process of research, but also the data collection procedures, the research instruments, sampling techniques and data analyses.

In this sense, one of the issues needing to be taken seriously in this study was how to document a convincing methodology for data collection and analysis so as to answer the research questions. The appropriateness of either applying the conventional paradigms or the alternative paradigm is called into question. As Guba and Lincoln (1989) affirmed, "paradigms are distinguishable *only* at the level of methods, that is, as mere collections of different inquiry tools and techniques" (p. 156). When conducting educational research, several methodological orientations are feasible. Is the study to be quantitative, qualitative, or a mix of each? Each method has its strengths and limitations. While most researchers currently employ whatever method is suitable for their studies (Tashakkori & Teddlie, 1998), the challenge is to decide on the methodology that provides the best information and provides answers to the research questions. Accordingly, for the purpose of this study, this chapter begins with research questions that lead the data collection of the study. The chapter is then divided into several major sections.

Following Section 3.1, Section 3.2 explains the research design, particularly the reason for adopting a case study approach and for using both quantitative and qualitative dimensions of research in this study. Section 3.3 explains the data collection procedures: the quantitative techniques for purpose of the empirical study and the qualitative techniques, which cover classroom observations, the semi-

structured interviews and documentary analyses for the purpose of gathering data from official documents. The last section is a brief summary of the chapter.

The following research questions were designed on the basis of an extensive literature review, as well as based on the purpose and specific aims of the study. The main research questions can be stated as follows:

(1) What is the focus of the current intended primary school science curriculum?
(2) How is the current intended primary school science curriculum actually implemented?
(3) How do teachers perceive the intended science curriculum in primary schools?
(4) How do students in primary schools perceive their classroom learning environment?
(5) Which discrepancies can be observed between the intended and implemented primary school science curriculum?
(6) How can the observed discrepancies between the intended and implement primary school science curriculum be explained?

3.2 Research Design

Two major tasks in any research design were to specify as clearly as possible what the study wanted to find out and to determine the best way to do it (Babbie, 2004). In line with this, Denzin and Lincoln (1994) pointed out the research design served to link the research orientation to specific methods of collecting and analysing empirical materials.

3.2.1 Research Orientation

According to Cumming (1994), nearly all research projects in educational settings can be placed in three categories: descriptive, interpretive and ideological. The orientation of research is a philosophical base where the researcher identifies the project; formulates research problems and chooses his/her approach with a specific theory and methods. The research orientation of this study is interpretive.

With this particular orientation, the researcher's task was "attempting to make sense of, or interpret, phenomena in terms of meaning people bring to them" (Denzin & Lincol, 1998, p. 3). Further, as Patton (2002, p. 39) argues, the interpretive study

"takes place in real world settings and the researchers does not attempt to manipulate the phenomena of interest". The aims of this study was to interpret any discrepancies between the intended and implemented primary school science curriculum and to explain teachers' perceptions of the intended curriculum and students' perception of their learning classroom environment , together with a specific case study located in six primary schools in Bengkulu province, Indonesia.

Schwandt (2000, p. 193) argues that in an interpretive study "it is possible to understand the subjective meaning of action (grasping the actor's beliefs, desires, and so on) yet to do so in an objective manner". However, the biases, values and judgment of the researcher cannot be denied and as a result a researcher has to state matters explicitly (Cresswell, 2003). In an interpretive study, both the researcher's and participants' roles are prominent. This is particularly when the researcher has acquired an insider status with the participants and then tries to interpret their experience (Schwandt, 2000). Therefore, the researcher admits that whilst the study was carried out with theoretical rigour and standard data analysis procedures, the interpretation of data was collected from a variety of sources and in various forms. Moreover, the researcher also had a personal motive to improve the implementation of primary school science curriculum, and it is possible that this will have unintentionally been allowed to influence his interpretation data to some extent.

Furthermore, the interpretive approach to this study included the study of individual teachers as a case in a case study. The individual case of study teachers' classroom practice was of interest in this study. The teachers as participants in this study were involved throughout research process. As Schaller and Tobin (1998) argued, the researcher could not be separated from the participants in the interpretive research process. They stated clearly, "endeavours to construct understanding that take account of the presence of the researcher and the involvement of the participants within a socio-cultural setting are of critical concern" (p. 42).

3.2.2 Case Study Approach

A case study approach was utilized in this study because it fits with the characteristic of interpretive inquiry (Anderson, 1998). Denzin and Lincoln (1998, p. 3), for instance, point out that "qualitative research is multi methods in focus, involving an

interpretive, naturalistic to its subject matter". This approach also leads to a better understanding of the phenomena, using diverse methods to collect data and by conducting in the study in a relatively short period.

Although the term case study is well-known to most people, there is little agreement on what constitutes case study research (Merriam, 1988). Creswell (2008, p. 476) defines the case study as "an in-depth exploration of a 'bounded system' (e.g., an activity, event, process, or individuals) based on extensive data collection". The term 'bounded system' or a case relates to the context and scope within which the researcher locates the case to be studied. Case studies are one of the most common ways to undertake qualitative enquiry because they enable interpretation to be within a context (Denzin & Lincoln, 2005). Usually it is up to the researcher to decide the circumstances of what is called "a case" in a case study (Creswell, 2007). The case itself, however, can be more than one site – it depends on the researcher to establish his/her unit of analysis (Yin, 1994).

The implementation of the intended science curriculum in primary schools in Bengkulu province, Indonesia is the phenomenon and the unit of analysis in this study. Although a study might take place on several sites, it can be counted as a single phenomenon. In this study, a multiple site case study method refers to a case study method that is addressed in several schools. This fits with Stake's (2000, p. 437) classification on the nature of the case which can be identified as a 'collective case study'. Moreover, Stakes (2000) argues further as follows:

> Individual cases in the collection may or may not be known in advance to manifest some common characteristics. They may be similar or dissimilar, redundancy and variety each important. They are chosen because it is believed that understanding them will lead to better understanding, perhaps better theorising, about still larger collection of cases. (p. 437)

Other reasons for choosing a case study are the practical orientation of this research and lack of control that the researcher has on the educational field that is studied. Anderson (1998) indicated it is suitable for the educational situations that do not easily allow tight control over the (independent) variables or experimental manipulation. In this research, phenomena are studied in their "authentic environment", while the researcher is going about his/her research, for the school it is "just business as usual". It is thus impossible to separate context and phenomena.

Moreover, at the start of the research, the exact boundaries between phenomenon and context were not obviously evident.

A case study approach is also useful in terms of gathering data for analysis which can be both quantitative and qualitative (Stake, 2000; Yin, 1994). Based on arguments by a range several authors (Anderson, 1998; Creswell, 2008; Yin, 1994), this research used a range of empirical data resources such as documentation, interviews and direct observation in addition to a questionnaire survey. These various sources of rich empirical data were then analysed as methodological triangulation. In addition to analysing data in the stages of data collection, Merriam (1988) also proposed that by conducting a case study, a theory can be tested or built. In this case study, van den Akker's (2003) curriculum framework was tested.

The study was concerned with the implementation of curriculum reform in one location. As Yin (1994, p. 10) states, a case study research "does not represent a 'sample', and the investigator's goal is to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization) ... the goal is to do a 'generalizing' and not a 'particularizing' analysis". Again, the study will inform an evaluation about policy and practices to state primary school context in Indonesia, which can be used to guide decision-making and improve science education for the future.

3.2.3 The Approach

This research was oriented in the pragmatic paradigm by adopting a "mixed methods' approach (Creswell, 2008) which included quantitative and qualitative data and techniques in one case study. He stated:

> The core argument for mixed methods design is that the combination of both forms of data provides a better understanding of a research problem that is either quantitative or qualitative data by itself. Mixed methods designs are procedures for collecting, analysing, and mixing both quantitative and qualitative data in a single study or in a multiphase series of studies. (p. 62)

Bryman (2006) asserted that the mixed methods design should not be thought of as a technique, but rather than an approach to inquiry which include an implicit theory of what constitutes quality, and what determines a sufficient understanding of social phenomena. Additionally, Creswell and Clark (2011) identified essential factors in

selecting a mixed-method design which included determining how and where to mix quantitative and qualitative strands, as well as determining the interaction levels, priority, and timing of quantitative and qualitative strands.

Currently, mixed methods research has become more generally used and more readily accepted by scholars because of the strengths that they engender in research (Johnson & Onwuegbuzie, 2003). Its use is driven by pragmatism rather than principle, motivated by the perceived deficit of quantitative methods alone to address the complexity of research in various studies (Teddlie & Tashakkori, 2009). As McMillan (2000) stated, one of the advantages of mixed methods approaches is "the ability to answer complex research questions that cannot be addressed through the use of quantitative or qualitative methods alone" (p. 30). In this study, there was the necessity to use both quantitative and qualitative data collection process so as to answer the research questions.

Over the past two decades, researchers have now begun using both interpretive and quantitative approaches as complementary parts of an investigation (Creswell, 2008). For example, Fraser and Tobin (1991) reported on three case studies and used both survey questionnaires and ethnographic methods to interpret the data collected. By using both quantitative and interpretative approaches, they were able to produce more consistent and detailed findings that would not have been achieved using only one of the paradigms.

Owing to the nature of the research questions, a pragmatic approach that employed both qualitative and quantitative data was deemed most useful in meeting the aims of this study. Furthermore, the study‘s focus on understanding how primary teachers perceive and implement the intended curriculum suggested that mixed method approach was the best frame, as it mixes elements of both quantitative and qualitative research methods.

3.2.4 Benefits and Drawbacks of Case Studies

Wellington (2000) pointed out that case studies should be illustrative, illuminating/insightful, disseminable, accessible, attention-holding, and strong on reality, vivid and of value in teaching. He also noted that "A case studies may not be generalisable, representative, typical, replicable or repeatable" (p. 97). Furthermore, Baxter and Jack (2008) argued that "One of the common pitfalls associated with case study is that there is a tendency for researchers to attempt to answer a question that is too broad or a topic that has too many objectives for one study" (p. 546). As the literature recommends, placing boundaries on a case will assist to ensure that the study remains focused and "reasonable in scope" (Baxter & Jack, 2008, p. 547). The case can be bounded: (a) by time and space (Creswell, 2008), (b) by time and activity (Stake, 2005), and (c) by context and definition (Miles & Huberman, 1994). The case under inquiry was bounded spatially by the fifth grade classrooms teaching science in six primary school setting. In terms of time, the research was bounded by three months during which the researcher was involved with six teachers and their students.

3.2.5 Triangulation

Creswell and Plano Clark (2011) mentioned that triangulation is one-phase design in which researchers implement the quantitative and qualitative methods during the same timeframe and with equal weight. These methods provide specific techniques and strategies by which the researchers are guided in data collection procedure and analysis. In a similar vein, several scholars point out that qualitative and quantitative methods are valuable depending on the purpose of the study and have relevance and characteristics for the improvement of education (Wellington, 2000; Wiersma & Jurs, 2009). The researcher further attested that triangulation is the simplest form of a mixed-method design which allows more visibility of the facets of the phenomenon in question.

In view of the fact that combining the aspects of qualitative and qualitative methods could result in achieving a systematic, objective, and replicable results, this study employed the concurrent triangulation strategy. This strategy is described by Creswell (2008) as follows:

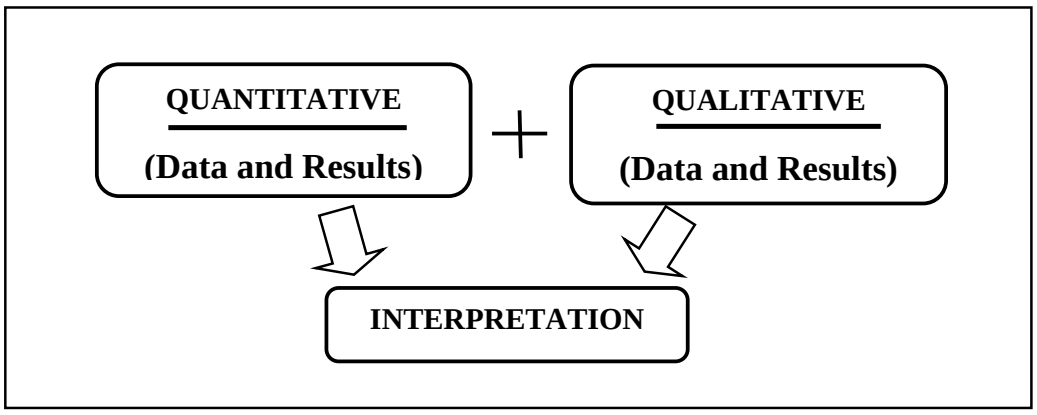

Figure 3.1 Concurrent Triangulation Strategy

(Adapted from Creswell, 2008: 557)

The concurrent triangulation strategy is mostly aimed at using separate quantitative and qualitative research as a means to offset the weakness inherent within one method with the strengths of the other method. As Mathison (1988) indicated that the purpose of triangulation is "to support a finding by showing that independent measures of it agree with it or, at least, don't contradict it" (p.13). In this context, the quantitative and qualitative data collection is concurrent, happening in one phase of the research study. The strategy integrates the results of the two methods during the interpretation phase. In the data collection phase of this study, the teachers' questionnaire (i.e. the perceived curriculum) was conducted concurrently with classroom observations (i.e. the operational curriculum) and documentation (i.e. the intended curriculum). As the primary goal of classroom observation was to seek clarification and deeper understanding on the issues raised in the empirical surveys, the results of quantitative and qualitative data analysis were combined. The concurrent triangulation strategy was, therefore, adopted in this study to increase the 'trustworthiness' of the data – that is, increasing the validity and reliability of these data by using a range of data resources.

3.3 Data Collection Methods

This research includes multiple methods to collect, describe, interpret, understand and explain data. The usage of multiple methods in a single study improves the validity of the research results (Mathison, 1988) as it provides rigour, breadth and depth to understanding the phenomenon in a question (Denzin & Lincoln, 1994).

Multiple methods also allow for triangulation, in the classic sense of seeking convergence of results (Creswell, 2003). Besides, multiple methods allow for overlapping and different aspect of a phenomenon to emerge, one method to successively inform another method, contradictions and fresh perspective to emerge, and additional scope and breadth to a study (Creswell, 2003). All of these aims for using multiple methods are relevant to this research.

3.3.1 The Quantitative Data Collection

Quantitative data collection was the primary method of obtaining data from a large number of teachers. It would not feasible to carry out interviews with a large sample. Thus, a questionnaire survey was employed in this study. As noted by Anderson (1998), the questionnaire can collect straightforward and factual information from a large number of respondents. Moreover, Wolf (1998) indicates that the questionnaire was a self-report instrument used for gathering information about variables of interest to an investigator. An advantage of the questionnaire is that it can be used to gather data in a relatively short period of time.

Since this study was concerned with the assessment of opinions, perspectives, practices, and procedures (Wiersma & Jurs, 2009), the method used to collect data was combination of quantitative, via questionnaire, and qualitative, through interviews with teachers and students, principals, and superintendent. Therefore, it was believed that by using this method, it would be possible to gather information on the curriculum implementation from a large sample, and that this would help in the interpretation of the results.

3.3.1.1 Teacher Questionnaire

The teacher questionnaire employed in this study was a pen and paper instrument designed to gather information regarding primary school teachers' understanding and perceptions of the intended and implemented science curriculum. The questionnaire was first designed and written in English, then translated into *Bahasa Indonesia*, so that all participants were able to understand it. Before the questionnaire was distributed, the researcher pilot tested it with a number of primary school teachers. The intention here was to "identify ambiguities in instruction … clarify the wording [of] question … and [be] alert to unanticipated answer" (Anderson, 1998, p. 179). As

a result, some changes were made to the questionnaire. The development of the questionnaire and its validation are presented in Chapter 4. By using a questionnaire, it was hoped to gather information on teachers' perceptions and use these data in a triangulation (Cohen, Manion & Morrison, 2011) with the interviews and the classroom observation to be carried out in the six school case study.

3.3.1.2 Student Questionnaire

In order to determine how students perceived their learning environment, students participating in this study completed the *My Class Inventory* (the MCI) as a measure of their classroom environment (Fraser & O'Brien, 1985). The MCI learning environment questionnaire was chosen as the major instrument used in this study because it contains scales pertinent to investigate the students' perceptions toward their classroom environment. The MCI assesses five classroom environment dimensions (*Satisfaction, Friction, Competitiveness, Difficulty, and Cohesiveness*) that seemed relevant to this study. This survey instrument has been utilized in a broad range of settings for assessing student perceptions of the classroom learning environment. Mink and Fraser (2005), for instance, employed the MCI in a study involving 120 fifth grade students in the United States. Since the MCI was adapted from previous research (Fraser, 1998a, 1998b), the survey instrument was translated into *Bahasa* Indonesia and then back translated into English by a second translator. Discrepancies were resolved through discussion.

Prior to administering the MCI, it was necessary to determine the reliability and validity of the MCI in the context of Indonesian primary schools. The reliability of the instrument scale can be defined in terms of their internal consistency (e.g. the extent to which items within a given scale are measuring a common concept), while validity for the instruments can be considered to be extent to which scales measures what they claim to measure. The development of and validation of the Indonesian version of MCI were presented in sections 4.2.2 and 4.2.3.

3.3.2 The Qualitative Data Collection

The qualitative data were gathered from documentation, direct observation, and interview. Denzin and Lincoln (1994) argue that:

> Qualitative research involves the studied use and collection of a variety of empirical materials – …, interview, observational, historical, interactional and visual text – that describe routine and problematic moments and meanings in individual lives. (p. 2)

In order to identify and explain any observed discrepancies between the intended and implemented primary school science curriculum, document analysis entailed critically reading the official curriculum documents and the analysis of documents made by teachers as well as conducting classroom observations, site studies and interviews with teachers, principals and teacher supervisors. In this study of the implementation of a curriculum reform, it is the intention to explore and investigate how teachers perceived and enacted the intended curriculum. This aim can only be conducted in the teachers' natural settings, their classrooms.

3.3.2.1 Documentation

According to Hodder (2000, p. 704) documents are important in qualitative research because "access can be easy and low cost, ... the information provided may differ and may not available in spoken form, and … texts endure and thus give historical insight". With related to this view, Atkinson and Coffey (2004, p. 59) state: "documentary materials should be regarded as data in their own right. They often enshrine a documentary version of social reality. They have their own conventions that inform their production and circulation". Similarly, Miller (1997) argues that texts are one aspect of sense-making activities through [which] we construct, sustain, contest and change our senses of social reality. In short, official public documents are important to analyse because they mirror power relations and create reality in the society.

Like other source data, documents have their limitation and their advantages. Since they are produced for the reasons other than research, they may be fragmentary, they may not fit the conceptual framework of the research, and their authenticity may be difficult to determine. On the other hand, as they exist independent of a research agenda, they are non-reactive, that is, they are unaffected by the research process (Merriam, 2009). In a similar vein, within this study, the availability of data was not produced for research purposes.

3.3.2.2 Classroom Observations

Performing direct classroom observations was the best way to obtain the data related to the proposed research questions. This process enabled the researcher to gain an insight into the teachers' perceptions of how they implemented the current intended primary school science curriculum. As indicated by Punch (2009), the classroom observation provided opportunities for the researcher to understand the research setting and the participants' behaviour and interactions.

Observations, defined as watching behavioural patterns of people in certain situations to obtain information about the phenomenon of interest (Johnson & Christensen, 2004), facilitated recordings of actual behaviour rather than reports of intended behaviours. Observations, conducted in purposive and appropriate ways, provided a window by which to view, "the phenomenological complexity of the world where connections, correlations and causes can be witnessed as and how the unfold" (Adler & Adler, 1994 in Denzin & Lincoln, 1994, p.378). In this study, observations heightened sensitivity towards patterns of behaviour that make sense in the classroom setting (Tseng & Seidman, 2007). The analysis of qualitative data can be found in the six case studies in Chapters 6 and 8. The case studies include the teacher background information and insights from teacher, principal and superintendent interviews.

3.3.2.3 Interview

The key to obtaining good data from an interview is the question asked (Merriam, 1998). In response to this notion, there are three general categorisations of interview designs: unstructured (or in-depth interviewing), structured interviewing, semi-structured interviewing (Wengraf, 2001). In this form of interview, the researcher needs to develop an interview guide which is used as a direction so that the content of interview focuses on the crucial issues of the study. The researcher used a semi-structured interview to unfold and probe deeply into the participants' knowledge, values, attitudes and beliefs in regarding to factors influencing the implementation of primary school science curriculum. In regard to these intentions, the questions started as highly structured and led to informal questions to clarify statements made by the interviewee. Much of the research done in the field of curriculum has used the interview as a method of inquiry (e.g., Treagust, 1987). This implies that

interviewing is a very useful tool for understanding the meanings that teachers give to their action, namely, what they think when they perform an action.

3.3.2.4 Teacher, Principal and Superintendent Interview

In addition to using the questionnaire, it was decided to conduct interviews with six teachers to obtain more in-depth information and greater understanding in terms of teacher personal views about the intended and implemented curriculum in primary school classrooms. The researcher hoped to understand teachers' perceptions (i.e., tacit knowledge, values, attitudes and beliefs), and these perceptions can only be gathered through interviews, where the teachers explained the meanings they attach to the actions that they have taken in their classrooms. Teachers' voices can be heard and appreciated using this method, and the researcher can compare the reality with the curriculum document and guidelines to see whether or not teachers implemented the intended curriculum. In addition to teachers' interviews (see Appendix A1), primary school principals and superintendent were also interviewed to scrutinise their personal perspectives with related to the implementation of School-Based Curriculum or the KTSP ((see Appendices A2 and A3). Using the metaphors of curriculum suggested by Schubert (1986), the teachers' and superintendents' perceptions of intended curriculum in the six case study school were investigated via the interviews (see Appendix A4).

3.4 The Research Samples

The choice of the sample was an important factor for each phase of the evaluation, as it determined the viability of the data collection process. In the social and behavioural sciences, there are two groups of sampling procedures: probabilistic sampling and purposeful sampling. Probabilistic sampling is to choose a large number of individuals who represent a segment of the population and purposeful sampling involves researcher intentionally selecting participants who have experienced the central phenomenon in the study (Creswell & Plano Clark, 2011).

3.4.1 Selecting the Survey Sample

The sample involved in the administration of Indonesian version of MCI is explained in Section 4.2.4 and the sample involved in the administration of the teacher questionnaire is presented in Section 4.3.3.

3.4.2 Selecting the Case Studies

Due to time constraints, the focus was on schools at the primary school level. Only schools that claimed to adhere to the official national curriculum are regarded as part of the population. The geographic area of interest was the municipal area and the district nearby to Bengkulu province: Bengkulu Tengah and Kota Bengkulu. The combination of the large area that constitutes Bengkulu province and time constraints resulted in the number of observations being lower than initially anticipated.

With the above mentioned selection in mind, a list of potential schools was constructed. In the end, only cooperative schools were included in the cases, which meet the selection criteria. The pragmatic consideration being that choosing other schools would likely require more time of the researcher than was available. The selected case studies are listed in Table 3.1.

Table 3.1
The Six Case Study Schools

School Location	School Code	Teacher Code	Gender	Years of Teaching Experience
Urban	U1	A	Female	16 (3)*
Urban	U2	B	Female	24 (18)*
Urban	U3	C	Female	23 (20)*
Rural	R1	D	Female	19 (17)*
Rural	R2	E	Female	16(12)*
Rural	R3	F	Female	20(16)*

* In bracket is teaching experience in the current school.

One may argue that to make causal inference, it is essential to include schools that have both good and poor achievement records in educational improvements. One may dispute that argument. It is very likely that schools with little educational improvements are reluctant to 'open up to the researcher'. The replication logic is based on level (Primary school), adherence to the new curriculum (the KTSP),

location (Municipal of and nearby Bengkulu province), and willingness to improve education.

For this study, six primary school teachers teaching in the fifth grade were selected to participate using purposeful sampling strategy that can be applied to both sites and individuals (Merriam, 2009). The six teachers involved in this study consisted of three teachers from urban and three from rural primary schools. They were told that the researcher would be using pseudonyms in the final report in an attempt to disguise their identity. The researcher, also, would be changing the name of the school district. Details of schools and teachers background are provided in Chapter 6.

To develop a comprehensive and in-depth understanding of the phenomenon of School-Based Curriculum (the KTSP) implementation, the researcher selected participants with a variety of teaching experiences. It was believed that a holistic picture should involve the experiences of people who have both favourable and unfavourable opinion of the phenomenon of interest. In addition, the number of years of experience teaching, and the number of years of teaching experience at the grade level at which they were teaching at the time of the research study is intentionally considered as one of the respondent variables that could affect teacher perceptions of curriculum implementation.

To some extent, there were some weaknesses in the teacher sample. First, the teachers at the six schools might not have been comparable. Teachers' varying personal and professional experiences could account for the variations in the educational learning environment found in the classes. Teachers' background information, including preparation for teaching science, was included in the six school case studies. Also, there could have been differences in the life experiences of students at the six schools.

3.5 Into the Field

3.5.1 Procedures for the Administration of Questionnaire

Procedures for the administration of the student and the teacher questionnaire are presented in section 4.2.5 and 4.3.4, respectively.

3.5.2 Procedures for Documents Sample Selection

The data collecting strategy involved mining documents where the documents are the key resource data. According to Merriam (2009), the term *document* in the qualitative case study refers to a wide range of written and physical material pertinent to the study. In this case study, public documents were the data source used. Documents were important because the National Standards of Education was the new concept in the Indonesian educational system, and the documents provided the formal frameworks of the School-Based Curriculum Development.

Concerning the authenticity of the document, "it is the researcher's responsibility to determine as much as possible about the document, its origins and reasons for being written, its author, and the context in which it was written" (Merriam, 2009, p. 151). To contend with these, four questions can be utilized to guide the researcher in judging the authenticity of documents as suggested by Guba and Lincoln (1981, cited in Merriam, 2009):

- How did the document come into my hands?
- Is the document complete, as originally constructed?
- For what purposes was the document produced?
- For whom was the document intended?

However, the fact that most documents except for the textbooks were visibly available and officially provided in each school, it can be assumed that these documents were authentic. Accordingly, internal validity measurement for document samples has been accomplished by its nature.

Since primary data for document analysis were public documents, the document required were not difficult to locate, and some were available in each school. The researcher borrowed the documents and made a copy of each for data analysis purposes. Due to all documents in *Bahasa Indonesia*, the researcher translated the documents to English from *Bahasa* Indonesia. The documents used in this research were regulation, policy statement, and guidelines (see Table 3.2).

Table 3.2
List of Documents Analysed

Name of documents	Issuing organisation	Years of issues
Act of The Republic of Indonesia No. 20/2003 on National Education System	Presidency of Republic of Indonesia	2003
Government Regulation No. 19/2005, concerning the National Standards of Education	Presidency of Republic of Indonesia	2005
The Ministry of National Regulation No.22/2006, concerning Content Standards for the primary and secondary education	Ministry of National Education	2006
Guidelines on Developing School-Based Curriculum for the primary school	National Education Standard Board Committee (BSNP)	2006

3.5.3 Procedures for Conducting of Classroom Observation

Using the classroom observation schedule, data concerning the ways the current intended primary science curriculum was implemented were collected. Classroom observations were conducted during two weeks of the second semester at every school where science was allocated two periods of 35 minutes per period. Therefore, the researcher spent a total of 12 class periods observing classroom interactions for each class in each school. At the first time of classroom observations, the primary teacher introduced the researcher to the students and explained the intention of his visit and his role. The teacher emphasized to the students that observations conducted by the researcher were for research purposes and would not influence their grades and the teacher required students to act usually. Throughout the lesson, each of classes was observed by the researcher from unobtrusive locations within the classroom. During observation of the lessons, the researcher remained seated at the back of the classroom and did not interact with the teacher or the students. Detailed field notes were taken of the sequence of instruction, teacher-student and student-student interactions, and questions to ask the students and the teacher, and researcher reflections.

Data regarding all aspects of classroom transaction as described in Chapter 6 were recorded. Interviews, if needed, were conducted after the lessons to check or to confirm the phenomenon that occurred during observations or to pursue teacher explanations on how and why she did certain activities. Field-notes were also taken

to anticipate events that were relevant to the purpose of the study. Additionally, these field notes were used to guide the follow-up interview with the teacher.

The six teachers were initially informed about this study through the principals and the superintendents. The researcher then spoke with each teacher who expressed interest in participating. Teachers were assured that their responses would be confidential. In particular, the administration would not have access to any of data collected unless pre-approved by the teacher. Each teacher agreed to perform a member check after the field note report of the classroom observations and interviews was written. All teachers who agreed to participate were selected. Once the teachers were selected, the researcher met with each teacher individually to choose a lesson for observation and to schedule the days for observation and the related interviews. This initial interview also provided a mechanism by which the thought process used by the teacher in preparing the lesson could be exposed. See Table 3.3 for list of classroom observation procedures.

Table 3.3
Procedures of Conducting Classroom Observation

Steps	Procedure
Step 1.	Individual meeting with teacher participants regarding study participation
Step 2.	Initial teacher interview prior to observation
Step 2.	Observation sequence
Step 3.	Member check
Step 4.	Correction made based on member check

At the beginning, the teachers were informed that during the observations the researchers would only act as a non-participant and would not make any kind of personal value judgment about the quality of teaching. This effort was taken to ensure classroom transaction occurred in a normal manner. The observations simply recorded for further analysis what was happening in the classroom. Member checking was used as a way of ensuring the validity of the data that collected. In so doing, after each observation, interviews with the teachers regarding events captured in classroom observations were conducted to clarify the researcher's judgment.

3.5.4 Procedures for Conducting of the Interviews

Interviews were audio taped and later transcribed verbatim or paraphrased. Bassey (1999) noted that the advantage of tape-recording interviews was that it enabled a researcher to focus on the direction of the interview rather than its detail. All of the teachers whom the researcher observed volunteered to be a part of this study. At the beginning of the interviews, the researcher interviewed each of the six primary school teacher to gather socio-demographical information, such as the number of years that she had been teaching, the grade level that had been ever taught, the number of years that she had taught science.

The researcher chose semi-structured interviews so that the teachers could reflect on what they knew about the curriculum reform (i.e. content standard), the nature of school-based curriculum, the obstacles faced in the curriculum implementation, the needed supporting system in the curriculum implementation.

3.6 Data Analyses

For the purpose of combining quantitative and qualitative dimensions of this study, the data analysis of the study applied the concurrent triangulation strategy in which the survey results (i.e. questionnaires) was conducted concurrently with data derived from three other relevant sources (i.e. the classroom observations, interviews, documentations), followed by conclusions with an emphasis on integrating both quantitative and qualitative data findings. The main research was conducted from 22 August to 22 November 2010.

It is important to note that every data analysis tool is just a means to help in interpreting and analysing the research findings. Field (2009) affirms that the statistical techniques are tool to help researchers digging into the data and mining them for precious findings, and composing the findings into meaningful structure. However, depending on the nature and characteristics of the data, different statistical tools have to be used for different purposes.

3.6.1 The Questionnaire

In the case of quantitative data analysis, the data were organized, synthesized, and analysed with the IBM Statistical Package, Services and Solution (SPSS) package version 20. According to Pallant (2007), SPSS package provides a powerful statistical analysis and data management system in a graphical environment by using descriptive menus and simple dialog boxes. Since the questionnaire items were mostly opinions and views of the curriculum, the frequency count of responses was suitable. The report of validity and reliability for the questionnaire employed in this study appeared on Chapter 4.

3.6.2 The Documentation

Qualitative content analysis used to analyse the documents collected has been defined as a systematic procedure for describing the content of communication (Merriam, 2009). Qualitative content analysis as pointed out by Patton (2002) was used to generate themes or categories responsive to the proposed research questions. This is basically an inductive process involving constant comparison within, between, and among the documents that were the data source. The analysis of each document was guided by the following research question: What is the focus of the current intended primary school science curriculum?

In analysing this database, the researcher worked with the document by years of issues; that is, the researcher first analysed "Act of the Republic of Indonesia No. 20/2003 on National Education System" published in 2003. Additionally, the researcher utilized the curriculum components (van den Akker, 2003) as the unit of analysis through reading all documents systematically and taking notes to categorize the content and theme of documents in response to the research question that guided his analysis. The researcher followed this same process for the four official public documents published between 2003 and 2007 (see Table 3.3).

3.6.3 The Classroom Observation

After completing classroom observations, all data gathered during this process including records, field-notes, interview logs and photographs were organized to develop the case study database (Yin, 2003). This database was either

chronologically or topically structured to enable the researcher to easily have access and analyse the data. From this database, categories or classifications and themes were developed. The data when structured to explain those phenomena that contributed to the implementation of primary school science curriculum at the classroom level. The results are descriptively presented in Chapter 6. A narrative account in the form of a vignette was used to describe the school and classroom's context under study.

3.6.4 The Interviews

For the purposes of identifying and cross-referencing data from sources like transcripts and lesson from field-notes and video material, different codes were used. In the context of this study, the codes took on particular formats. For instance, the lesson observed was recorded by field-noted as well as transcripts of video-taped material. In order to identify a lesson for referencing purposes, a format was used represented by code CO.TA.U1.05.10.10. The first letter represented classroom observation, the second identified the teacher (Teacher A), third part referred to the school (Urban school 1), and the fourth the date of the lesson (5th October 2010).

In the same way, reference is made to transcripts of interviews. In the code I.TC.U3.10.11.10, I referred to interview, TA identified teacher A, U3 referred to the school (Urban school 3), and 10.11.10 is the date that interview was conducted (10th November 2010). At the beginning part of the code (TA) is changed to, for instance, S2U1 if an individual interview with student number 2 in school urban 1 was held.

3.7 Researcher's Role

The researcher's role was maintained from an investigative concern with a passive existence around people when observations of the teachers were being conducted. The teachers were informed by me from the start that I was a researcher and my only interest was to do this study for my thesis. The role of the researcher was to speak to the teachers and observe them while they taught and were a part of the professional development experiences provided to them. Since teachers were my subjects, permission was taken from individual teachers of their willingness to participate in this study. The researcher had no other part to play in the classes being taught other than being a silent observer. The writings of the teachers were respectfully read, and

none of their perspectives were disclosed in any conversations with any other person. During conversations/interviews, comments from the researcher were kept neutral to initiate in depth explanation. An atmosphere of respect and keen attention was maintained throughout all conversations/interviews.

3.8 Gaining Access

Permission to conduct the research was obtained from government agencies in Bengkulu. Through the Head of The Bengkulu National Education province office, courtesy letters with the copies of the research proposal were sent seeking the permission (see Appendix B). These offices responded with the recommendations and a permission letter.

3.9 Trustworthiness

Lincoln and Guba (1985) argued that qualitative researchers can establish the trustworthiness of their findings by proving that they are credible, transferable, dependable and confirmable. These terms imply validity and reliability. Validity means that the researcher actually investigates something that matches what is being looked for, and this is research interpretability (internal validity) and research generalizability (external validity) on applicability to a larger population. On the other hand, reliability of the research deals with consistency of results, which include consistency in terms of collection, analysis and interpretation of data (internal reliability) to gain the same results if research procedures are conducted in other contexts (external reliability).

In order to achieve trustworthiness, the present study used a triangulation procedure in terms of methods of data collection and its analysis. The triangulation method was used by the researcher; the transcript of interviews was shown to respondents before data analysis for checking and additional comments. In addition, the triangulation method was also used for site studies and document analysis to provide a necessary context for the policy investigation and impact assessment in the location of the case study.

3.10 Ethical Issues

In a qualitative study, concerns about ethics are as important as concern about validity and reliability. Not only should the study be valid and reliable but also it must conduct in an ethical manner. Hence, to protect the individuals who participated in this study, appropriate ethical requirement were followed. In this way, the research participants could be assured of the confidentiality of their responses, their privacy and anonymity using pseudonyms for their names, names of their schools and locations of the schools. It was pointed out them that data which was collected from fieldwork was placed in a safe and secure location at all times. Respect for the privacy, dignity, and integrity of the researchers were the major principle to follow during the whole period of the research study.

3.11 Summary of the Chapter

This chapter highlighted the research methodology and design focusing on the quantitative and qualitative approach used in this current study. The methodological foundation of this research study is built on the premise that a mixed-method approach to the research questions yields a much richer that is the implementation of primary school science curriculum. Firstly, the chapter commenced by stating the key research questions based on objectives of the study. Secondly, the rationale of the research methodology, including theoretical concepts and reasons for using qualitative and qualitative approach were provided. Furthermore, the chapter provided discussions on interview types, classroom observations and document analysis. Lastly, the analyses of the study were identified, which focused on the power of using SPSS for the purpose of statistical data analyses.

The next chapter presents the development and validation of the questionnaires employed in this study.

CHAPTER 4

THE DEVELOPMENT OF THE INDONESIAN VERSION OF *MY CLASSROOM INVENTORY* AND THE DEVELOPMENT OF TEACHER QUESTIONNAIRE

4.1 Introduction

The main objective of this chapter is to describe the development of two survey instruments used to address the two research questions: How do teachers perceive the intended science curriculum in primary schools? and How do students in primary schools perceive their classroom learning environment?

This chapter depicts in detail the methods, the conceptual model, and the processes and procedures involved in developing and validating the two intended survey instruments. The intent of the first survey instrument was to obtain students' responses regarding their perceptions of the learning environment in their science classroom. The explanation of student's questionnaire is provided in Section 4.2. Following this section, Section 4.3 presents the description of the second survey instrument which is intended to attain information about primary school teachers' perceptions on the intended curriculum. The students and teachers were invited to respond with their perceptions about implementing the science primary school curriculum in their classroom.

Before other further analyses were undertaken to test the aforementioned research questions, it is crucial to generate the information about the questionnaires' validity and reliability. This information included the factor structure of each instrument, the discriminant validity, the scale's internal consistency reliability, and discriminant validity to distinguish among the different class groupings. Overall, these statistical measures provided an indication of the suitability of each questionnaire for portraying the classroom learning and primary school teachers' perspective on curriculum implementation, as well as providing evidence to support the validity and reliability of the questionnaires for future and wider use in an Indonesian school context. A flow chart of the development and validation research instrument in this chapter can be simplified in Figure 4.1.

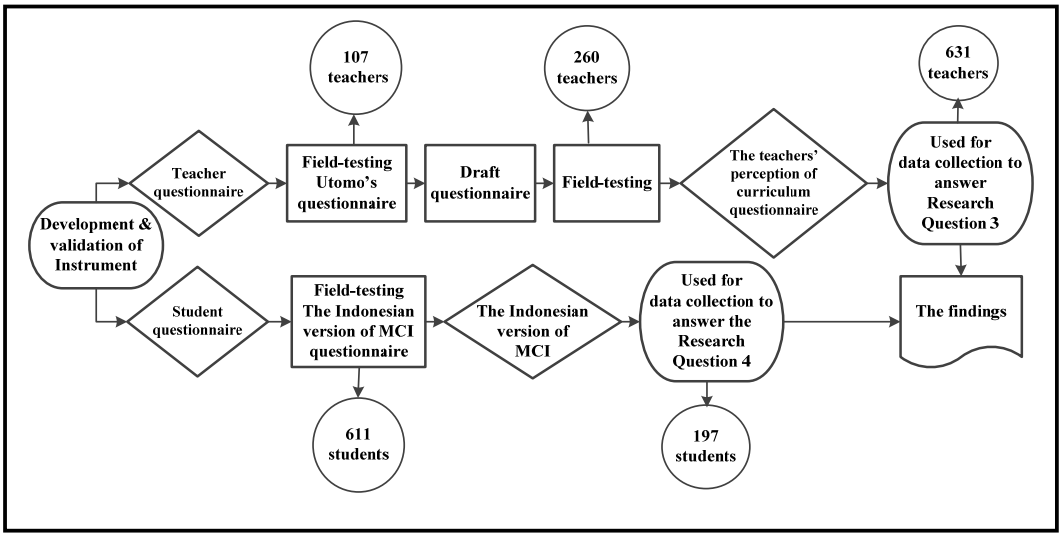

Figure 4.1 A Flow Chart of Development and Validation of Research Instrument

4.2 The Instrument Chosen for Measuring Classroom Learning Environment.

After conducting intensive literature reviews, *My Classroom Inventory* (MCI) was selected to assess students' perceptions of their classroom environment. There are many learning environment instrument available, each applicable to different situations. The MCI (Fraser, 1998a) questionnaire was selected for several reasons - the easy readability of the instrument, the short length, the provision to answer on the instrument, and the relevance of the scales evaluated. The MCI scales can be used to measure student perceptions of actual or preferred classroom environment. The *actual* form measures perceptions of the environment that currently exists in the classroom. In this current study, the actual form was only administered to primary school students in order to explore the students' perceptions about their classroom environment. On other hand, the *preferred* form is concerned with goals and value orientations as it measures perceptions of the environment ideally liked or preferred.

Researchers and teachers can use the MCI with students in lower grades because it provides the lowest reading level of all the existing classroom environment instruments (Majeed, Fraser, & Aldridge, 2002). For instance, Majeed et al. (2002) successfully used a modified version of the MCI in a study in Brunei Darussalam with 1,565 students in lower-secondary mathematics classes. Mink and Fraser (2005) used the MCI as criteria of effectiveness in the evaluation of an innovative educative

program undertaken with 120 fifth grade public schools students in Miami, Florida whose teachers participated in a program called SMILE (Science and Mathematics Integrated with Literary Experiences). In addition, Goh, Young and Fraser (1995) successfully validated a modified version of the MCI in Singapore to assess the four classroom climate dimensions of *Cohesion, Competition, Friction and Task Orientation* and used a three-point response format (Seldom, Sometimes, and Most of the Time).

4.2.1 Description of My Classroom Inventory (MCI)

The *My Classroom Inventory* is a simplified version of the Learning Environment Inventory (LEI) and is suitable for use with 8-12 year-olds (Fisher & Fraser, 1981). It differs from the LEI in four major areas. First, the number of scales is reduced from 15 to 5. Second, the wording is simplified for younger students. Third, the number of response choices is reduced from four to two. Fourth, the students answer on the form to minimize transfer errors (Fraser, 1998b).

With these modifications, the MCI is suitable for use in primary schools and middle schools due to the lower reading level (Fraser, 1998a, 1998b), with from six to nine items for scale and the five scales of *Cohesiveness, Friction, Satisfaction, Difficulty, and Competiveness* (Fraser & O'Brien, 1985). The numbers of items was reduced from 38 to 25 along with other modifications, hence making hand scoring easier (Fraser, 1998a). The MCI form is set up for easy scoring with 25 questions divided into groups of 5 questions per section. Each section has one question from each scale. The description of these scales accompanied by examples of an item from each scale is presented in Table 4.1.

Table 4.1
Description of Scales in MCI and Representative Items

Scale name	Scale Description	Example of the item
Satisfaction	Extent of enjoyment of the class	Some students are not happy in my class (-)
Friction	Nature of student's relationships with one another. It manifest itself in fighting, being mean towards one another or attempts to control other members	Some students in my class are mean (+)
Competitiveness	Relating to, characterised by, or based on competition, it involves striving for the same objective.	Most students want their work to be better that their friend's work (+)
Difficulty	Students generally are comfortable with their learning activities and the difficulty level is close to the ability level.	Most students can do their work without help (-)
Cohesiveness	Extent to which students know, help and are supportive of one another.	Some students in my class are not my friends (-)
Satisfaction	Extent of enjoyment of the class.	Some students are not happy in my class (-)

(Adapted from Scott, 2006, p. 46)

Items designed (+) are scored 3 for Yes and 1 for No. Items designed (-) are scored in the reverse manner. Omitted or invalid responses are scored 2.

Two recent studies involving the use of the MCI include Majeed, et al. (2002) and Mink and Fraser (2005). The study undertaken by Majeed et al. (2002) reported relationships between student satisfaction and classroom environment, and identified grade-level differences in learning environment perceptions. Furthermore, Mink and Fraser (2005) used the MCI as a source of criteria of effectiveness in evaluating a K-5 mathematics program which integrates children's literature. They reported that students whose teachers attended the workshop showed improvement in attitudes to mathematics and reading. As well, the research also indicated that students' satisfaction was greater in classroom with a more positive learning environment, specifically in terms of student cohesiveness.

4.2.2 Development of the Indonesian Version of MCI

As one can see, the MCI is highly effective for use with younger students, and can be modified in several ways, as reported by Majeed et al. (2002) and Goh et al. (1995). The instrument, namely, *My Classroom Inventory* (MCI) questionnaire (Fraser, 1998a) was adapted in this research to ensure its suitability for measuring classroom learning environment in the Indonesian educational context. A contextual, rather than textual, translation of the original version of the MCI was carried out. Since the original instrument was designed for Western students, with all statement in English,

careful translation and back translation was done as suggested by Brislin (1970). After translation into *Bahasa* Indonesia was carried out by an Indonesian postgraduate student studying at SMEC, Curtin University, an independent person who is fluent in both English and *Bahasa* Indonesia conducted a back translation into *E* to investigate whether or not the translation had captured the original meaning.

Previous to the main data collection, a pilot test was conducted that involved 611 Grade 5 students to establish suitability and readability of the questionnaire. From the pilot test details were gathered to know whether or not the directions and items are clear. Regarding item wording, interviews were conducted with students to ensure that Indonesian version was clear and understandable. Students considered the questionnaire to be simple and non-threatening. A minor explanation was requested of the meaning of the word '*sulit/sukar*', which is derived from the word 'hard'. Taken as a whole, the pilot study results suggested that the questionnaire was suitable to be used for the main data collection.

The final version of the Indonesia MCI contains 14 items (see Appendix D) that were distributed among three scales (*Satisfaction, Friction, and Cohesiveness*). All items were scored on a two-point scale with YES representing agrees with the statement and NO representing disagrees with the statement. The original version of MCI, the Indonesian version of MCI and back translation are available in Appendices C1, C2 and C3.

4.2.3 Validation of the Indonesian Version of MCI

The issues of instrument validity included factor structure of the questionnaire, scale internal consistency reliability, discriminant validity, and the ability of the questionnaire to differentiate perceptions between groups. It is important to establish that each item in a scale measures a common construct. If this condition is fulfilled, then the scale can be considered as being homogeneous or having internal validity. In this study, Cronbach's (1971) alpha coefficient was calculated for each scale as an estimate of the internal consistency reliability. For each scale, an estimate of scale internal consistency (the extent to which items in the same scale measure a common construct) and discriminant validity (the extent to which a scale measures a unique dimension not assessed by another scale) was assessed.

A principal component factor analysis with varimax rotation was utilized to scrutinize whether all of the items from the five scales of the Indonesia version of MCI formed five independent measures of the psychosocial learning environment. Varimax rotation is a factor analysis technique that keeps factor axes at right angles to each other, and it has been frequently used to validate learning environment instruments.

The IBM Statistical Package for Social Science (SPSS) software version 20.0 was used to analyse the Indonesian version of the MCI regarding its factor structure, scale internal consistency reliability, and ability to differentiate between the perceptions of students in different classrooms. Both factor and item analyses were completed.

4.2.3.1 Factor Structure of the Indonesian Version of MCI

The validation of the Indonesian version of MCI involved data obtained from the administration of the actual form of the MCI in January - June 2010. The original version of MCI has 25 items and five scales: Friction, Competitiveness, Difficulty, Cohesiveness and Satisfaction. The copies of the MCI questionnaire can be found in Appendixes. The questionnaire was administered to 611 students in 22 classes from 9 public primary schools in Bengkulu Municipality and Bengkulu Tengah district, Indonesia.

To check for validity of Indonesian version of MCI, several analyses were run. Principal component factor analysis followed varimax rotation was used to examine the internal structure of the 25 items of the original version of MCI. By using factor analysis, a data-reduction technique, the set of items in the MCI was reduced to a smaller set of underlying factors, which was compared with the structure of the original version of MCI. Hence, factor and item analyses were conducted in order to identify 'faulty' items that could be removed to improve the internal consistency reliability and factorial validity of the MCI scales. To find out whether the instrument was reliable, internal consistency reliability test were undertaken to measure the extent to which items within each scale assess a common construct. The Cronbach's alpha coefficient was used as a convenient index of scale internal consistency. Finally, one-way ANOVA was used for each MCI scales to check if it was able to differentiate between classrooms. An eta^2 value was also calculated to

provide an estimate of the proportion of variance in MCI scores accounted for by class membership.

Before conducting factor analysis procedures, an inspection of the assumptions and practical considerations underlying the application of the method was performed and the outcomes were in agreement with the criteria suggested by Pallant (2007). First, the sample size of 611 allowed the researcher to carry out factor analysis to scrutinize the internal structure of the Indonesian version of modified MCI which had 25 items. As indicated by Tabachnick and Fidell (2007), 'it is comforting to have at least 300 cases for factor analysis' (p.613). The second issue to be addressed concerns the strength of the interrelations among items. An inspection of the correlation matrix indicated that a considerable number of correlations exceeded 0.3; therefore the matrix is suitable for factoring. Third, the Bartlett test of sphericity is significant and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.84 (see Appendix E), which is greater than the minimum requirement (0.60). The KMO index ranges from 0 to 1, with 0.60 recommended as the minimum value for a reliable factor analysis (Tabachnick & Fidell, 2007). Accordingly, all assumptions were accomplished, and it was predicted that the results of the factor analysis are robust and relevant to explain the structure of the questionnaire.

The criteria for the retention of any item were that its factor loading must be at least 0.40 on its own scale and less than 0.40 on each of the other four scales. A loading of 0.40 is a widely-accepted cut-off value in factor analysis (Field, 2009). As a result of the factor analysis (see Table 4.2), all items in two scales (*Competitiveness* and *Difficulty*) and item number 17 from the Friction scale were removed to improve the internal consistency reliability and factor structure. In addition, an examination of the screeplot revealed that a clear break after the third component of the variance. With Catell's (1966) scree test, the three components was retained for further investigation (see Appendix F)

The proportion of variance accounted for by the 14 items in three scales is shown at the bottom of Table 4.2. The total proportion of variance is 50.58%, with a range for three scales being from 31.81% to 7.95% (see Appendix G). Table 4.2 also shows that eigenvalue for each scale ranges from 4.45 to 1.11. These data provide support for the factorial validity of the three remaining scales, namely, *Satisfaction*, *Friction*,

and *Cohesiveness*. Several principal component factor analyses with varimax rotation eventually resulted in Table 4.2 as the best structure based on the present data base (see Appendix E).

Table 4.2
Factor Analysis Result of Indonesian Version of Modified MCI

Item No.	Factor Loading		
	Satisfaction	Friction	Cohesiveness
Q1	0.56		
Q6	0.70		
Q11	0.62		
Q16	0.61		
Q21	0.52		
Q2		0.83	
Q7		0.40	
Q12		0.86	
Q17		-	
Q22		0.82	
Q5			0.68
Q10			0.59
Q15			0.59
Q20			0.67
Q25			0.62
Variance (%)	7.95	31.81	10.82
Eigen value Total	1.11	4.45	1.51

Factor loading less than 0.40 have been excluded, $N = 611$ in 23 classes of 9 schools.

4.2.3.2 Scale Internal Consistency Reliability of the Indonesian Version of MCI

In terms of the reliability of the MCI (*My Class Inventory*), the indexes of internal consistency are reported in Table 4.3. The scale's internal consistency refers to the degree to which the items that make up the scale measures the same underlying construct. Internal consistency was established for the Indonesian version of MCI scales using Cronbach's alpha coefficient for two units of analysis, namely, the student and the class mean. Cronbach's alpha coefficient is the most commonly used indicators of internal consistency. Ideally, the Cronbach's alpha coefficient of a scale should be above 0.70 (DeVellis, 2003). In this current study, the coefficients range from 0.62 for *Satisfaction* scale to 0.79 for Friction scale. Based on the findings, there is only the *Friction* (0.79) scale that satisfies levels of reliability exceeding 0.70. The two other scales, *the Satisfaction* and *Cohesiveness* scale, are not able to meet the ideal standard as DeVellis's (2003) suggestion. However, since all scales in the Indonesian version of MCI contain a small number of cases, the mean inter-item correlation for the cases can be employed. Optimal mean inter-item correlation

values in this scale range from 0.26 to 0.48 (as suggested by Briggs & Cheek, 1986). Additionally, McMillan and Schumacher's (2001) classified the Cronbach alpha based on the following categories: $0.5 < \alpha$ means unbelievable; $0.5 < \alpha < 0.7$ is believable; $0.7 < \alpha < 0.9$ is very believable; and $0.9 < \alpha < 1.0$ is extremely believable. Three scales of the MCI are categorized as believable ($0.5 < \alpha < 0.7$) as denoted in Table 4.3. Consequently, three scales provide sufficient support for the reliability of short attitude scales containing only four or five items each.

Table 4.3 shows that scale α coefficient using the individuals as the unit of analysis ranged from 0.79 to 0.62. As expected, reliability figures are higher with the class mean as unit of analysis. The findings show that scale α coefficient using the class mean as the unit of analysis ranges from 0.87 to 0.94. These support the Indonesian version of MCI's sound internal consistency reliability.

Table 4.3
Internal Consistency Reliability (Cronbach's α coefficient), Discriminant Validity (Mean Correlation with other Scales) for Actual Form, and ANOVA Results for Ability to Differentiate between Classrooms for each MCI Scale

MCI scale	No. of items	Unit of analysis	Alpha Reliability	Mean correlation with other scales	ANOVA eta $(\eta)^2$
Satisfaction	5	Individual	0.62	0.46	0.16*
		Class mean	0.87		
Friction	4[a]	Individual	0.79	0.45	0.18*
		Class mean	0.94		
Cohesiveness	5	Individual	0.70	0.47	0.19*
		Class mean	0.91		

*. $p < 0.01$.
[a] One item was omitted from the Friction scale
The η^2 statistic is the ratio of 'between' sum of squares between groups to 'total' sum of squares and represent the proportion of variance in the MCI scores accounted for by class membership.
The sample consisted of 611 students.

4.2.4 Ability to Differentiate between the Perceptions of Groups

Since students within a class usually have different perceptions from students in other classes, the ability of the Indonesian version of MCI to differentiate between classes is important to compute. Hence, a one-way analysis of variance (ANOVA) was conducted to determine if the Indonesian version of MCI was able to differentiate significantly between the perceptions of students in different classrooms. This characteristic was examined for each scale with class membership as the main effect and using individual scores as the unit of analysis. The last column of figures in Table 4.3 provides evidence about whether the actual form of each MCI scale is capable of differentiating between the perceptions of student in different classes. Ideally, students within the same class should perceive its environment relatively similarly, while mean class perceptions should differ from class to class. The η^2 statistic score, which represents the proportion of variance in the Indonesian version of MCI scales accounted for by class membership, range from 0.16 for *Satisfaction* scale to 0.19 for *Cohesiveness* scale. The resulting η^2 value is 0.16, which in Cohen's (1988, p. 284-287) terms would be considered a large effect size. Therefore, the Indonesian version of MCI scales (*Satisfaction, Friction, and Cohesiveness*) is able to differentiate significantly ($p < 0.01$) between the perceptions of students in different classrooms. Based on the analyses above, it is clear that the Indonesian version of MCI scales exhibited satisfactory factorial validity and internal consistency reliability and that actual form of each scale was able to differentiate between classes.

4.2.5 The Sample Involved in the Administration of the Indonesian Version of MCI

The assessment of the classroom learning environment was purposely focused on a small population from which a sample of schools and students was selected. As Tashakkori and Teddlie (1998) noted, purpose sampling techniques involve selecting certain units or cases "based on a specific purpose rather than randomly" (p. 713). A multiple cluster sampling (Teddlie & Yu, 2007) was utilized that initially included two out of nine districts and one municipality in Bengkulu province, Indonesia. Second, schools in these selected districts were categorised into rural and urban. In that way, a consultation with two superintendents in the two districts was sought, resulting in a total of six schools from these selected districts. Finally, Year 5 classes

at each school were purposely selected to be included in this study. As a result, the samples participated in the MCI administration included the willing and chosen participants from 159 students of six classes. The size of the class in the sample ranged from 16 to 38 students in the six primary schools in urban and rural areas of Bengkulu province, Indonesia.

4.2.6 Procedure for the Administration of the Indonesian Version of MCI

Prior to administering the questionnaire, formal permission from both the Ministry of National Education (MoNE) of Bengkulu province representative and the principals of the schools involved was sought and obtained.

Following a formal meeting with the principals, the researcher was introduced to the teachers involved and made arrangements for a time to visit their classes and administer the questionnaire. The entire questionnaires were administrated while the teachers were out of their rooms. Total completion time for students ranged from 10 to 15 minutes depending on students' reading abilities. After the questionnaires were completed, the teacher re-entered the room and continued with the planned lessons. These procedures were adhered to very closely for all 6 classes. On the whole, the administration of the questionnaire proceeded smoothly, all students had time to complete the questionnaire, and very few students had any queries about the items.

4.3 The Development of Teacher Questionnaire

Before the development of teacher questionnaire in the preliminary stage of the study, the curriculum framework was investigated and this was discussed in the Chapter 2. Two separate groups of primary school teachers participated in developing the questionnaire. The first group was used to identify teachers' perceptions of the curriculum, especially for item generation, item analysis, and in general, for establishing content validity. The second group was used to pilot-test the instrument items to establish validity and reliability of the questionnaire.

4.3.1 The Instrument Selected for Measuring Teacher's Perception on Curriculum

The development of a survey instrument was initiated by a search for an instrument that would adequately encompass circumstances unique to the teachers' perception on curriculum reform in Indonesian school context as cases for this study. The result of reviewing relevant literature found out that the questionnaire items designed and formerly employed by Utomo (2005) is preferred to this study. Utomo's survey instrument was used in investigating the ways in which primary school teachers respond to the implementation of curriculum reform, particularly issues like curriculum diversification, learning materials, syllabus design, and student assessment. Because this instrument was used for *Bahasa Indonesia*, as one of subjects in the primary school, it is needed to be slightly modified for used in science.

The questionnaire consisted of 25 questions regarding teachers' perceptions on curriculum. For a copy of the original questionnaire used in 2005, see Appendix H. The questions were categorised into eight themes. These themes and the questions as well as types of questions they comprise are outlined in Table 4.4.

The questionnaire called for both structured and unstructured responses and included items related to the following issues: 1) *adopting* – the manner in which the curriculum reform is supposed to be delivered and the teacher's understanding of the principles of the curriculum innovation; 2) *adapting* – the teacher's responses concerning learning material development and curriculum content; 3) *implementing* – the classroom based assessment from teachers' points of view, teacher's professional development, and school infrastructure.

"*Adopting*" and "*Adapting*" are concerned with the process of understanding the new curriculum: the past in its relation to the school-based curriculum (known as *Kurikulum Tingkat Satuan Pendidikan* or the KTSP), and the last in its relation to the teaching practices. Both "*adapting*" and "*implementing*" cope with the use of the KTSP to the classroom setting: the past associate with the syllabus, material development, and classroom assessment development, and the last with the teaching process, i.e., the concrete action in the classroom. The detail information related to

the issues of implementation, adaptation, and adaptation of curriculum reform was elaborated in chapter 2.

Table 4.4
Themes, Questions and Types of Questions

Theme	Questions	Types of questions
Curriculum diversification	10, 11 and 25	Closed-ended
Syllabus development	1, 24c, 24d and 24e	Closed-ended
Learning material	5, 6, 16, 17, 18 and 24a	Closed-ended
	8 and 9	Open-ended
School based assessment	7, 11, 12, 13, 14, 15, 24d and 24g	Closed-ended
Teacher's qualification	2, 3, 4, 24b and 24i	Closed-ended
School infrastructure	23, 24 and 24f	Closed-ended
Teacher professional development	19 and 20	Closed-ended with completed answer
Teachers' forum	21, 22 and 24h	Closed-ended

(Adopted from Utomo, 2005)

As indicated in Table 4.4, the majority of questions (92%) are close-ended questions, and different formats were employed in this survey. For some items, respondents were asked to choose only one of five options. Let's say, item no. 1 asked respondents to choose one of five options about who makes the syllabus available in schools. For other items, respondents were permitted to select more than one option. For example, in item 20 teachers were allowed to check more than one option regarding topics for in-service training that was useful for them. The other format asked respondents to choose only one of two options, e.g., agree/disagree or right/wrong. Some items that were partly open-ended included blanks for respondents to fill in with appropriate information. For instance, item no. 8 asked respondents to write in the blanks the topics they considered important in teaching science.

4.3.2 The Phase of Developing of a Questionnaire

The instrument development followed a two-phase study with different objective for each phase. The first phase, which utilized 25 closed and opened-ended questions, was to identify teachers' perceptions of the curriculum in order to design the questionnaire items. To conduct the study, there were 107 primary school teachers

were participated in. In the second phase, the items in the instrument being pilot-tested were based on the result of the first phase. The draft instrument was administered to 260 primary school teachers.

4.3.2.1 The First Phase: Designing the Draft Instrument

Utomo's questionnaire was administered during the teachers' workshop. It took about 25 minutes to complete the questionnaire. Participants were instructed to carefully read the items and not to omit any items if possible. They were reassured that their responses would be anonymous.

Based on the result of administering Utomo's questionnaire, the researcher formulated and designed the draft of questionnaire that consisted of 47 items which addressed issues on how teachers adopt, adapt and implement the curriculum. Adopting the KTSP (school-based curriculum) has to do with teacher attempts to understand the KTSP in comparison to the previous curriculum and reflects the teacher's effort to adjust and implement it to the classroom context while trying to apply their understanding of the curriculum to teaching and learning process. Adopting and adapting are concerned with the process understanding the KTSP. Likewise, both adopting and adapting cope with the use of the classroom setting. Therefore, primary school teacher were expected to respond to questionnaire items with their perspective about adopting, adapting, and implementing the KTSP.

A five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) with a neutral point, was used for each item in the questionnaire. Higher scores indicate a more favourable disposition. While other approaches such as Thurstone scaling, Guttman scaling and semantic differential scaling can be used for measuring perceptions, the Likert format is preferred, given its ease of use, general familiarity, and the resulting data being amenable to factor analyses for scale development.

There were both negatively and positively-worded items, and reverse scoring was performed for the negatively worded items for the purpose of statistical analysis. In the final analysis, if the marker item(s) correlated strongly with that factor or scale, this served as a guide in naming the scale. The instrument also included items addressing demographic information, including gender, age, educational background,

teaching status, years of teaching experience, and years of implementing KTSP. It was expected that teachers' responses would differ depending on how long they had been implementing the KTSP. The whole items of the draft questionnaire can be seen in Appendix I.

To make sure that the researchers and the respondents attribute similar meaning and interpretation to the construct, the interviews with six experienced teachers from different primary schools located in city and rural areas was carried out. In addition, they also were asked if the instruction, the terminology used, and the format of the questioners could be understood. The teachers indicated that 47 items, the instruction, the terminology used, and the format of the questioners were clear, concise, and easily understood. However, a minor revision was requested of the meaning of the acronym "PAKEM", which stands for learning that is typified by activity, creativity, effective, and fun (in *Bahasa* Indonesia: *pembelajaran aktif, kreatif, effektif, menyenangkan*).

4.3.2.2 The Second Phase: Field Testing and Analyses

Phase 2 required two steps. Step one included field testing the draft instrument with teachers in order to collect sufficient responses for statistical analyses. Step two involved factor analysis, aimed at identifying items whose removal would enhance the instrument's factor structure, and internal consistency reliability analysis, to determine the extent to which items within a scale measure the same construct as other items within that scale.

Step one: The field-testing the Draft Instrument

The field-testing was needed to improve the validity of the instrument especially in its usability and clarity. As Creswell (2008) has argued, pilot testing of an instrument is important in establishing content validity and in improving the questions, format, and scales. To obtain feedback about the structure and individual questions within the instrument, the 47 items five-point Likert response scale was administered to primary school teachers from three districts (i.e. Bengkulu Utara, Kaur, and Kepahiang). In this field-testing study, the sample size was determined primarily by guidelines for best practices in factor analysis (Costello & Osborne, 2005), specifically, the standard of a "participant to variable" ratio of 5 to 1 as suggested by Tabachnick and Fidell (2007); therefore a minimum sample size of 235 (47 x 5) was

deemed necessary. However, it was decided that the final effective sample size was 260.

The data management was carried out prior to the factor analysis using the IBM SPSS statistical package version 20. It consisted of four steps suggested by Iarossi (2006), i.e. coding, editing, data entry and screening or cleaning. From 260 teachers who responded to the questionnaires, all were usable because they met the criteria as a completed questionnaire. The data obtained from the questionnaire were transcribed to a coding sheet. After the data were coded, they were reviewed and edited by two colleagues who were experts in quantitative analysis. The editing stage was important to find and correct errors. The next stage was data entry. Microsoft Excel and the IBM SPSS statistical package version 20 were utilized to generate a computer data input and analysis of the data. The next process was data cleaning. The researcher carried out the data cleaning to verify the structural stability of the data. For example, invalid data, such as zero response and blank answer, were erased. Part of the data cleaning was eliminating the zero and non-responses (empty cells) from the data analysis.

Step two: Factor Analysis

Factor analysis involves a series of analyses used to develop a rigorous instrument. Factor analyses were conducted to serve two purposes: (1) to refine the scales; and (2) to provide evidence regarding reliability and validity of the refined scales. Those items not highly correlated with their respective scales were removed and data were reanalysed until all items with low-scale correlations were removed and the alpha coefficient was maximized. Analyses of the refined data set provided evidence to support the overall reliability and factorial validity of the refined scales. Therefore, the validation of research instrument that was taken in this study is by following the criteria: factor structure, internal consistency reliability and discriminant validity.

Factorial Validity

This validity basically refers to whether the factor structure of the questionnaire makes intuitive sense (Field, 2009). As such, factorial validity is assessed through factor analysis. The data mined from 47 items of the survey were analysed using mainly Exploratory Factor Analysis (EFA) toward elucidating the structural

(underlying factors or scales) and psychometric (reliability and validity) properties of the scales. Since there is conceptual and empirical evidence that both specifying too few factors and specifying too many factors are substantial errors that effect results, the number of factors to retain is one of the most critical decisions for scale development (Fabrigar, Wegener, MacCallum & Strahan, 1999). The number of factors was decided based on evaluation of the scree plot and parallel analysis, the size of the eigenvalues, cumulative percentage of variance explained, as well as consistency and meaningfulness of factor relative to the theoretical proposed domain structures.

Prior to conducting the factor analysis procedures, the inspection of the assumption and practical consideration underlying the application of the method were checked according to criteria advised by Pallant (2007). The first step was the assessment of the suitability of the data set for factor analysis. The sample size and the strength of the relationship among the items were scrutinized. Second, the investigations of the intended number of factors that can be used to best represent the interrelations among the set of items. The data set were subjected to principal component analysis (PCA) through Kaiser's criterion, Scree test, and Parallel analysis. The PCA is a statistical technique commonly used in questionnaire design to establish construct validity. Factor rotation and interpretation were the third steps to be determined to ensure all assumption were fulfilled. In practice, as stated by Tabachnick and Fidell (2007), orthogonal and oblique approaches provide similar solutions. In this study, however, orthogonal rotation was preferred to perform because its results were more readily to interpret and report (Fabrigar et. al., 1999). Whereas orthogonal rotations constrain factors to be uncorrelated, oblique rotations permit correlation among factors.

With the aforementioned procedures, the suitability of data for factor analysis was assessed. Inspections of the correlation matrix revealed the presence of many coefficients of 0.30 and above (Tabachnick & Fidell, 2007). Bartlett's test of sphericity, normality, and sampling adequacy of the data were tested. Barlett's test of sphericity indicated that $\chi^2 = 2750.28$ (see Appendix J) and this value reached statistical significance ($p<0.05$), supporting the factorability of the correlation matrix (Field, 2009). The KMO (Kaiser-Maiyer-Olkin) value of the dataset (see Appendix J) was 0.70, exceeding a minimum value (0.50) recommended by Field (2009),

confirming the appropriateness of data for further analysis. An inspection of the scree plot revealed a clear break after the third component. Using Catell's (1966) scree test, it was decided to retain three factors for further investigation. The screeplot for the draft instrument is provided in Appendix K. This was additional supported by the results of Monte Carlo Parallel Analysis, which showed three factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size. The PCA followed by varimax rotation as the method for data set analysis was used to check the structure of each questionnaire. The result of varimax rotation was confronted with oblimin rotation to make sure the similar findings. Both methods performed nearly comparable results.

As shown in Table 4.5, factor loadings indicate how strongly each item is related to a particular factor (see Appendix L), eigenvalues show the relative importance of each factor, and the cumulative variance can be used to check whether a sufficient number of factors have been retained (Field, 2009). The results indicate that the eigenvalues for each factor was greater 1 as recommended by Kaiser (1974). The percentage of variance and eigenvalues for each factor are shown at the bottom of Table 4.5. It reveals that the total amount of variance accounted for by the 33 remaining items is 23.35%. Table 4.5 also shows the eigenvalues rage from 2.23 to 5.54. These data provide support for the factorial validity of three renaming scales, namely, *Implementation, Adaptation*, and *Adoption*.

Pallant (2001) claims that if an item has a load above 0.30 this is an appropriate loading. In this study, all items loaded above 0.325 (with the lowest 0.35) on their respective scales. Therefore, the exploratory factor analysis utilized in exploring the interrelationship among a set of items (Pallant, 2007) clearly showed that 33 items could be extracted into three concise scales, except for item 24 which overlapped with the *Implementation* and *Adoption* scales (see Table 4.5). In response to this case, Field (2009) explained that if several variables loaded highly onto more than one factor in the structure matrix, this is due to the relationship between factors (i.e., the relationship between the *Implementation* and *Adoptions* scales). Since Q24 item was loaded on two scales, it is more appropriate to load on the *Adoption* scale due to two reasons. First, its' factor loading is quite high at 0.45 compared to the

Implementation scale at 0.37; and second, the item is intended to investigate about how they adopt the curriculum guidelines in teaching practices.

Table 4.5
Factor Loadings, Eigenvalues, and Percentages of Variance for Three Scales of Teachers' Perceptions on Curriculum Reform (TPCR) Questionnaire

No.	Items No	Factor loadings*		
		Implementation	Adaptation	Adoption
1	Q47	0.58		
2	Q46	0.55		
3	Q35	0.54		
4	Q39	0.54		
5	Q40	0.54		
6	Q45	0.54		
7	Q38	0.54		
8	Q41	0.52		
9	Q32	0.50		
10	Q37	0.47		
11	Q29	0.45		
12	Q31	0.42		
13	Q28	0.41		
1	Q16		0.63	
2	Q11		0.59	
3	Q9		0.57	
4	Q10		0.49	
5	Q30		0.45	
6	Q15		0.44	
7	Q2		0.44	
8	Q33		0.42	
9	Q42		0.41	
10	Q34		0.41	
11	Q20		0.39	
1	Q3			0.61
2	Q4			0.59
3	Q17			0.47
4	Q8			0.47
5	Q24	0.37		0.45
6	Q19			0.42
7	Q26			0.39
8	Q1			0.36
9	Q5			0.35
	Eigenvalue	5.54	3.21	2.23
	% Variance	11.79	6.82	4.74
	Cumulative %	11.79	18.61	23.35

* Factor loadings less than 0.32 have been omitted
N = 260 primary school teachers
Sample size data measured by subject to item ratio, that is, > 5:1.

In addition, the reliability statistic was computed for items in each scale to identify problematic items. The questionable items were examined for each domain scales and eliminated those that reduced the reliability coefficient for the scales. Thus, the

individual items were dropped to obtain the intended reliability and construct validity of each domain subscales. Accordingly, 33 items that were retained in the draft instrument and 14 items that were deleted from it can be seen in Appendix M and N, respectively.

Items that did not Load on any Factors

Examination of the individual item loadings revealed that 14 items did not load at 0.32 or higher onto any of the factors. The following section offers some possible explanations for why some of the items did not have loadings of 0.32 or higher. One possible explanation is that teachers may have found the wording of some of the items unclear. For example, one item read "I have paid more attention to fast learners than slow learners. Teacher may have not have understood what meant by fast learners and slow learners. Similarly, another item read "Teachers should pay attention to both fast and slow learners". For some teachers, both fast and slow learners may be difficult to differentiate.

Internal Consistency (Reliability)

Following the rotation, as well as preliminary interpretation and naming of the factors or scales, Cronbach's alpha coefficient was calculated for each scale. Cronbach's alpha quantifies the degree of internal consistency (reliability), that is, the extent to which a set of items measures a single unidimensional latent construct or dimension of a construct. In other words, it reflects the degree of homogeneity or coherence of the scale (Freeman & Tyres, 1995). Using an individual teacher as the unit of analysis, Cronbach alpha reliability coefficient for each scale ranged from 0.63 to 0.79 with two of three scales showing acceptable internal consistency estimates (see Table 4.6). More specifically, Cronbach alpha for *Implementation* and *Adaptation* scales were 0.79 and 0.72, respectively. Then, the *Adoption* scale had an internal consistency estimate of 0.63, which is lower than the acceptable 0.70 threshold (DeVellis, 2003). Due to the alpha value of *Adoption scale* lower than 0.70, this situation does not mean that this scale was unreliable. As suggested by Pallant (2007), if a measurement construct has less ten items, it is usual to find low alpha value. In addition, the relatively low reliability of 0.63 implies that primary school teachers perceived most items in this scale inconsistently. However, the value of scales overall Cronbach's alpha (0.72) is considered acceptable (Pallant, 2007).

Table 4.6
Internal Consistency Reliability (Cronbach's Alpha Coefficient), Discriminant Validity (Mean Correlation with Other Scales)

Teachers' Perceptions Scale	Number of Items	Cronbach's Alpha	Mean Correlation with Other Scale
Implementation	13	0.79	0.32
Adaptation	11	0.72	0.23
Adoption	9	0.63	0.25

The sample consisted of 260 primary school teachers

Discriminant Validity

Discriminant validity is the extent to which a scale is unique in the dimension that it covers and is not assessed by other scale in the same instrument. Mean correlation of a scale with other two scales in the TPC questionnaire was computed and employed as the criterion of discriminant validity (see Table 4.6). The lower mean correlation suggests greater discriminant validity for that scale. Table 4.6 shows that the discriminant validity, which measured the mean correlation of a scale with other two scales, ranged from 0.23 (*Adaptation* scale) to 0.35 (*Implementation* scale). These results suggest that raw score on the TPC scales developed and used in this study possessed relatively satisfactory scales construct, although a degree of overlapped still existed. However, the factor analysis results as reported in Section 4.3.2.2 support the independence of factors scores on the three scales.

Table 4.7 shows an overall positive teacher's perception on curriculum reform with overall average item means between 3.35 and 4.19 on a five point Likert-scale with a 5 meaning strong agreement on curriculum reform. The lowest area of agreement was the scale of adaption (M = 3.35, SD = 1.02) and the highest are of agreement of implementation scale (M = 4.19, SD = 0.77). Taken together, these items were investigating between '*undecided*' and '*agree*'. As seen in Table 4.7 results, primary school teachers considered their perspectives on the implementation of curriculum reform are moderately encouraging, but indicated that the adaptation of curriculum reform could be improved. The values of the average item standard deviations in both Implementation and Adoption scales are less than 1, which suggests that there are no major deviations in teacher's perception on implementing and adopting the curriculum reform policy. However, teachers' perceptions on the adaptation scale indicate that teachers vary their perceptions on curriculum reform policy.

Table 4.7
Descriptive Statistics of the Primary School Teachers' Perseptions on Curriculum Reform for Three Scales (N = 260)

Teachers' Perception Scale	Number of Items	Average Item Mean*
Implementation	13	4.19
Adaptation	11	3.35
Adoption	9	3.96

*: Range of 1 to 5; 1 = Strongly Disagree; 2 = Disagree; 3 = Undecided; 4 = Agree; 5 = Strongly Agree.

To sum up, the results of the factor analysis, reliability and discriminant validity suggest that the TPCR questionnaire, which consists of three scales and a total of 33 items, is valid and reliable for use among primary school teachers in Bengkulu province, Indonesia. The uniqueness of TPCR questionnaire is that it is specifically related to primary school teachers' perceptions on the implementation of KTSP or the 2006 Curriculum, particularly issues like learning material, syllabus design, student assessment and in-service training.

4.3.3 The Sample Involved in the Administration of Assessing Teachers' Perceptions on Curriculum Using the TPCR Questionnaire

To select the sample to be used for the administration of teacher questionnaire, multiple cluster sampling was utilized. According to Teddlie and Yu (2007), multiple cluster sampling involves implementing two basic probability sampling technique, in conjunction with one another, to generate a more complex sample. The first stage of sampling for this study involved random selection of an initial cluster, namely, in this case the district where the schools and the teachers have implemented the new curriculum in their instruction. The second stage of sampling involved the random selection of second cluster (i.e., the teachers who teach science).

Based on this sampling method, a total of 647 teachers teaching in 3-6th grade levels from eight districts and one municipality in Bengkulu Province, Indonesia were selected randomly. The researcher distributed the questionnaire to primary school teachers from a number of different schools during workshops. Since all primary schools in this study fell under the curriculum reform policy enacted at the district level, teachers' perceptions of this policy were expected to vary across schools at the individual level. The teachers were told that participation was voluntary. Teachers who were willing to take the survey then filled out the questionnaire. Because of

voluntary participation, grade level distributions were not equally represented in the sample (Table 4.7). The entire data collection took four months to complete, extending from June – September, 2010.

Table 4.8
Participating Teachers by Region and Grade

No	Region	Grade				Total
		3rd	4th	5th	6th	
1	Bengkulu Municipality	4	4	28	10	46
2	Seluma	65	63	65	75	268
3	Bengkulu Selatan	6	10	14	15	45
4	Kaur	8	12	10	18	48
5	Kapahyang	10	8	12	14	44
6	Bengkulu Utara	18	47	48	53	166
7	Muko-Muko	5	6	9	10	30
	Total	116	150	186	195	647
	%	17.9	23.2	28.8	30.1	100

4.3.4 Procedure for the Administration of Assessing Teachers' Perceptions on Curriculum Using the TPCR Questionnaire

Permission to conduct the study was obtained from government agencies in Bengkulu province. Before administering the questionnaire, formal permission from both the Head of The Bengkulu National Education district office and the principals of the schools involved was sought and obtained.

It was decided to use self-completion of questionnaire. During the workshop, the researcher gathered teachers in a room and explained the purposes of the study and the importance of their answer to the study. When explaining the purpose of the study to teachers, the researcher also reassured them that their responses would be confidential and that only the researcher and the supervisor have access to the data. In addition, without any names on the survey, respondents were assured that their identities would not be recognized. Having the opportunity to present the instructions to the entire group of participating teachers was not only efficient but also allowed them to ask any clarifying questions that had in a timely manner. Teachers were provided sufficient time to complete the questionnaire which took approximately 20–30 minutes to complete; there was no compensation for participating in this survey.

4.4 Summary of the Chapter

This chapter described the development and validation of two survey instruments. The first instrument was the development and validation of the Indonesian version of My Classroom Inventory. Data were obtained from 611 primary school students, and analysed using primarily factor analysis. The questionnaire consists of three scales (Satisfaction, Friction, and Cohesiveness) with a total of 14 items, and an overall alpha of 0.70. These 3 scales (alphas between 0.62 and 0.79) explained 51% of total variance, and all of the common variance underlying the items.

The second instrument was to develop and validate a scale for measuring teachers' perceptions on curriculum reform at the primary school level. The structure and dimensionality of the scale were examined, and its psychometric properties were assessed. Given the results of piloting study, the internal consistency estimates are moderately encouraging. More specifically, Cronbach's *Alpha* for *Implementation* and *Adaptation* scale were 0.79 and 0.72, respectively. But, *Adoption* scale had an internal consistency estimate of 0.63, which lower than the acceptable 0.70 threshold.

Overall, the analyses reported in this chapter attested to the satisfactory validity and reliability of the learning environment and perception questionnaire. Therefore, data from these questionnaires were analysed in the ways reported in Chapter 7 to answer the research questions that were mentioned in Section 4.1.

CHAPTER 5

THE INTENDED PRIMARY SCHOOL SCIENCE CURRICULUM

5.1 Introduction

This chapter provides direct responses to the first research question: What is the focus of the current intended primary school science curriculum? Addressing this research question will not necessarily shed light on what is the best science for primary school students in Indonesia. For that reason, the intention of the proposed research question is to examine the current intended science curriculum in primary school. The findings in this chapter mainly were explored from mining document, namely content standards (in *Bahasa* Indonesia: *Standar Isi*).

The recent education policy initiatives in Indonesia claimed to implement the Law 20/2003 of the National Education system and adopt the standard-based reforms. Porter, Polikoff and Smithson's study (2009) indicated that the backbone of the standard-base reform system was content standards. The content standards that have been officially valid since 2 June 2006 contain the formulation of competence standards and basic competences. These competences became the basis of curriculum development at the school level, known as School-Based Curriculum (KTSP). In the case of the science curriculum, the whole competence standard and basic competence contained in the content standards were wholly adopted from the 2004 curriculum. This means that the whole theories underpinning the 2004 curriculum are the basis of the content standard.

Due to the content standards being closely associated with the focus of the current primary school curriculum, a Subsection 5.2 is devoted to an analysis of the content standard document. The description of the selected curriculum components as suggested by van den Akker (2003) is presented in Section 5.3. Analysing the intended curriculum is discussed in Section 5.4. A summary of the intended curriculum documents analysis results is provided in Section 5.5.

Before commencing to analyse the content standard document, a number of considerations should be taken into account to inform the directions of the document analysis.

Firstly, in the field of education, standards are usually used to address "criteria" in either the context of content application in schools or in the context of assessment to measure student learning over time (Harlen, 2007). Similarly, according to Government Regulation no. 19 of 2005 article 1, the word "standard" refers to the minimum criteria about the educational system ["... *kriteria minimal tentang sistem pendidikan...*"]. Because the standards provide broad scope for the educator to structure a curriculum at the local or school level (Griffith, 2006), standards are sometimes used interchangeably with curricular frameworks. The aim is to provide guidelines that teachers can use to create a challenging, high-quality curriculum for all students, regardless of where they attend school (Clarke, Shore, Rhoades, Abrams, Miao & Li, 2003).

Secondly, the National Education Law No. 20 of 2003 provides the legal framework of curriculum reform and implementation and adopts the standard-based reforms. The characteristic of the standard-based reforms can be perceived from the government regulations No. 19 of 2005 regarding National Education Standard, which was the legal frameworks of standard based reform that describe the need to implement national standards of education.

Thirdly, the Minister of National Education (MoNE) of Indonesia has developed a separate set of standards covering eight different areas including outcomes' competency standard, educators' standard, media and infrastructure standard, management standard, funding and budget standard, and the education assessment. Two of these eight standards, the content standard (the MoNE regulations No. 22 of 2006) and graduate competency standards (the MoNE regulations No. 23 of 2006) are expected to be adopted by schools in developing their own curricula along with the curriculum guidelines published by the National Education Standards Body (the BSNP).

Fourthly, the BNSP has published guidelines to help schools develop their own curriculum along with a syllabus and lesson plan model that can be either adopted or adapted by schools.

Finally, the basic framework and structure of the curriculum are ascertained by the Central Government. The primary school curriculum is developed in accordance with its relevance as seen by the individual school committee and supervised by the district office of education (local government) in the frame of the Unitary State of Republic of Indonesia.

In this study, there are at least two effects of the National Education Law No. 20 of 2003 since it has been implemented in the Indonesian education system: Curriculum development is no longer the authority of the central government, and curriculum development is not directed to create a single curriculum for all schools (Law No. 20/2003, article 36). To date, accordingly, there have been three curricula which were implemented in primary school classrooms – the national curriculum which refers to the content standards developed by the central government, the curriculum developed by local government which refers to local content curriculum (LCC), and school–based curriculum which refers to the KTSP developed by every school level.

5. 2 The Description of Content Standards

5.2.1 Introduction

Recently Indonesian education policies have moved towards a standards-based approach to ensuring the quality of education to all students. To support the intended policies, the central government developed a set of minimum service standards which apply to each level of education from kindergarten upwards. One of the standards is the content standard that was strongly encouraged by the MoNE to be adopted and implemented in the school curriculum. Content standards provide teachers with a set of guidelines for what students are expected to know and be capable of doing. Moreover, content standards are meant to shape what is taught and in that sense, what students learn. This subsection is desired to investigate the focus of the content standard as the national intended curriculum in primary school.

5.2.2 Content Standards

This document published by the MoNE (2006) contains three chapters and describes principles and guidelines for developing and implementing school-based curriculum or KTSP. Chapter 1 of this document explains the legal framework of school curriculum that underpins the content standard. It is believed that the government institutes a National Education System to fulfil the mandates of the 1945 Constitution, Article 31 Section (1) and (2) that every citizen has the right to education. Hence, obtaining an appropriate education is the basic right of each citizen and it is guaranteed in the Constitution. According to Law number 20 of 2003 on National Education System, which supports the "Education for all" concept, the education system provides learning opportunities to every citizen, irrespective of gender, religion, ethnic, social or economic background. In relation of these, the government has committed to provide the qualified education to its people as stated in the vision. The vision of Indonesia education is the realization of educational system as solid and authoritative social institution to empower human resources to become bright spiritually, emotionally, socially, intellectually, and kinaesthetically and competitive citizens who are capable and proactive to stand facing the ever-changing challenges of the era.

Due to this concern, education is developed on the basis of four main strategies: equity, quality, efficiency, and relevance to the demands of national development. Equity in educational opportunities is accomplished via the nine-year universal basic education programme. This programme is one of the efforts of the government to create the critical mass and to provide students with basic skills and knowledge to continue on to higher education, to provide students with know-how in society, to give the students choices and make use of high-tech products and to interact and compete among society, groups and among nations.

The improvement of educational quality is intended to enhance the quality of human resources so that people can become competitive citizens to face global challenges. The aim of improving educational relevance is to produce human resources related to the country's needs. The effort of implementing the school-based management for all levels of education has been in force to increase the overall efficiency of education management.

The structure of the curriculum for primary school is described in chapter 2 of content standard document, which encompasses learning content over six years of the education. It is developed based on graduate competence standards for the end of primary education and subject competence standards. Graduate competence standard is the qualification of graduate abilities enclosing attitude, knowledge, and skills (Badan Standar Nasional Pendidikan, 2007). The standard is utilized as a guide to make decisions on whether or not students are allowed to be promoted to the next class or to transfer to the next stage of education. The aims of graduate competence standards at primary schools are to establish intellectual, knowledge, attitude, good moral conduct, as well as skills for living independently and to continue to higher education. The subject competency standard is elaborated in curriculum components, namely, content and competence. The primary school curriculum comprises eight subjects, local content, and self-development as shown in the Table 5.1.

Table 5.1
The Curriculum Structure in Primary School

Components	Grade and Time allocation			
	1st	2nd	3rd	4th — 6th
A. Subject				
1. Religious education				3 hours
2. Citizenship				2 hours
3. Indonesian language				5 hours
4. Mathematics				5 hours
5. Natural Science (IPA)				4 hours
6. Social Science (IPS)				3 hours
7. Arts and culture				4 hours
8. Physical Education, sport and health				4 hours
B. Local Content				2 hours
C. Self-development				2 hours
Total	26 hours	27 hours	28 hours	32 hours

(Adopted from Content Standard, MoNE Regulation No. 22/2006: 8)

As indicated by Table 5.1, there are three component parts of curriculum structure for primary schools, namely, the core curriculum consisting of 8 subjects, the local content curriculum, and activities for self-development. Local content, decided by individual school, includes curricular activities in order to develop competencies adjusted with unique local characteristic and potential, including local advantages where the content cannot be grouped into the existing subjects. Self-development is

not a subject that must be taught exclusively by teachers. The intentions of self-development are to provide opportunity for learners to develop and express themselves corresponding to each learner's need, talent, and interests. These opportunities could be facilitated by counsellors, teachers, or other educators that can be conducted in the forms of extra-curricular activities. They can be performed through counselling services related to students' individual problems, social life, learning, and career development. Learning process at Years 1, 2, and 3 is conducted through a thematic approach, while at Years 4, 5, and 6 is carried out through a subject matter approach.

Chapter 3 of the document informs that on average for Years 1, 2, and 3 students have between 27 and 32 hours a week of learning time, while for Years 4, 5, and 6 this is 34 hours per week. The length of one learning time is 35 minutes in primary school. Effective learning periods in one year of schooling are 34 – 38 weeks for each primary school.

5.3 The Description of the Selected Curriculum Components

Since the Law No. 20/2003 of the National Education System was implemented, the centralized curriculum was gradually changed by a decentralized school level curricula. As a result, schools are given the freedom to develop and implement a curriculum that is relevant to the needs of their specific students. Local school communities, in accordance with the national standard and curriculum guidelines and the supervision of the local government, are responsible for designing the curriculum for their own schools. This implies that every school should possess a different curriculum to other schools. Because of the change of the role of schools from curriculum implementer to curriculum developer, the government has realized that this role is not an easy task for local schools. Therefore, the government has offered a model curriculum, which may be adopted or adapted by local schools. This model curriculum is assumed as the formal or written curriculum and used in this study to attain the concept of current intended curriculum. The proposed curriculum model was the result of developing content standard and graduate-competence standard and the use of curriculum guidelines. In addition, the model curriculum can be seen in the

guideline for the curriculum entirely determined and published by an external, authoritative body called BSNP.

The curriculum components presented in the Table 5.2 are utilized to guide the description of the intended primary school science curriculum. By analyzing the curriculum components, conclusions could be made about the focus of the intended curriculum.

Table 5.2
Curriculum Components and Related Sample Questions

Components	Sample questions
Rationale	Why are students learning?
Aims and objectives	Towards which goals are students learning?
Content	What are students learning?
Learning activities	How are they learning?
Teacher role	How is the teacher facilitating learning?
Materials and resources	With what are they learning?

5.3.1 Rationale

The rationale for the curriculum includes the schools' vision and mission. Through vision, the school desires to become an institution devoted to the enhancement of noble characters; the attainment of learners' interests, skills and potential; the global insights rooted in cultural values in line with religious teaching. This vision leads to the school mission. The school's mission is to cultivate faith by practising religious teaching; to optimize the learning process and counselling; to develop knowledge in science and technology, literacy, sport and art along with talent, interest and potential; and to establish cooperation between school and the local community in harmonize ways. Anchored to the rationale, the educational goal is to situate the base of intelligence, knowledge, personality, noble character, to have skills for their life, and to continue their study.

In particular, due to science being one of the subjects in primary schools, the government provided education for all students in order to develop their ability in doing science. By doing this, it is believed that this will increase the students' ability to adapt to the changing environment and to enter the world of technology. For the

sake of students' life, as well as the economy and the environment, there is the need to equip students with sufficient competence and life skills such that they can be productive citizens in society.

By providing learning experience for understanding the concepts and processes of science, it is insisted that the primary school students can develop knowledge with respect to the following issues:

- Local, national, social, economic, worldwide and environment issues, as well as ethics,
- How to judge critically the development of technology and its influence on daily life,
- How to give a contribution with respect to the development of science and technology,
- How to make a sure career choice.

Based on the rational of this century of dramatic changes, the KTSP emphasises the students' need to being trained to become active and flexible, life-long learners. Science is suitable for developing the skill of investigating, finding and using knowledge. These skills are of great importance for enabling learners to become these active and flexible, and life-long learners.

5.3.2 Aims and Objectives

The learning aims and objectives convey the educational intentions of a subject matter and are statements of what the students will achieve. Aims and objective of science subject matter in primary school are defined as follows:

- To be faithful to God
- To acquire knowledge and understanding in science that can be practical and applicable in daily life;
- To develop curiosity, constructive attitude and perception about the relationship of science, environment, technology and society;
- To develop students' procedural skills for investigating natural world, solving problems, and making decisions;
- To be responsible for maintaining their environment;

- To make the students aware that nature is neatly organised, such that they can be convinced of the greatness of God,
- To obtain scientific knowledge, concepts and skills as the base for continuing to higher education level.

5.3.3 Content and Competences

Documents of Regulation by the Ministry of National Education number 22 of 2006 is concerned with competence standards (in *Bahasa* Indonesia: *Standar Kompetensi*), and basic competences (in *Bahasa* Indonesia: *Kompetensi Dasar*); these were examined to study the intended curriculum in primary schools. As stated by Government Regulation number 19 of 2005 Article 5 regarding the National Education Standards, the scope and sequence of content is arranged by units of education derived from the competence standards and basic competences. Competence standards are the abilities that can be shown or performed for a lesson. It is competence in a particular lesson that students have to achieve. Basic competence is minimum ability in a lesson that students should acquire. The competence standard covers aspects of thinking, skill and personality. It is aimed to give direction to the teachers about the ability and skill that becomes the focus of learning and assessment.

The science curriculum in primary schools does not comprise a list of science topics that need to be addressed. In its place, a framework is proposed that has to be taught by the schools. The science content is installed by a system of competences and shapes the principal pillars of this framework. The standard competences shape the backbone of the content organised around two interrelated strands: science-concept understanding and its application, and science inquiry skills. Science inquiry skills involve conducting investigations, communicating findings, developing creativities and solving problems, developing scientific attitude and value.

Science-concept understanding is evident when a person selects and integrates appropriate science knowledge in ways that explain and predict phenomena, and applies that knowledge to new situation and events. Science-concept understanding for Year 5 comprises: living things and their process; materials and its properties;

energy and forms of energy; earth and universe; Science, environment, technology, and society.

The national framework of competencies, by its nature, will enable standards to be developed at key points in the students' progress through the various components of the curriculum over all periods in the classrooms. The standards summarize the typical performances of students in specific parts of the curriculum at certain grade levels. The standard competences form the backbone of Year 5 primary school level education and can be obtained throughout the formal/written curriculum. Each of these standard competences is divided into several basic competences. Several basic competences together can constitute the 'main subject matter'. The basic competences are finally divided into several indicators. For illustrating what the formal curriculum looks like, a basic competence with its associated indicators and main subject matter is illustrated in Table 5.3.

Table 5.3
Example of a Standard Competence, a Basic Competence, the Related Indicators and Main Subject Matter

Standard Competence	Basic Competence	Indicators	Main Subject Matter
5. To understand correlation among force, movement, and energy, its function as well.	5.1 To describe correlation among force, movement, and energy through experiments	5.1.1 To compare the velocity of two objects those were falling with the different weights, sizes, and height. 5.1.2 To conclude that gravity force caused an object to fall to the ground. 5.1.3 To predict what will occur to an object within zero gravity.	Gravity force

Note: Standard competences and basic competences are provided by MoNE, while indicators are decided by schools.

Two documents included in the study of developing syllabus are Guidelines of developing KTSP realised by the MoNE (2007) and Documents of the Regulation of Ministry of National Education No. 41 of 2007 concerning process standard for basic and high school levels published by *Badan Standar Nasional Pendidikan* (or the BSNP) in 2007.

A straight consequence of the decentralisation paradigm underpinning the competence-based school level curriculum is the fact that the schools are responsible for finalizing their curriculum (Badan Standar Nasional Pendidikan, 2007). This means they have to develop the syllabus and the lesson plans by referring to the guidelines set down by the BSNP and under the supervision of the district education department. Being responsible for developing their own syllabus is intended to give schools the opportunity to make the national standards relevant to their local context and needs.

There are at least two questions that can be addressed by the curriculum guidelines, particularly how the syllabus is developed. First, does the guideline provide the rationale for the inclusion of the knowledge, content, skills, and process specified? and second, are syllabus materials stated in sufficient detail to provide an apparent guide for implementation?. These questions are utilized to analyse the curriculum guideline.

The schools are provided autonomy with respect to the design, but the syllabus should at least answer what is taught and how it is done. For that reason, the syllabus principally is aimed to reply the following questions:

- Which competences are addressed?
- Which learning experiences are provided for the students?
- What kinds of assessment are used to students?

The intended competences achieved by students are formulated in standard competence and basic competence. To achieve the aimed competences, learning experiences are provided for students related to time allocation to teach the respective competences and learning sources needed. The assessment of students' performance is indicated by indicators based on grades of the students' learning experiences. Indicators are categories of evidence to be used as a basis for judging competency achievement, or criteria that can be used to differentiate competent from incompetent performance (Mulyasa, 2006). In developing the syllabus, therefore, schools include the following in their syllabus: standard competence and basic competences; indicators; main subject matter; teaching steps including methods; time allocated; learning sources; assessment/evaluation.

5.3.4 Learning Activities and Teachers' Role

The teaching and learning process is guided by the process standard, established by BSNP, which is perceived as a national education standard related to the learning process at certain levels of education in order to achieve graduate competence. In addition, the process standard provides indicators to illustrate precisely how teaching and learning processes should appear in classrooms.

As stated in the educational vision, the government has a strong commitment to empower Indonesian people to become "qualified citizens" to face globalisation. Related to the vision, the principles of education implementation have been established as the base of educational reform. One of the principles is that education is implemented as civilizing and empowering learners based on lifelong learning. The impact of this principle is the shift of a paradigm from teaching to learning. In line with this principle, the intended role of the teacher requires shifting from a director or manager.to a facilitator or guide.

Consequently, the learning process has to be performed in the different approaches from teacher-centred to learner-centred instruction. Teachers were expected to perform activity-based learning approach known as "PAKEM". The main key word that captures the essence of the instructional strategy is learning that Active, Creative, Effective and Enjoyable. This intended instructional strategy is characterised by seven features: (a) Meaningful learning; (b) Learner-centred; (c) Learning by embedded experience; (d) Development of social, cognitive, and emotional skills; (e) Development of curiosity, imagination, and being faithful to God; (f) Lifelong learning; and (g) Blend independency and cooperation. Since the three features are more of a rationale nature, only three features are discussed here, namely, meaningful learning, learner-centred, and learning by embedded experience.

The document states that teachers should avoid 'transferring' information to the students. Instead, meaningful learning is the paradigm of the KTSP. It entails a process in which "...understanding is developing with respect to learning experience" (Badan Standar Nasional Pendidikan, 2007). This process is closely intertwined with perceptions, preconceptions, and feelings of the students. It is emphasised that learning should not be a process in which the knowledge is already provided in clear-

cut pieces to the learner. Instead, the teacher should facilitate the learning. The actual learning should be done by the students, and the responsibility for this should be inherent in the learner.

By using the term learner-centred, the guideline documents refer to the need to regard students as individuals who each have a different style of learning, and each have other feelings. It contends that different students are likely to use different ways of learning; some learn easily through reading, others learn easily through looking, and yet others learn best by 'doing things'. The most desirable learning experiences are provided by hands-on experiences, because 90% of what learners do is also actually learned. This is contrary to reading; only 10% of what learners read is actually learned (Departemen Pendidikan Nasional, 2003a). Therefore, the teachers need to adapt their lessons and instructional strategies to the individual students. Additionally, it is claimed 'If the student has not developed competence, this is not because the student was not able, but more because the student has not experienced the right learning experience that was relevant for the student's individual character'.

It is contended that a linkage should be made between the lesson material and daily-life situations. By contextualising and consequently embedding the lesson in daily-life settings, the students can learn both during the lessons, and through daily-life experiences. In case direct experiences are not possible, the next best thing to do is to let students experience the concepts to be learned through models, or audio-visual simulations. The least favourable learning experience is through listening.

This way of learning emphasizes developing students' competencies through learning by doing. The guideline offers directives on how to perform PAKEM, offering a list of 62 learning experiences, of which the first eight are presented: composing a song and singing; doing a game; discussing (asking, answering, commenting, listening to explanations, refuting); drawing and writing a story; reading; watching carefully to grasp basic concepts; making (cross-word) puzzles; and test a research question.

The guideline also recommends 'methods' which teachers should use, such that students are encouraged to be actively engaged in the learning-process: by providing questions that push students to think further in a productive way, meaningful tasks,

and an assessment programme that motivates students in doing about the specific tasks. Each of these 'methods' is accompanied with examples of standard situations and associated model-behaviour of the teacher, as well as with several theoretical notes on the methods. An example of such a standard-situation can be found in Table 5.4.

Table 5.4
Example of Standard Situations and the Model – Reaction of the Teacher

Student's behaviour	Teacher's ideal response
Question: "Is there life on Mars?"	Question: "What is your opinion?"
Statement: "There is probably life on Mars, right?"	Question: "Why do you think so?"

Besides asking the 'right' questions, the way the students are arranged is also of great importance according to the service document. The document also provides elaborate comments on how to organize group work, including locating the students throughout the room. It also gives a description of the process as it may occur over time. The rules of thumb that should help the teachers organise group work are classified as follows:

- Using small groups; who sits in which group is decided by the teacher,
- The task should be finished in a short time,
- The task should be simple,
- The teacher should provide clear and step-wise instructions,
- The teacher should have prepared a set of sources that can be used, and
- The assessment of the task should occur in an informal way and feedback should be given to the students.

5.3.5 Assessment

Assessment of student learning is intended to provide a more holistic impression of their learning. For this objective, assessment is now implemented at the classroom-level and national-level. The national-level assessment called as the national examination (in *Bahasa Indonesia*: *Ujian Nasional* or the UN) is combined with the classroom-level assessment to decide if a student passes and graduates. The school-based examination (in *Bahasa* Indonesia: *Ujian Akhir Sekolah* or the UAS) is a final

examination in all subject matters and takes into consideration the results of the teachers' continuous assessment.

The continuous class-based assessment is used not only as a technique for summative assessment but also as a part of the learning process. Hence, the continuous class-based assessment should be used as a diagnostic or prescriptive technique to ensure that learning takes place and to determine if students can move on to the next competencies. In this way, assessment is part of the learning process rather than a technique for a summative test to record students' grades.

Through the school-based examination and the continuous class-based assessment, teachers assess students' performance against three learning domains – cognitive, affective, and psychomotor (Departemen Pendidikan Nasional, 2003a). The 'cognitive dimension' covers the traditional academic achievement and is defined as the knowledge that includes linguistic intelligence and logical-mathematical intelligence. Within the cognitive dimensions, distinctions are made between six sub-dimensions. The sub-dimension, as well as selected examples of learning activities, which according to the document can be typically categorised as cognitive, is provided in Table 5.5.

Table 5.5
The Cognitive Assessment, Sub-dimension and Selected Examples of Learning Activities

Sub-dimensions	Examples of Learning Activities
Knowing the facts	Finding meaning in something; telling and analysing what has happened.
Comprehension	Expressing concepts; understanding in one own words; interpreting data.
Application	Counting necessities; performing experiments
Analysis	Identifying causal factors; drawing a graph
Synthesis	Making a design; composing a song; creating a new product
Evaluation	Defend one's own opinion; taking part in a discussion.

The 'psycho-motor dimension' is defined as the skills that include 'kinaesthetic intelligence', 'visual-spatial intelligence', and 'musical intelligence'. Within the dimensions, distinction is made six sub-dimensions. The dimensions, together with the associated sub dimensions and exemplary learning activities, are presented in the following table.

Table 5.6
The Psychomotor Assessment, Sub-Dimension and Selected Examples of Learning Activities

Sub dimension	Description
Reflexive motion	Peeling a mango with a knife; and cutting branches off a tree.
Basic fundamental movements	Playing netball; and pushing and pulling
Perceptual movements	Dribbling with a ball; and choosing one small object from a collection of objects with different sizes
Physical abilities	Activating muscles/muscle groups during a predefined time; running long distances; and playing football.
Skilled abilities	Dancing; and performing acrobatic movement.
Non-discursive communication	Making art of high quality (e.g., painting, ballet dancing); and physical exercising skills at a high level.
Reflexive motion	Peeling a mango with a knife; and cutting branches off a tree.

The ‘affective dimension’ is defined as attitude that includes social and emotional intelligence (Departemen Pendidikan Nasional, 2003). Within the affective dimension, distinctions are made between three sub-dimensions. The sub-dimensions, as well as selected example of learning activities, which according to the document can be typically categorised as affective, are shown in Table 5.7.

Table 5.7
The Affective Assessment, Sub-dimension and
Selected Examples of Learning Activities

Sub-dimension	Description
Receiving	Listening to music often; like to reading poetry; and eager to watch something.
Responding	Obey instructions; working on a task; and writing poetry.
Valuing	Appreciating art; and valuing an actor.

Taken together, these three dimensions should allow holistic impression of the students; not only as a learner, but also as a person as a whole.

The teachers are required to address these domains in ‘daily reports’. These reports, containing both a numerical grade and qualitative information (e.g. “improvement is needed in the field of observing skills”), aim at more comprehensively informing the parents of students. To provide this more holistic information for parents, the teachers are required to write the following reports for every student: the daily report and the academic report. The daily report include among others the results of tests, the task performed and related issues. The academic report is the more classical list with grades. It should include not only the cognitive (numerical) marks, but also grades for the other two dimensions.

5.4 Analysing the Intended Curriculum

5.4.1 Content Standard

Owing to the legalization and implementation of Education National Standard in 2005, a number of National Standards have been introduced into the National Education System. This implies that the systemic educational reform adopted by the Indonesian government is the standards-based approach to ensure that quality education is provided to all students. In relation to school-based curriculum

development, article 2 of the MoNE regulation No. 24 of 2006 demands that all schools across the country adopt content standards and graduate competence standards in the beginning of 2006/2007. Under the decentralised system, the central-level Ministry of National Education maintains the consistency of standards on curriculum design and implementation.

Since the National Education standards have been introduced in schools, it is useful to have an empirical consideration of the extent which content standards are currently adopted. The question is whether content and graduate competence standard can provide teachers with "a set of guidelines" for what students are expected to know and be able to do.

Determining "a set of guidelines" on instruction at least can be viewed from various perspectives such as from the document itself, the user, or a causal relationship between policy and practice. Establishing causal relations between policy (i.e. content and graduate competence standard) and practice (teachers' view on policy) is complicated, especially from users or practitioners who have interpreted and transformed the policy into practice (e.g. Donnelly & Sadler, 2009).

Considerable studies have been carried out to investigate causal relations between policy and practitioners. Hill's study (2001), for instance, revealed the role of language in mediating the comprehension of policy and, through that, practitioners' response. Other studies focused on the role that communities of practice play in shaping practitioners' understanding and thereby their apprehension of and response to policy (Coburn, 2001). Nevertheless, this study paid attention to the aims of policy whether the standards of concern are realistic or "ambitious" to put into practice in the real classroom. Cohen, Moffitt and Goldin (2007) affirmed: "The more ambitious the aims are and the more they depart from conventional practice, the greater the resources that will be needed to realize them in practice" (p. 525).

According to Swanson and Stevenson (2002), the national education standards are not only very demanding, but also they are an ambitious agenda in the sense that they aim to reach into individual classroom, changing the nature of instruction with the final goal of improving student learning. Many of the aims would be unrealistic even in developed countries. These set of standards are also complex and aspirational

rather than realistic, as for example, in relation to principles of curriculum implementation in the content standard, "...by employing multi-strategy and multimedia approaches..." (in *Bahasa* Indonesia: "*...dengan menggunakan pendekatan multi strategi dan multimedia*..."). A school with the limited availability of teaching resources in remote areas or mountain areas was would see these demands of the national standard as a burden and so the schools are unable to take into account the standards in teaching and learning process.

Another example, the development of KTSP is embracing the competence-based approach putting a greater emphasis on skills and personal development (see curriculum structure). The intent of personal development is "... corresponding to each learner's need, talent, and interest" (in *Bahasa* Indonesia: "*... sesuai dengan kebutuhan, bakat, dan minat siswa*"). The objective of this subject may be difficult for the schools with limited school funds to conduct the extra-curricular activities for every student. Taking the diverse population of Indonesia with over 50 million students distributed in 33 provinces and 490 districts and municipalities into consideration (Ministry of National Education, 2008b), the concerns mentioned above turn into an entry point for rethinking and simplifying the content standards.

The education challenge facing the Indonesian education system is not that its schools are not as good as they once were. Rather those schools must help the vast majority students to reach levels of skills and competence that were once thought to be the reach of only a few. One of main reason why the KTSP has been introduced into schools since 2006 is the skills and competences prescribed in the 2004 curriculum had not been achieved successfully by schools as was originally intended. Considerable research indicated that there still are tensions and arguments both in favour of and in opposition to the idea of national standards in education (Porter, Polikoff & Smithson, 2009). The standards-based reform system has been initiated in a number of countries, especially the UK, the USA, Singapore and Hong Kong. The results to date have demonstrated some short-time successes but long-term issues yet have to resolved (Schmidt, Wang & McKnight, 2005).

5.4.2 Rationale, Aims, and Objectives

Although Indonesia is not a theocratic country, religion plays an influential role in almost every aspect of life including education. Religious values are taken as one of the educational standards and objectives. These values are expected to become an integrated part of students' personality and to be manifested in their morality (Tilaar, 1995). These religious and moral objectives have been repeated explicitly in each Indonesian Education Act, though there has been an on-going apprehensiveness that such objectives have not been achieved (Sudarminta, 2000). One major difference between countries is the existence of religious goals and the extent to which they are included in the curriculum (Cush, 2007). For example, the Indonesian curriculum includes religious goals, while other countries, including Australia, France, and New Zealand, are secular in their public education systems.

The ideal curriculum is intended to impart cultural, ethical, and moral values. The educational goals in basic education include development of basic education knowledge (literacy, numeracy, and life skills); and of the child's intellectual, emotional, spiritual, and physical emotional; and of critical thinking and problem-solving skills. As indicated by Act No. 20 of 2003 on National Education System, education is defined as conscious and systematic effort to develop and optimize all individual's potentials and society to more advanced and functional.

Before the selection of aims and objectives, it is necessary to consider the philosophy of education of the school, conditions and problems of contemporary life – especially demand that will be made on students in their everyday life – the nature of subject matter, and the psychology of learning (Hurd, 1998). However, educators have long debated what the aims of general education should be. One may make judgment about the aims and purposes of education based on such value positions. In practice, most aims for general education are possibly better considered as "ideals," which do not actually exist and toward which schools are expected to direct their activities without ever actually achieving them.

The general aim of education provides a basis for designing classroom instructional activities. With regards to this, some educators recommend that the general aims should be "translated" into more specific objectives that are adjusted to the content of

courses and the particular needs of groups of students. The importance of the aims should be stated clearly in terms of competency; while it can be seen as an indicator to reveal that a school can function effectively.

In relation to the science subject matter in primary school, the scope of the rationale, aims, and objectives is rather broad. From the document, it can be derived that these statements should mention "to be faithful to God", it should be related to this era of electronic ICT and globalisation, and should address active, flexible, life-long learners. Virtually all sensible statements "fit" the aggregate body of rationale, aims, and objectives.

5.4.3 Content

The hallmark of competence standards for science in primary schools, as stated in the attachment of Regulation of Ministry of National Education number 22 of 2006 is the call for inquiry-based instruction ["*Pembelajaran IPA sebaiknya dilaksanakan secara inkuiri ilmiah*…" p. 484]. The standards call for more than "science as product" but also "science as process" in which students learn such skills as observing, inferring, and experimenting. As a result of this, scientific inquiry is central to science learning in primary school level. When engaging inquiry, students describe objects and events, ask questions, construct explanations, test those explanations against current scientific knowledge, and communicate their ideas to others. They identify their assumptions, use critical and logical thinking, and consider alternative explanations. In this way, students actively develop their understanding of science by combining scientific knowledge with reasoning and thinking skills.

Underpinned by the decentralisation-paradigm, the content is not described exactly in the curriculum documents. Instead the framework is offered, which has to be "completed" by the individual schools. The competence and instructional materials make up this framework. The structure of identifying the competences and main subject matter or teaching materials offers a usable structure for completing the curriculum component. The pairing of the competences and teaching materials is logical. By considering, for example, one of the standard competences for grade 5 can be found (see Table 5.8).

Table 5.8:
Standard Competences with Associated with Basic Competences and Main Subject Matter for Grade 5

Standard Competence	Basic Competence	Main Subject Matter
Applying the properties of light through modelling	Creating a model of periscope by applying the properties of light.	The properties of light

Providing such a framework is logical when taking into consideration the decentralisation paradigm. In fact, the decentralisation paradigm is practiced in the factual circumstances when "everything" has already been established by the MoNE. In spite of the logical framework that is offered, the author believes that this framework is challenging for teachers and students in a certain area. For instance, the author thinks there is a plausible reason behind the fact that the students in remote school areas are asked to design and develop a model of periscope; but it is difficult for primary school students in remote area.

When recalling that the curriculum is underpinned by a decentralisation paradigm, it can be reasonably well defended that a good balance is found between (1) freedom for decentralised initiatives and (2) offering a framework that ensures uniformity between implemented contents at locations.

5.4.4 Learning Activities and Teacher Role

The learning activities and teacher role in the written curriculum are corresponding to the current trend seen in the educational literature. Based on the international literature, the researcher considers it justifiable to use the term "constructivist" to exemplify the learning activities and teacher role.

The main shortcoming is the somewhat theoretical and clinical discussion of the instructional strategy. It is echoing international literature that learning is closely intertwined with perceptions, preconceptions, and the view of the students. Most educational researchers agree with the statement that each learner is "unique", and therefore teaching and learning process must cater to individual needs of every student. However, based on the extraction of selective documents, it does not offer

practical guidelines for primary school teachers in real classroom situations, with class size ranging between 15 through to 35 students.

The practical directives that are needed by teachers are elaborate and offer descriptions of situations that may take place in an actual classroom. The list of 62 learning experiences that teachers may offer are practical and sound plausible. In addition, the methods for activating students' thinking reflect situations that may happen in real practice and as such offer valuable practical guidance. However, the author considers that the documents are still rather abstract.

By using Table 5.4 for instance, in which a question-answer sequence is presented. It shows an interaction and communication during learning process that could have happened in an actual classroom setting. Through these learning activities, the students are enabled to develop social, cognitive, and emotional skills. However, the author believes that in real classrooms, it is not limited to only two question-answer cycles, but multiple reaction-response cycles. In real practices, many more 'typical question' of students can be encountered.

It is evident from the mere size of the curriculum service documents that effort has been put into writing in these documents. The practical directives in itself are aimed at giving practical guidance. However, the author thinks that the intended written support may be little worth if it is not supplemented with considerable practical guidance as well.

The intention is that the teacher's role is facilitating learning and providing appropriate learning experiences, adapted to the characteristics of every individual student. This is illustrated by the phrase "if the student has not developed a competency, this is not because the student was not able, but more because the student has not experienced the right learning experiences that were relevant for the student's individual character" (Departemen Pendidikan Nasional, 2003b, p.12).

5.4.5 Assessment

The goal of the assessment is to provide a more holistic impression of students – not merely as academic learner but as a person as a whole. It is in line with the educational goals, aims, objectives, and competences. However, as the case with the

learning activities and teacher role, it is difficult to draw precise practical conclusion from it. For a great deal, this is caused by the general nature of the written document that addresses assessment issues; no written document that specifically addresses assessment in primary school science has been found. The fact that the general definitions and exemplary learning activities of the three domains – cognitive, psychomotor, and affective – are rather vague.

The cognitive domain is logically subdivided into its six sub-domains. Although some scholars may object to categorizing "taking part in a discussion" as cognitive (instead of affective), the greater picture is obvious. The same reader may also be sceptical about the practicality of dividing the cognitive domain in the six sub domains. The position that the first three sub-domains – knowing the facts, comprehension, and application – suffice to describe the cognitive domain is a stance that can be defended reasonably well. The general line is however clear: it addresses the pure academic content and as such is not different from the way students were assessed prior to the previous curriculum (i.e., the Competence-Based Curriculum or the KBK, the 1994 curriculum).

The general nature of the domains is illustrated when taking a closer look at the psychomotor domain. Among others, it is stated that it involves skills that include "kinaesthetic intelligence", and can be freely translated as "the skill of learning by moving one's body". Through generally defined, one may imagine practical as a typical activity that is mainly psychomotor in nature. However, few would object when it is stated that exemplary psychomotor activities such as "peeling a mango with a knife" and "playing the piano" offer little practical guidance on how to apply it to primary school in general and to science in primary schools in particular.

The general nature of the defined domains is also clear when looking at the affective domain. The author has difficulty seeing the connection between social and emotional intelligence and "eager to watch something" (see Table 5.7). From the existing document, one would interpret the affective domain as addressing competences as social interaction with one's peers and elders (in line with the overarching competences), although little is found in the exemplary activities.

Despite the vague and general nature of the defined (sub) domain, the principle distinction between the classical grading, practical and other physical activities, and social intelligence offer a framework that can be used in practice for assessment according to the respective dimensions of cognitive, psychomotor, and affective.

5.4.6 A Summary of Intended Curriculum Analysis Results

Many rationale statements can 'fit' the intended rationale. In order for a rationale to be in line with the intended rationale, it should mention God, it should mention living this modern era of globalisation, and it should addresses the students becoming active, flexible, and life-long learners.

The intended content does not make obvious every topic in great depth, and the information is not yet operational. Instead, the intended content confines itself to offering a framework, constituted by competences, and instructional materials. This framework has to be elaborated by the respective schools. This is due to the decentralization-paradigm underlying the intended curriculum. The elaborated content is written down in a 'syllabus'.

The intended instructional strategy is described in a simplified manner by using the degree of teacher control and the degree of embeddedness. The degree of teacher control is low, meaning that teacher should act as 'a facilitator' of the learning process. These learning processes should be adapted to the characteristic of every individual student. The degree of embeddedness should be elevated, meaning that the learning experienced by the primary students should be linkage to their daily-life situations.

The meticulous reading of instructional strategy issues directs to the conclusion that in order to achieve the intended instructional strategy, the availability of learning equipment for hand-on activities should be supplied for every school. The in-service training for the classroom teachers related to how to use the equipment and to design the science learning activities is urgently needed to be carried out in the primary school.

The intended assessment aims at achieving a ‘complete impression of the student as a whole human being’. This is obtained by assessing the students on the bases of three domains: the cognitive, the psychomotor, and the affective domain.

Based on the international educational literature and the personal experience of the author as a teacher educator, two issues are identified: (1) the documents offer little basis for drawing practical conclusions and (2) the documents suggest that practical (in-service) training is limited.

5.5 Summary of the Chapter

Indonesia’s curriculum framework envisions the development of students who are healthy, independent and culturally aware, with good moral conduct and work ethics, are knowledgeable and can master technology, and show a love of their country. The current curriculum therefore was designed to become more diversified to accommodate student, environment, cultural and local differences; provide the national standards for academic and skills achievements as well as for the formation of social/personal values and morals; be flexible and relevant to current changes and future developments; and enhance the participation of schools in educational programs and policy decisions. The content standards cover the scope of materials and level of competency to achieve the outcome competency for different levels and types of education.

CHAPTER 6

THE OPERATIONAL PRIMARY SCHOOL SCIENCE CURRICULUM

6.1 Introduction

The explanations of the intended primary school science curriculum have been given in Chapter 5. This chapter presents the research findings to answer Research Question 2: How is the current intended primary school science curriculum actually implemented? It gives an account of the report on how the teachers actually implemented the currently intended primary school science curriculum. The nature of the proposed research question to be addressed in this chapter required an interpretative research approach. The explanations of the primary science curriculum implementation in the classroom are elaborated in Section 6.2. The explanations are mainly based on the interpretations of the data that came out from a multiple site case study in six primary schools. The chapter concluded in Section 6.3 by presenting a brief summary of the chapter for the case study.

6.2 The Implementation of the Primary School Science Curriculum

A curriculum, no matter how good, will simply remain on paper if it is not implemented properly. This is indicated by research from curriculum studies consistently show that the manner in which curricula are implemented does not always reflect what curriculum designers have in mind (e.g. Smith & Southerland, 2007). The findings from a multi-site case study in this research support the previous studies. In a decentralized educational system such as in the Indonesian school context, teachers referred to the national curriculum or the content standards; however, they perceived and implemented them in different ways. To some extent, the teachers in the schools are the key to the implementation of that curriculum. In this section, an attempt is made to explain the findings about the implementation of the primary school science curriculum described based on the interpretation of data

obtained from classroom observations in three rural and three urban primary schools and interviews.

Since the role and influence of the teachers in curriculum implementation is indisputable, six teachers participated voluntarily in this study; three of them were the specialist science teachers for grade 4, 5 and 6; the other three teachers were the classroom teacher in Grade 5 from rural primary schools. Two classroom observations of each of the six teachers were planned. In practice, only five teachers agreed to be observed twice and one teacher was willing to be observed only once. The latter teacher could only be observed once due to her being offered further study on a degree course before her second observation. Therefore, a total of 11 science lessons taught to each of the chosen class (grade 5) were observed, typically 70 minutes for each science lesson. The six teachers themselves decided the time available for the classroom observations, and each teacher had the autonomy to select whichever class and topic she wanted to teach and felt comfortable when observed. Hence, the six teachers determined the appointments. The only thing asked of them was that the period after the observation was a free period to enable an interview on the lesson observed.

An interview session was held immediately after the in-class observations to facilitate reflection and because the teachers wanted the interviews to be shortly after the lessons that they had taught. Together, these sources of information were intended to allow close analysis of the approaches taken in the lessons, as well as giving an indication of the context of the lesson in terms of teachers' science pedagogical knowledge in implementing the curriculum components.

Prior to commencing to 'elaborate' on the case study schools, it is convenient to arrange this subsection into two parts. First, the status of the observed implemented curriculum components in three urban primary schools is described in section 6.2.1. Second, the status of the observed implemented curriculum components in three urban primary schools is explained in section 6.2.2. The detailed backgrounds of each school and teacher are given at the beginning of each section to provide the contexts of the multi-site case study.

6.2.1 Science Curriculum Implementation in Urban Primary Schools

As mentioned at section 6.2, classroom observations were conducted at three schools in an urban area when three classroom teachers were teaching science lessons. To keep the identity of each school confidential, the case studies have been coded to reveal only their type. The coding is as follows: urban primary schools 1, 2 and 3 have been coded U1, U2, and U3, respectively.

The descriptions of science teaching practices in terms of the implemented selected curriculum components were mined from the classroom observations. In order to describe a science teaching practice, a selected classroom observation is presented in vignette form and this is followed by an interpretive commentary. The selection was based on an intentional consideration so that the teaching practice being observed was distinctive and might be representative of each teacher. The interpretive commentary classified by the observed curriculum components enacted by six classroom primary teachers is supported and elaborated with other data interpretations from the rest of the classroom observations. Finally, the status of the implemented science curriculum components in these primary schools is formulated in Section 6.2.1.5.

6.2.1.1 Settings of Subjects

The Schools

The three urban schools involved in the learning environment survey are situated either in the capital city of the province or its municipality and they are public schools. With the exception of other schools in the similar area, they shared mutual conditions that included a relatively good physical structure, adequate learning and teaching materials and supplies, and relatively rich library book collections. These schools are easy to reach by any transportation modes such as motorcycle, car and public transport. Although the three schools were provided with computers, these facilities are mainly for administrative purposes. Only school U1 has computers for teaching and learning purposes.

School U1 is surrounded by government offices. Due to limited land space for building more classrooms, the school building became two floors. The first floor has been designed for Year 1, 2 and 3 classrooms. The school is the oldest school in

Bengkulu municipality as shown by the number attributed to its name (the 1st of all public primary schools). As this school was promoted to become the "National-Plus school" in 2006, the teaching programs in science, mathematics, social science are delivered bilingually – in Indonesian and English. The school facilities that support the teaching program include a language laboratory, library, computer laboratory, nursing room, canteen, teacher and student toilets, and praying house for Moslem students and teachers. The Laptop and portable LCD equipment is accessible for use in the teaching program. The school has stated clearly its vision and mission which the teachers, the students and parents should know. One of the school's missions is to provide the highest quality education that lays emphasis on the total development of each student: spiritual, moral, intellectual, social, emotional, and physical. The principal explicitly stated that the teachers and principal have committed to have their school become "A second Home for every student by loving, respecting, and valuing each student". The school principal is supported by 29 teachers and 7 administration staff to cater for 404 students who were distributed from Year 1 to Year 6. Approximately, every class is occupied by on average 27 to 32 students. A telephone line has been connected for faster communication with other schools, parents and the office of the Ministry of National Education at the district, provincial and central government levels.

There are a number of schools from lower to upper secondary level located in the area near to **school U2**. As this typical for urban schools situated in Indonesia cities, the land space is a common problem. Because of this condition, the school cannot provide the adequate playground for students during recess time. Since this school was categorized as a "National-Standard School" (in *Bahasa* Indonesia: *Sekolah Standar Nasional*), the school facilities such as library, computer laboratory, canteen, nursing room, teacher's and student's toilets and a science laboratory are well maintained. The school library has adequate book collections yet the reading room space is relatively limited compared to the number of students. In addition, there is a room for stockpiling teaching aids. Nonetheless, the school does not have a sports hall for physical education. The only available area for physical education was a small field in front of the classrooms. The parking area for teachers' and visitors' motorcycles is located nearby this field as well and squeezed into the physical education area. While performing the physical education, students are noisy and the

noise diffused into the classrooms. The principal admitted that the lack of a sport hall and a playing field for students might influence the learning climate. The school is supported by 26 fulltime teachers and 4 school administrators. The principal explained that the school community greatly supported the school vision and mission and was committed to build the school to be excellent in providing education for all students.

School U3 is surrounded by the official offices and housing. Similar to school U1, land space has forced the school to build the classroom into two levels. During the field study, this school was in the process of renovating its building and upgrading the facilities, including Year 5 classrooms and students' toilets. Consequently, the learning and teaching process for Year 5 was conducted from 1.30 PM to 5.30 PM. The library, nursing room, canteen and toilets were well maintained. Resembling the other schools, a *mushola* was established in order that Moslem students and teachers are able to pray in the afternoon. The playground and outdoor arena was located at the centre of the school building; in this area, a flag ceremony was performed every Monday morning. During this occasion, the principal summoned the advice to all students and the announcement or news related to the school's academic activities. The school was looked after by a principal supported by 26 fulltime teachers, three part-time teachers and four school administrators. Two computers were available for administrative purposes. A telephone line has been connected for faster communication with other schools, parents and the office of the Ministry of Education at the National and provincial levels. Two portable LCD were also available for teachers for learning and teaching purposes. School U3 was mandated by the province government to offer a 'Fast-Track' stream (in *Bahasa* Indonesia : *Kelas Akselarasi*) for the high achieving students after following Year 3. The fast-track-class is generally in the form of grade skipping, where the students could complete their study less than the normal time, which then leads into an early graduation and admission to a higher educational level.

The Teachers

Teacher A (TA) of school U1 had 16 years of teaching experience and held a Baccalaureate degree (*S1-Strata 1*) in primary school teaching awarded in 2008. She has participated in teacher training at provincial levels. In 2005, she participated in the SEQIP (Science Education Quality Improvement) project training provided by the Ministry of National Education in collaboration with the German government. Since then, she was appointed as one of the key teacher to organise the KKG (in *Bahasa* Indonesia: *Kelompok Kerja Guru* or Teacher Working Group) for science teaching in the Bengkulu city district. At the time of the field study, she had been teaching science in the school for two years.

Teacher B (TB) has been teaching for 24 years in primary schools. To update her knowledge and skills in teaching, she had attended some workshops on science teaching organised by the LPMP (in *Bahasa* Indonesia: *Lembaga Penjamin Mutu* or Educational Quality Control Institute). She had also upgraded her qualifications by acquiring a Baccalaureate degree (*S1-Strata 1*) in primary school through distance learning at the Open University awarded in 2002, and taken part in the Saturday workshops hosted by the KKG in the school every two months. Teacher B was recommended to the researcher by the school principal as a very cooperative and dedicated practitioner.

Teacher C (TC) of school U3 has 23 years of teaching experience and holds a Master degree (*S2-Strata 2)* in *Bahasa* Indonesian teaching awarded in 2008. Besides, being a classroom teacher in Grade 5A, she also is a specialized teacher for *Bahasa* Indonesia in the fast-track-class. In 2005, she was selected to participate in the SEQIP training for two weeks. In addition, the LPMP also appointed her as an instructor assistant for *Bahasa* Indonesian teaching in teacher workshops.

The Students

The student's population of 96 students involving in this study consisted of 58 females and 38 males. These students come from various socio-economic family backgrounds but the majority were from families with a middle-upper income. Parent's occupations are commonly public servant, such as government officers, teachers and lectures, businessmen or businesswomen, and other skilled white-collar workers. Their socio-cultural background also varies as depicted by the language

spoken at home, with 67% speaking *Bahasa Indonesia*, 17% speaking *Melayu Bengkulu*, 16% speaking other languages as *Bahasa Jawa*, *Minang*, and *Sunda*. Nevertheless, students are fluent and confident in using *Bahasa* Indonesia, the language of instruction in the classroom.

6.2.1.2 Science Teaching in Practice in Urban Primary School 1

General observation

The classroom visited had cupboards, usable whiteboards, a table for the teacher, adequate ventilation, but there was insufficient space available for the teacher to organise different activities or rearrange seating. The poster of Susilo Bambang Yudhoyono and Boediono, the president and vice president of the Republic of Indonesia, were displayed at the front of the classroom wall. This is a standard display in an Indonesian classroom setting. In addition, there were charts on science topics displayed on the wall, showing hydrologic cycle and a concept map of energy. The classroom rules and timetable were also displayed on the wall.

The school day in this school began at round 07h50 in the morning, with assembly and the first lesson began at 08h00. The school had a total of six periods per day, with two periods before recess 1 (15 minutes) followed by two periods before recess 2. The recess 2 was on the average 30 minutes for lunch and prayer time and there were two periods in the afternoon before the school closed at 14h30.

Grade 5B at primary school U1 had a total of 38 students (20 girls and 18 boys). Two students shared a desk except a few cases where a student had their own desk. The students were arranged in four rows with the desk close to each other, there were two rows by the wall on either side of the classroom and there were paths between every row for the teacher to pass through when checking and marking students' work.

The In-class Observation U1 (CO.TA.U1.04.12.09)

As soon as having gained permission from the principal, the observer came promptly to classroom 6A on the second floor to see Teacher A who taught science in grade 6A as well as in grade 5. The teacher and the observer went together to classroom 5B (one of five Year 3 parallel classes) on the same floor with classroom 6A. After introducing the observer to the students and asking them to act as normal, the teacher began a lesson by discussing homework assigned to students in the previous day. She subsequently reviewed materials being learnt during the previous lesson by posing the reviewed questions to the students. It seems that in the introduction session the teacher practiced the interactive questioning strategy, in addition to the reviewed questions on homework, to ensure students'

understanding of the topic delivered previously. Using a PowerPoint presentation, the teacher highlighted the intended learning indicators to the whole class.

Teacher A organised students into groups of four or five and explained the activity that they would perform in the working group. After each student was seated in a group, the teacher invited one of every group member to take the students' worksheet and the magnetic set kit. Using direct teaching through PowerPoint presentation, she explained the objectives, the procedures and questions that guided the students to carry out the hands-on activity. Referring to the curriculum document, this activity can be classified as guided inquiry in which the teacher provides the problem, goals, and procedures while students conduct the inquiry as prescribed in the student worksheet.

The nature of learning activities as instructed in the worksheet called for students to explore a number of dissimilar items to distinguish which item will or will not be attracted to a magnet. Based on the observed evidence, the items had to be categorized in accordance with the item's ability to attach to the magnet. In order to perform this task, every group was provided with ten items made of magnetic or non-magnetic materials, such as paper clips, nails, staples, tin can lids, paper, wood, soda straws, rubber eraser, cooper pennies and corks. To ensure that the group would perform the hands-on activity as expected, the leader had to organise other group members. Hence, the classroom became alive with students in each group negotiating among themselves who would perform the activity and who would record the observed results.

Teacher A moved around the classroom to check and provide the corrective feedback to the groups in performing their tasks. During the first 20 minutes of this session, Teacher A accommodated and facilitated the students' and each groups' needs. It is not possible to depict all transactions that occurred in each group. Nonetheless, the whole spirit of teaching and learning activities can be brought to light. The learning activities facilitated students as both an individual and as a member of a group to be physically (hands-on) and mentally (minds-on) active. The indication of hands-on activities can be approved with students keenly performing their roles in each group, while those of minds-on activities can be verified from students' discussion in a group to determine which objects were made of the magnetic and non-magnetic materials.

The whole classroom observation supported this statement, although a few students were observed to be off-task. The observer captured a scene in which two students of a corner group were enjoying playing with their own game brought from home while the classmate in his group were busy with their tasks. Teacher A was not aware of this instance due to the large size of the classroom and the nature of learning activity. However, Teacher A was alert to off-task students; it was observed that she always gently kept the inattentive students back on task, and encouraged the students to be focused on the learning. *'Please carry on answering all questions as stated on your worksheet; I believe you can make it'*. '*If you carry out this task successful, you can answer the questions on the school exam*'. These sentences that Teacher A often used to keep the students motivated.

Each group had finished the activity and had packed away the magnetic set kits. The teacher led the class discussion and asked two groups to respond to the first question voluntarily. Teacher A used the volunteer group's answers as a point for the third and fourth question. She did not only simply ask for agreement or disagreement of the answers by the rest of the group, instead she asked the other groups to provide explanations of their answers. By means of the result of class discussion, the teacher explained the type of materials attracted to a magnet and introduced the scientific term for the materials. Knowing that the lesson time was almost to be terminated, the teacher deliberately ended the class by summarising the lesson. Finally, following instructing the students to place their chairs in the earlier positions, she gave students an additional assignment to be completed at home.

Interpretative Commentary on the Implemented Curriculum Components

Content

Although the completed syllabus had not yet been finished, Teacher A showed it to the observer after the class was over. In addition to the syllabus, the teacher also showed her lesson plans. When considering a good lesson plan for guiding her teaching, as a priority Teacher A's attention turned to the standard format of a lesson plan published by the BSNP. In considering what the BSNP guideline has to say about a good lesson plan, therefore, a teacher can commence with competences and indicators that are important to be achieved by students, namely, students' learning experiences for the stages of introduction, core activity and closure, subject materials, and assessment procedures. However, the appropriate assessment to identify whether the learning indicators can be achieved or not did not exist in the lesson plans. It seemed that there was confusion how to select and decide the assessment that matches the learning indicators.

Learning Activities and Teacher's Role

Since Teacher A wrote the lesson plan using abbreviated notes, there were inadequate hints to figure out how learning and teaching strategies should be carried out. Conversely, based on the in-class observation, the teacher brought together three overlapping main learning strategies that were cognitive, metacognitive and motivational during the 60-minute lesson. Group discussion between students about their understanding of the magnetic concepts from the result of the hands-on activity was a cognitive strategy for learning but it can categorized as a metacognitive strategy because it involves not just what students understand but how they acquire their understanding. With regard to how the teacher perceived students' difficulties in their learning, she performed her role as 'one of building confidence' in cultivating students' belief in themselves and their own ability to succeed in the task. She used the phrases *'I believe you can make it'* in order to motivate students who began to be off-task.

Teacher A used varied questioning techniques from closed to open question types and from recalling facts to reasoning levels. She tried to involve as many students as possible in the teaching and learning processes. Teacher A's effort to maintain students' involvement was confirmed by giving all students the opportunity to

answer before pointing to a student to respond. Based on the subsequent observations in Teacher A's classroom, it was verified that she consistently maintained this typical teaching strategy.

The teaching and learning activities were concentrated on reviewing the prior lessons to prepare the students to face either the school or the national examination. The pressure experienced by the teacher that was related to the students' success in the examination was inevitable. Examinations in class are administered to record each student's achievement and as a foundation to enable the student to proceed to a higher grade. Owing to this in-class examination system, Teacher A was aware of the importance of examinations in motivating students. She repeatedly used statement as, *'If you carry out this task successful, you can answer the questions on the school exam'*. Being able to succeed in examination and to obtain better examination grades and marks was the extrinsic purpose of learning utilised to encourage her students to learn. Consequently, preparing students to succeed in examinations eclipsed how Teacher A perceived and implemented the intended curriculum. From interviews, she reveals her concern about preparing students for examinations.

> "I did everything to prepare the students in the school examinations. Hoping my effort would pay off in the end of semester". (I.TA.U1.04.12.09)

Materials and resources

Due to lack of electricity power to operate air-conditioning, the door and window are open all time, leading to inference from outside (in particular street noise). In some instances, students had brought in towels to wipe away their sweat.

Assessment

As pointed out from the lesson plan document and classroom observation, it seemed that Teacher A was somewhat unfamiliar with the assessment for learning. Although in the lesson closure stage as mentioned in BSNP guideline, the teacher is required to provide feedback on both the process and the result of learning. Interviews with Teacher A revealed that she is unclear about how to assess the performance of the students. To some extent, Teacher A is struggling for the balance between competence-oriented teaching and test-oriented teaching. Since the aims of learning – cognitive, psychomotor, and affective domain have not been equally reflected in the testing and questions of test mainly are in the form of multiple choices.

Concluding Remarks

Although Teacher A selected and decided whichever the classes and the science topics she wanted to teach and felt comfortable when observed, the influence of the observer as a teacher trainer and a pre-service teacher educator myself were unavoidable for Teacher A to put in the best effort due to the observation. With the aim of keeping away from the bias during data interpretation and to support the assertion being made, the interpretations of a single impression must be considered and verified with those of other observations. Similarly, subsequent observations were used as a base for refuting, revising, and accepting assertions. The criterion for acceptance was a decisive balance of probabilities supporting the assertions. It is pointed out that the following in-class observation confirmed the evidence that Teacher A's teaching practices were consistent.

The characteristics attributed to Teacher A's teaching practices included providing clear learning expectation at the outset of each lesson, the use of proper teaching methods that allowed optimum students' involvement during the lesson, the use of appropriate questioning techniques, and the utilization of effective classroom management skills. However, either school or national examinations emphasis on cognitive domain in science teaching has created lingering false assumption about the purpose of testing, which indicated that it should bring closure to learning and focus on specific terminology rather than on processes or general idea. The pressure and the high-stakes of the national exit examination as one of the decisive requirements for student graduation have made Teacher A place more emphases on remembering the basic facts rather than understanding the underlying concepts and principles of the topics.

6.2.1.3 Science Teaching in Practice in Urban Primary School 2

General observation

The classroom being observed consisted of 19 females and 7 males during the topic of '*Materials can be changed in a variety of ways'*. From the lesson plan, the objectives of this lesson are for the students (a) to be able to identify six factors that caused materials to change; and (b) to describe the changes on the material's properties such as colour, smell, elasticity and stiffness. To achieve the aims, teacher B planned to deliver this topic by using hands-on activity in the science laboratory.

However, the teaching and learning activity was ten minutes behind the schedule because students took time to arrive in the laboratory. Teacher B had informed students to work in groups of three or four prior to coming into the laboratory, and the students at once formed their work groups. Since this classroom observation was the second one, the teacher did not introduce the observer to the students. Most students were greeting with '*Selamat siang Pak*' (good afternoon, Sir) while passing in front of the observer. This welcoming indicated that the observer was not an outsider for them any longer. The teacher informed the class to conduct the science activity by using the materials (candle, cement, sugar and salt, ice). After distributing a worksheet for each group, the teacher explained what they were going to perform in the laboratory during 70 minutes.

The in-Class Observation (CO.TB.U2.23.11.09)

After the observer was seated on the backbench, Teacher B commenced the learning and teaching process by asking a question to stimulate and motivate students. "In what ways can a material be changed?"- She posed the question to the whole class. A few students seated in the front row attempted to respond by looking for the answers in their science textbooks. Nevertheless, most students solely looked to her whilst she wrote the question down on the whiteboard. Then, she mentioned that the question was considered as a problem that needed to seek the student's answers. She continued to explain how and why materials were changed. Some students had paid attention to her explanations but others opened their textbooks and chatted to their classmates.

Teacher B continued the lesson by showing and introducing the materials and the equipment used in the science activities. She reminded students to be cautious in lighting the candles. To ensure performing the activity accurately, one of group demonstrated how the science activity was to be conducted by following the worksheet directions. The class demonstration was unique because one of group member recited loudly the directions as written on the worksheet and other group's member followed the verbal directions to perform the demonstration. Teacher B repeatedly demanded other students to observe how their classmates carried out the activity during the demonstration.

After completing the class demonstration, every group carried on its science activity based on what each member observed during the class demonstration and by following the directions on the worksheets. The teacher walked and observed every group as students performed the activity. Sometimes she answered students' questions, but questions were rare and students seemed to manage fine by themselves. Most students appeared to be involved in their group work and were interested in their tasks**.** Teacher B directed and frequently reminded students to answer all questions in the worksheets based on the evidence found in the activity. However, most students looked for the answers from their science textbooks.

During the last 15 minutes of the lesson, the representative from each group was required to present their findings and conclusion and others had to pay attention to the class presentation. After presenting students' results, the teacher dismissed the class although students had not yet finished their task. Before leaving the classroom, the students were instructed to finish their task for homework.

Interpretative Commentary on the Implemented Curriculum Components

Content

Teacher B adopted the syllabus provided by the commercial publisher because most publishers commonly published science textbooks including the syllabus and lesson plans. For practical reasons, the teacher's decision to utilize a ready-to-use syllabus document is acceptable; however, the aims of curriculum reform to provide the opportunity for schools to develop their own syllabus based on local resources and students' abilities could not be implemented in this class.

Learning Activities and Teacher's Role

To some extent, the teacher's intention to provide the hands-on activity safely and easily to perform for Grade 5 was understandable. However, carrying out hands-on activity in certain conditions, such as the availability of time allocation, is important to be considered cautiously. Although the lesson was well designed, teacher B faced the problems in managing students' activity effectively in terms of the time allocation. Teacher B's choice to utilize student's demonstration prior to group activity is reasonable if time allocation is sufficient. Therefore, time constraints commonly are one of the factors hindering many primary school teachers to embrace and perform inquiry-based activities in the classroom. Besides taking longer time to prepare the lesson, teachers also need to spend the time allocation effectively during the activity. Teacher B gives a comment regarding the use of inquiry-based activity in her classroom.

> When I teach science with inquiry-based activity, the allocation of time 35 minutes is the major challenge for me in designing and implementing the lesson plans. (I.TB.U2.23.11.09)

Embracing the inquiry-based teaching approach in primary schools is challenging for in-service teachers. Based on what have been observed during the 70 minutes lesson, Teacher B made an effort to adopt the hands-on science in her science class. Various teaching strategies were employed to ensure that students were engaged in their learning and activated their interest with real phenomena through manipulative objects. However, as reported by extensive research in teaching science in schools, one challenge for many primary teachers is a lack of previous experience with hands-on science. Related to the in-class observation, the limited teacher's experience with hands-on science may have influenced students' engagement in this learning task.

When connecting the science content with students' interest and personal experiences via the open-ended question '*In what ways a material can be changed*?', for example, Teacher B utilized the effective technique in science teaching. Unfortunately, at *this introduction stage*, the uses of "probing question" and 'wait time' have not been optimised for knowing students' prior knowledge about the science content. At the beginning of the *main activity stage*, the teacher's existing knowledge about teaching science might be different from the view of inquiry-based teaching approach. By using an explanatory teaching strategy, Teacher B deliberately explained a number of causes making a material change and the properties of a material changed. The knowledge of how material can change and how their properties were transformed ought to be constructed actively by individual students during their interactions with the concrete objects and with their peers. Nevertheless, hands-on activities performed by students in group work were intended to confirm her explanations and students' learning activities were aimed at strengthening the teacher explanations.

Materials and Resources

During the classroom observation, the observer noticed that students owned a science textbook. In this school, every student was required to own and take the textbook to the science class. However, students who did not bring the book to the class can borrow one from the school library. A number of science kits are available in science laboratory. Each kit was aligned to outcomes in the curriculum and provided a complete set of materials and guidelines for classroom use. However, some kits were not operating properly because of lack of maintenance. Adopting the inquiry-based teaching approach was a critical decision by Teacher B. In addition to being time consuming to design the activity, Teacher B felt challenged to acquire the resources needed to create the kind of science learning environments she considered appropriate. When she was able to find resources, she was challenged when asked to set up the equipment in ways accessible to the students.

Assessment

According to the curriculum guidelines published by the Ministry of National Education (MoNE), the assessment of students' learning included cognitive, psychomotor and affective domains. From this perspective, a teacher has to assess

students' performances during the science learning process. This demand becomes a big challenge for primary school teachers. Although aspects of students' performances were written explicitly on the teacher-made lesson plan, Teacher B was not able to fully assess the students' performance.

During the interview (I.TB.U2.24.11.09), Teacher B explained that she was not sure how to assess the performance of her students, specifically in psychomotor and affective domains. The cognitive domain is addressed via the written tests and a numerical scale is utilized to indicate students' performance. However, she confronted the difficulties when assessing the students' performance on the psychomotor and affective domains. She revealed that the psychomotor domain is addressed through the results of a hands-on activity (such as filling the working sheet). The affective domain is determined based on the extent to which the student works together with the others and the diligence of the student during the activity, among others. Nevertheless, apart from the uncertainty of measuring student's performance, she mentioned that the two last domains did not contribute to determine whether or not a student can advance to the next school-grade.

Concluding Remarks

The researcher was conscious that Teacher B might have given her best attempt in delivering the teaching practice due to the classroom observation. However, the subsequent classroom observation confirmed the evidence that her teaching practices were consistent as in the first observation. Using the classroom observation data, therefore, a list of assertions that portray how Teacher B performed her science teaching in the classroom are suggested as follows. First, Teacher B has made an attempt in her science teaching class to perform student-centred approach. Second, Teacher B utilized various science teaching approaches and strategies. These ranged from a conceptual approach with demonstration to inquiry-based approach with hands-on activity and group discussion. Third, Teacher B tried to keep her students active, both minds-on and hands-on, as much as possible.

6.2.1.4 Science Teaching in Practice in Urban Primary School 3

General Observation

The following is a description of the classroom observations of Teacher C using group work in delivering the lesson topic on '*Materials and their purposes*' in the

syllabus document. Classroom observations were conducted twice during the year in the second semester of the 2009 academic year. Observations lasted for one class period and were of a science lesson as defined by Teacher C. Due to the renovation of school buildings including the classroom for grade 5, the class begun at 13.10. When all students were seated, Teacher C introduced the observer, the purpose of his visit, and she commenced the 55 minutes lesson delivered during that was observed. The students' responses were positive; some students waived their hands to the observer while others greeted the observer verbally. During the lesson, the researcher tried to be as unobtrusive as possible and was seated at the back of the room, note-taking with paper and pencil. The observation notes were narrative descriptions of the lesson, as the observer concentrated at this stage on compiling neutral accounts of what took place.

The In-class Observation (CO.TC.U3.01.12.09)

The teacher started the lesson by asking the question: "who do not attend the class today?" Following the students' responses, the teacher reviewed materials being learnt in the previous lesson by posing the questions: "Who can tell us what we learnt in the previous class?" Some students raised their hands so enthusiastically and looked forward to answering the question. After two students expressed their answers, dealing with "materials and their compositions", Teacher C reviewed the prior lesson and linked it to the present lesson. She continued the lesson by writing down the topics of the lesson on the white board. The teacher maximised the questioning technique to develop interest and motivate students in becoming actively involved in the lesson. By pointing at a number of objects around the class, for example, benches and chairs, she raised questions "can you identify what are the similarities and differences between a bench and chair?" After reinforcing student's answers, she finished the introduction section by emphasising the learning aims that students should achieve and the activity they would perform. Students felt exciting and said: 'Yes' (in a chorus), as soon as Teacher C informed that they had to work together in groups to identify objects and their compositions, as well as their usage in daily life.

Teacher C organised students into group of four and each group work was assigned to the name of objects around the class. It took 5 minutes to have students sit in groups at desks pushed together to make a square. Before students started working in groups, the teacher invited students to formulate 'thumb rules" that they had to obey: (a) raise hand – when students need teacher's help; (b) silence – when students raise their hands, they bring their conversation to a close; (c) attention to the class presentation – students stop whatever they are doing, look at, and listen to the presenter. In addition, each group member was required to assign a role i.e., encourager, recorder, presenter, and timekeeper.

After the teacher explained that each student's task was to identify objects and their usage in daily life that found in class or their own homes. Teacher C wrote a table down on the white board and instructed the recorder to duplicate it on a piece of paper. The table consisted of three columns, that is, the name of objects in the first column, the objects made from in the second column, and their usages in the third column.

Teacher C moved around in an attempt to monitor groups. The teacher attempted to encourage each group member to be responsible for participating and learning. With

encouragement the students engaged actively in exchanging information, discussing ideas, and making decision. Even though teachers tried to organize every group, for a while the loss of control and off-task behaviour could not be avoided. During the activity, one student took no part whatsoever in the discussion. He sat there rocking back and forward on two legs of his chair – unless the teacher was present or was looking his direction. He did not appear to speak during the whole three-quarters of an hour of the lesson. Six minutes before the presentation session, Teacher C reminded students to work effectively. The groups that did completely all tasks were asked to submit their works to teacher.

It was five minutes away from 14.05, when the teacher called for class discussion. After all groups submitted their work to the teacher, students asked a group voluntarily to present their work in front of their classmate. Because no group was willing to be the first presenter, the teacher dominated the '*Meja*' group to present their work verbally and demanded other groups to respond to this presentation. The teacher did not only simply ask for agreement or disagreement of the answer by the rest of group, instead she clarified to students' work and reinforced the students' opinions. Knowing that the lesson time was almost finished, Teacher C deliberately ended the lesson by requiring students' to learn at home the topic of 'changing materials' for the next lesson.

Content

The teacher showed the completed syllabus for Year 5 but the lesson plan was not yet finished. As indicated in the process standard document published by the BSNP, the teacher was obliged to design the lesson plan completely and systematically to achieve the competency standards. Even though the lesson topic was not stated in the content standard document, according to Teacher C's past teaching assignments, the topic needed to be taught to students. According to the teacher's construal of basic competency (4.2), the lesson topic of 'materials and their usage in daily life' was the link to this basic competence (4.2). In this case, Teacher C adapted the content of the curriculum in ways that she thought was the most appropriate for each specific teaching aim and situation.

Learning Activities and Teacher's Role

Since the renovation of school building was being undertaken, the decrease of lesson time from 70 to 55 minutes became a challenge for Teacher C. Although this unexpected condition did not reduce the teacher's enthusiasm in delivering the lesson, she strived to have every aspect of her lesson prepared and timed. The importance of lesson time management for Teacher C should be taken into consideration because students will take advantage of that, start playing, and the teacher will lose control of the class. Being aware of this shortcoming, Teacher C established good classroom management using the beginning activity to help her prepare students to behave appropriately in groups. It is demanding to maintain primary students 'on-task behaviour' while sitting and working in groups. However,

the "thumb rule' established can create the productive learning environment, although in many occasions Teacher C repeatedly reminded the students on the learning task.

Taking into account the potential obstacles in classroom management, regardless of no specific cooperative learning structure used, such as Listen-Think-Pair-Share, it was a reasonably good lesson on cooperative learning; and the students appeared to be enthusiastic about the tasks. However, it was observed while students appeared to sit in heterogeneous groups of four, the work were done by one or two dominant students in most of the groups. Then the similar dominant students from each group went out to the front of the class to present their results. In addition, due to lack of effective time management, the teacher appeared to be running short of time and was in a hurry to wrap up the lesson. The result was that there was inadequate probing of the students' answers that were presented during oral presentation by small group.

Even though cooperative learning in the classroom – a theoretically grounded and well-researched approach in education – brings about positive effects on cognitive and affective learning, Teacher C considered the adoption of this learning method is challenging. She states that:

> I know cooperative learning technique is recommended by the KTSP guidelines, but until know I consider carefully to use it due to the managerial classroom problems such as the loss of control; increased disruption and off-task behaviour; beliefs that students are unable to learn from one another; and beliefs that assessing students when working in interactive group is problematic. (I.TC.U3. 01.12.09)

Materials and Resources

Not similar to school B, this school did not own a particular room to be used for science learning activities. Conversely, the school provided a room to keep the science kits and other teaching media. Each student was required to have a science book recommended by the teacher. When, Teacher C instructed student to open their science textbook, students took their books from their bags. It was indicated that all students owned their textbook.

Assessment

According to the national assessment standards (Ministry of National Education, 2003), assessment is defined as the process of gathering and interpreting information

to determine the achievement of students' learning. This definition indicates the central purpose of assessment is to provide information on *student achievement*. Assessment of learning looks at a student's level of performance on a specific task or at the end of a unit of teaching and learning. The information gained in this way is used mostly for reporting, namely, classroom assessment, grade promotion and school leaving examination. Practicing this kind of assessment, Teacher C thinks it is not very feasible to assess completely according to the three domains. According to Teacher C, with so many students, it is unrealistic to presume that a full and valid impression of the students as a whole is created. The cognitive domain is graded using a numerical value. For the affective and psychomotor assessment, a qualitative scale is used. The paper-pencil test dominantly was utilised in the assessment of student learning with items which are normally multiple-choice, matching, or true-false format.

Concluding Remarks

To some extent, Teacher C's teaching strategy dealing with the shortage of lesson time impressed the researcher. During the 55 minute science learning due to school renovation, managing 38 primary students in a crowded classroom and performing a cooperative learning as a teaching method are not easy tasks. Nonetheless, teacher C was well organised and was effectively performing her teaching. In a smooth manner, she broke down her teaching into three segments: introduction, main activity and closure as described in the process standard published by the National Education Standard Body (in *Bahasa* Indonesia: Badan Standar Nasional Pendidikan). The clear and understandable explanation that Teacher C provided on the main activity indicated her strong content knowledge, while effective classroom management designated her pedagogical skills. The researcher was aware that Teacher C might have given her best effort in delivering the teaching practices due to the classroom observation. However, her 26 years of teaching experience provided her with the confidence to teach science; the next classroom observations confirmed the evidence that her teaching science practices were consistent with the previous observations. Based on the classroom observation data, therefore, the assertions that present the characteristics of Teacher C's teaching practices are offered as follows. First, Teacher C used a distinctive technique in managing students working in small groups. Second, Teacher C maintained an intended teaching structure that consisted

of introduction, main activity and closure. Third, Teacher C managed her classroom affectively by minimising students' disruptions and keeping students on task.

6.2.1.5 Status of Teaching Science in Urban Primary Schools

Based on the data analysis that emerged from the practices of a small number of teachers during several observations in three urban primary schools, the findings of this case study are presented below in terms of four assertions. First, the assertion on the general status of implementing content in terms of the syllabus and lesson plans in urban primary schools is explained. Second, the characteristics of learning activities and the teacher's roles during science teaching practices in urban primary schools are described. These included the use of various teaching approaches and methods, the use of a defined teaching structure, having a clear expectation of students' outcomes and the establishment of good classroom management. Third, the availability of materials and resources supported the science teaching practice in urban school is described. Finally, assertions on factors that become obstacles for the assessment of students' performance in urban schools are presented.

Assertion 1. The three teachers in urban primary schools implemented the curriculum in terms of the syllabus and lesson plans.

Basically the syllabus consists of minimal content that needs to be learned by all students so as to achieve instructional aims. However, since classroom teachers were given the opportunity to add more topics in their programmes, it was possible for them to give advanced topics to the students in the class. Drawing from the visits to three schools, and a sequence of prolonged classroom observations in three case study schools, it is indicated that teacher's perspectives on the national curriculum, particularly on the syllabus, were still in the level of 'adoption'. During the interview session, the teachers revealed that they prefer to use a syllabus provided by the BSNP or the commercial publisher. As stated by Teacher B, the preference for using the syllabus model provided by the commercial publisher was pragmatic. According to Teacher B's view, the use of syllabus is more suited for administrative purposes rather than guidelines for teaching. However, Teachers A and C admitted that they adopted the syllabus model published by the BSNP. Both teachers agreed that the provision of the syllabus in their classroom was not only for the fulfilment of administrative requirements but also for the guidelines in developing lesson plans.

Assertion 2. In terms of learning activities and the teacher's role, generally, science-teaching practices in urban primary schools are aligned with the requirement as prescribed in the process standard document.

For the instructional practice the curriculum guidelines suggest that the teachers have to choose and use the strategies that involve students in active learning, mentally, physically and socially. Based on the classroom observations, this study found that to some extent science instruction in three urban primary schools are in line with the suggestions provided in the curriculum document. The three teachers have used various teaching methods and approaches, used appropriate questioning techniques, and applied a standardised teaching structure. Both Teachers A and C employed a range of teaching strategies such as experiment, group discussion, demonstration and direct teaching. Both teachers attempted to minimize the use of traditional chalk-and-talk methods. However, due to the limited time allocation, the students of Teacher B could not carry out the hands-on activity according to the worksheet.

Drawing from the impression of two periods of classroom observations, each teacher's personal belief system leads her to prefer certain classroom management approaches. A teacher who believes in the students' right to influence the decision-making in the class might consider implementing a democratic classroom management approach. Teachers B and C, for instance, gave self-determination to students to perform their learning activities without much overruling from the teachers while the students were nosy or were moving around the room to pass things to their peers. Conversely, Teacher A preferred a strictly structured approach where learning by practising and correcting mistakes is the main strategy because she believed that behaviourism is the best way to learn. Evidence from the lessons based on the classroom observation are in the similar vein to the results of many educational studies that affirmed the notion that teachers' belief system has an impact on the their pedagogical decisions and classroom practices (Pajares, 1992; Philipp, 2007)

Assertion 3. To some extent, generally, the availability of materials and resources has been optimised in distinctive ways for supporting the practical activities in three urban primary schools.

Although, the material and resource in their schools was easier to access, the teachers in the three urban primary schools designed and practiced the practical activities

based on equipment and materials, which are simple and familiar to the students. Teacher C, for example, used the familiar objects found in the classroom. One of the most important decisions faced by teachers is how to select instructional materials and resources that ensure learning success or enhance instruction. When selecting instructional materials, teachers should base their decisions to the learning outcomes rather than on the basis of availability or ease of use. In line with this view, a teacher selected and used the instructional resources that helped students achieve the learning goals.

Assertion 4. To some degree, the science-teaching practice in urban primary schools is influenced by the school assessment system.

The content standards indicated clearly that the assessment system for assessing student's performance must be embedded within the everyday science activity. However, the educational system emphasizes in-class examinations to assess students' academic achievement. This substantial ambiguity caused teachers in the three case study schools to make the great effort to maintain equilibrium between competence-oriented teaching and test-oriented teaching. The questions in tests most frequently used are multiple choice questions; few questions require a written essay.

Extracting from the classroom observations of Teacher C's teaching practices, the content of teacher discourses is associated intentionally to the examination. The interviews with Teachers A and C indicated that the current assessment system adopted by the schools predominantly hinder them to perform inquiry-based instruction. Because of in-class examination system, which tests students' memorisation of particular topics in lessons, both teachers are trapped into employing a classroom pedagogy that highlights students' memorisation skills for success in the examinations. The system of examination has apparently some potential to effect teachers' choice of content and ways of teaching. It was obvious that to some degree the science-teaching practices in these case study schools were examination driven. The assessment system emphasis in-class examination to assess student academic achievement may have influenced the three teachers in delivering their teaching, although the degree of influence varied.

6.2.2 Science curriculum implementation in rural schools

The subjects of the multi-site case study that represented rural schools in this research comprise three schools, as mentioned in section 6.2. The identity of each school was kept confidential and the case studies used pseudonyms to reveal only their type. The coding is a follows; rural primary school 1, 2 and 3 have been coded R1, R2 and R3, respectively. These schools with teacher appointed by school principals are the R1 with Teacher D, the R2 with teacher E and the R3 with Teacher F. Before the status of the science curriculum being implemented in these schools is presented in Section 6.2.2.5, an overview of the subjects' setting is presented in section 6.2.2.1. The interpretive commentary on the implementation of selected curriculum components in school R1, R2 and R3 are explained in the next three sections, respectively. The interpretive commentary presented in each vignette was deliberately selected so that it presents the typical implementation of curriculum component in related schools.

6.2.2.1. Settings of the Subjects

The following paragraphs described the backgrounds of the subjects in this study that include general information of the school setting, the teachers and the students. Further specific information of the school environment is embedded in each vignette that portrays typical science-teaching practices in each school where the case study was conducted.

The Schools

Three rural primary schools participating in this study were from two districts, namely, Bengkulu municipal and Bengkulu Utara regency. Most schools are located in villages that have various modes of transportation. On average, each school in a rural area has relatively small class size with 15 to 25 students per class. This class size is much less than that of urban schools that has more than 30 students per class. One of the greatest advantages of a smaller class size is that it is generally more manageable for teachers. Nevertheless, the three schools were all government funded and share common conditions such as limited teaching aids, lack of textbooks and extra reading materials, and relatively needy physical environments. Around 75% of the teachers in these schools lived in the town or the capital city, and commute, coming to the schools five days a week from Monday to Saturday.

School R1 is located in a recently developed settlement. The first impression when visiting this school is the tranquillity and serenity provided by the nature in which green and shady trees surround the school building. Neither the canteen nor nursing room were sufficient to serve the school community better. The canteen was so small, and the nursing room was not equipped with the necessary first aid kits. The school was run by the female principal who lives in the town with the support of ten full time teachers, four contract-teachers, and a school janitor. A computer has been installed for administrative purposes. On the walls of the principal office, there were posters listing student's enrolments, timetable, school plan, and calendar. The records of student's attendance and attainment levels also were displayed in the teacher room. Although a telephone line has been connected to schools, the school could not operate it anymore due to the limited school's fund to pay the phone bill. The school did not have a library building and lacked teaching materials. According to the principal's explanation, the damage caused by the flood in 2006 ruined almost all textbooks and teaching materials in this school. To date, during the wet season, the school yards were still immersed by water. The students and the teachers considered this condition both inconvenient and unhealthy.

School R2 is under the administration of Bengkulu Utara regency. Although the location of school R2 is close to Bengkulu municipality, its location is considered as rural. The school provided a room for the library and the nursing room was previously used as a classroom. The number of books is inadequate for students in the school. A computer was installed for administrative purposes, but no telephone line was connected to the school. There was no electricity supply in the classroom and piped water was unavailable. The school was run by a soon-to-be-retired female principal who was supported by eight fulltime teachers and one fulltime administrators, as well as one school janitor.

School R3 is located at a strategic area because the school building is close to the main road. As a new school that was built in 1994, it has fairly good and adequate facilities that include a library and nursing room. The school administration is equipped with two computers and a telephone line has been installed. The library was well maintained although the number of books in the library collection was relatively limited. The school vision that emphasises the importance of students'

success in the national examination is displayed in the main entrance. On the school walls, there has been displayed a motto: 'Knowledge is power'. Two school administrators and 12 fulltime teachers supported the principal in operating the school.

The Teachers

Three rural primary school teachers in Year 5 who agreed to be involved in this study are the classroom teachers. The teachers had been selected to participate in the research by the principals of the schools due to their decision that they were the only fifth-grade teachers who would not be disturbed by the researcher's presence in their classrooms. On average, their teaching experience in primary school was from 15 to 20 years. During their teaching job in the rural primary school, they have the common features in experience, namely, the limited opportunity for participating in professional development programs provided by the central or local government. Interviews with teachers revealed that (a) they need more training and support in order to update their professional knowledge and (b) it is highly important for provision of teaching-learning materials that are deficient in the schools. They quoted training in new teaching method as important areas and ones in which they would like to go for training now. Furthermore, training in making and using simple teaching aids was thought to be important. Having less access to support services and fewer opportunities to attend in-service courses, one teacher wanted to move to an urban school; however, the other teachers enjoyed teaching in the rural primary schools.

Teacher D has 19 years teaching experience and holds a Baccalaureate degree (S1-Strata 1) from the Open University. The only professional development programmes that teacher D has participated in are *Kelompok Kerja Guru* (KKG) – a forum for strengthening teacher practices at the district level. The teacher lived in a different location, half an hour by motorcycle from the school.

Teacher E has 16 years teaching experience in primary schools. Before she moved to school R5, she had taught in a remote area school in Bengkulu regency. She held a Diploma II Certificate but she planned to continue her study to obtain a Baccalaureate degree (S1-Strata 1). She has expressed concerns about the classroom facilities, the school resources, and the opportunity for further education. The last

professional development programmes in which she participated in 2006 was KKG at district level yet the program did not run any more due to the lack of funds and the head teacher for science had moved to a school in the Bengkulu municipality.

Teacher F of school R3 has 20 years teaching experience, mostly in remote area and rural schools. She holds a Diploma II certificate and recently she has taken examination from the Open University to obtain her Baccalaureate degree (*S1-Strata 1*). In this school, there are two parallel classes in Year 5. The principal recommended the teacher F teaching in the Year 5A classroom.

During the 2009-2010 school years, the majority of students came from middle-low socio-economic family backgrounds where their parents' occupations are traditional farmers and other unskilled labour workers. Students' socio-cultural background also varies as depicted by the language spoken at home, with 75,8% speaking *Bahasa Melayu Bengkulu* and 24,2% speaking *Bahasa Jawa*. The rural students appeared to be quite homogenous in term of socio-economic and socio-cultural background compared to the urban students.

6.2.2.2 Science Teaching Practice in Rural Primary School 1

In this subsection, the field study report consists of general observations, the classroom observations, and interpretative commentary and assertions. This subsequent vignette was written immediately following the in-classroom observation in *Bahasa* Indonesia and then it was translated into English. It was written to picture the learning activities and the teacher roles with an account of what the observer had seen.

General Observation

Grade 5A at primary school R1 had 24 students (11 girls and 13 boys). All of the students were wearing school uniforms, and the majority looked clean and healthy. The classroom is well equipped, with enough wooden desks and chairs for every student. Supported by the small class size, the teacher could set up student's desks to be in a roundtable-style. The walls of the classroom were covered with various teaching aids such as the circulatory system, a poster of the earth and planets.

The In-class Observation (CO.TD.R1.31.09)

After performing the praying led by a student and greetings to Teacher D, the lesson was started by the teacher raising a question to all students to know who was not attending the class that day. "Everybody was in the class *Bu*" the students answer in chorus. Knowing some students were not ready to learn, Teacher D posed the question, "Are you ready to study science now, guys". With holding the cactus plant within a pot on her right hand, she invited the students to look carefully at the plant and she posed the questions to the whole class "what is the name of this plant?" In addition, she continued asking another question, "What are the specific features of its leaves?" After a student sitting in front of the row answered the teacher's questions, she instructed the students to open their science textbooks. Some students opened the textbooks; others talked with their classmates and looked at the teacher. Teacher D continued the lesson by posing the question: "Why is the shape of cactus leaves like spines?" The similar student who had responded the previous question gave the answer: "to protect themselves from its enemies". In spite of replying to students' answers, she wrote down "Plants' adaptations" as the topics of lesson on the whiteboard.

After forming students into five working groups and distributing the worksheet to all groups, Teacher D called for students to examine the pictures on the worksheet. She explained how to carry out the task and ordered every group reply all questions on their worksheet. During the time that the students worked in groups, the teacher visited one group after another. Most students were working on the tasks yet few students were off-task. Frequently she requested students to work in groups and called the students' names that are not on-task. Generally, the girls were more active than boys. Some boys were off task, talking, bothering each other, walking around and going out of the classroom.

Although two groups did not finish their task, the teacher requested every group to stop their working and present the results in front of the class. After finishing reading their results, she demanded other groups to give their responses on the presentation. Teacher D led the class to make the conclusion by repeatedly encouraging students to participate in formulating the conclusion.

Interpretive Commentary on the Implemented Curriculum Components

Content

The observer has seen no syllabus. Teacher D, however, said that syllabuses were in rough copy. Teacher D knew that the syllabus is a requirement for teaching. However, because of teaching the similar topic for many years and by using her teaching experiences she was able to carry out the lesson without the syllabus and lesson plan. Additionally the use of the textbooks that purposely approved by the MoNE guided her teaching practice. Based on those assumptions, there was no reason to believe that she did not adhere to the intended contents. Teacher D considered that her teaching was designed by taking into account the science learning activities provided in the science textbooks. During an informal conversation with Teacher D, she expressed a preference for following a set lesson, as in the science textbooks, because she did not feel competent and confident enough to develop her own activities (Field Note, 31.09.09). To some degree, Teacher D's daily instruction

is dictated by the sequence of activities described in the student textbooks or the teacher's guide.

Learning Activities and Teacher Role

The intention of presenting this vignette of teacher D's classroom was the teaching method used by the teacher and the observed classroom interaction. Two in-class observations were made. In two lessons, teacher D tried to provide and enhance student's learning experiences by using a variety of teaching methods such as demonstration, classroom questioning, and small group discussion to solve problems. Looking meticulously at the structure of Teacher D's actual classroom interaction during the 70 minute lesson, she demonstrated three structures of interactions; teacher to students; students to students; and students and the teacher.

Teacher D's attempts to engage students actively in the lesson via classroom questions was the appropriate decision because questioning is one of the most popular modes of teaching (Brophy, 2010). Extracting from three structures of interaction, however, Teacher D raised questions yet most of these were mainly low-level cognitive questions. High-level cognitive questions to check on the conceptual understanding were only occasionally used. When a student, for example, provided the answer about "how does the cactus make adaptations", Teacher D raised a question related to why cactus has spines rather than leaves.

Although the questions were designed to match the content of the lesson, Teacher D did not provide students with much time to process the questions and formulate the questions. Using wait time allows students to establish a certain level of comfort in the classroom and encourages them to voice their personal opinions more freely (Rowe, 1986; Tobin, 1987). To some degree, Teacher D's fifth-grade class did not implement effective questioning techniques to increase class participation; she mainly relied on convergent questions which did not result in high level of participation.

While the teacher directed the interaction, it seems that the students lacked motivation and interest in what the teacher was discussing. Though Teacher D commenced the lesson by showing an authentic object and following a series of the questions to generate student responses and interest, this strategy was unsuccessful to

attract student's attention to the lesson. This was frequently since the teacher lacked the appropriate questioning skills to actively engage students' interest in the material. Some students, during student-to-student interaction were involved actively in small groups on tasks that required interaction; they tackled learning activities, in particular solving the problems in the worksheets. Teacher D expected students to answer the questions according to the evidences and conclusions from students' learning activity. Nevertheless, most students did not succeed to formulate explanations for answering the questions based on the evidence on the observed phenomena. Few students in answering the questions used their findings and conclusions.

Interactions reflected collaborative working relationship among students (e.g., students working together, talked with each other about the lesson), and between the teacher and students. Nevertheless, Teacher D apparently did not maximise the use of student observations to develop specific idea and did not provide enough guidance for interpreting the evidence that addressed the investigated questions. This strategy use of students' observations and discussions had characterized teacher D's handling of the plant adaptations.

Materials and Resources

Some students did not have science textbooks. To overcome this difficulty, Teacher D requested students to copy the book. The shortage of students' books was due to the 2006 flood that ruined many books and teaching aids. While taking the field notes, the schools were waiting for the new books to replace the damaged books caused by flood.

Assessment

Even if the curriculum provided guidance how to assess student's performance in science learning, that is, conceptual and procedural knowledge, the teacher preferred to assess the conceptual knowledge through paper-pencil tests. She mentioned that the guidelines did not give the clearly practical explanations how to assess the performances of students in the procedural knowledge. Although the KTSP demanded teachers to use less emphasis on assessing students for factual knowledge at the end of the unit, the system of examination has some potential to affect teacher's choices of content and ways of teaching. As a result, most of the written

tests held for the mid and final semester were designed by the teacher to assess the students' conceptual knowledge.

6.2.2.3 Science Teaching Practice in Rural Primary School 2

General Observation

The school begun at 7.30 a.m. but the observer arrived in the school ten minutes prior to the lesson commencement. Teacher E escorted the observer to see the principal in order to have the permission from her. While waiting for the lesson to start, the teacher explained that only two students from 26 students in the class have high achievement and others had average and low achievements; as well two students were retained in Year 5. In addition to students' achievement, the teacher mentioned that the absence of teaching aids is the source of greatest concerns for her science teaching. The classroom walls were completely bare. The teacher acknowledged that she could make teaching aids if paper, pens, magic markers and coloured pencil were available, but due to lack of funds, this was not possible. Sometimes the teacher did bring in material locally available or asked students to provide them.

The In-class Observation (CO.TE.R2.06.10.09)

As soon as the bell was rung, students immediately entered the classroom. Without any instruction from the teacher, a student led a prayer and gave a greeting to the teacher. After greeting each other, Teacher E was engaged in completing the attendance register by calling the students' names. She begun the lesson by reviewing the concepts learnt in a previous class and she tried to link them with the present topic. The teacher stated that the topic of today lesson was "characteristic of plants" and then wrote down the topic on the whiteboard. She posed the following question to explore the student's prior knowledge about the topic: "*Who can tell me what the characteristics of plants are*?". A student tried to response to the question: "*a plant does respiration, Bu (or Madam)*". The student's respond was followed by addressing the investigating question to the whole class. *"Does anybody want to explain that the plants do the respiration in the similar way with human being?* After waiting for students to respond for a few seconds, none could provide the answer. Teacher E instructed the students to open their science books and to read pages 60-62. Following the reading activity, she explained how the students performed the learning activity in the groups. She grouped the students as usual into groups of four, so that there were six groups. By using the worksheets, the student's task in groups was to discuss and find out how certain plants adapt to their habitat.

Teacher E asked the students to have a look at the plant's pictures on the worksheet and gave them about 10-15 minutes to discuss with their peers in the group. During the discussion, students firstly looked at the pictures and found the information of adaptation related to the plant's picture from the textbook they have to share, followed by the shared meaning in the group. From the teacher's desk, she observed and encouraged students to engage every group member actively in their tasks. She used the following phrase to promote students to work

actively: "*Come on guys, give your contribution to your groups*". For the certain occasion, she moved around only to assist students as needed. Five minutes before the small group discussion was terminated, the teacher reminded students concentrated more on their tasks. The groups finishing their task showed their work to the teacher to have feedback. To perform teacher-led discussions, the leader of each group was invited to present their results in front of the class, started with the first group related to picture number 1 (cactus). Because there were six plants' pictures, every group representative has the opportunities to explain their results and get feedback from their peers. Ten minutes before the lesson ended, the teacher summarized the results of class discussion and resumed by giving students homework with more exercises in the science textbook.

Interpretative Commentary on the Implemented Curriculum Components

Content

As is well known, textbooks are one of the most important teaching aids used in teaching science in schools. It seemed that Teacher E might adopt this point of view. Many in-service teachers believed that a combination of teaching experience and textbooks can give them confidence to deliver the intended curriculum. Consequently, the notion that lesson plans are vital in teaching was not evident for Teacher E. She likely assumed that lesson plans were only as a document. As indicated by observations made during this time from the field notes, most teachers in the school simply walked into a classroom with textbooks and taught from textbooks. By sticking to the textbooks, the lesson can be carried out and this approach had been done for many years. This confirmed with the result of the second observation. After the classroom observation, Teacher E directed the researcher to the teacher room to show her lesson plan. However, the layout of the lesson plans did not follow the curriculum guidelines published by the BSNP.

Learning Activities and Teacher's Roles

The teaching was about the plant's adaptation in their environment. Teacher E utilized the combination of small and whole group discussion as teaching method. With regard to this method, the teacher played her roles to be good manager and facilitator in discussions. Teacher E was convinced that classroom management is the key to success in teaching. Other observations in Teacher E's classroom revealed similar teacher roles. It can be claimed that to some degree and based on limited observations that Teacher E did not want any her students to be out of control and managed the activity of every student involved. Despite the scarce resources, according to Teacher E's belief, it is important to have the students become active learners even if employing the small group discussion combined with reading

activity. As indicated by Teacher E, however, one of the biggest challenges in offering hands-on activities is to find learning resources. From the interview, she stated:

> Now, it is difficult for me to teach science using hands-on activity. There are no science materials in my classroom, except for science books. I have bought some items myself, but it is not easy to collect everything, put it together, and it is also expensive. (I.TE.06.10.09)

Materials and Resources

Observing during the reading activity, some students did not own their science textbooks. Teacher E had a strategy to combine the students who owned books with other students not having books so that the learning activity can be done smoothly. In addition to the scarcity of students' science books, the availability of science kits in the classroom made Teacher E unable to include inquiry-based science activities in the classroom.

Assessment

Since Teacher E did not use the lesson plans the whole time of the 70-minute lesson, the observer was not able to indicate whether or not the assessment is aligned with the instructional goals. However, from the teacher interviews, it was revealed that the system of examination is one of components that strongly influenced what Teacher E actually was teaching in the classroom. The school and national examination system affected Teachers E's choice of content and techniques of teaching.

6.2.2.4 Science Teaching Practice in Rural Primary School 3.

General observation

The students and teachers were supposed to perform a flag ceremony but due to the rainy season, the Monday morning activity was cancelled. Consequently, most students were already in class. Teacher F and the observer went to the class and the observer sat in the back row. While teacher F prepared the lesson, the observer explored the classroom physical environment from the backbench. Pictures of national heroes were displayed at the walls, together with the posters that accentuated the importance of being diligent such as "*rajin pangkal pandai*" (working hard as start of cleverness) and "*malas pangkal bodoh*" (The laziness as start of foolishness). During the time when the teacher was getting prepared for the lesson, most students

were sitting silently in their chairs and only a few students were talking to their peers.

The In-class Observation (CO.TE.R3.04.10.09)

Teacher F opened the lesson by reviewing the previous lesson with related to chlorophyll. The teacher wanted to know students' understanding about chlorophyll by posing the reviewing questions which related to green plants in daily life. In this section, the time belonged to the teacher and teacher roles were dominant compared to students' roles. The interaction started from the teacher and sometime ended up with the teacher. Frequently, teachers' questions, for example, did not get responses from the students so the teacher herself answered the questions. This section seemed that the teacher played a pivotal role in the instructional process with compared to the students.

While writing down the terms chlorophyll and photosynthesis on the whiteboard, the teacher explained the photosynthesis concept to the whole class. She mentioned that Chlorophyll is the green coloration in leaves. Chlorophyll is the molecule that absorbs sunlight and uses its energy to synthesise carbohydrates from CO_2 and water. This process is known as photosynthesis and is the basis for sustaining the life processes of all plants. To some extent, the teacher attempted to have the whole class comprehend the concepts of chlorophyll and photosynthesis. However, the observations recorded that this effort was hardly successful due to any observable responses from the students. All information was delivered by teacher talk and students listened to the teacher's talk. Sometimes the teacher looked at the textbook to confirm her explanation. There was less two-way flow of information in the classrooms and teacher talked most of the time. In most cases, the teacher still played a significant role rather than the students to keep the lesson moving. The students remained passive in the process.

Beside the teacher's explanation, the teacher pointed out to the students the results of photosynthesis by showing a number of plants such as, cane, cassava, green beans, and eggplant. The teacher offered student the opportunity to ask questions related to the topic. However, none of the students took up this offer and politely they remained silent until the end of the period. The teacher concluded the lesson by summarizing the lesson and asking students to do homework on the science textbook. Before the class was dismissed, the teacher reminded the students that the current topic would appear in the formative assessment in the next week's science class.

Interpretative Commentary on the Implemented Curriculum Components

Content

For the period of the observed instruction, the observer did not see the use of lesson plans by the teacher. For both observations, the science textbooks were predominantly utilised in her teaching. The interview with Teacher F revealed that she utilized commercially published lesson plans. A lack of developing lesson-planning skills and time was acknowledged by the teacher as one of the main reason why she preferred using the lesson plans published by the commercial publisher.

Learning Activities and Teacher's Role

The teaching and learning activities being observed were about green plants. According to the curriculum document, ideally this topic should be taught using an inquiry-based approach and an experiment as the teaching method. The observation conformed that teaching practices performed by teacher F were far from ideal because the scarcity of science kits hinder the teacher from teaching science as expected in the curriculum documents. Generally, students merely posed questions if they could not figure out what the teacher has written down on the blackboard or if they did not pay attention to teacher's explanation; however, the teacher asked questions first to ensure that students have understood. From the teacher's interview, it was revealed that students did not ask questions, because they might be shy or have no confidence in themselves. It seemed that the teachers did not attempt to encourage the students to raise questions. Students were not encouraged to discuss in class unless they were working in groups. Students were not taking notes, not asking and answering of questions unless the teacher demanded them to do that. This was supported by the second observations. To some extent, science teaching in her classroom was a one-way communication.

Material and Resources

Having science textbooks was not compulsory for the students since most students could not afford to buy them. The school library provided the books during the learning time and the books were returned to the library at the end of the lesson.

Assessment

The assessment must be embedded within the everyday science activity. However, either the school test or national test emphasis on the cognitive domain in science testing has created lingering false assumption about the purpose of testing, which indicated that it should bring closure to learning and focus on specific science terminology rather than on processes or a general idea. The notion of the instructional procedures adopted by Teacher F was driven by preparing students to succeed in examinations was observed in this classroom. Teacher F claimed that she covered all the required topics as described in the curriculum document and used the remaining available time for reviewing and practising the questions related to the test.

6.2.2.5 Status of Teaching Science in Rural Primary School

This section is an attempt to explain some of the unique characteristics of science teaching in the three rural primary schools to discuss about what science teaching can be learnt from the culture of teaching in primary schools by examining some of the ways in which science is taught. Four key assertions were presented as succinctly as possible. To formulate the assertions, two questions were used as follows;

1) How well prepared were science primary teachers in terms of both content and pedagogy?
2) What were teachers trying to accomplish in their science instructions, and what activities did they use to meet these objectives?

Assertion 1 The effectiveness of implementation of intended curriculum in the classroom in the three rural primary schools mainly was indicated by three features.

Drawing from the classroom observations in each of three rural primary schools and teacher interviews, the ways of rural primary teachers to translate the intended curriculum into the operational curriculum depended on 'the individual teacher's enthusiasm' and 'principal's commitment' to support the implementation of curriculum in classroom. To some extent, the three classroom teachers preferred to use the science textbooks to help them in planning the lesson instead of using the curriculum documents. It seemed that each teacher's enthusiasm to take account on the curriculum document in her lesson planning was not associated with the policy makers and the curriculum writers. The lack of clarity of the competence standards and basic competence into learning indicators initiated that the teachers paid no attention to the government intentions on curriculum reform. These teachers' limit actions should be counterbalanced by the principal's lofty commitment to keep up teacher efforts to implement the aims of the intended curriculum. Therefore, the qualities of both the individual teacher's enthusiasm and principal's commitment were seen as critical to effective curriculum implementation and, to a large degree, as a way to overcome other constraints.

Another dominant feature influencing the implementation of new curriculum in the three rural primary schools was 'professional development'. Professional development was seen as needing to focus on the curriculum needs of teachers. The teachers emphasised that professional development was crucial to their learning

about a new curriculum and the methods to implement it. Throughout the teacher interviews conducted at the three primary schools, professional development involving the need for critical reflection and review in order to improve teaching practice was stressed. The three teachers appeared driven by the desire to create an environment for their students and themselves where the students experienced deep learning rather than surface coverage of the curriculum within relevant, meaningful context. To some degree, the convergences of the aims of curriculum with teacher's aspiration required their needs be met for professional development for curriculum.

Assertion 2 To some degree, science teaching practices in rural primary schools were categorized as 'traditional whole-class teaching'.

When a closer looking at the patterns of teacher-student interaction for the period of the limited classroom observations, there were seemingly two categories of classroom interaction what is called 'whole-class teaching'. The first category was where the teacher 'interacted with the whole-class for the majority of the lesson', for instance, whole-class discussion including activities such as teacher demonstrations and teacher questioning. The second whole-class teaching consisted of an introductory concept, after which students sat and worked in groups on similar tasks. During these parts of the lessons, the teacher periodically requested the attention of the whole class in order to provide further instructions, comment on work in progress, to ask students what they had done with their peers and to give evaluative comments on students' work. In other words, not surprisingly the classroom discourse was heavily dominated by teacher talk and the largest proportion of this talk consisted of teachers making statement. Even when questioning students, the primary school teachers tended to dominate the discourse. Traditional classroom discourses could be described as a one-way communicates system in which, for most of the time, teachers talk and students listen. The teachers extensively directed, explained, and gave questions in the context of whole group instruction followed by students working on paper-and-pencil assignments. Consequently, these practices are inconsistent with the methods and teaching approaches as suggest in the intended curriculum.

Assertion 3 The shortage of teaching resources hampered these rural primary teachers to include inquiry-based science activity in their lessons.

Primary rural schools operate under the same content-standard document and with comparable expectations and goals as their urban counterparts, but less the quantity or quality of support and teaching resources available from the local government. Ultimately, the onus for providing better science teaching being delivered to students with the scarcity of teaching resources remained primarily on the classroom teacher. When a teaching resource is defined as some form of support necessary for a teacher to deliver a lesson, the three rural primary teachers predominantly faced the scarcity of teaching resources as an obstacle to implement the learner-centred approach as prescribed in the process standard document. What is needed, therefore, is 'the system of support' for the teachers in order to facilitate the best possible learning environment for the students and to help teachers implement the curriculum more effectively.

Teachers in underfunded rural schools are using their creativity to improvise teaching aids amid a shortage of essential facilities. Teacher D, for instance, used materials from nature to teach science. She says 'I ask the students to collect kind of leaves around the school yard or from their home, and I use those to teach them about identifying the leaves' (I.TD.R1.31.09.09). Moreover, Teacher E asked her students to bring the needed objects from the student's houses, such as unused items, for the purpose of lesson.

Assertion 4 The three classroom teachers in rural primary school area preferred to practice the traditional paper-and pencil test to assess student's performance.

One of the most basic and difficult tasks that teachers face in their work is the process of assessment. Classroom assessment includes all the process involved in making decisions about students learning progress. It includes the observation of students' written work, their answers to questions in class, and performance on teacher-made and standardized tests. However, most classroom teachers assumed that assessment was simply to measure student's achievement on the certain subject. Although, there are the number of instruments used to assess students' performance, the traditional paper-and-pencil test, mainly that of multiple choice questions,

matching or true/false, play a dominant role in classroom appraisal in the three rural science classrooms.

The preference for using paper-pencil tests in the classroom may be considered from the perspective of the teachers. From the informal teacher interviews, the three classroom teachers preferred to use paper-and-pencil tests due to being easily administered, scored, and interpreted by the teachers. Although the teachers realized that the students were scored according to response with little attention paid to the process or method used in reaching the response, they adhered to this traditional assessment because they did not have enough knowledge and time to practise the performance assessment as the curriculum guidelines prescribed. As indicated by the guidelines, classroom assessment is much more than tests and giving the grades, yet assessment is an integral part of classroom instruction. To some extent, therefore, the classroom teachers in three rural primary schools areas were not able to perform the primary purpose of classroom assessment in order to inform teaching and improve student's learning in certain subject matter.

Concluding Remarks

Most of the teaching time was devoted to teacher talk. This typical classroom was nearly similar in the three classrooms. Teachers D and E performed various strategies for optimizing students' ability to understand the lesson's content. Activities included the use of small group discussion techniques. Active learning approaches emphasized giving students the opportunity to learn from direct exposure such as from pictures. To teach science is a challenge everywhere, but rural teachers confront several problems such as the problem of insufficient resources and the limited opportunity of professional development that can weaken their morale and undermine the quality of education they offer their students. Teacher E, for example, revealed that at the beginning of semester she proposed some of what she needed to the school principal; however, the school allotted no money for science teaching and had almost no supplies for her science-teaching practice. Her dream to teach science in an inspired and hands-on way - as opposed to the traditional lecture system with its overemphasis on vocabulary - began to fade as she faced the realities of teaching at a small, rural school with scarce resources.

6.3 Summary of the Chapter

Although, the Minister of National Education already has policies in place which allow or encourage local schools to develop their own curriculum relevant to the needs of their students, this does not lead automatically to policy implementation. A research on the curriculum implementation done by the Curriculum Development Centre in 2007 has shown the results that the majority of teachers have insufficient understanding to the standard competency contents of the curriculum policy. In fact, teachers should be able to draw upon their prior knowledge, beliefs, and experiences to interpret new instructional approaches, even reconstructing them in ways that can both reinforce the pre-existing practices and lead to draw the incremental change (Spillane, et al., 2002).

A curriculum reform has been disseminated to schools throughout Indonesia. For example, written guidelines given by education authorities to teachers on how to enact the intended curriculum to their classroom practice are rarely sufficient to bring about actual change. In practice, however, the KTSP curriculum reform has not been clearly understood by many teachers.

Using the data analysis that emerged from the practices of a small number of primary teachers during several classroom observations in three urban and three rural schools, teacher training and support are a critical factor in order to help the teachers implement the new curriculum effectively in their classrooms. As indicated by Nielsen (1998), primary school teachers, especially those in rural areas, are rarely in a position to attend teacher training.

CHAPTER 7

THE PERCEIVED PRIMARY SCHOOL SCIENCE CURRICULUM

7.1 Introduction

This chapter provides direct responses to Research Questions 3 and 4: How do teachers perceive the intended science curriculum in primary school? and How do students in primary schools perceive their classroom learning environment? The structure of this chapter is organized as follows: first, teachers' perceptions toward the intended science curriculum are elaborated in Section 7.2; second, teachers' and superintendents' perceptions of the intended primary school curriculum in the six case study schools are discussed in Section 7.3; third, students' perceptions of the science classroom learning environment are illustrated in Section 7.4; and finally summary of this chapter is described in Section 7.5.

7.2 Assessing Teachers' Perceptions toward the Intended Curriculum

The study was conducted addressing the literature gap found in many studies about educational reform initiatives and teachers' perceptions. The literature showed that there were no research reports in the Indonesian school context that revealed the level of implementation of the KTSP as the intended curriculum by primary school teachers, especially regarding teachers' perceptions of curriculum reform. Research in other settings, however, showed that teachers' perceptions were crucial for the implementation of any innovation. Thus, this study investigated the perception of primary school teachers in the implementation of the KTSP. Using the purposive sample of 647 primary teachers from fourth, fifth and sixth grade levels, and the study aimed at answering Research Question 3.

As pointed out in Chapter 4, data collection procedures to address Research Question 3 utilized the Teachers' Perspective on Curriculum Questionnaire developed by Koto and Treagust (2011). The collection of quantitative data is presented using tables or

figures in conjunction with individual interviews that were conducted with teachers and superintendents.

Of the 647 teachers who were willing to take the survey and completed the questionnaire, 16 responses were deemed invalid because they either showed an abnormal answering pattern (e.g., respondent chose 'Agree' for all of the items), or left more than half of items unanswered. After the screening process, the final data set had a total of 631 cases with complete data.

7.2.1 Respondent Demographic

People's perceptions, behaviours and abilities in performing tasks for their job or profession are often influenced directly by their demographic characteristic, especially educational background and experience related to their job.

Educational degrees obtained by teachers, along with teacher certification and level of experience, have been treated as proxy of teacher quality in the sphere of education (Smith & Desimone, 2005). The assumption behind this connection is that teachers with higher educational attainment can provide more scholarly instruction and presumably, possess more insights about what is good for the student. Although this assumption was questioned by some researchers, the study shows that preparedness in certain subjects (measured by educational degree) such as mathematics and participation in content related professional development activities are associated with increased use of reform-oriented teaching strategies (Smith & Desimone, 2005). Furthermore, Hargreaves (2005) found teachers with more experience (measured by total years in teaching) are prone to being indifferent in learning new things. To mid-career teachers, older colleagues do not have the energy levels needed to deal with change that they find as "just too much work" (p. 979).

With regard to demographic variables, Table 7.1 provides a summary of the descriptive statistics for the demographic characteristics of teachers involved in this study. As part of the survey, teachers completed four demographic questions that included teaching experience, educational background, age and gender.

Table 7.1
Frequencies and Percentages of Respondent Demographics

Respondents demographics (N = 631)	Frequency	Per-cent (%)
Teaching Experience		
Fewer than 5 years	174	27.6
5 - 10 years	101	16.0
10 - 15 years	75	11.9
15 or more years	281	44.5
Educational Background		
Teacher Education Senior High or SPG (3 years)	208	33.0
Diploma-2 (2 years)	212	33.6
Bachelor (4 years or *Sarjana-S1* degree)	210	33.3
Master Degree	1	0.1
Age		
Fewer than 35 years	210	33.3
35 – 44 years	245	38.8
45 – 54 years	165	26.2
55 or more years	11	1.7
Gender		
Female	438	69.4
Male	193	30.6

Four categories were used for classifying respondents' teaching experience in this study, regardless of the year level of students they taught. As shown in the observed range of teaching experience in Table 7.1, some teachers were novices while some others had 15 or more years of in primary school teaching. The largest single group of teachers (44.5%) according to years of teaching experiences was that with 15 or more years of teaching experience (see Figure 7.1a). Thus, although this haphazard teacher sample might not be representative of the primary school teacher population in Bengkulu province, it was made up of teachers of different teaching experience, educational attainment, and ages.

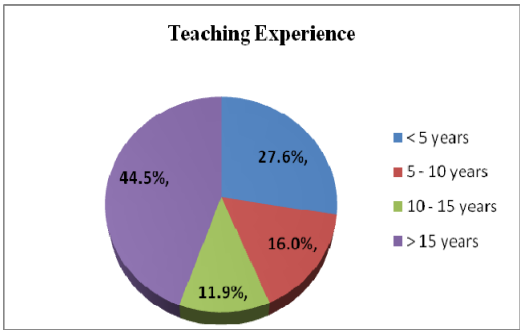

Figure 7.1a Respondents' Teaching Experiences

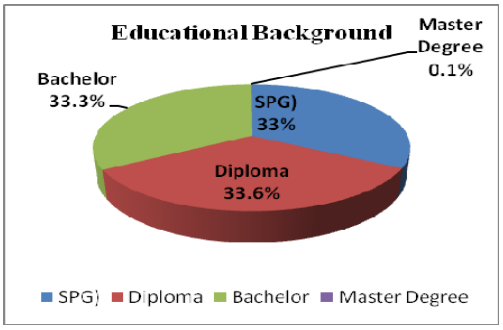

Figure 7.1b Respondents' Educational Background

Respondents' educational backgrounds were classified into four categories as shown in Table 7.1. The percentage of respondents holding a Diploma (34.6%) was relatively similar to the percentage of those holding a Bachelor/"Sarjana" degree (33.3%) and the percentage of those with Teacher Education Senior High or SPG/PGA (33.0%). One teacher in this survey had a Master's degree. The minimum requirement for teaching primary school, junior secondary school and senior secondary used to be graduation from the SPG/PGA, Diploma-2 and Diploma-3, respectively, so more than two thirds of the sample had qualification beyond the minimum requirement (see Figure 7.1b).

An analysis of characteristics of the 631 respondents in this survey showed that the primary school teachers consisted of 438 (69%) females and 193 (31%) males. The respondents' age ranged from less than 35 years to 55 or more years and 421 (66.6%) of the primary school teaching force in this study were over the age of 35. Roughly, 210 (33.3%) the respondents' age, however, was less than 35 years.

The teachers participating in this survey came from different schools that have been implementing the KTSP during the academic years 2005-2009. In this study, most primary school teachers (60.2%) had been implementing the KTSP in the academic school year 2007 and 2008. Since all primary school teachers in this study have enacted the curriculum reform policy (i.e. the KTSP), teachers' perception of this policy were expected to vary across schools at the individual level.

7.2.2 Teachers' Perceptions on Curriculum Reform (TPCR) Scales

This section presents the findings regarding teachers' perception toward the intended curriculum in terms of the *Implementation* scale*,* the *Adaptation* scale and the *Adoption* scale. In this study, averages and standard deviations provide an adequate representation of response 'directions' and these are presented alongside the response profile.

Table 7.2
Mean and Median Scores with Percentage Responses Across all Items within Each Scale on the Teachers' Perceptions on Curriculum Reform

Scale	Items	Mean (*SD**)	Median	SD (1)	D (2)	U (3)	A (4)	SA (5)
Implementation	13	4.24 (0.75)	4.08	0.41	4.14	5.16	54.1	36.19
Adaptation	11	3.39 (1.05)	3.45	2.64	29.47	9.60	42.66	15.63
Adoption	9	4.06 (0.73)	4.11	0.43	5.04	9.84	57.48	27.21

Note: SD = strongly disagree; D = disagree; UD = undecided; A = agree; SA = strongly agree; *SD** = standard deviation.

Findings were generally positive and encouraging with 90.29% of all scores across the 13 items within the *Implementation* scales and 84.69% 11 items within the *Adoption* scales expressing agreement or strong agreement. While the *Adaptation* scale, the level of expressed agreement or strong agreement remained relatively impressive (58.29%). Overall, the mean scale values ranged from 4.24 (*Implementation* scale) to 3.39 (*Adaptation* scale) on the five-point scale, while median valued range from 4.08 (*Implementation* scale) to 3.45 (*Adaptation* scale).

The variation in responses reflected in the standard deviation was similar for the *Implementation* scale (0.75) than the *Adoption* scale (0.73). The significance of the *Adaptation* scale as most concerning the enactment of intended curriculum (the KTSP) was further emphasised with this scale receiving the highest expressed level of disagreement or strong disagreement (32.11%). Interestingly, the variety of responses across 11 items in this scale suggested that the primary school teachers have various views on the enactment of the KTSP in the classrooms. The relatively low numbers of 'neutral' views provided should not be overlooked (9.84% - 5.16%). What seems to emerge from this first level of analysis is a picture of participating teachers with largely enthusiastic views while discussing issues associated with the demands attached to the preparation for and teaching in primary schools as a curriculum perspective.

In order to better visualise the differences between scales, the score distribution is also presented in the form of box and whisker plots (Figure 7.2). Though perhaps

looking ‘slight’ in appearance, the results of the Friedman test indicated that there were statistically significant differences in teachers’ perceptions of the implementation of the intended curriculum across the three scales (implementation, adaptation, adoption, $\chi^2(2, n = 631) = 713.45, p = 0.001$). Examination of the median rank values showed a difference increasingly in teachers’ perceptions between the adaptation scale (median = 1.16), the adoption scale (median = 2.23) and the implementation scale (median = 2.61). These evidences reveal that the three scales were able to measure the respondents’ perceptions differently.

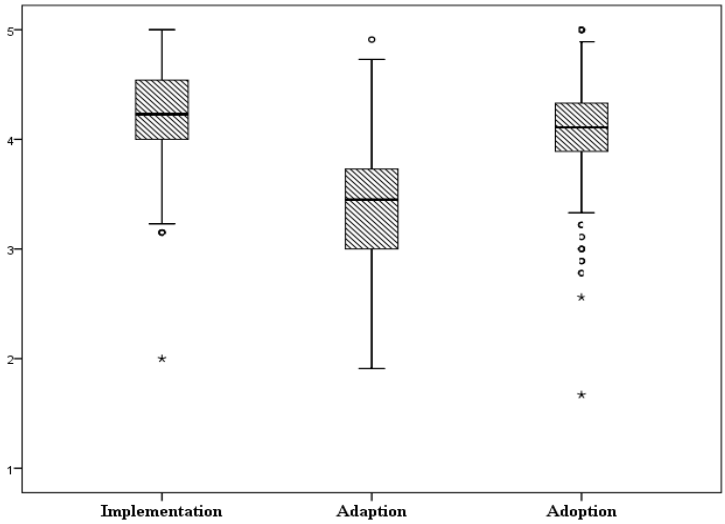

Figure 7.2 Box and Whisker Plot Showing the Median Values and Overall Distribution of Responses Including Outliners and Extreme Values Across Each of the Three Scales ($N = 631$).

In addition to the percentage (frequency) of teacher’s choosing each response on the teacher’s questionnaire, the mean, mode and standard deviation scores were calculated for each item within the *Implementation, Adaptation* and *Adoption* scales.

7.2.2.1 The Implementation Scale

The Implementation scale’s mean score, the highest of the three scales, was 4.24 (median = 4.08) which is shown in Table 7.2; 90.29% of responses to the 13 individual items of this scale indicated agreement or strong agreement with only 4.55% disagreement or strong disagreement. The mean values for 13 items ranged from 4.54 to 4.17. The two items receiving the highest mean scores were item Q37 (“Teaching and learning aids are necessary in schools”: mean score = 4.54) and item Q38 (“Extra time is needed for teachers to prepare learning materials”: mean score =

4.31). Respondents also agreed or strongly agreed mostly with item Q37 (*n* = 361; 96%). There are four items (Q46, Q41, Q29, Q28) receiving the lowest mean scores (mean score = 4.17), while the item Q39 ("The principal should provide an incentive for teachers spending extra time) receiving the most disagreement and strong disagreement (n = 631; 10%). Overall, it might be suggested that respondents agreed or strongly agreed with all variables about the factors influencing the implementing of the new curriculum in Bengkulu province, Indonesia. Furthermore, by looking at the items' mode scores, it seemed that respondents tended to agree with the 13 items.

7.2.2.2 The Adaptation Scale

The Adaptation scale's mean score, the lowest of the three scales, was 3.39 (median = 3.45) (see Table 7.2); 58.29 % of responses to the 11 individual items of this scale indicated agreement or strong agreement with 32.11% showing disagreement or strong disagreement. The mean scores for every individual item ranged from 4.23 to 2.71. The item obtaining the highest mean score was item Q30 ("I think professional development should be designed by teacher's forum": mean score = 4.23) and this item was also mostly agreed to or strongly agreed to by the primary school teachers (*n* = 631, 89.9%). The item receiving the lowest mean score was item Q16 ("I assess my students on the basis of student homework": mean score = 2.71) whereas respondents mostly disagreed or strongly disagreed with item Q15 ("I asses my students on the basis of students' formative exams": *n* = 631, 56.1%). In general, by examining the standard deviation scores which were greater than 1.00, it might be suggested that primary school teachers have different views and various experiences about the statements in the 11 items while implementing the KTSP in their classroom.

7.2.2.3 The Adoption Scale

The Adoption scale's mean score was 4.06 (median = 4.11) (see Table 8.2); 84.69% of responses to the nine individual items on this scale indicated agreement or strong agreement with only 5.47 % disagreement or strong disagreement. The two items receiving the highest mean score were item Q5 ("I think I need to learn more about the KTSP guidelines": mean score = 4.60) and item Q1 ("The syllabus is developed at school level": mean score = 4.24). Respondents also mostly agreed or strongly agreed with item Q5 (*n* = 631, 98.9%). The item receiving the lowest mean score was

item Q26 (“If textbooks are unavailable, I add some topics that are not prescribed in the guidelines”: mean score = 3.76) while respondents mostly disagreed or strongly disagreed with item Q26 (14.6%). Overall, it might be suggested that most respondents considered that the teachers’ knowledge related to the KTSP and their school provided ready access to resources required to teach primary schools science.

7.2.2.4 Correlations among the Teachers’ Perspectives on Curriculum Reform Scales

A set of analyses examined the relationship between the TPCR scales using Pearson product-moment correlations. With respect to correlations between scales, the coefficients varied from 0.35 to 0.17. The *Implementation* scale was significantly correlated with the *Adaption* scale and the *Adoption* scale at the 0.05 level, respectively. The *Adaption* scale was significantly correlated with the *Adoption* scale at the 0.01 level (see Table 7.3). These values implied that the three TPCR scales measure different.

In addition, Table 7.3 provided information about discriminant validity using the mean correlation of a scale with the remaining two scales as a convenient index. Discriminant validity considers the degree of independence of questionnaire scales. Using the individual as the unit of analysis, the discriminant validity indices for the three TPCR sales ranged from 0.31 to 0.21. The data suggests that raw scores on the TPCR appear to measure distinct but somewhat overlapping aspects of implementation. Overall, these evidences suggest that the three TPCR scales are relatively independent of each other.

Table 7.3
Correlation among the Teachers' Perceptions on Curriculum Reform Scales

Scales	Implementation	Adaption	Adoption	Mean Correlation with other Scales
Implementation	1.00	0.28**	0.35**	0.31
Adaption		1.00	0.17*	0.21
Adoption			1.00	0.25
Mean	4.19	3.37	4.03	
Std. Deviation	0.42	0.53	0.37	

Notes **. $p < 0.01$ level (2 - tailed).
*. $p < 0.05$ level (2 - tailed).

7.2.2.5 Exploratory Analyses of Data by Subgroup: *Teacher Characteristic*

In addition to considering the three individual scales of the TPCR questionnaire, it was also appropriate to analyse the questionnaire data in terms of the teacher characteristics themselves. These characteristics included gender, age, educational attainment, years' teaching experience and years of implementing the KTSP. The demographics of teacher respondents noted were independent variables. Using the variables for each of the three constructs, the Kruskal-Wallis and Mann-Whitney *U* tests were used to check for theoretically predictable differences between respondent characteristic variables with respect to the three scales. The outcomes are summarized as shown in Table 7.4.

Table 7.4
Statistical Analysis of Responses to the Teachers' Perceptions on Curriculum Reform Scales by Group ($N = 631$)

Scale	Gender	Age	Educational Attainment	Teaching Experience	Years of Implementing KTSP
Implementation	[b]0.071*	[a]0.141*	[a]0.000	[a]0.032*	[a]0.387*
Adaptation	[b]0.169*	[a]0.011*	[a]0.003	[a]0.821*	[a]0.693*
Adoption	[b]0.743*	[a]0.237*	[a]0.003	[a]0.707*	[a]0.354*

[a]Exact probability, Kruskal-Wallis χ^2.
[b]Exact probability, Mann-Whitney *U*.
*Coefficients significant at the 0.05 level.

No statistically significant differences were found across the scales with data analysed by gender, age, teaching experience, or years of implementing KTSP.

Interestingly, however, a Kruskal-Wallis test revealed a statistically significant difference in three scales (Implementation: $\chi^2 = 19.460$; $df = 3$; $p < 0.001$, Adaptation: $\chi^2 = 14.312$; $df = 3$; $p < 0.01$, Adaptation: $\chi^2 = 13.882$, $df = 3$; $p < 0.01$) across three different educational attainment groups (Teacher Education Senior High degree, Diploma degree, Bachelor degree)

7.2.3 Teacher's Perceptions of the School Based Curriculum (the KTSP)

This section presents the findings concerning (1) curriculum guidelines, (2) syllabus development, (3) learning material development, (4) student assessment, and (5) issues of implementation of the KTSP.

7.2.3.1 Curriculum (the KTSP) Guidelines

Table 7.5 shows, across all educational backgrounds (SPG, Diploma-2, and Bachelor/"Sarjana"), a high percentage of primary school teachers (95%) agreed or strongly agreed that the direction of how to implement the new curriculum written in the guidelines can direct them to perform their teaching practices in the classroom (Statement Q3: "The KTSP guidelines can guide me to perform my teaching in the class"). This perception was relatively similar across the levels of education, except for those teachers holding a Bachelor degree (around 97% agreed or strongly agreed with Statement Q3).

Considering years of teaching experience, a slightly lower percentage (roughly 89%) agreed or strongly agreed with the statement Q3. Interestingly, teachers' understanding about the KTSP guidelines may not be influenced significantly by years of teaching experience. Nevertheless, as indicated by Table 7.5, the level of agreement or strong agreement constantly decreased as the years of teaching experience increased. For example, 93% of teachers who have teaching experience less than 5 years agreed or strongly agree with Statement Q3, but 85% of primary teachers who have teaching experience more than 15 years agreed or strongly agree with Statement Q3. On the other hand, the percentage that did not give opinions to Statement Q3 increased from 7% for the teachers at the lowest level of teaching experience (less than 5 years) to 14% for teachers at the highest level of experience, more than 15 years.

Table 7.5
Responses of Teachers (N = 631) to the Statement about the KTSP Guidelines Document (Q3)

Demographic Variables	Per-cent (Frequency) of Teachers Choosing on the Options					Mean	SD
	SD (1)	D (2)	UD (3)	A (4)	SA (5)		
Education							
Secondary (SPG)	1.4 (9)	1.9 (12)	2.9 (18)	67.0 (423)	26.8 (169)	4.15	0.69
Diploma	0.5 (3)	3.6 (23)	1.4 (9)	58.3 (368)	36.0 (228)	4.26	0.71
Bachelor/"Sarjana"	0.0 (0)	1.9 (12)	1.4 (9)	61.7 (389)	35.0 (221)	4.30	0.59
Grand mean	0.6 (4)	2.5 (16)	1.9 (12)	62.4 (394)	32.6 (205)	4.24	0.66
Teaching Experience							
Fewer than 5 years	0.0 (0)	1.0 (6)	7.0 (44)	54.0 (341)	38.0 (240)	4.29	0.64
5 – 10 years	0.6 (4)	2.9 (18)	7.5 (47)	54.0 (341)	35.0 (221)	4.20	0.74
10 – 15 years	0.0 (0)	1.4 (9)	12.9 (81)	57.1 (360)	28.6 (181)	4.13	0.68
More than 15 years	0.3 (2)	0.7 (4)	14.3 (90)	55.6 (351)	29.1 (184)	4.12	0.69
Grand mean	0.2 (1)	1.7 (11)	9.2 (58)	55.2 (348)	33.7 (213)	4.21	0.69

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Q3:Q3: The KTSP guidelines can guide me to perform my teaching in the class.

However, Table 7.6 shows that more than 98% of primary teachers (mean score = 4.6, SD = 0.56) perceived that they still need to learn more about the KTSP guidelines (36.5% agreed and 62.1% strongly agreed with Statement Q5: "I think I need learn more about the KTSP"). What may be inferred from this evidence was that, in the 'cognitive' sense, teachers already understood some principles of the KTSP as prescribed in the guidelines, yet they did not wholly understand all of the principles.

Table 7.6
Responses of Teachers to the Statement about the KTSP Guidelines (Q5)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
I think I need to learn more about the KTSP guidelines (Q5)	0.3 (2)	0.3 (2)	0.8 (5)	36.5 (230)	62.1 (392)	4.60	5	0.56

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

With respect to the teachers' qualification and teaching experience, teachers with a higher level of education (Bachelor or S1 degree) and more teaching experience had comparable responses, arguing that teaching science focused on competencies. Table 7.7 displays approximately 87% of primary teachers who have more than 15 years in teaching experience and who have a Bachelor degree agreed or strongly agreed with Statement 8 ("Based on the KTSP, teaching science focused on competences).

Table 7.7
Responses of Teachers to the Statement about the Curriculum Approach (Q8)

Demographic Variables	Per-cent (Frequency) of Teachers Choosing on the Options					Mean	SD
	SD (1)	D (2)	UD (3)	A (4)	SA (5)		
Education							
Secondary	1.9 (12)	7.7 (49)	17.4 (110)	58.5 (369)	14.5 (91)	3.76	0.86
Diploma	0.0 (0)	3.3 (21)	10.3 (65)	64.0 (404)	22.4 (141)	4.06	0.68
Bachelor/"*Sarjana*"	0.0 (0)	4.7 (30)	8.1 (51)	56.4 (356)	30.8 (194)	4.13	0.75
Grand average	0.6 (4)	5.2 (33)	11.9 (75)	59.7 (377)	22.5 (142)	3.98	0.76
Teaching Experience							
Fewer than 5 years	1.7 (11)	5.7 (36)	18.4 (116)	59.2 (373)	14.9 (95)	3.80	0.83
5 – 10 years	0.0 (0)	4.0 (25)	10.0 (63)	64.0 (404)	22.0 (139)	4.04	0.69
10 – 15 years	0.0 (0)	8.6 (54)	11.4 (72)	47.1 (297)	32.9 (208)	4.04	0.84
More than 15 years	0.4 (2)	4.6 (29)	8.2 (52)	61.7 (389)	25.2 (159)	4.07	0.74
Grand average	0.6 (4)	6.0 (38)	13.3 (84)	56.8 (358)	23.3 (147)	3.96	0.80

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree
Q8: Based on the KTSP, teaching science focused on competencies.

In addition, as indicated in Table 7.7, 73% primary teachers with lower level of education agreed or strongly agreed with Statement Q8 (mean score = 3.76, SD = 0.86), and 74% teachers with fewer than 5 years in teaching experience agreed or strongly agreed with Statement Q8 (mean score = 3.80, SD = 0.83). This evidence revealed that the primary school teachers across all educational backgrounds and years of teaching experience perceived explicitly that the KTSP was based on the competency approach.

Furthermore, since more than half of primary school teachers (56%) involved in this survey implemented the KTSP during the academic year 2005/06 – 2007/08 (see Figure 7.3), the length of time KTSP had been implemented in a school was not significant in teachers' understanding of curriculum. As a result of these findings, the majority of survey respondents understood the framework of the KTSP.

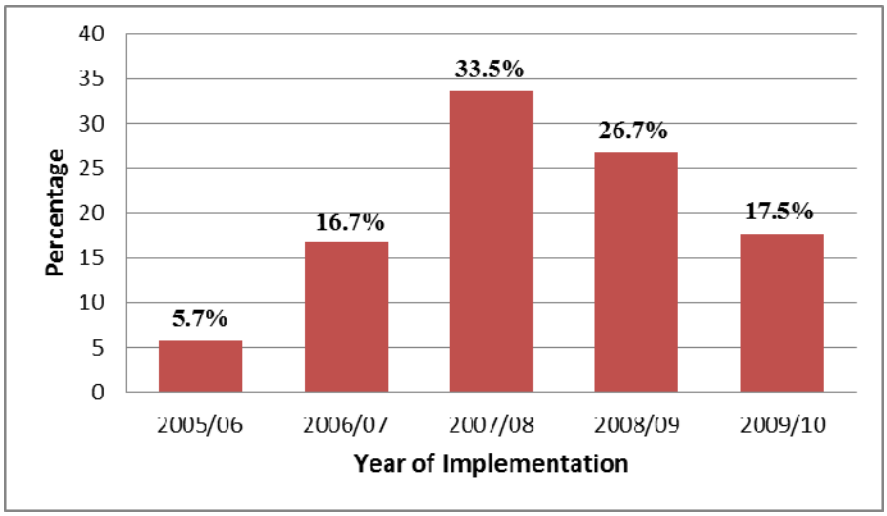

Figure 7.3 Years of Implementing the KTSP

7.2.3.2 Syllabus Development

Two issues were raised with respect to the curriculum: whether its development as a curriculum was centralized or decentralized (local schools), and the differences and similarities between the KTSP and the former curriculum of 1994. When teachers were asked about syllabus development, the majority (nearly 95%) understood that the syllabus was not to be developed at the central level (MoNE); 62.3% of teachers agreed and 32.6% strongly agreed that the development was at the local school level (see Table 7.8). Only a few of teachers (3.1%) were in favour of centralization (*Mean* = 4.24; *SD* = 0.67). Overall, almost all of primary school teachers perceived that the development of syllabus is carried out at the school level.

Table 7.8
Responses of Teachers to the Statements about the Curriculum Approach (Q1 and Q8)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
The syllabus is developed at school level (Q1)	0.6 (4)	2.5 (16)	1.9 (12)	62.3 (393)	32.7 (206)	4.24	4	0.67
Based on the KTSP, teaching science focus on competencies (Q8)	0.6 (4)	5.2 (33)	11.9 (75)	59.6 (376)	22.7 (143)	3.98	4	0.78

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

When asked to compare the KTSP with the previous curriculum (see Table 7.8), roughly 82% of teachers perceived that the KTSP were significantly different from the earlier curriculum 1994; while only 5.8% perceived that the two as being not different. However, nearly 12% of the primary teachers who did not make decision regarding to Statement Q8: "Based on the KTSP, teaching science focus on competencies".

Table 7.9
Responses of Teachers to the Statements about Preparing Learning Material (Q38)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
Extra time is needed for teacher to prepare learning material (Q38)	0.2 (1)	2.2 (14)	2.9 (18)	59.4 (375)	35.3 (223)	4.28	4	0.64

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

As indicated in Table 7.9, the teachers perceived developing a syllabus needs extra time in terms of preparing the learning materials (59.4% agreed and 35.3% strongly agreed with Statement Q38 "Extra time is needed for teachers to prepare learning materials"). Consequently, across all educational backgrounds and teaching experiences, roughly 95% of teachers argued that learning materials were critical elements of syllabus development and that preparing learning materials was time-consuming (*Mean* = 4.28; *SD* = 0.64).

7.2.3.3 Learning Materials

Pertaining to scarcity of learning materials (i.e., textbooks), teachers argued that government policy such as the KTSP guidelines was the most important source of instructional guidance. Whatever policy was put forth by the government, the majority of teachers perceived that they had to implement it at the classroom level (82% agreed or strongly agreed with Statement Q24).

Table 7.10
Responses of Teachers to the Statements about the Learning Materials (Q24, Q26, Q29)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
If textbooks are unavailable at schools,								
• I use the KTSP guidelines (Q24).	0.8 (5)	7.8 (49)	9.5 (60)	70.8 (447)	11.1 (70)	3.84	4	0.73
• I use the KTSP guidelines and add certain topics related to students' needs (Q26).	1.0 (6)	13.6 (86)	10.6 (67)	58.3 (368)	16.5 (16.5)	3.76	4	0.92
The development of learning materials is useful topics of in-service training (Q29).	0.3 (2)	4.3 (27)	4.3 (27)	59.9 (378)	31.2 (197)	4.17	4	0.72

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Teachers' perceptions of the KTSP were incongruent with their teaching practices (see Table 7.10). Almost 75% of teachers perceived that they can use any textbooks by using the KTSP guidelines. However, 15% of teachers did not agree with Statement Q26 and 11% of teachers did not provide opinions related to this issue. What may be inferred from this evidence was that about one-quarter of the teachers did not understand the principles of KTSP.

Since the learning materials were one of the crucial curriculum components, a large majority of primary school teachers (91%) agreed or strongly agreed that they would like to have knowledge of developing learning materials through in-service training (Statement Q29). Only a few of them (almost 5%) perceived that the development of learning materials was unimportant as a component in developing the syllabus and were not useful topics of in-service training (see Table 7.10).

7.2.3.4 Student Assessment

The two issues for discussion in relation to evaluation and assessment dealt with portfolio and school-based assessment. In response to student assessment, almost three-quarters of the teachers perceived that they did not assess their students on the basis of students' homework (61% disagreed or strongly disagreed with Statement Q16: "I assess my students on the basis of student homework").

Table 7.11
Responses of Teachers to the Statements about the School-Based Assessment (Q16, Q15, Q19, and Q20)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
I assess my students on the basis of								
• student homework (Q16)	5.4 (34)	55.6 (351)	7.3 (46)	25.7 (162)	6.0 (38)	2.71	2	1.09
• student formative exams (Q15)	2.5 (16)	53.6 (338)	4.7 (30)	33.3 (210)	5.9 (37)	2.86	2	1.09
The school exams were planned by group of schools (Q19)	0.3 (2)	5.2 (33)	2.7 (12)	59.0 (372)	32.8 (207)	4.19	4	0.75
The school exam is prepared by classroom teachers (Q20)	0.8 (5)	10.9 (69)	4.0 (25)	52.4 (331)	31.9 (201)	4.04	4	0.93

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Similarly, around 56% of teachers disagreed or strongly disagreed that assessing students' learning is used for formative assessment (Q15). The result indicated that teachers did not completely understand what a portfolio was and what school-based assessment meant. In addition to the aforementioned issues, the majority of teachers (91.8%) agreed or strongly agreed that a group of schools in the same district planned the school examination (Statement Q19). Moreover, more than 84% of teachers perceived that the school examination is prepared by the classroom teacher (Statement Q20).

Table 7.12 shows that almost three-quarters of primary school teachers perceived that the way of assessing students' progress was close to the KTSP guidelines (70.0% agreed or strongly agreed with Statement Q17 "The way that I assess students' progress is close to the KTSP). There are 26.5% of teachers, however, who admitted that they were unsure whether or not they assessed their students' progress

based on the curriculum guidelines. When asked the aim of teaching science, more than half of the surveyed teachers (53.4%) agreed or strongly agreed that "The aim of science teaching is to have students pass the examination" (Q9). However, 39.2% of primary school teachers perceived that having students pass the school examination was not the aim of their science teaching (see Table 7.12).

Table 7.12
Responses of Teachers to the Statements about the Assessment (Q17 and Q9)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
The way that I assess students' progresses is close to the KTSP (Q17)	0 (0)	3.5 (22)	26.5 (167)	57.2 (361)	12.8 (81)	3.80	4	0.68
The aim of teaching science is to have students pass examination (Q9)	5.1 (32)	34.1 (215)	7.4 (47)	37.9 (239)	15.5 (98)	3.25	4	1.22

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Primary school teachers' opinions about learning content in relation to student assessment were heavily influenced by their prior knowledge of implementing the previous curriculum; 68.8% of the teachers agreed and strongly agreed with statement Q10 (see Table 7.13) "All learning materials that are taught should be assessed". On the other hand, approximately 62% of teachers agreed and strongly agreed with statement Q11 "Only materials learnt by students can be assessed and if they were not, those would be not necessary to teach".

Table 7.13
Responses of Teachers to the Statements about the Contents of Assessment (Q10 and Q11)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
All learning materials that are taught to student needed be assessed (Q10)	0.8 (5)	25.5 (161)	4.9 (31)	46.9 (296)	21.9 (138)	3.64	4	1.11
Only material learnt by students were needed to be assessed (Q11)	2.7 (17)	28.4 (179)	7.0 (44)	48.6 (307	13.3 (84)	3.42	4	1.11

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

7.2.4 Issues of Implementation of KTSP

This section describes several issues regarding the implementation of the KTSP. As for the view that the KTSP was challenging, therefore, the large majority of teachers argued that the implementation of KTSP encouraged them to increase their teaching knowledge and skills as indicated by Statement Q45 in Table 7.15. Although the KTSP makes teaching practice more challenging (Statement Q41 in Table 7.16), 46.8% of primary school teachers perceived that teaching using the KTSP makes their science class become interesting (36% agreed and 10.8% strongly agreed with Statement Q42 in Table 7.14:"The realization of KTSP makes my science class become interesting"). Moreover, the majority of teachers (above 80%) argued that their knowledge about KTSP is sufficient for teaching science (58.3% agreed and 22.3% strongly agreed with statement Q4).

Table 7.14
Responses of Teachers to the Statements about the Issues of the KTSP Implementation (Q42, Q46, Q4, and Q2)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
The realization of KTSP makes my science class become interesting (Q42)	2.4 (15)	36.6 (231)	14.2 (90)	36.0 (227)	10.8 (68)	3.16	2	1.11
The KTSP makes me learn from other teachers' experience (Q46)	0.0 (0)	3.7 (23)	5.5 (35)	60.7 (383)	30.1 (190)	4.17	4	0.69
My knowledge about KTSP is sufficient for teaching science (Q4)	0.5 (3)	6.8 (43)	12.0 (76)	58.3 (368)	22.4 (141)	3.95	4	0.81
I am familiar with the KTSP from colleagues (Q2)	3.0 (19)	21.5 (135)	19.7 (124)	49.3 (311)	6.7 (42)	3.35	4	0.99

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Approximately 91% of teachers perceived that the implementation of the KTSP promoted them to work collaboratively with their colleagues for sharing of learning experiences (60.7% agreed and 30.1% strongly agreed with Statement Q46: "The KTSP makes me learn from other teachers' experience). This evidence, however, is not coherent with teachers' responses on Statement Q2. Over half the teachers agreed that they were familiar with KTSP document as a result of sharing information with colleagues (56% agreed or strongly agreed with Statement Q2 in Table 7.14: "I am familiar with the KTSP from colleagues").

7.2.4.1 Teacher's Knowledge and Qualification

This subsection describes the survey findings in relation to the teachers' implementation of the KTSP in classroom practice, and their perception of the process of adopting and adapting the KTSP. This description includes the variable, such as teacher's qualification, school infrastructure, teachers' professional development, and teachers' forums.

As shown by Table 7.15, a majority of the teachers perceived that the KTSP encouraged them to pursue to high-level education (86.3% agreed or strongly agreed with Statement Q47) and lead teachers to becoming a professional teacher (95.6% agreed or strongly agreed with Statement Q45). As shown in Table 7.1, the teacher's educational background was broken down as follows: 33.3 per cent had the equivalent of a bachelor's degree (S-1 level, a four-year university program), while 33.6 per cent of teachers were "Diploma-2" graduates and 33.0% were "Teacher Education Senior High or SPG (3 years)" graduates. Therefore, teachers requested an opportunity to improve their qualification to S-1 levels and to be encouraged to pursue additional studies beyond S-1. What may be inferred from this finding is that, if offered the chance, these teachers were enthusiastic to pursue further studies at the university level.

Table 7.15
Response of Teachers to the Statements related to the Upgrading of Teacher's Knowledge and Skills (Q47 and Q45)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
The KTSP encourage me to have higher education level (Q47)	1.0 (6)	6.8 (43)	5.9 (37)	45.7 (289)	40.6 (256)	4.18	4	0.89
The KTSP encourage me to increase my teaching knowledge and skills (Q45)	0.0 (0)	1.0 (6)	3.4 (22)	60.7 (383)	34.9 (220)	4.29	4	0.58

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Across all educational backgrounds and teaching experiences (see Table 7.16), the teachers' responses in relation to implementing KTSP in the actual classes, the majority of teachers perceived that the implementation of the new curriculum made their teaching practices more challenging; approximately 89% of surveyed teachers

agreed with Statement Q41 "The KTSP makes my teaching practices more challenging" (see Table 7.16).

Table 7.16
Response of Teachers to the Statements related to the KTSP Implementation in Classroom (Q41)

Demographic Variables	Per-cent (Frequency) of Teachers Choosing on the Options					Mean	SD
	SD (1)	D (2)	UD (3)	A (4)	SA (5)		
Education							
Secondary	0.0 (0)	4.8 (30)	10.6 (67)	59.4 (375)	25.2 (159)	0.74	4.05
Diploma	0.0 (0)	2.8 (18)	7.0 (44)	58.9 (372)	31.3 (197)	0.68	4.19
Bachelor/"*Sarjana*"	0.5 (3)	1.4 (9)	3.8 (24)	59.2 (374)	35.1 (221)	0.65	4.27
Grand average	0.2 (1)	3.0 (19)	7.2 (45)	59.2 (374)	30.4 (192)	0.69	4.17
Teaching Experience							
Fewer than 5 years	0.0 (0)	2.9 (18)	8.6 (54)	62.1 (392)	26.4 (167)	0.67	4.12
5 – 10 years	0.0 (0)	4.0 (25)	9.0 (57)	58.0 (366)	29.0 (183)	0.73	4.12
10 – 15 years	0.0 (0)	2.9 (18)	8.5 (54)	55.7 (351)	32.9 (208)	0.71	4.19
More than 15 years	0.4 (2)	2.8 (18)	4.9 (31)	58.9 (372)	33.0 (208)	0.69	4.21
Grand average	0.2 (1)	3.1 (20)	7.7 (49)	58.7 (370)	30.3 (191)	0.70	4.16

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree
Q41: The KTSP makes my teaching practices more challenging

7.2.4.2 School Infrastructure

As can be seen from Table 7.17, a high percentage of primary school teachers agreed that considerable resources are needed for teaching and learning aids to implement the KTSP (96% agreed or strongly agreed with Statement Q37). In addition, 42.3% of teachers agreed and 44.1% strongly agreed that the principal should allocate funding to provide consumables for teaching and learning (Statement Q40). Because extra time is needed to prepare learning materials (see Table 7.9), the majority of primary teachers perceived that the principal should provide an incentive for teachers to spend extra time on these tasks (43.3% of teachers agreed and 39.9% strongly agreed with Statement Q39).

Table 7.17
Response of Teachers to the Statements on the School Infrastructure (Q37, Q40, and Q39)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
Teaching and learning aids are necessary in schools (Q37)	0.2 (1)	1.3 (8)	2.5 (16)	36.3 (229)	59.7 (377)	4.54	5	0.63
The principals need to allocate funding for providing consumables (Q40)	0.8 (5)	7.9 (50)	4.9 (31)	42.3 (267)	44.1 (278)	4.21	4	0.91
The principal should provide an incentive for teachers spending extra time (Q39).	1.4 (9)	8.9 (56)	6.5 (41)	43.3 (273)	39.9 (252)	4.11	4	0.98

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

7.2.4.3 Teachers' Professional Development

Regarding resources for teacher professional development, the study found that most teachers (91.9%) preferred to have instruction by a subject matter specialist from "the Committee of Education Assurance" followed by their second choice of subject matter specialists from the university (90.5%), the subject matter teachers' group (61.5%) and the supervisors (47.5%). However, 34.7% of teachers disagreed or strongly disagreed with Statement Q33 "Professional development should be carried out by supervisors" (see Table 7.17).

Table 7.18
Response of Teachers to the Statement on the Institution of Professional Groups for Conducting In-Service Training (Q35, Q32, Q34, and Q33)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
I think professional development should be carried by								
• subject matter specialist from "Committee of Educational Quality Assurance"(Q35)	0.5 (3)	2.9 (18)	4.7 (30)	51.8 (327)	40.1 (253)	4.28	4	0.73
• subject matter specialist from the university (Q32)	0.5 (3)	4.1 (26)	4.9 (31)	50.4 (318)	40.1 (253)	4.26	4	0.77
• subject matter teachers' group (Q34)	1.9 (12)	22.0 (139)	14.6 (92)	49.6 (313)	11.9 (75)	3.48	4	1.02
• Working group/supervisors (Q33)	4.0 (25)	30.8 (194)	17.7 (112)	38.5 (243)	9.0 (57)	3.18	4	1.09

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

The study showed that there were several ways for teachers to understand the KTSP. First, there was a series of meetings through teachers' forums, such as Teachers Working Groups (KKG). When asked which group should design the professional development, a high percentage of primary teachers (89.9%) were in favour of the teachers' forum (see Table 7.19). Second, the teachers received information regarding the KTSP from colleagues with 56.0% of primary teachers agreeing or strongly agreeing with Statement Q2 "I am familiar with the KSP from colleagues". Finally, by taking part in professional development conducted by the local government, a vast majority of the teachers (about 89%) also obtained information concerning the KTSP (44.4% agreed and 42.2% strongly agreed with Statement Q31).

Table 7.19
Responses of Teachers to the Statement on Teachers' Professional Development (Q30, Q2, Q31, and Q28)

Statement	Per cent (Frequency) of Teacher' Choosing the Options					Mean	Mode	S.D
	SD (=1)	DA (=2)	UD (=3)	A (=4)	SA (=5)			
I think professional development should be designed by teachers' forum (Q30)	0.5 (3)	5.3 (34)	4.3 (27)	50.9 (321)	39.0 (246)	4.23	4	0.80
I am familiar with the KTSP from colleagues (Q2)	3.0 (19)	21.5 (135)	19.7 (124)	49.3 (311)	6.7 (42)	3.35	4	0.99
I think professional development have to be carried local government (Q31)	0.8 (5)	7.4 (47)	5.4 (34)	44.4 (280)	42.0 (265)	4.19	4	0.90
I think the topic of professional development useful for teachers is how to implement the "PAKEM" approach (Q28)	0.3 (2)	3.6 (23)	6.0 (38)	59.2 (373)	30.9 (195)	4.17	4	0.72

SD = Strongly Disagree; D = Disagree; UD = Undecided; A = Agree; SA = Strongly Agree

Furthermore, the vast majority of teachers (90%) agreed or strongly agreed with the use of the active learning approach (the PAKEM approach) in science teaching is a useful topics for in-serving training (Statement Q28), but they also perceived that the development of learning materials is an important topic for teachers' professional development (Statement Q38 in Table 7.9).

7.3 Teachers' and Superintendents' Perceptions of the Intended Primary School Curriculum: Six Case Study Schools

In this study, the teachers' perceptions of the intended primary school curriculum were investigated using the TPCR questionnaires. However, in order to further investigate teachers' and superintendents' perceptions of the intended primary school curriculum in the six case study schools, the metaphors of curriculum suggested by Schubert (1986) were employed as discussed in Chapter 4, Subsection 3.4.2.4. Within the Schubert (1986) framework, eight curriculum metaphors are offered, of which four have been chosen. These four curriculum metaphors had been utilized by Wahyudi (2004) to explore teachers' and superintendents' perceptions of the intended lower secondary school science curriculum. The four curriculum metaphors are reproduced and used in this study to indicate the primary school teachers' and the superintendents' perceptions of primary school curriculum in Bengkulu province, Indonesia (see Appendix A4). Therefore, within the context of this present study, their perceptions were framed within these four metaphors: (1) Curriculum as Content or as Subject Matter (2) Curriculum as Programme Planned Activity or as Syllabus Design (3) Curriculum as Intended Learning Outcome, and (4) Curriculum as Discrete Task and Concepts.

Six teachers and one superintendent participated in this study. The results from the data analysis confirmed that teachers and superintendents held different perceptions of the curriculum. Further descriptions of the findings are organised under the related metaphors.

7.3.1 Metaphor 1: Curriculum as Content or as Subject Matter

One teacher stated her preference for this metaphor and provided her opinion for their selections. Teacher B of school U2 argued:

> According to my opinion, I prefer curriculum as *content or as subject matter* (choice no.1) rather than as programmed planned activity. During instruction, I definitely ground my instruction on the curriculum framework that emphasises content of the subject which needs to be comprehended by students. So, the curriculum consists of the subject matter which is based on the standard competencies and the basic competencies. The teaching-learning activities are the realization of the standard competency and the basic competency as prescribed in the curriculum. (I.TB.U2.24.11.11)

7.3.2 Metaphor 2: Curriculum as Programme Planned Activity or as Syllabus design.

None of the teachers and superintendents who participated in this study pointed out this metaphor as their perception.

7.3.3 Metaphor 3: Curriculum as Intended Learning Outcome

Three teachers (TA,TC,TE) and one superintendent expressed their preference for this metaphor and provided their judgment for their choices. Teacher A of school U1 enthusiastically expressed her argument in selecting the metaphor that best represented her perceptions of the primary school curriculum. She stated:

> My teaching purpose is 'successful learning'. When performing my instruction, I am obliged to have and adhere to the aims; the aim is the intended learning outcomes. Whether it is achieved or not? The last thing is the outcomes. The results comprise two kinds; the success or not. However, if I view *curriculum as content or as subject matter*, I do not know whether the content was achieved or not. Therefore, I need to have the aims, the process, and the outcomes. Without paying attention to the teaching and learning process, I would say the final judgement is the students' learning outcomes (I.TA.U1.23.11.11).

In addition, Teacher C of school U3 expressed similar reasons for choosing her perceptions. Teacher C articulated:

> I agreed with all choices, however, I select '*curriculum as intended learning outcome*'. The curriculum is my scope, my expectation. By using the curriculum, my instruction needs to correlate with the intended goals. When I teach green plants, for example, my expectation is to have the students know about green plants. So, I would say my expectation is the intended learning outcomes. (I.TC.U3.25.11.11)

Furthermore, Teacher E of rural school 2 expressed different reasons for choosing her perceptions. She mentioned assuredly:

> ... the intended learning outcomes... [She read through all the metaphors provided by interviewer] that must be achieved…and that must be pursued in the classroom. During my 26 years of teaching experience, the most frequently asked questions by the principal and the superintendent are how well my teaching practice achieved the learning outcomes. They hardly ever asked how well I prepared my instruction, what kinds of assessment I used and what instructional resources I need. So, I think my teaching focus is on the set of students' learning outcomes. That is the reason why the product or students' learning outcome is my priority. I leave the process as

the conduit to reach the goals. (I. TE. R2. 24.11.11)

The superintendents (S) confirmed his view of curriculum with this metaphor. Confidently he mentioned:

> From these four metaphors, I tend to choose metaphor no.3 [curriculum as intended learning outcomes]. For me, the curriculum is simply the framework; it is the framework that brings a teacher to reach the final goals. As we know, every activity needs the goals. Reaching the goal needs the pathway. The pathway guides us to reach the goals. The most important for me is the goals rather than the process. The curriculum is the framework that leads teachers' instruction to achieve the final goals. Teachers can modify the process, depending on students' condition and the schools, however, the final goals cannot be altered. So, I think my perception is similar to …[curriculum] as a set of learning outcome that will be achieved. (I.S1.26.11.11)

7.3.4 Metaphor 4: Curriculum as Discrete Task and Concepts

Two teachers (TD, TF) being interviewed chose this metaphor deliberately to represent their curriculum perceptions. They explained their understanding of curriculum definition as intended in the curriculum document and followed their argument of selecting the preferred metaphor. For example, Teacher F of rural school 1, although hesitantly, argued:

> Among these four metaphors, the most appropriate for me is no. 4 [curriculum as discrete tasks and concepts]. I think the learning tasks that I have planned and taught should be achieved by the students. The effectiveness of the instruction is measured by how many principles of science can be absorbed and used by students in answering the questions during the formative and summative tests. The learning tasks are based on the syllabus following the curriculum framework. So, whatever I have planned and taught about science is to ensure that students are well-informed with science principles. (I.TF.R3.25.11.11)

The results indicate varied perceptions of the primary school curriculum based on curriculum metaphors. This diversity can be explained on account of the differences of every respondent's priority in interpreting the curriculum definition. Curriculum generally is defined as 'a set of plans and regulations regarding the aims, content and material of lessons and the methods employed as the guidelines for the implementation of learning activities in order to achieve given objectives' (Ministry of National Education, 2003, p.7). Several keywords can be mined from this definition such as a *set of plan, the aims, content and lesson material, and method*. The degree of respondents' preferences for these keywords may lead to their interpretation of the curriculum definition, hence forming their view of curriculum. If

a respondent prefers to focus his or her interpretation on keywords such as aims, it can be expected that he or she would choose curriculum as intended learning outcomes to represent his or her perception of curriculum.

Three of the six respondents had some difficulties in deciding which metaphors they should select between two or three that sounded the best to indicate their perceptions. In coping with this situation, they might reinforce one metaphor and drop the other. For instance, Teacher D and Superintendent A (SA) balanced their choosing of curriculum metaphor between curriculum as intended learning outcomes and curriculum as programmed planned activity. Although they agreed that teaching and learning activity or process was important, they did not support the description of instruction as a fixed plan. For example, when he was requested to elaborate on his choice of metaphor, the superintendent said:

> I believe the notion of final results is determined by the process; if the results are outstanding, the process should be outstanding too. So I would rather give the choice of teaching process to the teachers themselves; I mean… Teachers can teach in many ways or use different techniques to achieve the expected students' learning outcomes. To me, the teaching process must not be mandated as written in the curriculum document. (I.SA.25.11.11)

Alternatively, respondents might hold several metaphors by ranking in their head the order of preference. An example of this case was shown by the response of Teacher D who deliberately included four curriculum metaphors to represent her perceptions. She stated that despite her choice of curriculum as programme planned activity or as syllabus design, she also considered the two other metaphors, namely, curriculum as content and curriculum as discrete task and concepts to represent her views of curriculum.

7.4 Students' Perceptions of the Classroom Environment

The purpose of Section 7.4 is to describe the findings from administering and analysing the student questionnaire to respond to the research question: How do students in primary schools perceive their science classroom environment? Fraser (1998a) argued that there is strong connection between the classroom learning environment and student outcomes, both effective and academic. As mentioned in Chapter 4, *My Classroom Inventory* (MCI) was employed in this study as a measure

of classroom environment (Fraser & Fisher, 1986). This particular instrument was chosen because the vocabulary is well suited for the primary school students, the responses are in a simple YES-NO format, the answers are recorded on the questionnaire itself to avoid errors in transferring information from one place to another (Fraser, 1989).

The MCI has both a preferred form and actual form. The preferred form is concerned with goals and value orientations as it measures perceptions of the environment ideally liked or preferred (Fraser, 1998b). The actual form measures perceptions of the learning environment that currently exists in the classroom. The preferred form, with wording almost identical to that of the actual form, provides an indication of perceptions of an ideal class. An example of wording is "Some students in my class are mean" for the actual form and "Some students in my class would be mean" for the preferred form (Fraser, 1989).

The perceived or actual forms assess the perceptions of the actual classroom. Preferred or ideal forms measure perceptions of the ideal or desired classroom environment. Knowledge of both the students' preferred environment and their perceived environment can indicate areas that need to be addressed in order to create a more positive classroom learning environment.

The Indonesian version of MCI assesses the three scales of Satisfaction, Friction and Cohesiveness. It has 14 questions, five questions for *Satisfaction* scales and *Cohesiveness* scales and four questions for *Friction* scales, and is written for the primary school-level student. The actual form of the Indonesian version of MCI was administered in October 2010 to 159 students in six classes. The preferred of the Indonesian version of MCI was administered in November 2010. Prior to the main data collection, a pilot study that involved 611 Grade 5 students in 23 classes of 9 schools in Bengkulu province, Indonesia. The questionnaire's validity, including the factor structure, the scale's internal reliability, and discriminant validity were discussed in Chapter 4.

7.4.1 Descriptions of Typical Science Classroom Learning Environments

Since the number of items in each the Indonesian version of the MCI scales varies from 4 to 5, the average item mean (i.e. the scale mean score divided by the number

of items in that scale) and average item standard deviation of each scale for both the actual and preferred forms of each the Indonesian version of the MCI were computed to investigate the status of the classroom environment in six primary schools. The average item mean was used to provide a meaningful basis for comparing the means of scales containing differing numbers of items. In addition to that, a *t*-test for paired samples for each scale to check the statistical significance of differences between students' actual and preferred perceptions of their classroom learning environment.

In order to portray a more detailed picture of the classroom environment, this study also investigated any of the differences in students' perceptions of their classroom learning environment based on the school's locality. These differences were calculated using *t*-tests with paired samples. The findings are organized into two sections. Differences between students' perceptions of the actual and preferred science classroom environment are described in Section 7.4.1.1. Differences between students' perceptions of the actual science classroom environment based on the schools' locality are explained in Section 7.4.1.2.

7.4.1.1 Differences between Students' Perception of the Actual and Preferred Science Classroom Learning Environment.

Results from *t*-tests for paired samples showed that there were statistically significant differences ($p<0.05$) between students' perceptions of their actual and preferred learning environment on all Indonesian versions of the *MCI* scales except *Friction*. A summary of the average item mean and average standard deviations for the two versions of the questionnaire together with the difference between actual and preferred score on each scale (the results of a *t*-test for paired samples) is reported in Table 7.20. Mean scores of the same data are graphed in Figure 7.5.

Table 7.20
Average Item Mean, Average Item Standard Deviation, *t*-Value from *t*-Test and Effect Size with Paired Samples for Differences between the Actual and Preferred Perceptions

Scale	Average Item Mean		Average Item Standard Deviation		Difference in Average Item Mean	*t* value	*Sig.* (2tailed)	Effect size
	Actual	Preferred	Actual	Preferred				
Satisfaction	2.69	2.78	0.44	0.41	-0.09	-2.02	0.04*	0.02
Friction	1.41	1.42	0.62	0.67	-0.01	-0.18	0.86	*NA*
Cohesiveness	2.65	2.78	0.54	0.43	-0.13	-2.36	0.02*	0.03

The sample consisted of 159 students in six classes.
*p < 0.05

As can be seen in Table 7.20, students would prefer a significantly more favourable classroom learning environment on the two scales of Satisfaction and Cohesiveness. In other words, students preferred to have more Satisfaction and more Cohesiveness. Although the eta squared statistic of *Satisfaction* and *Cohesiveness* scales (0.02 and 0.03, respectively) indicated a small effect size according to Cohen (1988), by interpreting the results in Figure 7.5, students tended to prefer a more favourable classroom environment than perceived as actually present on the two dimensions assessed by the Indonesian version of the *MCI* scales. Interestingly, students perceived roughly the same level on the *Friction* scale for both the actual and preferred forms (see Figure 7.5). This anomaly affirms further investigation.

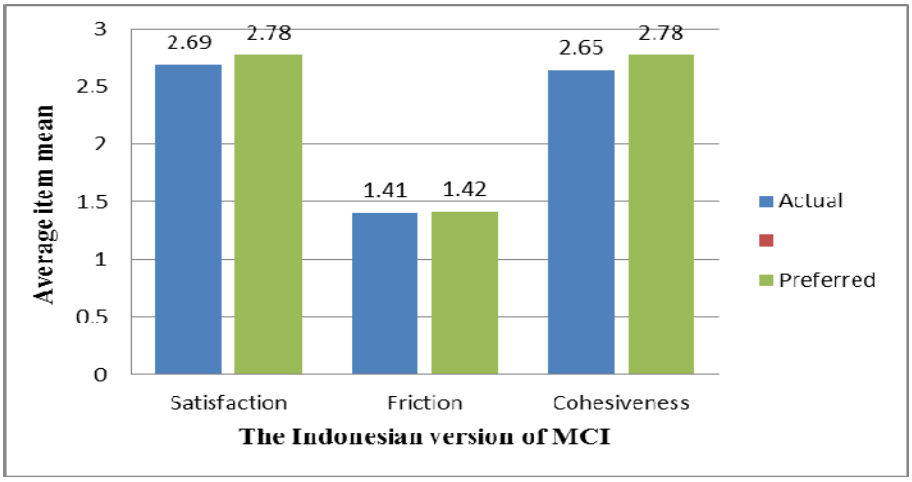

Figure 7.4 Average Items Mean for Actual and Preferred Forms of the Indonesian Version of MCI Scales.

In sum, Table 7.20 and Figure 7.5 suggest that the students' perceptions of two scales on the preferred version of the science classroom environment questionnaire are statistically significantly different to their perceptions on the actual version of the same questionnaire. The result is consistent with previous studies (Mink & Fraser, 2005) and suggests that students' satisfaction would be greater in classrooms with greater student cohesiveness.

In terms of evaluating the effectiveness of the six primary school teachers in creating positive learning environments, it seems that the levels of classroom satisfaction of the lessons and student cohesiveness that are actually created by the six teachers are not at the levels preferred by the students. These results could provide evidence for the effectiveness of curriculum evaluation in the fifth-grade classroom in six school case studies.

7.4.1.2 Differences between Students' Perceptions of the Primary School Classroom Learning Environment Based on Schools' Locality.

To investigate differences between students' perceptions of the classroom learning environment in term of schools' locality (urban, rural), *t*-test for paired samples was carried out for each the Indonesian version of MCI scales. All three scales of both actual and preferred forms of the Indonesian version MCI were placed as the dependent variable. A summary of average item mean, average item standard deviation, and *t* valued from *t*-test for paired samples for differences between rural and urban students' perceptions of their classroom learning environment is displayed in Table 7.21.

Table 7.21
Average Item Mean, Average Item Standard Deviation and *t* Values from *t* - test with Independent Samples for Differences between Rural and Urban Students' Perceptions of Classroom Learning Environment.

Scales	Form	Average item mean		Average item standard deviation		Locality differences in average item mean	*t*-value	*Sig* (2-tailed)
		Rural	Urban	Rural	Urban			
Satisfaction	Actual	2.79	2.72	0.38	0.44	0.07	1.09	0.28
	Preferred	2.89	2.88	0.28	0.28	0.01	0.29	0.77
Friction	Actual	1.33	1.35	0.53	0.61	-0.02	-0.11	0.91
	Preferred	1.37	1.14	0.64	0.34	0.22	2.39	0.02*
Cohesiveness	Actual	2.61	2.86	0.59	0.32	-0.24	-2.90	0.005**
	Preferred	2.86	2.79	0.38	0.43	0.07	0.88	0.38

The sample consisted of 159 primary school students in six classes.

*p<0.05; **p ≤ 0.05

As shown in Table 7.21, students in urban schools prefer significantly ($p < 0.05$) less friction than students' perception in rural schools. Interestingly, students in urban schools perceived more cohesiveness than students in rural schools ($p \leq 0.005$). While the magnitude of the differences between students' views of the classroom learning environment in rural schools and students' views in urban schools are small and statistically not significant for *Satisfaction* scales in both actual and preferred form for *Friction* scales in actual form and for *Cohesiveness* scale in preferred form, respectively.

To some extent, however, students' views about their classroom learning environment either in urban school or rural school are not very much different. The learning environment may be affected by teacher support of her students. All classrooms in the three cases studies at the urban school have more than 25 students each class. Consequently, teachers do not give their attention and monitor all students' activities at the same time. Teachers in urban school predominantly pay attention to students sitting in the first or second rows. However, teachers in rural schools can pay attention to every student due to the small number of students in every classroom.

7.5 Summary of Chapter

This chapter has addressed both Research Questions 3 and 4. Responses to Research Question 3 are provided in Section 7.2. This section shows that the study findings are categorized into two parts: respondent demographics and the teachers' perceptions toward the KTSP. In the first category, the teachers' responses was analysed using percentage and non-parametric statistic such as Mann-Whitney U test, Kruskal-Wallis test, and Friedman test. The Mann-Whitney U test and Kruskal-Wallis test were employed to trace the relationship between demographic respondents and selected variables. The findings indicate that no significant differences were founded across the three scales (i.e., Implementation, Adaptation, and Adoption scales) with data analysed by gender, age, teaching experiences or years of implementing KTSP.

In the second category, by examining the individual items of both adoption and adaption scales reveals that teachers' knowledge related to KTSP were still at the level of 'adopting' and 'adapting', in which teachers attempt to understand the KTSP and to enact it in the classroom. With regard to 'implementing' the KTSP, teachers face problems having to do with learning materials, teaching methods, assessment, and instructional resources. Primary school teachers involved in this study claim that the topics of training teachers prefer to use something from their daily class problems and to have experts in subject matter for in-service training from the Committee of Education Assurance, the university, and local government officers.

Teachers' and superintendent's perceptions of the intended science curriculum are provided in Section 7.3. The results, which are based on the perceptions of six case study teachers and one superintendent, revealed that primary school teachers and superintendent hold different perceptions of the intended curriculum. The metaphor 'Curriculum as Intended Learning Outcomes" was commonly perceived by three teachers and one superintendent who have this view. 'Curriculum as Discrete Task and Concepts' is the second metaphor preferred in which two teachers hold this view for different reasons. One teacher expressed her preference for the metaphor 'Curriculum as Content or as Subject Matter'. None of teachers chose the metaphor 'Curriculum as Programme Planned or as Syllabus'.

The description of the science classroom learning environment was discussed in Section 7.4. With regard to the use of the Indonesian version of MCI, the findings included the cross-validation of the questionnaire, the comparison of the actual and preferred perceptions of students and of school locality. The results of study can be summarised as follows.

First, there was a gap between the actual and preferred perceptions held by the students at all schools regardless of locality. Obviously, students were not content with the actual learning environment as indicated in their preferred view of what kind of learning environment should be created by the teacher. Students would prefer a learning environment that has more satisfaction and better student cohesiveness.

Second, disparities also exist between perceptions of students in rural schools and of students in urban schools. To some extent, students in urban schools perceived a more positive learning environment than did their counterparts in rural areas for Cohesiveness scales and preferred less student friction. This finding warrants that teachers in rural schools should consider what should be done to provide a better classroom learning environment as well as to assure teachers in urban schools to create the learning environment that continuously lessens the student friction during school time.

CHAPTER 8

THE DISCREPANCIES BETWEEN THE INTENDED AND IMPLEMENTED PRIMARY SCHOOL SCIENCE CURRICULUM

8.1 Introduction

This chapter reports the findings on the two research question: Which discrepancies can be observed between the intended and implemented primary school science curriculum? (Research Question 5), and How can the observed discrepancies between the intended and implemented primary school science curriculum be explained? (Research Question 6).

In this chapter, the findings of Chapters 6 and 7 are utilised to identify and explain how the teachers perceived the intended science primary school curriculum and put their understanding into instructional practice in their classrooms – referred to as the implemented curriculum. By taking into consideration the findings of the implemented curriculum (i.e. Chapter 6 and 7) and the intended curriculum (i.e. Chapter 5), the discrepancies between the intended curriculum (as specified in the national curriculum or the content standards) and the implemented curriculum (as put into practice by the teachers in classrooms) can be identified and explained.

The discrepancies between the intentions and implementation of selected curriculum components such as rationale, content, instructional strategy, material and resources, and assessment are presented in Section 8.2. For explaining the observed discrepancies, the findings discussed in Section 8.2 are culminated in Section 8.3. In order to illustrate the process of presenting the study results, the outline of Chapter 8 is provided in Figure 8.1.

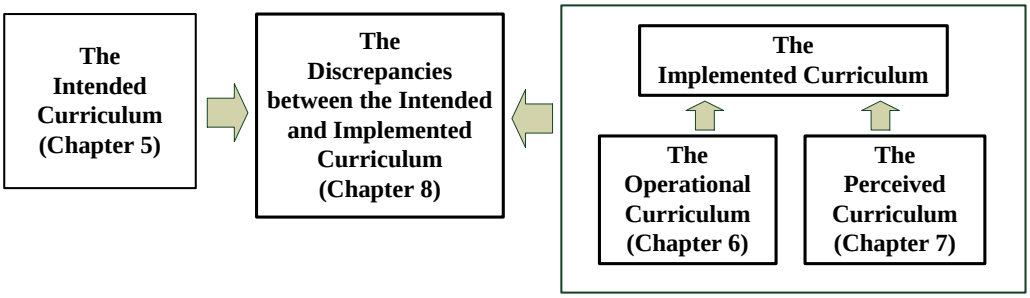

Figure 8.1 Outline of Chapter 8

8.2 Discrepancy between Intended and Implemented Primary School Science Curriculum

Identifying and explaining discrepancies is a potentially useful tool for investigating the adherence of schools or teachers to intentions. Thus, the discrepancies between classroom practices and the intentions written on curriculum documents play a key role to indicate how much a teacher is committed to the intentions. However, since a discrepancy has relative meanings by itself, it is useful to distinguish between intentions that can be implemented 'on paper' and intentions that require 'actual action' of the teachers.

8.2.1 Rationale

As already stated in chapter 5, the intended rationale statements written on the national curriculum document (or the content standard) are unspecified. As a result, the range of the intentions is broad, allowing a variety of vision and mission statements to fit the intended rationale, so long as it is directed towards developing moral, intellectual, social and physical aspects of learners.

Fieldwork in the six case study schools revealed that all vision and mission statements were aligned with the intended rationale; they were broadly defined but offered little practical guidance. From the results of the document analyses, it was pointed out that the vision and mission statements in the KTSP documents in the six schools take into account moral, intellectual, social and physical aspects, and state that the students will come into the community as well developed Indonesians. Frequently, these vision and mission statements were accompanied with other moral messages (e.g. learners become good citizens, polite, industrious). For instance,

Figure 8.2 presents the school U3's vision and mission. Therefore, there is no observable discrepancy between the intended and implemented 'rationale'.

Vision:
To form learners who are religious, skilled, intelligent, creative, and competitive
[*Membentuk peserta didik yang bertaqwa, terampil, cerdas, kreatif, and kompetitif*]

Mission is to
1. Have the learners who are pious, intelligent, creative, competitive, communicative, and able to develop science and technology and art.
   [*Mewujudkan pendidikan dengan kelulusan yang bertaqwa, cerdas, kreatif, kompetitif, komunikatif serta mampu mengembangkan IPTEK dan Seni*].
2. Reach excellence, efficiency, relevancy and effectiveness in the education
   [*Mewujudkan pendidikan yang bermutu, efisien, relevan dan efektif*].
3. Develop the learners to become cooperative, disciplined, orderly and skilled.
   [*Mengembangkan sikap kooperatif, disiplin, tertib and terampil*].
4. Shape the learners who are spirited, patriotic, and readyly help each other.
   [*Membentuk peserta didik yang berjiwa patriot, siap membantu sesamanya*].

Figure 8.2 Vision and Mission of School U3

The school principals employed certain strategies to disseminate the school's vision and mission to the school community, particularly teachers. For instance, the vision and mission of school U3, R1, and R2 were displayed on the walls of the principal's or the teachers' offices. Besides that, the vision and mission could be found also on many walls in the school U1, school U2 and school R3.

8.2.2 Content

According to article 36 of the 2003 National Education System Law, the development of curriculum is based on the National Education Standards for the pursuit of national education goals. The national curriculum is composed of a series of cross-curriculum competencies for each subject matter; these competences are divided into standard competencies and base competencies. Accordingly, the national curriculum is a basic framework consisting of 'minimum learning competencies' that has to be achieved by all students through their learning experience at schools.

In line with the underlying decentralisation paradigm, a framework is offered that has to be 'finished' by schools. It consists of sometimes inspiring and challenging competences, of which the competence "developing a model equipment using the

light properties such as periscope or lens …", is an example. Regardless of the sometimes challenging framework, it offers a clear impression of the categories that have to be covered. Proposing a framework that requires to be 'filled in' by the individual schools, leads to the intention to being rather broad; so long as the framework is used, virtually all the 'filled in' frameworks are corresponding to the broadly defined intentions.

The fieldwork indicated that the six observed schools adhere to the intended framework. The finished framework is written down in the documents typically named 'syllabus'. In regard to the availability of syllabi at school level, schools tended to reproduce 'the generic model of syllabus' published by the Curriculum Development Centre and *Badan Standar Nasional Pendidikan* (the BSNP).

The KTSP (School-Based Curriculum) officially started to be implemented in the 2006 school year. Nonetheless, during the first fieldwork (in 2009) conducted, only three teachers were able to present the syllabus documents to the researcher. The teachers of School U1, R1 and R2, however, could not show a syllabus for the academic year 2009; it is believed that the syllabus is soon to be finished. During the second fieldwork visit (in 2010), the six teachers could show these syllabuses and all syllabi adhered to the general intended framework. Hence, no discrepancy between the intended and implemented 'content' was observed.

8.2.3 Instructional Strategy

As stated clearly in the National Standards Document, the educational processes in the classroom have shifted from the teacher paradigm toward the learner paradigm. The national standards ask for the teaching and learning process in the classroom to become more interactive, inspirational, challenging, motivating the students to actively participate and providing sufficient space for initiative, creativity and independence. This is not simply a paradigm shift but also the demand of a different type of approach to teaching and learning. In this regard, the instructional strategy comprises the degree to which the teacher acts as a 'facilitator' and as a traditional 'source of knowledge'. Accordingly, the six teachers participating in this study need to rethink the way instruction is practised in their classrooms.

Fieldwork showed that in most cases observed in the six classrooms; there was a considerable gap between the teacher as 'facilitator' and the teacher as 'source of knowledge'. To some degree, the teachers' science practices in the six classrooms were likely to adopt and implement 'the traditional teaching method'. Traditional teaching is defined as teacher-centred, classroom-disciplined and textbook-oriented, typically using the lecture method followed by whole-class questions and answer method and using textbooks and worksheets which give students step-by-step instructions. Observations from the fieldwork reflect little of inquiry-based, explanatory, communicative, cooperative, and active-engaged means of instruction.

Though the degree and extent of practicing 'traditional teaching method' varied from school to school, there are large discrepancies observed between intentions and implementations for school R1, R2, and R3. An intermediate discrepancy is observed for school U2, and the small discrepancies could be discerned at school U1 and U3.

8.2.4 Materials and Resources

The instructional materials and resources are not clearly defined in the curriculum documents. Nonetheless, the six teachers predominantly perceived that the textbooks are the most important instructional materials for their instruction. In addition to textbooks, science kits are not stated explicitly in the national standard document as well. According to the description of the intended teaching strategy, it can be reasonably argued that science kits should be sufficiently available in the primary schools.

The fieldwork revealed a discrepancy was identified in the rural school areas. The lack of availability of science textbooks, science kits and teaching aids was faced by the teachers of schools R1, R2 and R3. Although, the accessibility of science textbooks at the school R3 was sufficient for every student, the science kits were not accessible to the students and the teachers for some reasons such as the limited quantity, the missing operational guidelines, and the broken equipment or being out of order. It can, therefore, be argued that a large gap exists between the intention and implementation – excluding the three schools in the urban area.

8.2.5 Assessment

Assessment of student learning is intended to provide a more holistic impression of their learning and to determine what student skills need to be developed (Badan Standar Nasional Pendidikan, 2007). For these objectives, the assessment is done on three learning domains: cognitive, affective, and psychomotor.

Unfortunately, the fieldwork revealed that practically all assessment done in the six observed classrooms was in the cognitive domain. The reasons why few efforts are made by the six teachers to assess student learning in the psychomotor and affective domains were the lack of practical assessment information in the guidelines. Although, the affective domains, for example, are defined in the guidelines as students' attitudes that include social and emotional intelligence, the role of affective characteristics in student learning is unspecified in the guidelines.

Additionally, continuous assessment is used only as a technique for summative evaluation and not as part of the learning process. The survey data indicated that three-quarters of the teachers (63%) did not practice formative assessment to assess students' learning. Thus, the concept of assessment is not fully understood by the teachers. Due to the facts, the schools' assessment is not in line with the intentions.

For the sake of convenience, a summary of the observed discrepancies between the intended and implemented curriculum component are presented in Table 8.1

Table 8.1
A Summary of the Observed Discrepancies between the Intended and Implemented Curriculum Components

Aspects of Observations	Observed Discrepancies					
	Urban schools			Rural schools		
	Teacher A	Teacher B	Teacher C	Teacher D	Teacher E	Teacher F
Rationale	No	No	No	No	No	No
Content	No	No	No	No	No	No
Instructional strategy	Small	Intermediate	Small	Large	Large	Large
Material and resource	Small	Small	Small	Large	Large	Large
Assessment	Large	Large	Large	Large	Large	Large

Based on the findings that emerged from the fieldwork, the schools, in particularly the six teachers, make observable efforts to adhere to the intended curriculum. The study findings in regards to the status of the schools' commitment to the intended curriculum are synopsised in four assertions.

First, no discrepancies are observed between the intended and the implemented rationale in the six cases. The alignment between intentions and implementation is observed as predicted due to the broad and unspecified definition of the intended rationale.

Second, there are also no discrepancies observed between the intended and implemented content in the six cases. Apparently, the framework of competencies that needs to be filled in by the respective schools is a sufficient one.

Third, to some extent, large discrepancies can be observed between the intended and implemented instructional strategies in the three rural schools. Apparently, the written supports (i.e. the KTSP guidelines) have not resulted in the lessons that are in line with the intended instructional strategy as identified while the classroom observations in the three rural schools. Conversely, intermediate discrepancies were observed in school U2, and small discrepancies in schools U1 and U3.

Fourth, from large to small discrepancies are observed between the intended material and resources and the actual material and resources available in the six cases. These findings could be easy to indicate because no explicit intentions for material and resources are given in the national standard document.

Finally, since the cognitive domain was the mostly preferred to use in assessing students' learning, there are large discrepancies observed between the intended and implemented assessment.

These three curriculum components, namely, rationale, content, assessment, are all administrative requirements, in the sense that these all need to be written down. Whether the schools meet these requirements or not can be confirmed by examining the documents made by the six schools. Nonetheless, the implementation of the intention curriculum, which are not required to be written down in detail in the documents, but instead have to be 'enacted in real practice', are the instructional

strategy and the material and resources. Hence, Subsection 8.3 provides the explanation of the discrepancies between the intentions and the implementation of the two curriculum components in the six case study schools.

8.3 Explaining the Observed Discrepancies

8.3.1 Introduction

To explain the observed discrepancies, Section 8.3 culminates the information of the previous chapters. It also presents the findings of the questionnaire, classroom observations and interviews, which were not yet discussed. Literature is used to support the inferences.

To some degree, the instructional strategy is one of the curriculum components that has to be enacted in 'real practice'. In fact, the instructional strategy can demonstrate how the teachers interpret the intended curriculum and deliver it to the students. Therefore, focusing on the instructional strategy is also relevant to this study because all degrees (large, intermediate, and small) of discrepancies have been observed.

Since a discrepancy was observed between the intended and the implemented instructional strategy through 12 classroom observations in the six primary schools during science instructions, Section 8.3.2 explains to what degree the differences in the six cases and the status of primary school science teaching in three schools in the rural areas can be used to explain these observed discrepancies. After concluding that these differences cannot satisfactorily explain the observed discrepancies, a number of factors are discussed which have been encountered during the fieldwork. The first factors are Time Constraints (Section 8.3.3), Non-Alignment of Examination and the Intended Curriculum (Section 8.3.4), Lack of Intellectual Support (Section 8.3.5). The three other factors are Lack of Instructional Materials (Section 8.3.6), Professional Development (Section 8.3.7), and Teacher's Belief and Resistance (Section 8.3.8). This subsection finishes off with concluding comments which discuss briefly the observed discrepancies in the other curriculum components, among others.

8.3.2 The Description of Instructional Strategy Based on Schools' Locality

8.3.2.1 Class Size

Although there are various views concerning the educational effects of class size in schools, the size of the class can be used to explain partly the close alignment with the intentions. It is natural to think that the smaller the number of students, the more attention the teacher can give to each student individually (cf. Blatchford, Bassett, & Brown, 2011). In addition to that conception, one can plausibly argue that the smaller the numbers of students, the more learning materials are available per student - this is in particular relevant, when the materials and resources are limited. Therefore, class size had an important influence on teaching and learning process in the classrooms.

The related literature clearly indicates that the class size and the effects associated with the class size should be seriously taken into consideration. For example, students in smaller classes have been shown to ask twice as many questions compared to those in large classes and teachers adjust their style of teaching (Blatchford, Russel, Basett, Brown, and Martin, 2007). In other words, teachers tend to use a whole class teaching method when faced with a larger class. Murphy, Neil and Beggs (2008) reported that, in addition to teachers' confidence and ability to teach science, large class sizes, lack of resource, and lack of time for science teaching for science are the central constrains faced by primary science teachers. In this regard, there would be some differences between teaching in small class and in large class.

In order to consider the effect of class size on teaching, it is important that reliable measures of class size be used. As pointed out by national standard document (2007, p.12), the preferred number of students in a classroom is 28. No matter how good the curriculum guideline is, even an excellent teacher would find it extremely hard to deliver the curriculum effectively in a class of 25 to 35 students with the scarcity of material and resources.

The number of students in every class in school U1, U2, and U3 is on average 27 to 32 students. On the contrary, fieldwork conducted in school R1, R2, R3 revealed that the three classrooms had the same (small) number of students in their classes. Despite the small class size with 15 to 20 students in three classrooms, the

instructional strategy was not in line with the intentions. To sum up, the class size is not a factor potentially influencing variability of level of teachers' practices the intended instructional strategy.

8.3.2.2 Financial Support

Limited finance is the largest problem faced by the schools in rural or remote areas in supporting the instructional processes in the classrooms. Many examples of curricular interventions have failed, not because of teacher resistance, but because administrations or principals failed to provide adequate budgets and time to prepare the lessons (Darling-Hammond, 2003). The limited financial support in the three rural schools was one of the biggest challenges faced by the teachers to implement the intended instructional strategy such as inquiry science approach.

As pointed out by Teacher E in Section 6.2.2.3, because no budget was provided to have instructional supplement for hands-on activities, Teacher E preferred to practice whole-class activity or employ demonstration teaching methods. The same condition also was faced by the two other teachers at school R1 and R3.

Furthermore, since the majority of rural school students came from low socio-economic family backgrounds, the three school principals indicated that they faced a big challenge to get the parents' contributions for supporting the school programs. The school principal at school R3 expressed her concern about the limited parents' contribution to the school programs as follows:

> …the second constraints are the parents' contributions in supporting the school programs. Our school needs the financial support from parents to smoothly run the school's programs. Some of the programs are not responded to by the parents, and sometimes the financial contribution is not as much as my expectation. Indeed, I know the majority of my students come from disadvantage family backgrounds. So,.. you know… I am unhappy to insist them give for contributions. (I.TE.R3.04.10.09)

Examining the specific character of the three classrooms in the urban schools, an explanation may be that financial support is needed for the teaching and learning process in the science class. To sum up, it was reasonable that the financial support can explain the discrepancies observed between the intended and implemented instructional strategy in three rural school areas.

Although Teacher B did not state in interviews that the financial support was the constraint in her daily teaching practices, the informal interviews with the school

principal revealed that the parent's contributions for supporting the school's programs were greatly encouraging since the majority of students came from the middle socio-economic family backgrounds. However, it did not seem likely that the financial support significantly influenced to Teacher B's decision in practicing the intended instructional strategy. Using the fieldwork findings such as classroom observation and interviews with her students, Teacher B preferred to practice the whole class activity and employ the science textbook as the instructional strategy.

Taking into consideration the financial support as one of variables that influence teachers in practising the intended instructional strategy, the teachers at three rural schools and one urban school did not practice the intended instructional strategy. This added to the assumption that financial support was not able to explain the observed discrepancy between the intended and implemented instructional strategy in terms of the school locality.

As previously stated, the difference in class size cannot satisfactorily explain the observed discrepancies in the instructional strategy. Furthermore, the amount of financial support does not enable an explanation of the discrepancies in instructional strategy. To seek the explanation for the discrepancies, other factors are needed. Therefore six factors are identified and are discusses in the following subsections.

8.3.3 Time Constraint

Primary school teachers agreed with the fact that extra time is required for science teaching, specifically in regards to the change of the their roles from curriculum implementers to curriculum developers. A high percentage of teachers (roughly 95% of 631 teachers) perceived that the syllabus development was a time consuming activity in terms of preparing learning materials. As a classroom teacher, developing a syllabus for all subjects as indicated in Subsection 5.2.2 (except religious education, physical education, sport and health) required extra time. As a result, more than 83% of teachers argued that an incentive was needed to be provided for them to spend extra time on that task.

In addition, as the consequences of their roles nowadays as the curriculum developers, the teachers faced a big challenge to examine basic competencies in

order to formulate the learning indicators. The survey data revealed that a vast majority of teachers (99%) argued that they still need to learn more about the KTSP guidelines. This role became more challenging for them since their knowledge about the guidelines are not sufficient to compose the learning indicators that must be obtained from the content standards. The flow of process of syllabus development is illustrated in Figure 8.3.

The fieldwork revealed that one of the reasons why the six teachers were not able to develop their own syllabi and lesson plans was the time constrain. During the first fieldwork (in 2009), for instance, teachers in schools U2, U3, and R3 were able to possess their own syllabi, yet the other three teachers were not. Knowing the need of the extra time for preparing the learning material, the time constrain can be partly linked to the observed discrepancies.

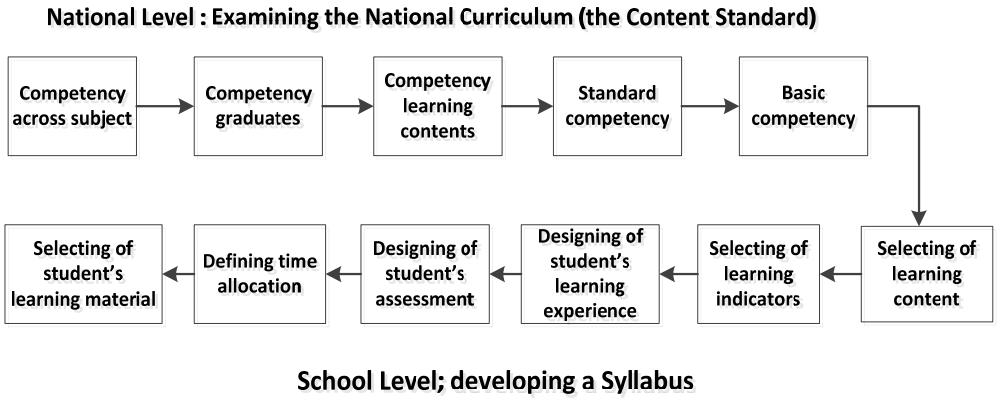

Figure 8.3 Flow Chart of Developing a Syllabus

A study conducted by Ministry of National Education (2008a) concerning the implementation of KTSP revealed that generally teachers interpreted the KTSP more on administrative matters. The study's report also indicated that, in general, primary school teachers had difficulties in developing syllabi into lesson plans particularly in selecting of learning content, instructional procedures and evaluation to achieve learning indicators, and rubric for assessments. They had difficulties in translating standards competency and basic competency into indicators, developing criteria for mastery learning, as well as the techniques of assessment. In the report, two reasons

were identified for those problems; (1) teachers had a lack of practical guidelines and examples; and (2) the administrative duty required a great deal of time.

8.3.4 Non-alignment of Examinations and the Intended Curriculum

Primary school students are subject to twice-yearly examinations, which are used to determine whether they are allowed to be promoted to the next class or to transfer to the next stage of education. Since teachers can contribute to the final grading of students through classroom assessment, teachers have more control over determining whether a student can graduate. In this regard, the survey data showed that a majority of respondents (84%) perceived that the classroom assessment was prepared by teachers. Theoretically, teachers have less pressure to 'teach to the test'. In reality, the examination was never far from the minds of teachers, given the centralized nature of the curriculum. Teacher A of school U1 expressed her opinion on this matter:

> …The curriculum then becomes the basis for the classroom instruction, while the examinations serve as a prod for teachers to follow it. (I.TA.U1.29.11.10)

Regarding the teachers' concerns about the examination, the survey data revealed that only learning material learnt by students were needed to be assessed. As indicated implicitly by the data, primary school teachers in this survey are sensitive to the context of the examinations that their students will be taking.

In this sense, the teachers are likely to be measured by parents and administrators through their success in getting their students to pass their examinations. Although the survey findings revealed that only 53% of teachers agreed that having student pass the school examination was the aim of their teaching, the examinations drives teachers to teach to the test and an enormous amount of time is devoted to test preparation at the end of each school year. On the contrary, more than 80% of teachers across all educational attainment and years of teaching experience perceived that the focus of the KTSP is on the students' competencies. This result suggested that the teachers participated in the survey had the knowledge of curriculum-based competency, but the interviews with the six teachers did not confirm the implementation of their understanding in the actual classroom due to the mismatch of examinations and the intention curriculum. For instance, Teacher A of school U1

expressed her view about the influence of examination on her daily teaching practices.

> [W]e think there are many positive aspects to the competency-based curriculum, but one problem that I have with this whole system reform is the fact that the student's learning is measured based on what a student achievement in examination. It seems to me our [teacher's] effort and a student performance is measured on the basis of what a student has written in the examination's paper. (I.TA.U1.06.12.09)

Because of the disassociation between the curriculum and the examination, teachers preferred to teach to the test, in particularly preparing students for taking the national leaving examinations.

The view of preparing students for examinations and the consequences of adhering to it were accepted by principals, teachers, and students. The influences of examinations can also be identified from the schools' vision and mission. For example, the school principal at school R3 stated clearly that the importance of students' success in the national examination is the school's priority. In this regard, teaching to the test is intensified when the stakes attached to the examination are high.

The following narrative from interviews with Teacher C provided complementary insight into dimensions of the view.

> Preparation for assessment is an important part of my teaching approach. The nature of the assessment … as prescribed in the guidelines, is required to be set down in the syllabus and lesson plans, so my students have no choice in how they will be assessed. Evaluation is going to happen at some stage, at the end of a unit study, so I spend quite a lot of time trying to prepare student for that situation, teaching students how I want answer to questions on examinations constructed. I work hard to make sure every student know my requirements, what is expected for high marks. (I.TC.U3.22.10.10)

With regard to teachers' pedagogical strategy, as stated by Teacher B at school U2 and Teacher D at school R1, the students spend their extra time at school to practice for the examinations after school time, especially for those of students who were going to take the leaving school examination. In that way, the teachers can ensure that their students have the best change to pass the examination. Therefore, the examination greatly influences science teaching practices in the six observed classrooms. In other words, the examination drives the intentions of the intended curriculum and the preferences of instructional approach rather than the reverse. As stated by Au (2007), most high-stakes testing models resulted in confining of

curriculum, fragmented subject coverage, and increased use of teacher-centred pedagogy (i.e., lecturing instead of inquiry).

8.3.5 Lack of Intellectual Support

The teacher forum known as the KKG (in *Bahasa* Indonesia: *Kelompok Kerja Guru*) was stimulated in the Government Regulation No. 38 of 1994. Based on the regulation, this professional forum at the district level has five aims. One of its aims that are associated with this current study is to provide teachers with the opportunity to share information and experience in curriculum implementation. As a result, this forum was expected to be a form of early teacher's professional development.

However, this forum was discontinued by the local government for efficiency or certain reasons. Although teachers at rural or remote areas had several difficulties to attend the forum such as transportation and getting permission to leave schools, many teachers expressed their concern in terms of the lack of local government support for this forum. As expressed by Teacher D at school R2 in this prescribed interview,

> I had no opportunity whatsoever to be involved in the INSET since my teaching employment. But, since I moved to this school, I was involved actively in the KKG, but from the last semester until nowadays I did not receive the invitation to attend the KKG. I heard that it does not exist anymore due to lack of budget. Frankly speaking, I feel sad to hear that because I got the precise benefit from that KKG. (I.TE.06.10.09)

Although over 61% of teachers preferred the resource person of the INSET from the teacher group, roughly 90% perceived that the INSET should be designed by the teachers' forum. This evidence indicated that the forum's activity should be on the basis of teachers' practical needs such as solving the problems in daily teaching practice. The similar comment also was expressed by Teacher D as the following quotation:

> Attending the teacher forum for me is important because I can obtain the alternative solutions to my problem, [for instance], in dealing with students' passiveness in the classroom. Also,..we can share our experience about learning material development and instructional strategy using the learning material developed. (I.TD.R1.31.09.09)

Apart from several obstacles encountered by teachers, particularly the teachers from schools in rural or remote areas, teachers value the opportunity to have regular meetings to share their experiences with colleagues from other schools. Their

experiences can be an excellent recommendation for other teachers to improve the implementation of the KTSP in science instruction, because learning from their experience can benefit other teachers. Thus, the role of the KKG in improving the teacher's professionalism is becoming more important when the intention is to implement the intended instructional strategy.

8.3.6 The Lack of Instructional Materials

Instructional materials are key ingredients in learning. They provide information, organize the presentation of information in terms of scope and sequence, and provide students with opportunities to use what they have learned. This contention was strengthened by a high percentage of teachers (96%) who perceived that instructional materials are needed for helping students in learning. Primary school teachers in this survey study were underpinning the challenge of creating their own instructional materials required in the implementation of the KTSP. In addition to the survey data, the lack of instructional resources may also drive teachers to practice the traditional way of teaching as identified in the three rural schools during the field study.

In addition to the accessibility of and providing the instructional material, another issue which was important to be addressed concerning instructional materials, particularly textbooks, is how to use a textbook as one of instructional tools rather than following it in sequence. For example, fieldwork conducted in schools U2, R1, R2, and R3 showed that the teachers at those schools adopted the lesson topics to be taught by following the textbook in sequence and used the worksheets in learning activity and reproduced the exercises provided in textbooks as assessment.

Although the textbooks predominantly influenced teachers' decisions in planning and practicing the science instruction in the six case studies, the survey indicated that 82% of primary schools teachers believed that the shortage of textbook at school had not influenced their teaching activities because the curriculum guidelines enabled them to implement their instructional processes in the classrooms.

Using the fieldwork findings, to some extent, the model for curriculum design used by four teachers (TB, TD, TD, and TE) in this study was categorised as 'the traditional model': (a) the teachers started curriculum planning using the textbooks; (b) the teachers reproduced the worksheets in the textbooks to guide each student's

activity; (c) the teachers called for students to answer the questions in the textbook; and (d) the teachers selected the certain questions from the textbooks and used them as the formative or summative assessment. The teachers, in other words, treated the science textbook as 'a plan for learning' and did not use any instructional material other than the blackboard and textbook.

8.3.7 Teacher Professional Development

Apparently teacher training is a critical factor for the successfulness of curriculum implementation. In response to the needs of teacher training for further implementation of the KTSP, the in-service teacher training (INSET) can be described in several components: the aims, working conditions, training approach, and the training's topic.

8.3.7.1 The Aims of the INSET

The INSET's program should emphasize the qualitative improvement of the professional abilities of primary schools teachers. From the survey data, there were two particular goals which should be achieved in the INSET in order to improve teachers' knowledge and qualification: A high percentage of teachers (above 86%) desired to pursue education at a higher level. A vast majority of teachers (nearly 96%) strived to be a professional teacher. In relation to the six case studies, the aims of INSET's should focus on training the teachers to improve their pedagogical and sociological knowledge thereby enabling them to create favourable classroom learning environment. As pointed out by the 162 primary school students' expectations to their classroom learning environment, students preferred to have more Satisfaction, less Friction and more Cohesiveness.

In addition to the training program which should relate to the teachers' needs and be conducted continuously, Teacher E expressed her opinion in this quotation:

> If the government intended seriously to improve the quality of teaching, especially in rural schools, the province or the local government should provide the training program continuously for teachers (I.TE.24.11.10).

With such training programs, the teachers become more professional and develop their knowledge and their pedagogy. MacDonald and Sherman (2006) affirmed that

professional development program can have a positive impact on teachers' knowledge and skills.

8.3.7.2 Working Conditions of the INSET

Regarding teachers' need to improve their knowledge and skills, this has an impact on working conditions of the INSET, such as dichotomy between the teachers' needs to continuously update their professional knowledge and the lack of opportunity to participate in the INSET. From the survey data, the considerable majority of respondents (99%) perceived that they need the INSET to upgrade their understanding in terms of implementation of the KTSP. However, the provincial or district level of the INSET can only facilitate a small number of teachers due to the limited budget and transportation problem for teachers in remote areas. As revealed by Teacher E in this quotation:

> … Before I moved in to this school, I had taught in the remote area for five years. For five years, I never had an opportunity to participate in the INSET. Because I planned to continue my study, I proposed to the province government to move to other schools. I waited for three years to get the government's reply ….(I.TE.R2.06.10.09)

The similar comment also was expressed by Teacher F from school R3. In general, primary school teachers in less privilege rarely have the opportunity to attend the INSET due to the limited budget, the geographical and physical condition that creates the uneven spread of development in Indonesia.

8.3.7.3 The INSET's Approach

Teachers' knowledge and skills are necessary to be upgraded because the implementation of the KTSP demands teachers' creativity to provide the classroom learning environment that supports students' learning. Regardless of the teachers' educational background and teaching experience, more than 89% of teachers perceived that the KTSP makes their teaching practices more challenging. However, the three teachers (TA, TB, and TC) participating in the dissemination of the KTSP held by the local government argued that the workshops did not supply them with enough knowledge and skills for practicing the KTSP in the real classroom settings. This finding seemingly connotes that the INSET's approach which was used and organized by the local government was not as effective as it should be.

Generally speaking, the training programs were designed top down, whether it is needed or not, to solve their problems at the schools. Besides that, the District Office of Education did not facilitate the trained teachers to disseminate or share experience with other teachers at the district level. As revealed by Teacher D: "the results of in-service training benefited only the individual teacher". And the quite similar comment was expressed by Teacher F when one of teachers in her school participated in a workshop.

In most cases, the results of in-service training were not easy to put into practice, so even the teachers who participated in the training kept to the traditional way of teaching. For example, Teacher C who participated in the workshop of the PAKEM approach expressed her opinion, as follows:

> I was invited for intensive three-day training at a hotel in Bengkulu Municipality. There were 34 trainees in that hotel room and we received intensive lectures on the PAKEM approach from 8.00 to 17.00 and 19.30 to 20:30, so it makes us very tired. In the two last days, we worked in groups to discuss the classroom management and to write the lesson plans using the [intended] approach. However the trainers did not demonstrate how to use the approach in the classroom. I think as classroom teachers we need to see obviously how to use the approach. Any way…, until now I am not convinced the PAKEM approach, in particular, can achieve the learning goals using the approach in my classroom. (I.TC.U3.01.12.09)

Therefore, the finding suggested that this type of the INSET approach was not effective because only a few teachers have a chance to participate in the training and it could not solve teaching problems at the classroom level. One of the main factors noted was that reforms mandated from top levels do not result in frequent changes in classroom instruction.

8.3.7.4 The Training's Topic

To meet the teachers' expectations, the topics of training should cover the following topics: (1) how to develop learning materials; and (2) how to implement the intended instructional teaching such as the PAKEM approach in the science classroom.

In relation to the first topics, a majority of teacher (91%) argued that the topic was one of the important topics in the INSET. The evidence revealed that training teachers to create their own learning materials was a significant requirement of the implementation of intended instructional strategy. The topic might focus on issues such as the use of the learning materials (i.e. the science textbooks) based on the

previous curriculum to serve the principles of the KTSP. This topic seems to be important for the school improvement because teachers involved actively in the curriculum development.

The second topic of training is related to the shift of instructional paradigm from teacher-centred to student-centred. Most teachers (90%) perceived that this training topic was useful for teachers. From the interviews, the six teachers had justifiably argued that they had the difficulty in designing and practising the student-centred learning approach such as the PAKEM approach in the classroom. The term PAKEM stands for "learning process should be active, creative, effective, and fun" (Departemen Pendidikan Nasional, 2003b, pp. 7-11).

Moreover, the six teachers selected different expectations in terms of the topics of the INSET. Teacher A at school U1, for instance, preferred the INSET's topic related to classroom management. In contrast, Teacher D at school R1 argued that science content knowledge was the most important topic in the INSET. In sum, it is reasonable to assert that the choice of the topics for teacher's professional development should take into account the types of attendees and their level of educational attainment and the years of their teaching experience.

8.3.6 Teacher's Belief and Resistance

Teacher's belief and resistance is also to be taken into consideration because they are important factors in the implementation process of the intended instructional strategy. Teachers make their decision for a variety of reasons, ranging from teacher's beliefs and resistance – the shift from teacher-centred approaches to student-centred approaches – emphasising the lack of learning resources to carry out the teaching and learning process. What triggers resistance from the teacher is the feeling that they have to do more work without providing an opportunity to enhance their knowledge and skills to achieve the curriculum intentions.

The implementation of the KTSP is not followed by the changing of approaches used by the teachers in the classroom. The teachers' style and their previous experience influenced the way of their teaching. For example, three teachers from rural and one teacher from an urban school held traditional beliefs about science teaching, which

influenced their implementation of the intended curriculum. In describing her roles as a teacher to maximize students learning, Teacher D responded:

> With respect to [the] modern concept 'we are all learners in the class', I think this concept works only for university students. But, I still believe the teacher is the holder of knowledge and the director of events, especially for primary school students. So,… I can maximize student learning through lecturing as the primary source of knowledge transfer.(I.TD.R1.05.10.09)

In addition to that, Teacher B pointed out that although she practiced the hands-on activity and cooperative learning in her science classes she still used the transmission method for ensuring students to achieve the lesson intensions. She stated:

> I believe that transmission of knowledge is the core of what teaching is all about. In teaching a lesson – there are certain skills and knowledge that the students have to go. But I need to explain the main concepts in order to ensure my students to achieve the learning indicators in syllabus (I.TE.R2.16.10.09).

It is evident that teaching beliefs played a large role in the implementation of the intended instructional strategy. The study conducted by Tobin and McRobbie (1996) indicated that one of the factors influencing teacher belief and classroom practice is to prepare students to be successful on examinations. However, Savasci and Berlin (2012) pointed out that teacher beliefs appear to be a strong influential factor to classroom practice but the examinations (standardized testing) also significantly influenced teacher's classroom practice.

8.5 Summary of the Chapter

Six factors were identified in order to explain the observed discrepancies between the intended and implemented 'instructional strategy' in six case studies. These six factors are:

- Time Constraints,
- Non-alignment of Examinations and the Intended Curriculum,
- Lack of Intellectual Support,
- The Lack of Instructional Materials
- Teacher's Professional Development
- Teacher's Belief and Resistance.

For the purposes of the study reported here, it is of interest and of considerable importance to state that the observed discrepancies are a measure of the 'commitment' to intentions. Extracting conclusions from these discrepancies, however, calls for a full understanding of quality of the discrepancies. For example,

regardless of the alignment between the intended and implemented 'rationale', teachers were still confused about the dimensions of the rationale.

Moreover, the value of an observed discrepancy could be influenced by the degree to which acts of 'window dressing' happened for the duration of the study conducted in the investigation. There is explicitly a big difference between the intentions that be appear on the document, and the intentions that actually need to be enacted in the real setting in the classrooms. The first can only require writing or reproducing the documents in order to illustrate the intentions. This may consequently lead to distorting conclusions about the implementation process. The researcher sees no reason to presume that other curriculum components may not be influenced by the same process. Aside from the alignment of the intended and implemented content, for instance, there should be additional support needed in terms of the implementation of the content.

CHAPTER 9

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

9.1 Introduction

This chapter brings the thesis to an end. The main purpose of this thesis was to analyse the existing implementation of the science curriculum in Indonesian primary schools through identifying and explaining any discrepancies between the intended curriculum and the implemented science curriculum in rural and urban primary schools. By examining the focus of the intended science curriculum and by observing the actual implementation of the intended science curriculum in six primary school classrooms, any discrepancies could be explained. In this study, the term of discrepancies is defined as differences (or gaps) between the intentions and the actual implementations.

This chapter is organised into four main sections. Following the introduction in Section 9.1, an overview of the research design is provided in Section 9.2. In this chapter, a summary of the major findings or conclusions obtained from the study that have been discussed in Chapter 4, 5, 6, 7 and 8 are described in Section 9.3. The implication of the study is presented in Section 9.4. Finally, recommendations and the possibilities for future research are concluded in Section 9.5.

9.2 Overview of the Research Design

This research comprised two types of data, involved two phases of data collection, and used two different methodologies. In the first stage, questionnaire surveys were employed to obtain teachers' perceptions of the intended curriculum and students' perceptions of their classroom environment. The data gathered from this stage were mainly quantitative. The second phase of data collection utilized a multiple site case study as the method to investigate the teaching and learning processes in the willing and selected schools. The data collected in this stage were mostly qualitative.

Two questionnaires, that is, the Teacher Perception of Curriculum Reform (TPCR) and the Indonesian versions of My Classroom Inventory (MCI), were developed and validated. In order to answer Research Question 3, the TPCR assessed teachers' perceptions of the intended science primary school curriculum. Similarly, the Indonesian version of the MCI was used to investigate students' perceptions of their classroom environment as indicated in Research Question 4.

The development of the teacher's and student's questionnaires followed the standard procedures that included the translation of the original version of the MCI questionnaire into the Indonesian language, and back translation of the Indonesian version into English. The teachers' questionnaire was distributed to 1014 primary school teachers in Bengkulu province, Indonesia while the Indonesian version of MCI was administered to 770 primary school students in nine schools. The issues of instrument validity such as factor structure, scale internal consistency reliability, and ability of the questionnaire to differentiate perceptions between scales and groups was determined using IBM SPSS package version 20. In the same way, the data analysis that incorporated means, standard deviations, and *t*-test procedures were conducted using the SPSS software as well.

The second phase of the research used a multi-site case study approach as the method to collect both qualitative and quantitative data in response to the fourth research question. The method has flexibility in that various data collection strategies and multiple data sources can be used. Similarly, various strategies were used to ensure internal validity of the qualitative data obtained through the research.

In addressing Research Question 1, the research involved mining documents as the data collection strategy and used the content standards published by the Ministry of National Education and curriculum guidelines provided by the National Education Standard Board as data sources which included four curriculum documents as described in Chapter 3, Section 3.6. Internal validity and reliability of the obtained data were established through clarification of the researcher's judgments.

Research Question 2 was addressed through long-term classroom observations conducted in six selected schools in urban and rural areas. Six primary school

teachers who participated in long-term observations resulted in a total of 11 science lessons taught to each of the chosen classes (grade 5) observed.

The research used various techniques during classroom observations including field notes and interviews. To confirm the credibility of the data obtained during observations, two main actions were carried out. First, at the outset the teachers were informed that during the observations the researcher would only act as a non-participant and not make any kind of personal value judgment about the quality of teaching. This approach was to ensure that classroom transactions occurred in the normal manner. Second, member checking was used as a way of ensuring validity of the data being collected. After classroom observations, interviews with the teachers or students regarding events captured in the classroom observations were conducted to clarify the researcher's judgment.

Finally, in response to Research Questions 5 and 6, the study used mining documents and classroom observations as data collection strategies. By using the results of the mining documents and the classroom observations, the researcher was able to identify and explain the discrepancies between the intended and implemented curriculum.

9.3 Conclusions

The overarching research questions distinguished between the intended and implemented curriculum. The intended curriculum is the intentions of the people who write the curriculum. This study focussed on the formal/written curriculum. The implemented curriculum is the curriculum that is transformed into actual action.

Both the intended and implemented curriculum were investigated in terms of selected curriculum components such as Rationale, Aims and objectives, Content, Learning activities, Teacher role, Material and resources, and Assessment. The learning activities and teacher role are combined to form the instructional strategy. By comparing the intentions and implementations of every curriculum component, the discrepancies can be identified and explained.

Research findings that can shed light on the match between curriculum intent and classroom reality in such dynamic and complex educational environments as discussed in the previous chapters are important when evaluating how effectively curriculum aims are actually being met, and help inform decisions about what steps may be needed to improve the intended curriculum implementation. In concluding this study, all research questions are answered and discussed. A summary of the major findings and discussion are grouped into six subsections as responses to each research question.

9.3.1 Research Question 1: The Focus of the Current Intended Primary School Curriculum

An analysis of the content standards as the intended primary school science curriculum document for primary schools as well as guidelines for developing the School-Based Curriculum that was discussed in Chapter 5 provided the different levels of information of content standards in science primary school level. The documents provide primary school teachers with a range of information from philosophical ideas that outline the content standard to comprehensive information for preparing and implementing the primary school science curriculum in the classroom.

The question of the focus of the primary school science curriculum cannot be divorced from the question of what is the requirement of the National Education. National education refers to the education that is based on the 1945 constitution and the 2003 Indonesian National Education System Act and rooted in the values of religion, the national culture of Indonesia and is responsive to the demands of a changing era. In order for a rationale to be in line with the intended rationale, there were emphases on religious and moral values, intellectual competences, and democratic values. These three focal points are to be integrated into the personalities of Indonesian students.

The intended content does not make obvious every topic in great depth, and the information is not yet operational. Instead, the intended content confines itself to offering a framework, constituted by competences, main subject matters, and indicators. This framework needs to be finished by the respective schools. This is

because of the decentralisation-paradigm underlying the intended curriculum. The finished content is written down in a syllabus.

The intended instructional strategy is described in a simplified manner, by using the degree of teacher control and the degree of embeddedness. The degree of teacher control is requested to be low, meaning that the teacher should act as a facilitator of the learning process. These learning experiences should be adopted to the characteristics of every individual student. The degree of embeddedness should be high, meaning that the learning experienced should be linked to their daily-life situations.

Meticulous analysis of the instructional strategies forms the conclusion that a properly equipped instructional resource for hands-on activities should be present in every school so as to achieve the instructional strategy. The in-service training for the classroom teachers related to the use of the equipment and to design the science learning activities is needed to be carried out in the schools through Teacher's Forum. The intended assessment aims at achieving a complete impression of the development of each student's potential. This is carried out by assessing level the student's achievement on three dimensions: the cognitive, the psycho-motoric, and the affective.

Based on the review of the educational literature and the personal experience of the author as a teacher educator, two issued are identified, (1) the documents offer little basis for drawing practical conclusions and (2) the documents suggest that in-service training is scarce.

9.3.2 Research Question 2: The Implementation of the Current Intended Primary School Science Curriculum in the Six Case Studies

In response to this research question, a multi-site case study that involved classroom observations was conducted in a limited number of schools and teachers as described in Chapter 6. In general, this study asserted that to some degree the implementation of the intended science curriculum in urban school is more favourable than in rural schools in terms of the variety of teaching and learning activities in the classroom.

In almost all cases, the syllabuses were written in line with the National Curriculum. In terms of the teachers' perspectives on the National Curriculum, the six teachers prefer to adopt or reproduce a model syllabus provided by the BNSP or the commercial textbook publisher. To some extent, the majority of teachers perceived the use of syllabus as more suited to administrative purposes rather than guidelines for teaching.

In terms of learning activities and the teacher's role, generally science teaching practices in urban primary schools are aligned with the National Standards. The teachers (TA, TB, TC) have used various teaching methods and approaches, used appropriate questioning techniques, and applied a standard teaching structure. In other words, the teachers attempt to minimize the use of chalk-and-talk methods. However, to some degree, science teaching practices in rural primary schools were categorized as traditional whole-class teaching. The classroom discourse was heavily dominated by teacher talk and the largest proportion of this talk consisted of teachers making statements.

The availability of teaching materials and resources has been optimised in distinctive ways for supporting the hands-on activities in the three urban schools. However, the shortage of teaching resources hampered the three rural primary teachers to include inquiry-based science activities in their lessons.

The nature of science teaching practices in the six case study schools is influenced by the school assessment system. The current assessment system adopted by the six schools predominantly hinder the six teachers to perform inquiry-based instruction. Due to the assessment system which tests students' memorisation of particular topics in lessons, the six teachers are trapped into employing classroom pedagogy that highlights students' memorization skills for success in the examination. In addition, the six teachers preferred to practice the traditional paper-and-pencil test to assess students' performance. They adhered to this traditional assessment because they did not have enough knowledge and time to practice the performance assessment.

9.3.3 Research Question 3: How do teachers perceive the intended science curriculum in primary schools?

The aim of this research question was to investigate the implementation of an educational reform initiative called School-Based curriculum (the KTSP) from the teachers' perspectives. Teachers' perceptions on educational reform are imperative because in the end, how the teacher feels and perceives a given change determines whether or not any change occurs in the classroom (Hall & Hord, 2001). In addition, change requires teachers to provide a considerable amount of time, knowledge and skills (Hargreaves & Moore, 2000). Therefore, addressing teachers' perceptions about the educational reform is necessary in order to help them gain more competence and confidence for any reform effort.

The survey instrument named as Teachers' Perceptions on Curriculum Reform (the TPCR) was used to collect the data that consisted of two parts. The first part asked about the respondent's demographic background. The second part included items related to three issues: adopting – the manner in which the KTSP is supposed to be delivered and teacher's understanding of the principles of the KTSP; adapting – the teacher's responses regarding learning material development and curriculum content; implementing – classroom based assessment, teacher's professional development, and school infrastructure.

The TPCR survey instrument was measured for its reliability and validity. The three scales of the instrument (Implementation scale, Adoption scale, and Adaptation scale) were assessed for their reliability using Cronbach's Alpha. The result for the reliability using Cronbach's Alpha was 0.72 for all scales of the TPCR and ranged from 0.63 to 0.79 for three scales; 0.79 for 13 items of the Implementation scales; 0.72 for 11 items of the Adaptation scale; 0.63 for 9 items of the Adoption scales.

The validity of the TPCR was inferred from several sources. An Exploratory Factor Analysis (EFA) was conducted to build the psychometric validity of the instrument for further use. The result from the run of EFA using orthogonal rotation (varimax) and extraction based on Eigenvalues over 1 showed KMO = 0.70, exceeding the minimum requirement (0.50) recommended by Field (2009). Bartlett's test of

sphericity χ^2 = 2750.28, p < 0.05, indicated that correlation between items were significant for EFA (Field, 2009).

In response to Research Question 3, the survey study reveals that the in-service teacher training is one of the centre key for succeeding the implementation of KTSP. Teachers claimed to know what the KTSP is, but in actual classroom implementation of the KTSP, these teachers were lost, returning to the former curriculum, which they were more comfortable teaching. Regarding teachers' involvement in developing the KTSP, teachers prefer to adopt the model of the syllabus either provided by the BSNP or the commercial publishers. To some degree, the change of teachers' roles from the curriculum implementer to curriculum developer was a big challenge for the six case study schools due to a range of reasons such as time constraints, lack of intellectual support, teacher's professional development, and teacher's belief and resistance to change.

9.3.4 Research Question 4. How do students in primary schools perceive their science classroom learning environment?

Results from the study presented in Chapter 4 show that the Indonesian version of the MCI was valid and reliable instrument when used with the primary school students in Bengkulu Municipality, Indonesia.

In response to Research Question 4, a total of 159 students in six classes were asked to respond the Indonesian version of MCI. The result of the administered Indonesian version of MCI can be summarized as two assertions. First, students prefer a significantly more favourable classroom learning environment on the two scales of *Satisfaction* and *Cohesiveness*. Second, students in urban school prefer a significantly ($p < 0.05$) less friction than students' perception in rural schools. In addition, students in urban schools perceived more cohesiveness than students in rural schools ($p \leq 0.005$).

9.3.5 Research Question 5: Which discrepancies can be observed between the intended and implemented primary school science curriculum?

The summary of the observed discrepancies between the intended and implemented curriculum components were presented in Table 8.1. In general, the six teachers who participated in this study made observable efforts to adhere to the intended curriculum. No discrepancies were observed in two cases for the curriculum components 'rationale' and 'content' in the six cases. Apparently, the framework of competences that needs to be filled in by the respective schools is a sufficient one. Mainly large to small discrepancies were observed between the intended and implemented instructional strategies in the six cases ranging from large to small discrepancies are observed between the intended material and resources and the actual material and resources available in the six cases. Since the cognitive domain was mostly preferred in assessing student's learning, there are large discrepancies between the intended and implemented assessment.

9.3.6 Research Question 6: How can be observed discrepancies between the intended and implemented primary school science curriculum can be explained.

Six factors were identified to explain the observed discrepancies between the intended and implemented instructional strategy in the six case studies. These six factors are:

- Time Constraints,
- Non-alignment of Examinations and the Intended Curriculum,
- Lack of Intellectual Support,
- The Lack of Instructional Materials
- Teacher's Professional Development
- Teacher's Belief and Resistance.

It is acknowledge that observed discrepancies are a measure of the adherence to intentions. However, drawing conclusions from these discrepancies demands a full understanding of the quality of the intentions. For instance, in spite of the alignment between intended and implemented 'content', the findings in this research show that the teachers who were involved in this case study have a limited understanding of

KTSP even though teachers had attended several training workshops related to the implementation of the KTSP.

9.4 Recommendations

This research carried out preliminary attempts in building the Teachers' Perceptions on Curriculum Reform scale. As noted in the results of the exploratory factor analysis, the factor loadings of the items were mixed. Consequently, further research about this scale is needed by involving a larger sample size. Furthermore, this study examined internal consistency, and not test-retest reliability, which should also be addressed in order to determine the stability of the scale over time. It is strongly recommended that future studies also use confirmatory factor analysis following explanatory factor analysis.

There is also limited research on professional development as it relates to the implementation of standards in Indonesia. Specifically, there is a gap in exploring what types of professional development may be most effective when it comes to the implementation of standards-based education in Indonesia. More research is needed to find out what type of professional development increases teachers' knowledge and skills as well as changes in their teaching practices.

It is imperative to focus more attention and resources on primary education, since it is the foundation of education. Teaching at this level should use higher order instructional methods and different forms of assessment that can be adequate for mastering not only basic skills, but also application and problem solving.

9.5 Possibilities for Future Research

The research recommendations offered in this sub-section are derived not only from the main conclusion drawn for the study but also from issues in need of further investigation that came to the fore throughout data reporting for this thesis. These possibilities for future research are:

Firstly, as indicated in the first chapter of this thesis, fieldwork research located in Bengkulu has indicated further possible research directions. Bengkulu province is a small province in the Western part of Indonesia. It would be worth knowing how the implementation of KTSP in other provinces in Western Indonesia, especially the more advanced regions of Java, is being experienced. Then a similar study in a comparable or different sized district (*kota* or *kabupaten*) or Eastern Indonesian regions would provide comparative information.

Secondly, this study examined state primary schools. An examination of the implementation of KTSP at other levels in state sector systems, namely secondary schools and junior high schools, would also provide useful findings for comparison. This is because the secondary level is regarded as more complex than the primary school levels where teachers and students will have different characteristics in classroom learning environments.

Thirdly, the results of this study highlight the need to view teacher professional development as an ongoing activity. Therefore, future research involving the evaluation of teacher professional development has considerable potential: and the use of teachers' views on curriculum reform and the use of learning instruments could play an important role in that growth.

Finally, in recognition of the importance of teachers' perceptions for the implementation of the intended curriculum as well as students' perceptions for their learning classroom environment, further research is needed into the impact of these aspects on teachers' practices in the Indonesian context.

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APPENDIX A1

INTERVIEW PROTOCOL WITH PRIMARY SCHOOL TEACHERS

Regarding

The implementation of School-Based Curriculum (KTSP)

1. Introduction;

- tell name, educational background,
- tell goal of this research (impression of how KTP is implemented in practice),
- the information is secret; name of you and school are only known to me and supervisors,
- may I use a voice-recorder to record this?

2. Background/knowledge;

- What is your educational background?
- How long have you been teaching? (at this school, other school, etc.)

3. First impression of the school;

- What are the current vision/mission statements of this school?
- How many pupils does this school have?
- Are all the pupils from this district?
- What jobs do the parents of the pupils have?

4. School-Based Curriculum (KTSP);

- Which (curriculum) documents has the school received from the government? May I see them?
- Which kind of support has the school received (distinguish between school, person, intellectual support, material/financial support!)
- What is your opinion about the received support?
- May I see the syllabus?

5. Improving the curriculum;

- Which aspects of KTSP may be improved?
- Which strategy do you think suitable for bringing about these changes?
- Which support would you need if you would like to improve KTSP?

6. Closing;

- Thank you!
- Making further appointments

APPENDIX A2

INTERVIEW PROTOCOL WITH PRINCIPALS

Regarding

The implementation of School-Based Curriculum (KTSP)

1. How important is the issue of the implementation of KTSP for your school? Please explain.
2. What are the impacts of implemented KTSP on your schools?
3. From your point of view, what kinds of authority have devolved to schools in terms of the implementation of KTSP? Please explain.
4. What are the effects of the implementation of KTSP on your school organizational climate and procedures?
5. What kinds of support from the district level have helped your school to implement KTSP?
6. How is the support to implement the KTSP given?
7. What are the advocacy and facilities offered by you as the principals to the implementation of the KTSP at your schools?
8. What are the current constraints to implementing KTSP in your school? How do you address the problems of the implementation of KTSP?

APPENDIX A3

INTERVIEW PROTOCOL WITH SUPERINTENDENT

Regarding

The implementation of School-Based Curriculum (KTSP)

1. How important is the issue of KTSP for the school? Please explain.
2. From your point of view, what kinds of authority have to be devolved to school in terms of curriculum reform? Please explain
3. Curriculum reform has been a central focus to administer school in the autonomy era, why do you think that the government chose this kind of policy?
4. What kinds of support from the district level have helped to schools to implement the KTSP?
5. What kind of relationship have you established between district-school-community in terms of the implementation of KTSP?
6. What are the current constraints to practicing the KTSP in the schools?
7. What potential resources can improve the implementation of KTSP in the schools?

APPENDIX A4

Interview Protocol for Curriculum Metaphors

This interview protocol is aimed to examine the teachers' and superintendents' perceptions of the intended curriculum. After introducing each other, the following questions will guide the interview to inquire the teacher's and superintendent's perceptions of the established curriculum.

1. What is your perception of the [intended] curriculum? Could you please explain in detail?
2. There are lots of definitions of curriculum. None of them has been confirmed as rigorous definitions. Therefore, Schubert [interview explained to them who Schubert is] has offered curriculum metaphors instead to explain the meaning of curriculum. Here are some examples of curriculum metaphors:
   - Curriculum as Content or as Subject Matter
   - Curriculum as Programme Planned Activity or as Syllabus Design.
   - Curriculum as Intended Learning Outcome
   - Curriculum as Discrete Tasks and Concepts

   Among those, which one do you prefer? Why? Please explain your reason.
3. Thank you!

Making further appointments

APPENDIX B

Letter for Conducting Fieldwork

Hal: Permohohan Ijin Penelitian

Kepada :
Bapak Ka. Dis. Diknas Kota Bengkulu
di Kota Bengkulu

Dengan hormat,
Dengan ini kami beritahukan bahwa, mahasiswa Fakultas Sains and Teknik*, Curtin University of Technology, Australia* :

N a m a	: Irwan Koto
N I M	: 14130001
Semester / Jurusan	: II / *Science and Mathematics Education (SMEC)*
Alamat	: 9/37 Leonard Street, Victoria Park, WA. 6100

Bermaksud mengadakan penelitian guna menyusun laporan Disertasi dengan judul :
Indonesian primary School Science in Practice: Challenges between the intended and implemented curriculum.

Pembimbing I	: Prof. David Treagust
Pembimbing II	: Prof. Vaille Dawson

Penelitian tersebut akan dilaksanakan

Di	: 6 sekolah di Kota Bengkulu
Tanggal/Bulan	: 01 November 2009 – 31 Januari 2010 dan Juni – September 2010

Fasilitas yang diperlukan	: Ijin Penelitian dari 6 Kepala Sekolah tersebut di atas
Penanggung Jawab	: *Director of SMEC Curtin University of Technology*

Sehubungan dengan hal tersebut, mohon bantuan Saudara untuk berkenan memberikan ijin kepada yang bersangkutan untuk mengadakan penelitian pada sekolah yang tersebut diatas. Atas kesediaan dan bantuan Saudara, diucapkan terima kasih.

Perth, 24 Oktober 2009
Director of SMEC,

Prof. Barry J. Fraser

APPENDIX C1

My Class Inventory (*Original Version*)

Direction

This is not a test. The questions are to find out what your class is actually like. Each sentence is meant to describe what your actual classroom is like. Draw a circle around

YES if you AGREE with the sentence
NO if you DON'T AGREE with the sentence

EXAMPLE:

28. Most pupils in our class are good friends.

If you agree that the most pupils in the class actually are good friends, circle the YES like this :

(YES) NO

If you don't agree that most pupils in the class actually are good friends, circle the **No** like this:

YES (NO)

Please answer all question all questions. If you change your mind about an answer, just cross it out and circle the new answer. Don't forget to write your name and other details below.

NAME _____SCHOOL _____CLASS_____

	Remember you are describing your ACTUAL classroom	Circle Your Answer	
1.	The students enjoy their schoolwork in my class.	Yes	No
2.	Students are always fighting with each other.	Yes	No
3.	Students often race to see who can finish first.	Yes	No
4.	In my class the work is hard to do.	Yes	No
5.	In my class everybody is my friend.	Yes	No
6.	Some students are not happy in my class.	Yes	No
7.	Some students in my class are mean.	Yes	No
8.	Most students want their work to be better than their friend' work.	Yes	No
9.	Most students can do their schoolwork without help.	Yes	No
10.	Some students in my class are not my friends.	Yes	No
11.	Students seem to like my class.	Yes	No
12.	Many students in my class like to fight.	Yes	No
13.	Some students feel bad when they don't do as well as the others.	Yes	No
14.	Only the smart pupils can do their work.	Yes	No
15.	All students in my class are close friends.	Yes	No
16.	Some pupils don't like my class	Yes	No
17.	Certain pupils always want to have their own way.	Yes	No
18.	Some pupils always try to do their work better than the others.	Yes	No
19.	Schoolwork is hard to do.	Yes	No
20.	All pupils in my class like one another.	Yes	No
21.	My class is fun.	Yes	No
22.	Students in my class fight a lot.	Yes	No
23.	A few students in my class want to be first all of the time.	Yes	No
24.	Most students in my class know how to do their work.	Yes	No
25.	Students in my class like each other as friends.	Yes	No

APPENDIX C2

My Class Inventory (Translation to *Bahasa* Indonesia)

PETUNJUK:
Pertanyaan berikut ini bertujuan untuk mengetahui seperti apakah kondisi kelasmu **SEBENARNYA**. Setiap pernyataan dimaksudkan untuk menjelaskan bagaimanakah keadaan kelasmu sebenarnya. Lingkarilah:

YA jika kamu SETUJU dengan pernyataan
TIDAK jika kamu TIDAK SETUJU dengan pernyataan

CONTOH:

28. Hampir semua murid-murid di kelas mu merupakan teman-teman yang baik.
Jika kamu setuju bahwa hampir semua murid di kelasmu adalah teman-teman yang baik, lingkari

YA **TIDAK**

JIka kamu tidak setuju bahwa hampir semua murid-murid di kelasmu merupakan teman-teman yang baik, lingkari

YA **TIDAK**

Mohon dijawab semua pertanyaan. Jika kamu mengubah jawabanmu, berilah tanda silang pada jawaban tersebut dan lingkarilah jawaban yang benar. Jangan lupa untuk menuliskan nama, sekolah dan kelasmu.

NAMA : _____SEKOLAH: _____KELAS:_____

	Ingat Kamu Sedang Menjelaskan Kelasmu yang Sebenarnya	Lingkari Jawabanmu	
1	Murid-murid di kelasku menyenangi pekerjaan sekolah mereka.	Ya	Tidak
2	Murid-murid selalu berkelahi satu sama lain.	Ya	Tidak
3	Murid-murid sering berlomba untuk dapat tampil menjadi yang pertama.	Ya	Tidak
4	Di kelasku tugas sukar untuk dikerjakan.	Ya	Tidak
5	Setiap orang di kelasku adalah temanku.	Ya	Tidak
6	Beberapa murid tidak merasa senang di kelasku.	Ya	Tidak
7	Beberapa murid di kelasku tidak mau meminjamkan miliknya padaku.	Ya	Tidak
8	Hampir semua murid menginginkan tugas mereka menjadi lebih baik dari tugas teman lain.	Ya	Tidak
9	Hampir semua murid dapat mengerjakan tugas tanpa bantuan dari orang lain.	Ya	Tidak
10	Beberapa murid di kelasku bukanlah teman-temanku.	Ya	Tidak
11	Murid-murid nampaknya menyenangi kelasku.	Ya	Tidak
12	Banyak murid di kelasku suka berkelahi.	Ya	Tidak
13	Beberapa murid merasa tidak senang bila mereka tidak mengerjakan sebaik teman lainnya.	Ya	Tidak
14	Hanya murid pintar dapat mengerjakan tugas.	Ya	Tidak
15	Semua murid di kelasku berteman akrab.	Ya	Tidak
16	Beberapa murid tidak menyenangi kelasku.	Ya	Tidak
17	Murid tertentu selalu ingin mengerjakan sesuatu dengan cara mereka sendiri.	Ya	Tidak
18	Beberapa murid selalu mencoba untuk mengerjakan tugas mereka lebih baik dari murid lainnya.	Ya	Tidak
19	Tugas sekolah sukar untuk dikerjakan.	Ya	Tidak
20	Seluruh murid di kelasku menyenangi satu sama lain.	Ya	Tidak
21	Kelasku menyenangkan.	Ya	Tidak
22	Murid-murid di kelasku sering berkelahi.	Ya	Tidak
23	Sebagian kecil murid di kelasku ingin untuk menjadi pertama setiap saat.	Ya	Tidak
24	Hampir semua murid di kelasku tahu bagaimana mengerjakan tugas mereka.	Ya	Tidak
25	Murid di kelasku senang satu sama lain sebagai teman.	Ya	Tidak

APPENDIX C3

My Class Inventory (Back Translation to English)

DIRECTIONS

This is not a test. The following questions are to investigate what your actual class like. Each sentence is meant to describe what your actual classroom is like.
Please circle:

YES if you AGREE with the sentence
NO if you DON'T AGREE with the sentence

EXAMPLE
28. Almost all students in your class are good friends.
If you agree that almost all students in your class are good friends, circle **YES** like this:

YES **NO**

If you don't agree that almost all students in your class are good friends, circle **NO** like this:

YES **NO**

Please answer all questions. If you want to change your answer, please cross out your answer and circle your right answer. Don't forget to write your name, school, and class as bellow:

NAME _____SCHOOL_____CLASS_____

	Remember you are describing your actual classroom	Circle Your Answer	
1	The students in my class enjoy their schoolwork.	Yes	No
2	The students are always fighting each other.	Yes	No
3	The students are race to see who finish the work first.	Yes	No
4	In my class the work is hard to do.	Yes	No
5	In my class everyone is my friend.	Yes	No
6	Some students are not happy in my class.	Yes	No
7	Some students in my class do not want to lend their own to me.	Yes	No
8	Almost all students want their work become better than their friend's work.	Yes	No
9	Almost all students can do the work without any help.	Yes	No
10	Some students in my class are not my friends.	Yes	No
11	Student seems to like my class.	Yes	No
12	Many students in my class like to fight.	Yes	No
13	Some students are not happy if they are not doing work as well as their friends.	Yes	No
14	Only the smart students can do their work	Yes	No
15	All students in my class are good friends	Yes	No
16	Some students don't like my class.	Yes	No
17	Certain students always want to do their work by their own way.	Yes	No
18	Some students always try to do their work better than other students.	Yes	No
19	Schools work is hard to do	Yes	No
20	All students in my class like each other	Yes	No
21	My class in enjoyable	Yes	No
22	The students in my class like to fight a lot	Yes	No
23	A few students want to be the first all the time	Yes	No
24	Almost all students in my class know how to do their work	Yes	No
25	Students in my class like each other as friends	Yes	No

APPENDIX D

The Indonesian Version of Modified *My Classroom Inventory*

Direction

This is not a test. The questions are to find out what your class is actually like. Each sentence is meant to describe what your actual classroom is like. Draw a circle around

YES if you AGREE with the sentence
NO if you DON'T AGREE with the sentence

EXAMPLE

28. Most pupils in our class are good friends.
If you agree that the most pupils in the class actually are good friends, circle the YES like this :

YES **NO**

If you don't agree that most pupils in the class actually are good friends, circle the **No** like this:

YES **NO**

Please answer all question all questions. If you change your mind about an answer, just cross it out and circle the new answer. Don't forget to write your name and other details below.

NAME _____SCHOOL _____CLASS_____

Remember you are describing your ACTUAL classroom		Circle Your Answer
Q1	The students enjoy their schoolwork in my class.	Yes No
Q6	Some students are not happy in my class.	Yes No
Q11	Students seem to like my class.	Yes No
Q16	Some pupils don't like my class	Yes No
Q21	My class is fun.	Yes No
Q2	Students are always fighting with each other.	Yes No
Q7	Some students in my class are mean.	Yes No
Q12	Many students in my class like to fight.	Yes No
Q22	Students in my class fight a lot.	Yes No
Q5	In my class everybody is my friend.	Yes No
Q10	Some students in my class are not my friends.	Yes No
Q15	All students in my class are close friends.	Yes No
Q20	All pupils in my class like one another.	Yes No
Q25	Students in my class like each other as friends.	Yes No

APPENDIX E

Factor Analysis of the Indonesian Version of *My Classroom Inventory*

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.845
Bartlett's Test of Sphericity	Approx. Chi-Square	2352.627
	df	91
	Sig.	.000

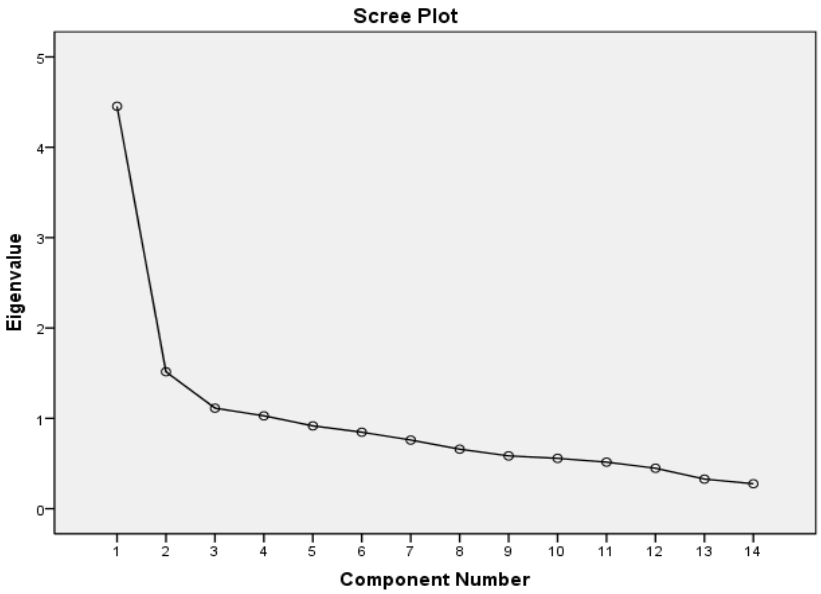
Rotated Component Matrix[a]

Component		
1	2	3
.858		
.833		
.821		
.405		
	.679	
	.673	
	.621	
	.594	
-.409	.589	
		.700
		.616
		.606
		.560
		.524

Extraction Method: Principal Component Analysis.

APPENDIX F

Screeplots for the Indonesian Version of *My Classroom Inventory*



APPENDIX G

Total Variance Explained of Indonesian Version of My Classroom Inventory

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.453	31.810	31.810	4.453	31.810	31.810	2.716	19.399	19.399
2	1.515	10.823	42.634	1.515	10.823	42.634	2.348	16.770	36.169
3	1.113	7.947	50.581	1.113	7.947	50.581	2.018	14.411	50.581
4	1.028	7.342	57.922						
5	.917	6.548	64.470						
6	.847	6.047	70.517						
7	.760	5.428	75.945						
8	.658	4.703	80.648						
9	.584	4.174	84.823						
10	.557	3.980	88.803						
11	.516	3.683	92.486						
12	.448	3.199	95.685						
13	.328	2.342	98.028						
14	.276	1.972	100.000						

Extraction Method: Principal Component Analysis.

APPENDIX H

Teacher's Perceptions on Curriculum Reform (TPC)

(Utomo's Questionnaire)

The purpose of this survey is to investigate the ways in which primary school teachers respond to implementation of the CBC. The results of the survey will be shared with policy makers in an effort to help improve implementation nation-wide. Individual responses to this survey will remain confidential and anonymous. Please feel free to respond openly, according to the statements provided. *Thank you for your participation in this research.*

Directions: Please complete the information requested below about your school and yourself.

1. School location
   Province : ……..
   District : …….
   School name : …….
   Address :
   Tel. & E-mail :

2. Gender
   ☐ Female
   ☐ Male

3. Age
   ☐ Fewer than 35 years old
   ☐ 35 – 44 years old
   ☐ 45 – 54 years old
   ☐ More than 55 years old

4. Education
   ☐ Secondary School Program: …….
   ☐ Diploma (D-II) Program: …….
   ☐ Bachelor (S-1) Program: …….
   ☐ Master Program: …….

5. Teaching status
   ☐ Classroom Teacher
   Teaching class (1^{st} – 6^{th} grades) ……
   ☐ Subject teacher

6. Teaching experience
   ☐ Fewer than 5 years
   ☐ 5 - 10 years
   ☐ 10 - 15 years
   ☐ More than 15 years

7. When did your school implemented the CBC :
   ☐ School academic year 2001
   ☐ School academic year 2002
   ☐ School academic year 2003
   ☐ School academic year 2004

Directions: Please answer the following questions by putting a cross (**X**) beside the closed statements and specify your comments on open statements in the space provided.

1. The syllabus would be better if it had been developed by (**Choose one of them**)
(a) Central government
(b) Provincial level office of local government
(c) District/Municipal level office of local government
(d) Sub-district level office of local government
(e) School

2. I am familiar with information regarding the new curriculum CBC from
(**Choose more than one and specify your answers**)
(a) Book published by the MONE
(b) In-Service Teacher Training (INSET) conducted by _____how many times _____
(c) Colleagues
(d) (Others; please specify)_____

3. Knowledge that I gained about the CBC is sufficient for me to teach a particular subject, e.g., Science (**Choose one**)
(a) Agree
(b) Disagree

4. I think that I should have learned more about the CBC (**Choose one**)
(a) Agree
(b) Disagree

If you **DISAGREE**, go directly to item #5.
If you **AGREE**, please give complete the following statement.

I prefer to find information about the new curriculum in the form of (**Choose more than one**)

(a) Written document (e.g., curriculum guidelines)
(b) Spoken explanation (e.g., workshop)
(c) (Others; please specify)_____

5. How do you perceive the following statements concerning issues of learning materials? (For the following statements, put **R** if it is Right and **W** if it is Wrong)
____ (a) Learning materials from the 1994 curriculum can be used to achieve student learning competency as expected in the CBC
____ (b) Learning materials should be different; it is impossible to teach the CBC utilizing learning materials from the 1994 curriculum
____ (c) Teaching a language, according to the 1994 curriculum, focuses on learning materials that are supposed to be taught to students. Teaching a language based on the CBC focuses on skills that students should develop.

6. What is the purpose of teaching Indonesian? (**Choose one**)
(a) Students are able to learn certain aspects of language, e.g., grammar
(b) Students are able to pass the exam
(c) Students are able, among other things, to raise the question clearly.

7. How do you perceive the following statements regarding the relationship between learning materials and assessment according to the CBC?
(For the following statements, put **R** if it is Right and **W** if it is Wrong**)**.
____ (a) All learning materials should be assessed
____ (b) Only materials learnt by students can be assessed. If those materials would not be assessed, those are not necessary to be taught.
____ (c) I should teach, among other things, speech and writing skills, although those skills would not be assessed.

8. What topics concerning the Indonesian language should be taught?
(**Please list as many topics as you feel are important to be taught**)
(a) _____
(b) _____
(c) _____

9. Which are the most important topics listed in item # 8 (Specify your answer)
_____

Which are the least important topics (**Specify your answer**) _____

10. Which students do you focus on in your teaching? (**Choose one**)
(a) Fast learners
(b) Slow learners
(c) (a) and (b)

11. How would you tackle problems related to your answer item #10 ? (**Choose one**)
(a) I don't know
(b) Students' differences should be considered; the important thing is to teach according to the competencies required in the new curriculum
(c) I give attention to the slow learners
(d) Fast learners are given priority in terms of having extra to do exercises
(e) (c) and (d)

12. I assess my students on the basis of (**Choose one**)
(a) Students' daily exams
(b) Students' homework
(c) The total of students' daily progress
(d) (a) and (b)
(e) (a), (b), and (c)

13. According to the CBC, what is the way to assess students' progress? (**Choose one**)
(a) I don't know
(b) Close to what I did before (students' daily exam)
(c) Students' whole daily progress

14. Based on your teaching experience in the last academic year 2008, were school exams planned by a group of schools in your district? (**Choose one**)
(a) Yes
(b) No
If **Yes**, who designed the school exams? (Specify your answer)
_____

15. According to the CBC, who should devise school exams? (**Choose one**)
(a) Group of teachers at one school
(b) Group of schools

16. Should the Indonesian language textbook for primary school be written in the same way for all Indonesian pupils who come from different ethnic and cultural entities?
(a) Agree
(b) Disagree

17. According to the CBC, who should design the textbook? (**Choose one**)
(a) Central government
(b) Provincial level office of local government
(c) District/municipal level office of local government
(d) Teacher or group of teachers

18. If the textbooks are not accessible at your school and only the CBC guidelines are available, I will (**Choose one**)
(a) Utilize the curriculum guidelines and teach every topic written in them
(b) Make use of the curriculum guidelines, but arrange the topics according to my students' needs and class level
(c) Use the curriculum guidelines and add some topics that are not available in the guideline

19. Have you ever participated in INSET to increase your knowledge of teaching Indonesian?
(a) Yes
(b) No
If **Yes**, who conducted the training? _____What was it about?_____
Did the training last? _____How many times did you participate?_____

20. Which topics of in-service training do you consider useful for primary school teachers? (**Choose more than one and/or add information in the space provided**)
(a) How to enhance knowledge and skills in teaching Indonesian according to the CBC
(b) How to assemble or design test items according to the CBC
(c) How to develop and design learning materials according to the CBC
(d) (a), (b), and (c)
(e) Other (please specify your answer) _____

21. Professional teacher development would be better if it could be designed by (**Choose one**)
(a) Provincial level office of local government
(b) District level office of local government
(c) Sub-district level office of local government
(d) Schools
(e) School neighbourhood, e.g., PKG

22. Professional teacher development should be carried out by (**Choose more than one and/or you add information**)
(a) Subject matter specialists from the university
(b) Supervisors
(c) Working groups: supervisors or head teachers
(d) Subject Matter Teachers' Group
(e) Education Committee
(f) Teachers
(g) (Others; please specify)_____

23. To make curriculum implementation most advantageous (**Choose more than one**)
(a) Teaching and learning aids are necessary
(b) Extra time is needed for teachers to prepare learning materials
(c) (Others; please specify) _____
(d) _____

24. I conclude regarding the implementation of the CBC at my school that
(Put **A** if you **Agree** and put **D** if you **Disagree** in the space provided)
____ (a) the objective(s) of the CBC are not only to produce students who can pass the exam, but students who are able, among other things, to explain, to raise questions, and to argue
____ (b) the CBC makes teaching activity more challenging and it makes me enjoy teaching as a profession
____ (c) my students are becoming interested in their learning, particularly in learning the science
____ (d) the CBC makes me work extra hard and is time consuming
____ (e) the CBC is similar to the curriculum 1994
____ (f) the CBC requires the school to get more funding for curriculum realization
____ (g) the CBC makes me try to learn from other teachers' experiences
____ (h) the CBC encourages me to attend the PKG regularly
____ (i) the CBC needs highly qualified teachers in terms of education level and teaching experience

25. It is necessary for local language(s), as a medium of instruction, to be learned by pupils in the early grades (grade 1 & grade 2)
(a) Agree
(b) Disagree

APPENDIX I

Pilot Test of Draft Teachers' Perception on Curriculum Reform (the TPCR) Questionnaire

The aim of this survey is to explore the ways in which primary schools teachers respond to implementation of the KTSP. The findings of the survey will be shared with policy makers in an attempt to help improve implementation nation-wide. Individual responses to this survey will remain confidential and anonymous. Therefore, you feel free to response your

Part A

Direction: Please complete the information requested below about your school and yourself

1. School Location

District : ……
School Number :……

2. Gender

☐ Female
☐ Male

3. Age

☐ Fewer than 35 years old
☐ 35 – 44 years old
☐ 45 – 54 years old
☐ More than 55 years old

4. Education

☐ Secondary School Program ……
☐ Diploma Program ……
☐ Bachelor/"Sarjana" Program ……
☐ Master Program ……

5. Teaching Experience

☐ Fewer than 5 years
☐ 5 – 10 years
☐ 10 – 15 years
☐ More than 15 years

When did your school implement the KTSP

☐ School academic year 2005
☐ School academic year 2006
☐ School academic year 2007
☐ School academic year 2008
☐ School academic year 2009

Part B

Direction: Beside each of the statements presented below, please circle whether you ***Strongly Disagree*** (SD); ***Disagree*** (D); ***Undecided*** (UD); ***Agree*** (A); or ***Strongly Agree*** (SA).

No	Statements	An alternative answer				
1	The syllabus is developed at school level.	SD	D	UD	A	SA
2	I am familiar with the KTSP from colleagues.	SD	D	UD	A	SA
3	The KTSP guidelines can guide me to perform my teaching in the classroom.	SD	D	UD	A	SA
4	My knowledge about the KTSP is sufficient for teaching science.	SD	D	UD	A	SA
5	I think I need to learn more how science teaching is delivered in classroom.	SD	D	UD	A	SA
6	Learning materials based on the 1996 curriculum can be used to achieve the learning competencies.	SD	D	UD	A	SA
7	It is impossible for me to teach science using learning materials from the 1996 curriculum	SD	D	UD	A	SA
8	Teaching science based on the KTSP focused on competencies.	SD	D	UD	A	SA
9	The aim of teaching science is to have students pass exam.	SD	D	UD	A	SA
10	All learning materials taught to students needed be assessed.	SD	D	UD	A	SA
11	Only materials learnt by students were needed to be assessed.	SD	D	UD	A	SA
12	I have to teach all learning materials pointed out by the KTSP, although the materials are not needed to be assessed.	SD	D	UD	A	SA
13	I have paid more attentions to fast learners than slow learners.	SD	D	UD	A	SA
14	Teachers should pay attention to both fast and slow learners.	SD	D	UD	A	SA
15	I asses my students on the basis of students' formative exams	SD	D	UD	A	SA
16	I asses my students on the basis of student homework.	SD	D	UD	A	SA
17	The way that I have assessed students' progress is close to the KTSP guidelines.	SD	D	UD	A	SA
18	Besides formative exams, students are required to take the school exams.	SD	D	UD	A	SA
19	Based on your teaching experience, the school exams were planned by group of schools.	SD	D	UD	A	SA
20	The school exams should be devised by classroom teachers.	SD	D	UD	A	SA
21	I think science books should be designed similarly throughout the country.	SD	D	UD	A	SA
22	I think "PAKEM" approach has not been implemented in classroom due to lack of teacher's understanding to approach.	SD	D	UD	A	SA
23	The textbook should be designed by group of teachers.	SD	D	UD	A	SA
24	If the textbooks are not accessible at schools, I will	SD	D	UD	A	SA

	use the KTSP guidelines and teach every topic written down in the guidelines.					
25	If the textbooks <u>are not</u> accessible at school, I will use the guidelines but arrange the topics according to my students' needs and class level.	SD	D	UD	A	SA
26	If the textbooks <u>are not</u> accessible at school, I will use the KTSP guidelines and add some topics unavailable in the guidelines.	SD	D	UD	A	SA
27	I think the topics of in-service training needed for teachers are the content knowledge.	SD	D	UD	A	SA
28	I think the topics of in-service training considered useful for teachers are how to teach science using the "PAKEM" approach.	SD	D	UD	A	SA
29	I think the topics of in-service training useful for teachers are how to design learning materials.	SD	D	UD	A	SA
30	I think professional teacher development is better if it is designed by group of school.	SD	D	UD	A	SA
31	I think professional development should be carried by provincial level office of local government.	SD	D	UD	A	SA
32	I think professional development should be conducted by subject matter from the university.	SD	D	UD	A	SA
33	I think professional development should be carried out by supervisors.	SD	D	UD	A	SA
34	I think professional development should be done by subject matter teachers' group.	SD	D	UD	A	SA
35	I think professional development should be carried out by "*Lembaga Penjamin Mutu Pendidikan*".	SD	D	UD	A	SA
36	The PAKEM approach <u>cannot</u> be implemented in classrooms if the curriculum coverage is still the standard for the successfulness of teaching	SD	D	UD	A	SA
37	Teaching and learning aids are necessary in schools.	SD	D	UD	A	SA
38	Extra time is needed for preparing learning materials.	SD	D	UD	A	SA
39	The principal should award an incentive to teachers who spend extra time for teaching preparation.	SD	D	UD	A	SA
40	The principal should allocate funding to purchase endurable goods for instructional process.	SD	D	UD	A	SA
41	The KTSP makes my teaching activities more challenging.	SD	D	UD	A	SA
42	The implementation of KTSP makes my science class become interesting than others.	SD	D	UD	A	SA
43	The KTSP is similar to the 1996 curriculum.	SD	D	UD	A	SA
44	The KTSP requires the school to get more funding for curriculum realization.	SD	D	UD	A	SA
45	The KTSP encourage me to increase my teaching knowledge.	SD	D	UD	A	SA
46	The KTSP makes me learn from other teachers' experiences.	SD	D	UD	A	SA
47	The KTSP encourage me to have higher education level.	SD	D	UD	A	SA

APPENDIX J

Factor Analysis of Draft Teachers' Perception on Curriculum Reform (the TPCR) Questionnaire

KMO and Bartlett's Test

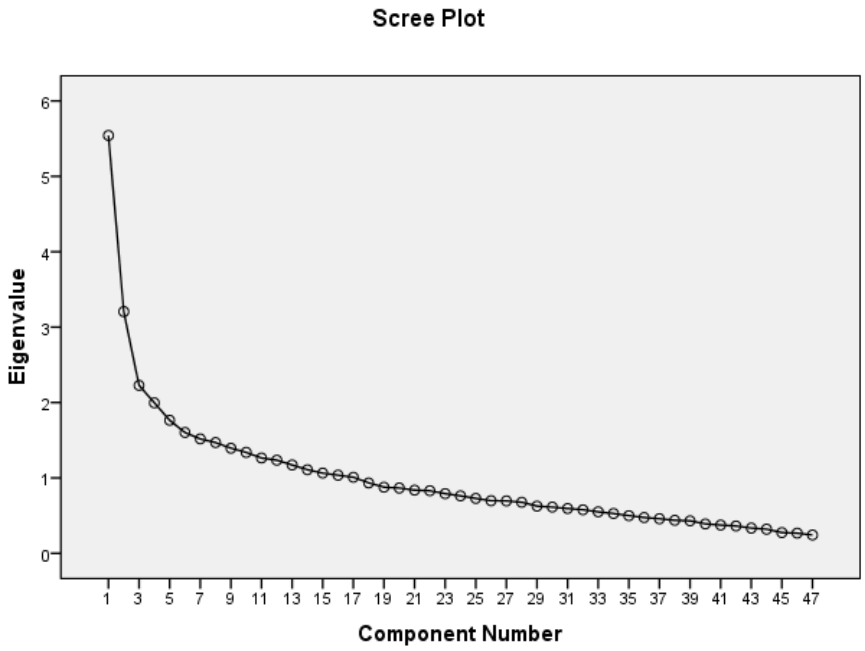
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.700
Bartlett's Test of Sphericity	Approx. Chi-Square	2750.284
	df	1081
	Sig.	.000

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.542	11.791	11.791	5.542	11.791	11.791
2	3.206	6.822	18.613	3.206	6.822	18.613
3	2.227	4.739	23.352	2.227	4.739	23.352
4	1.995	4.245	27.597			
5	1.764	3.753	31.350			
6	1.602	3.409	34.760			
7	1.517	3.228	37.988			
8	1.469	3.125	41.113			
9	1.394	2.966	44.079			
10	1.339	2.849	46.928			

APPENDIX K

Screeplots Obtained by Factor Analysis of Items in Item Pool for the Draft Teachers' Perception on Curriculum Reform (the TPCR) Questionnaire Instrument



APPENDIX L

Factor Loading for the Draft Teachers' Perception on Curriculum Reform (the TPCR) Questionnaire

Rotated Component Matrix[a]

	Component		
	1	2	3
Q47	.581		
Q46	.547		
Q35	.545		
Q39	.538		
Q40	.538		
Q45	.536		
Q38	.536		
Q41	.524		
Q32	.501		
Q37	.472		
Q29	.446		
Q31	.416		
Q28	.413		
Q44			
Q14			
Q43			
Q16		.627	
Q11		.592	
Q9		.573	
Q10		.491	
Q30		.452	
Q15		.445	
Q2		.440	
Q33		.420	
Q42		.415	
Q34		.412	
Q20		.386	
Q18			
Q13			
Q12			
Q21			
Q27			
Q7			
Q23			
Q22			
Q3			.613
Q4			.586
Q17			.472
Q8			.470
Q24	.366		.455
Q19			.425
Q26			.390
Q1			.357
Q5			353
Q6			
Q25			
Q36			

Extraction Method:
Principal Component Analysis.
Rotation Method:
Varimax with Kaiser Normalization.

APPENDIX M

The Revised Questionnaire of the Teachers' Perception on Curriculum Reform (the TPCR) Questionnaire

The aim of this survey is to explore the ways in which primary schools teachers respond to implementation of the KTSP. The findings of the survey will be shared with policy makers in an attempt to help improve implementation nation-wide. Individual responses to this survey will remain confidential and anonymous. Therefore, you feel free to response your choices according to the stated statements.

Part A

Direction: Please complete the information requested below about your school and yourself

1. School Location

District : ……
School :…….
Number
Address :…….

2. Gender

☐ Female
☐ Male

3. Age

☐ Fewer than 35 years old
☐ 35 – 44 years old
☐ 45 – 54 years old
☐ More than 55 years old

4. Education

☐ Secondary School Program ……..
☐ Diploma Program ……..
☐ Bachelor/"Sarjana" Program ……..
☐ Master Program ……..

5. Teaching Status

☐ Classroom Teacher : ……..……..
☐ Subject Teacher : …….

6. Teaching Experience

☐ Fewer than 5 years
☐ 5 – 10 years
☐ 10 – 15 years
☐ More than 15 years

7. When did your school implement the KTSP

☐ School academic year 2005
☐ School academic year 2006
☐ School academic year 2007
☐ School academic year 2008
☐ School academic year 2009

Part B

Direction

Beside each of the statements presented below, please circle whether you ***Strongly Disagree*** (SD); ***Disagree*** (D); ***Undecided*** (UD); ***Agree*** (A); or ***Strongly Agree*** (SA)

No (Items' Codes)	Statements	An alternative Answer				
1(Q1)	The syllabus is developed at school level.	SD	D	UD	A	SA
2(Q2)	I am familiar with the KTSP from colleagues.	SD	D	UD	A	SA
3(Q3)	The KTSP guidelines can guide me to perform my teaching in the class.	SD	D	UD	A	SA
4(Q4)	My knowledge about the KTSP is sufficient for teaching science	SD	D	UD	A	SA
5(Q5)	I think I need to learn more about KTSP guidelines.	SD	D	UD	A	SA
6(Q8)	Teaching science based on the KTSP focused on competencies.	SD	D	UD	A	SA
7(Q9)	The aim of teaching science is to have students pass examination.	SD	D	UD	A	SA
8(Q10)	All learning materials taught to students needed be assessed.	SD	D	UD	A	SA
9(Q11)	Only materials learnt by students were needed to be assessed.	SD	D	UD	A	SA
10(Q15)	I asses my students on the basis of students' formative examinations	SD	D	UD	A	SA
11(Q16)	I asses my students on the basis of student homework	SD	D	UD	A	SA
12(Q17)	The way that I have assessed students' progress is close to the KTSP.	SD	D	UD	A	SA
13(Q19)	Based on your teaching experience, the school exams were planned by group of schools.	SD	D	UD	A	SA
14(Q20)	The school exam is planned by classroom teachers.	SD	D	UD	A	SA
15(Q24)	If textbooks are unavailable at schools, I use the KTSP guidelines.	SD	D	UD	A	SA
16(Q26)	If textbooks are unavailable at school, I add some topics which are not prescribed in the guidelines.	SD	D	UD	A	SA
17(Q28)	I think the topic of in-service training is how to implement the "PAKEM" approach.	SD	D	UD	A	SA
18(Q29)	I think the topic of in-service training useful is how to design learning materials.	SD	D	UD	A	SA
19(Q30)	I think in-service training is designed by group of school.	SD	D	UD	A	SA
20(Q31)	I think in-service training is done by provincial level office of local government.	SD	D	UD	A	SA
21(Q32)	I think in-service training is conducted by subject matter specialist from the university.	SD	D	UD	A	SA
22(Q33)	I think in-service training is carried out by supervisors.	SD	D	UD	A	SA
23(Q34)	I think in-service training is done by subject matter teachers' group.	SD	D	UD	A	SA
24(Q35)	I think in-service training is carried out by "*Lembaga Penjamin Mutu Pendidikan*".	SD	D	UD	A	SA
25(Q37)	Teaching and learning aids are necessary in schools.	SD	D	UD	A	SA
26(Q38)	Extra time is needed for preparing learning materials.	SD	D	UD	A	SA

27(Q39)	The principal provides an incentive for teachers spending extra time.	SD	D	UD	A	SA
28(Q40)	The principal needs to allocate funding for providing endurable goods.	SD	D	UD	A	SA
29(Q41)	The KTSP makes my teaching activities more challenging.	SD	D	UD	A	SA
30(Q42)	The realization of KTSP makes my science class become interesting.	SD	D	UD	A	SA
32(Q45)	The KTSP encourages me to increase my teaching knowledge.	SD	D	UD	A	SA
33(Q46)	The KTSP makes me learn from other teachers' experiences.	SD	D	UD	A	SA
34(Q47)	The KTSP encourages me to have higher education level such as from Diploma 2 to "Sarjana".	SD	D	UD	A	SA

APPENDIX N

Questionnaire Items Deleted

Q6	Learning material from the 1996 curriculum can be used to achieve student learning competency.
Q7	Learning materials have to be different; it is impossible for me to teach science utilizing learning materials from the previous curriculum
Q12	I teach all learning materials which is pointed out by the KTSP, although those materials is not assessed.
Q14	Teachers pay attention to both fast and slow learners.
Q22	The teachers did not teach science based on "PAKEM" approach due to lack of teacher understanding to the approach.
Q23	The textbook should be designed by teachers or group of teachers
Q25	If the textbooks are not accessible at school, I use the KTSP guidelines to teach science.
Q27	I think that the topics of in-service training needed for teachers are content knowledge.
Q36	The "PAKEM" approach cannot implement in classroom if the demand of curriculum coverage is still a standard for the successfulness of teaching.
Q43	I think the implementation of the KTSP at my school that the KTSP is similar to the previous curriculum.