Factors Influence Reading Proficiency: Analysing A Case of Indonesia in PISA Reading 2009 Using HLM

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Abstract

This study examines how student factors, such as learning strategies, engagement, home language and school resources, communities and sectors, influence the reading proficiency of Indonesian students in the Programme for International Student Assessment 2009 (PISA). The methods of analyses employed in this study was Hierarchal Linear model (HLM). Hierarchal linear model was chosen as it solves the problem related to nested data (non-independent data). The results of the analysis using a hierarchal linear model reveal that both learning strategies and internal motivation predict reading proficiency significantly but the coefficient of internal motivation (reading enjoyment) is smaller compared to learning strategies, whereas learning strategies, particularly meta-cognitive strategies such as understanding and summarising, have a significant influence on reading proficiency becoming the major influential learning strategies that distinguish between high and low proficient in reading. However, these factors become insignificant when analysed simultaneously with other variables that have an indirect effect, as indirect effect has more influence.

Contents

List of Figures

List of Tables

Chapter 1: Introduction

Chapter one presents the background information related to issues examined in this study. It starts with the role of reading proficiency, scope of the study, and theoretical framework. It also contains the profile of Indonesia as a country whose data were used, research questions, and the concept of reading adopted in this study.

1.1 Background

While constant change in the 21st century challenges the educational system in each country to seek the best way to prepare young learners to cope with demands, reports from large-scale assessment, such as the Programme for International Student Assessment (PISA) and Progress in International Reading Literacy Study (PIRLS), reveal that high reading proficiency is not achieved equally by learners from different countries and areas, for example, Indonesia (IEA, TIMSS & PIRLS, 2011; OECD, 2010a). Therefore, as reading proficiency is a quintessential skill needed by learners to be able to adapt, survive and be actively involved at school, in the workplace and in the global community, it is important to study how various factors influence reading proficiency to provide an accurate insight for teachers, decision makers, parents and other stakeholders that enables them to take appropriate action or implement policies that strenghten positive effect and disminish negative effect. The focus of this study is on individual factors and school factors, particulalrly learning strategies and student engagement because the research findings show that these factors are the most influential in reading proficiency (OECD, 2010; Guthrie, 2013). However, some related factors, such as language use, reading diversity, teacher influence, school

community and school type, are also investigated using hierarchal linear model (HLM) software.

1.2 The Importance and Trends of Reading

Today, reading proficiency plays an important role in education, as it provides the opportunity for learners to acquire new knowledge and skills continuously. For example, in an educational context, high reading proficiency can assist the learner in studying other important knowledge from early childhood to higher education (e.g., language, science, maths and history) and help the learner to manage many academic reading requirements, such as articles, textbooks and reports, independently (Özdemir, 2009).

Studies show that reading proficiency is a good predictor of a successful life. For instance, in socioeconomic life, it is reported that reading proficiency is a better predictor for earning potential and social wellbeing than academic achievement for both male and females (OECD, 2010). Similarly, in education, it is found that reading proficiency has a close relationship to academic achievement and accomplishment in later life; the higher the level of reading proficiency, the bigger the chance of achieving academically and becoming succesful in life (Myrberg & Rosen, 2006). Moreover, it is found that countries with high achievement in reading are more likely to perform better in other fields, such as science and maths (OECD, 2010).

According to Stanovich (2008), the inability to become a proficient reader creates the 'Matthew effect'. He explains that this effect is a bidirectional effect, where problems in reading cause additional problems related to other cognitive knowledge and skills. The Matthew effect occurs when proficient readers gain more knowledge and skill because of their reading ability and engagement, while poor readers fall

behind (the gap becoming bigger and bigger), as they tend to avoid reading and, thus, read less and learn less. Eventually, poor readers may be unable to perform or acquire knowledge and skills in other fields that they need to survive and experience success in real life (Cain & Oakhill, 2011; Prochnow et al., 2013). In addition, Kempe et al. (2011) found that the Matthew effect has a close relationship with reading comprehension, which is a fundamental part of reading for gaining proficiency.

Given the important role of reading proficiency, many international assessment programmes have been established to assess and monitor its progress (e.g., PIRLS, NCLB, PIAAC, IALS/ALL) because countries have demanded comparative data, which is available regularly and is reliable, on the knowledge and skills of their students. One of these programmes is PISA, which was founded in 1997 by the Organization for Economic Cooperation and Development (OECD).

The PISA test is different from other large-scale, standardised international tests. The first main difference is the purpose. The PISA test is mainly designed to measure how well-prepared young learners (15 years old) are to apply their skills and competency in real-life situations and how equipped they are with essential skills that enable them to fully participate in the local and global community. The test does not measure how well they master the subject of curriculum. Another difference is that the test is carried out with a different focus every three years, for instance, it was reading in 2000, mathematics and problem solving in 2003, science in 2006 and reading again in 2009 (OECD, 2010)

1.3 Indonesian Profile in PISA 2000–2009

In general, the results of the PISA study show that, although the reading achievement of Indonesian students increased steadily between 2000 and 2009, proficiency was still significantly lower than the mean average of OECD countries. In

2000, Indonesia was ranked 39th with an average score of 371 from 41 countries, while, in 2009, it ranked 57th with an average score of 402 from 65 countries. This shows an improvement of 31 points. However, the average score of OECD countries was 493, which is significantly higher. In addition, when the results were examined closely, it was found that proficiency was not equally distributed among students.

Moreover, 21.77% of students were at Level 1b of the reading scale (the lowest level), 36.53% were at Level 1a, 29.05% were at Level 2, 11.09% were at Level 3, 1.50% were at Level 4 and 0.05% were at Level 5. Thus, 87.35% of Indonesian students were at Level 1 and 2, indicating that most could only find main ideas and specific information and make restricted comparisons and integration in texts, yet for complex and unfamiliar texts that required integration, interpretation, evaluation and, especially, critical thinking ability, they did not perform well. From these facts, it can be assumed that the quality of education in Indonesia is still not appropriate for preparing young learners to face the challenges of real-life situations in the 21st century. Therefore, this study aims to investigate how student and school characteristics influence reading proficiency and attempts to identify the underlying problem and, thus, find an appropriate solution to improve the performance and, ultimately, increase the quality of education in Indonesia (OECD, 2013)

1.4 Reading Concept

The concept of reading is taken from PISA, since this study uses the PISA dataset. Thus, the term 'reading proficiency' in this study shares a similar concept of reading to that defined by PISA. Designers of PISA 2009 prefer to use the term 'reading literacy' than 'reading' because it more accurately reflects what the test measures. They contend that reading generally refers to reading activities, such as

decoding or loud reading (can be interpreted as passive reading), while what the test measures is deeper and broader than it, including a wide range of cognitive and metacognitive competencies used in different contexts and for different purposes in real-life situations (can be interpreted as active reading). In this context, PISA redefines reading literacy in 2009 as 'understanding, using, reflecting on and engaging with written text, in order to achieve one's goal, to develop one's knowledge and potential, and to participate in society' (OECD, 2010,p.23). It explains the reading concept as 'an individual's capacity to: understand, use, reflect on and engage with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society' (OECD, 2010. p. 15), while literacy is the 'students' capacity to extrapolate from what they have learned and apply their knowledge in real life setting, and the capacity to analyse, reason, and communicate effectively as they pose, interpret, and solve problems in a variety of situations'. Further, each part of the definition of reading literacy is explained as follows:

- understanding: referring to comprehension ability in reading
- using: understood as notions of function and application
- reflecting on: seen as interaction of reader's previous knowledge and experience with the text
- engaging with: involving the motivation to read, such as interest and enjoyment, that leads to the choice of the topic, type and diversity of reading and the frequency of reading practices
- written text: including all types of text in graphic form from various media
- in order to achieve one's goal, to develop one's knowledge and potential, and to participate in society: indicates a wide range of settings where reading

literacy plays a role (e.g., private to public, formal education to lifelong learning and active citizenship).

This definition indicates that PISA is more interested in seeing how students can interpret and integrate the text in real-life situations or, in brief, about reading to learn not learning to read.

Based on the established concept of reading, the instrument designed by PISA to capture student proficiency in reading is then built in three important areas: situation, text and aspect (see PISA 2009 Assessment Framework). Situation is the context in which reading activities take place and consists of four settings: personal (e.g., letters, fiction and diary-style blogs), educational (e.g., books or materials used for reading to learn), occupational (e.g., text for accomplishing tasks immediately, such as job searching or workplace direction) and public (e.g., forum-style blogs, news websites and public notices). The percentage of each situation in the assessment instrument is shown in Table 1.1.

Table 1.1

Tasks Distribution Based on Situation in PISA 2009

Situation	**% of total tasks PISA 2009: print**	**% of total tasks PISA 2009: electronic**
Personal	30	30
Educational	25	15
Occupational	15	15
Public	30	40
Total	100	100

Text is another important characteristic in PISA. In PISA 2009, four classifications of text are identified and used: medium, environment, text format and text type. Based on medium, the texts are categorised into print and electronic. Print-

medium text is usually displayed on paper and includes single sheets, brochures, magazines and books that have a static form, while electronic-medium text is usually displayed on electronic devices, for example, liquid crystal display and plasma thin film transistor. This kind of text has an unfixed form. For assessment in Indonesia, PISA mainly uses print-medium text, as it is the common medium used in schools because of the unavailability of electronic devices.

Next, based on environment, texts are divided into authored-environment where the text is fixed (the reader cannot alter it) and message-based environment where the reader is able to change or add the content of the text. This characteristic is only applied to electronic-medium text.

Based on text format, the texts are classified as continuous, non-continuous, mixed and multiple, which applies to both electronic and print media. Continuous text usually consists of sentences and paragraphs (e.g., newspaper reports, essays and letters). Non-continuous text is text that is not structured (e.g., lists, tables and advertisements). The combination of these types is known as mixed text, which commonly appears in magazines, reference books, reports and email messages. In contrast, multiple text refers to independent texts that are juxtaposed for a specific purpose (e.g., for assessment purposes). Information about flights provided by different agents is one example of this category.

Based on text type, the text is classified into description (e.g., blog diary, a geographical map and a process in a technical manual), narration (e.g., a novel, a play and a biography), exposition (e.g., a graph of population trends, scholarly essays and a diagram showing a model of memory), argumentation (e.g., a web-based review of a book or a film and a letter to an editor), instruction (e.g., a recipe and guidelines for

running digital software) and transaction (e.g., emails between colleagues that requests and confirms arrangements).

The aspect of reading is another essential characteristic considered in PISA. Aspect relates to the 'mental strategies, approaches or purposes that readers use to negotiate their way into, around, and between texts' (OECD, 2009, p. 34). Five aspects are employed to guide reading literacy assessment in PISA, including retrieving information, forming a broad understanding, developing an interpretation, reflecting on and evaluating the content of a text and reflecting on and evaluating the form of a text. For PISA 2009, these five aspects are reorganised into three larger aspects:

- access and retrieve (identifying and retrieving a piece of particular information and locating it on provided space, such as finding a telephone number with several prefix codes)
- integrate and interpret (processing what is read to make internal sense of a text)
- reflect and evaluate (drawing on knowledge, ideas or attitudes beyond the text to relate the information provided in the text to one's own conceptual and experiential frames of reference) (OECD, 2009, p. 33–39).

These aspects of reading are the basis for PISA in construction of tasks and scales for reading assessment 2009, which is also used in this study as the outcome or dependent variable derived as an average from all threes aspects (their plausible values). The relationship between reading framework and the aspects of reading can be seen in OECD Report (2008, p.5)

The concept of reading literacy is assumed to be similar to the term 'reading proficiency', which is used in this study, in the sense that it reflects similar skills or aspects of reading that are captured and measured by the PISA test. However, it is different from reading achievement, as it refers to the average of residual values of the

reading aspect (assess and retrieve, integrate and interpret and reflect and evaluate) of each reading skill, instead of the raw score of students' performance. Moreover, as explained in the PISA technical report (2009, p. 262), proficiency is preferred to performance, as it represents student ability and knowledge in general instead of individually.

1.5 Factors Related to Reading Proficiency

Many studies suggest that various factors influence student proficiency in reading. Some that have been reported consistently to have close association at the student level include attitude, strategies in study, meta-cognitive strategies, reading engagement, motivation, high socioeconomic status, parental education, parental involvement and home resources (books) (De Witte & Kortelainen, 2013; Hartas, 2011; McKool, 2007; Neuenschwander, Röthlisberger, Cimeli, & Roebers, 2012; Suggate, 2009); OECD, 2010; PIRLS, 2010). At the classroom level, factors include teaching instruction, teaching stimulation, teaching approach, classroom environment and peer influence (Connor et al., 2011; Damber, Samuelsson & Taube, 2012; McGinty, Justice, Piasta, Kaderavek & Fan, 2012; Merritt, Wanless, Rimm-Kaufman, Cameron & Peugh, 2012; Talmage, Pascarella & Ford, 1984; Taylor, Roehrig, Hensler, Conner & Schatschneider, 2010). At the school level, factors such as school policy, climate, area, type, budget, policy, leadership style and size are also reported to influence student attitudes, strategies, interest and engagment in reading (Adeogun & Olisaemeka, 2011; Carlisle, Correnti, Phelps, & Ji, 2009; Esposito, 1999; S. M. Johnson, Kraft, & Papay, 2012; W. Johnson, Bouchard Jr, Segal, & Samuels, 2005; Sherblom, Marshall, & Sherblom, 2006; Tajalli & Opheim, 2005). Meanwhile, at the country level, factors closely relating to reading capability include educational policies, system of

curriculum, country's socioeconomic background and budget spent on education (Çalik & Eames, 2012; OECD, 2010a). However, the magnitude and type of influence of those factors varies according to context.

1.6 Purpose and Scope of Study

Generally, the purpose of this study is to examine how student characteristics, such as learning strategies, reading engagement and home language, teacher characteristics and school characteristics, such as teaching instruction, influence learning strategies applied by high and low proficient readers and, secondly, to detect how these characteristics contributed to the variability in reading proficiency of Indonesian students in PISA 2009.

There were four main considerations that led this study to focus on reading, PISA and Indonesia. First, reading is an important skill needed to learn other knowledge and skills that continually change, as explained in the previous section. Second, the PISA test is unique as it collects data that reflects the ability of students to apply their reading ability in real-life contexts (this is the main aim of the PISA test). Third, since PISA 2009 focused on reading, there are many data related to reading literacy available, which allowed the writer to examine how different factors predicted reading proficiency. Finally, no specific study on Indonesia has been conducted previously, despite the fact that the average performance of Indonesian students was significantly lower than the OECD average.

This study applied HLM to investigate how factors such as reading engagement, learning strategy, teaching instruction, language at home and gender influence the reading proficiency of Indonesian students and how school factors, such as community, type and facilities, affect and mediate the reading proficiency of high and low performing students, respectively.

1.7 Significance of the problem .

Many studies have reported a significant influence from student, teacher and school characteristics on reading proficiency; however, there was no research on how these factors explain the variability of reading proficiency in an Indonesian context (comparing high performing students with low performing students). Therefore, this study aims to examine how these factors explain the variability of reading proficiency in an Indonesian context. Further, as no research study has particularly focused on examining how learning strategy and engagement work between high and low proficient readers, this study also examine how learning strategies and reading engagement explain the variance of learning strategies within and between schools, comparing high and low proficient readers.

1.7.1 Research questions and theoretical framework.

1.7.1.1 Theoretical framework.

Since this study focuses on how the variability of reading proficiency of Indonesian students is explained by learning strategies and reading engagement, it considers other factors that are assumed to influence reading proficiency significantly, as well as learning strategies and reading engagement. Thus, important variables, such as socioeconomic status and parental education level are excluded, as it is suspected that they may discard variables that reflect learning strategies and reading engagement.

As shown in the theoretical framework (see Figure 1.3), variables at the student level (Level 1) include the reading proficiency score (derived from the average of plausible values reflecting reading aspects: access, retrieve and integrate), which becomes the dependent variable (READPROF = reading proficiency). Next, five different types of learning strategies (MEMOR = memory, UNDREM = meta-

cognition of understanding and remembering, CSTRAT = control strategy, ELAB = elaboration and METASUM = meta-cognition: summary) and one combination of significant learning strategies (LSTRAT = learning strategy) become explanatory variables at the student level, as do three variables of reading engagement (JOYREAD = reading enjoyment, ONLNREAD = reading online and DIVREAD = reading diversity), two variables of teaching instruction (STIMREAD = stimulation of engagement in reading and STRSTRAT = use of structuring and scaffolding strategies), gender (MALE) and first language not test language (HMELANG). Further, as learning strategies and reading for enjoyment also have an indirect effect (see Figure 1.3), variables reflecting the indirect effect of those variables were created using multiplication, for instance LSTRAT * DIVREAD = LDIVREAD (for full explanation, see Chapter 3).

At the school level (Level 2), communities (VILLAGE, TOWN and CITY), sectors (PUBLIC and PRIVGOVD = private government dependent) and resources (SCMATEDU = school resources and materials for teaching and TCSCHORT = teacher shortage) become explanatory variables. In addition, since this study will also compare how learning strategies and reading engagement affect high and low proficient readers, two new variables reflecting both groups were created (LOWPROF = low proficiency and HIGHPROF = high proficiency).

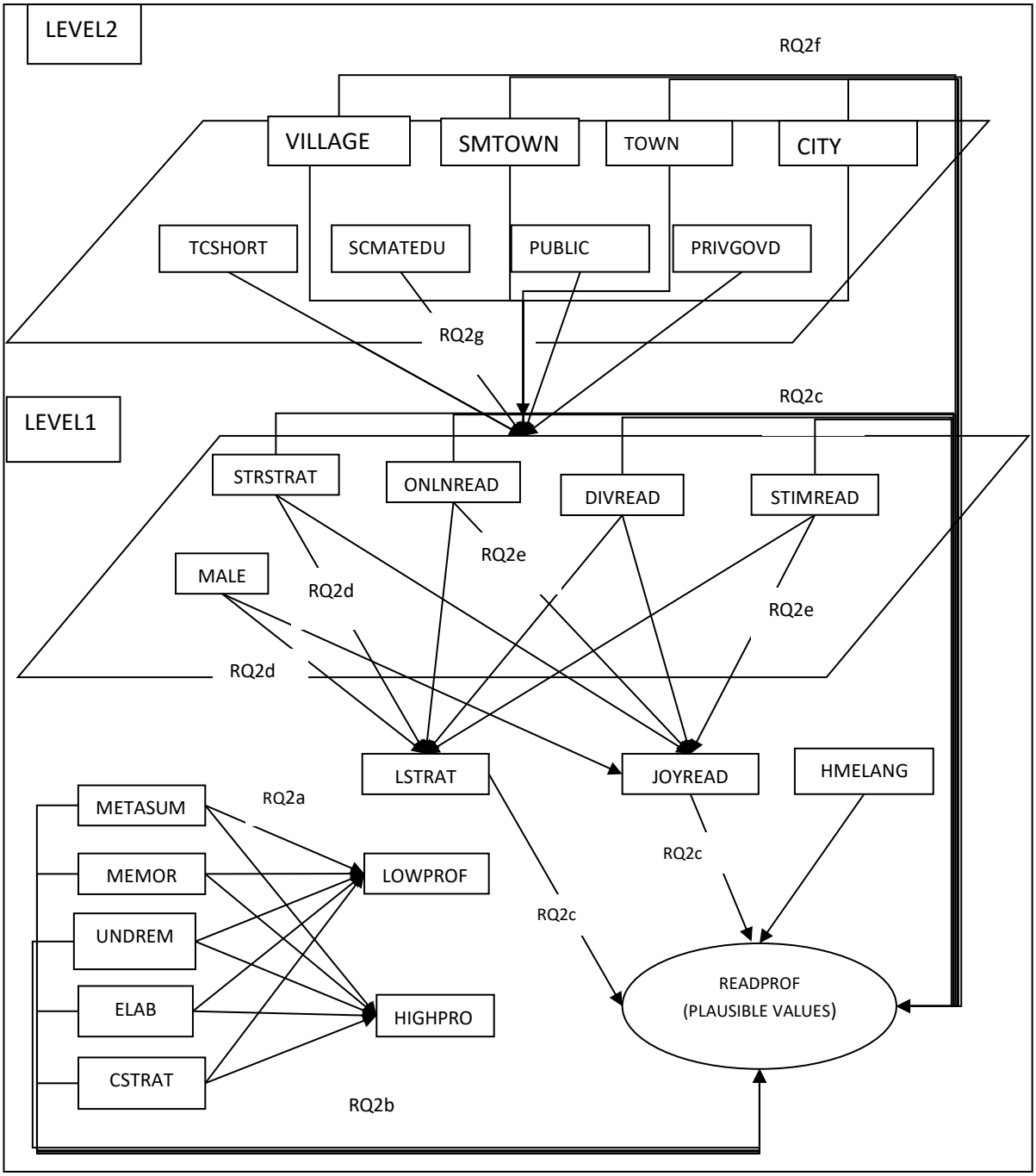

Figure 1.1. Theoretical Framework

1.7.1.2 Research questions.

The research questions used to guide this study include:

1. How do the following variables interact and influence reading proficiency?

   At the student level:

   - learning strategies:
     a. memory (MEMOR)
     b. elaboration (ELAB)
     c. meta-cognition: summarising (METASUM)
     d. understanding and remembering (UNDREM)
     e. control strategy (CSTRAT)
     f. learning strategy (LSTRAT)
   - reading engagement:
     g. diversity in reading (DIVREAD)
     h. reading enjoyment (JOYREAD)
     i. online reading (ONLNREAD)
   - other characteristics of students:
     j. home language not test language (HMELANG)
     k. gender (MALE)
     l. students with low reading proficiency (LOWPROF)
     m. students with high reading proficiency (HIGHPROF)
   - teaching instruction:
     n. stimulation of student engagement in reading (STIMREAD)
     o. use of structuring and scaffolding strategies (STRCSTRAT).

   At school level

- school community (location):
    p. village
    q. town
    r. city
- school sector (public and private):
    s. public
    t. private relied on government fund (PRIGOVD)
- school resources:
    u. teacher shortage (TSCHORT)
    v. school material for education (SCMATEDU)

This question leads to more specific questions relating to building the model in this study. These are as follows:

a. How do learning strategies, such as MEMOR, METASUM, UNDREM, CTRAT and ELAB, affect the reading proficiency of students?
b. How did learning strategies, such as MEMOR, METASUM, UNDREM, CTRAT and ELAB, influence the reading proficiency of Indonesian students in PISA 2009?
c. How do HMELANG, ONNLNREAD, STIMREAD, STRSTRAT, LSTRAT, DIVREAD and JOYREAD influence reading proficiency directly?
d. How does the interaction between LSTRAT and STIMREAD, DIVREAD, JOYREAD, STRSTRAT, MALE, ONLNREAD, HIGHPROF and LOWPROF influence reading proficiency indirectly?
e. How does the interaction between JOYREAD (reading motivations) and LSTRAT, STIMREAD, DIVREAD, JOYREAD, STRSTRAT, MALE,

ONLNREAD, HIGHPROF and LOWPROF influence reading proficiency indirectly?

f. How do factors at the school level, such as SCMATEDU, TCSHORT, school community and school sector (type), influence reading proficiency?

g. How do student and school characteristics explain variability in reading proficiency?

Chapter 2: Literature Review

This chapter discusses all previous research related to factors examined in this study. It begins with factors at student characteristics such as gender, reading engagement (reading enjoyment, diversity in reading, and reading online), learning strategies (cognitive and meta-cognitive strategies), and home language. Whilst, for school factors, it addresses school's resources (teaching material, teacher shortage), school communities (village, small town, town, city), and school sector (public, private).

Student Characteristics

2.1 Student Gender (Q2)

A large number of studies on gender related to reading achievement and the factors associated with it have reported that there is a relatively large performance gap between males and females across many countries in the world. Universally, for overall reading performance, females outperformed males significantly. Xin (2008) used data from PISA 2000 to examine gender gaps within schools and across schools in 41 countries and found that females performed better than males in all countries except Romania. Similarly, Rosén (2001) used data gathered by the International Association for the Evaluation of Educational Achievement (IEA) and compared two populations (nine-year-old students from 25 countries and 14-year-old students from 22 countries), which showed that, although the gender gap might not be identical in univariate and multivariate analyses, a similar pattern existed in both analyses and populations, as well as the results of the other studies, which was that female students performed higher than male students in reading. Further, PISA compared the gap differences from 2000 to 2009 and the results showed a similar trend through the

years (OECD, 2010b), which was that males performed lower than females (Wolff (2010). Other similar results were reported by Marks (2008), Smith, Smith, Gilmore, and Jameson (2012) and Shafiq (2013).

Gender influence on the reading gap was affected by reading text type and test item (males prefer multiple choice and females prefer constructive response) (Taylor & Lee, 2012), cultural stereotype, family factors (e.g., parental education, mother's reading activities and early reading activities), educational policies (e.g., curriculum and text), student characteristics (e.g., intrinsic motivation, reading attitude and reading strategies) and school characteristics (e.g., material resources, teacher behaviour and enrolment size) (Mcgeown, 2012; (McKenna, Conradi, Lawrence, Jang, & Meyer, 2012; Rosén, 2001; Shukakidze, 2013; Su-Yen & Luo, 2012; Xin, 2008). Surprisingly, a study conducted by Chiu and McBride (2006) that examined the relationship between gender, context and reading in 43 countries showed that only reading for enjoyment mediated the gender gap significantly (42%).

2.2 Reading Engagement (Q23, 25, 26)

Reading engagement has a strong positive association with reading proficiency (Wigfield & You, 2012 in Afflerbach, Cho, Kim, Crassas, & Doyle, 2013; WigField et al., 2008 in De Naeghel, Van Keer, Vansteenkiste, & Rosseel, 2012; Guthrie, Klauda, & Ho, 2013). Kirssch (2002, in Twist, Gnaldi, Schagen, & Morrison, 2004) suggests that, when reading engagement is high, reading proficiency will be higher regardless of the student's background, while PISA's results indicate that a good solution for reducing the gap that is created because of disadvantaged socioeconomic backgrounds is promoting engagement in reading (OECD, 2010).

Reading engagement is defined in various ways in relevant studies. According to De Naeghel, Van Keer, Vansteenkiste & Rosseel, 2012), reading engagment is 'the quality of behavioural involvement [e.g., student attention and effort] and emotional involvement [e.g., positive emotion]' during learning activities. However, Guthrie (2013) defines it as merely 'its behavioural form, consisting of actions and intentions to interact with text for the purpose of understanding and learning. Engagement is the act of reading to meet internal and external expectations' (p. 10). Hence, it is divided into two categories: dedication (positive engagement, such as willingness to learn) and avoidance (negative engagement, such as avoiding tasks and activities relating to reading). Fredericks et al. (2004, p. 60, as cited in Lee and Shute (2010) classify engagement into three categories: behavioural engagement (observable activities, such as reading and borrowing books), cognitive motivational engagement (the willingness of students to do extra work, self-efficacy and goal expectation) and emotional engagement (students' affective feeling, such as happiness, curiosity, boredom and anxiety). Conversely, PISA (OECD, 2010), portrays reading engagement as reading habits consisting of reading for school, diversity of online reading activities, enjoyment of reading, time spent reading for enjoyment and diversity of reading materials (p. 26). For this study, PISA's concept of reading engagement is adopted, as the data used for the analysis is taken from the PISA 2009 dataset. More specifically, this study includes frequency or the amount of reading activities reflected in reading enjoyment (STQ23), like reading (STQ25) and reading online (STQ26) (see student questionnaire for PISA 2009 for further information), because it has been found that there is a strong positive effect on reading performance (Guthrie et al., 1999; Anderson, Wilson,& Fielding, 1986 in De Naeghel et al., 2012).

2.3 Reading enjoyment (Q23).

Research consistently demonstrates that engagement in reading because of internal motivation, such as enjoyment, curiosity or self-learning, positively influences reading proficiency more significantly than reading because of external motivation does (e.g., at the teacher's demand) (De Naeghel et al., 2012; Fulmer & Frijters, 2011; Guthrie et al., 2013; Hughes, Wen, Oi-Man, & Loyd, 2008; IEA, TIMSS, & PIRLS, 2011; OECD, 2010c; Quirk, Schwanenflugel, & Webb, 2009). In particular, findings from PISA indicate that students who enjoy reading have a higher proficiency level in reading. Results show a proficiency level 1.5 points higher than that of students who do not like reading (OECD, 2010); thus, it is suggested that increasing enjoyment in reading will increase reading ability. One factor that has been reported to have a significant influence on reading for enjoyment is teaching instruction (Guthrie, 2013).

2.4 Reading diversity (Q25).

PISA reports that diversity in reading has high positive correlation with reading attainment. The results show that from reading material, such as fiction, non-fiction, comics, magazines and newspapers, only reading fiction was associated significantly with high reading literacy, while comics were associated least significantly. However, it is found that students who have wider reading diversity perform better than students who only read certain types of text, such as fiction. Further, findings suggest that reading frequency positively correlates to reading proficiency more significantly than time spent on reading, suggesting that frequency in reading is more important than reading duration for high proficient readers (OECD, 2010).

2.5 Reading online (Q26).

For online reading, it is suggested that students who have high achievement in reading are more likely to engage in reading than students who have low achievement (OECD, 2010). In particular, it is reported that using the Internet to find information has a stronger effect on reading proficiency than using it solely for social activities, such as chatting and communication (Gil-Flores, Padilla-Carmona, & Suárez-Ortega, 2011).

2.6 Learning Strategies (Q27, Q41, Q42)

Learning strategies have been recognised as the most influential factors that affect the level of reading proficiency directly, as they influence the way students approach and comprehend reading material (Afflerbach et al., 2013; Kit- ling & Chan, 2007; Law, 2009; Mason, 2013; OECD, 2010c; Sui-Chu & Willms, 1996). Many strategies in learning influence reading ability; however, in general, they are divided into two broad categories: cognitive and meta-cognitive (self-regulated) strategies.

2.7 Cognitive strategy (Q27).

The literature defines cognitive strategies as strategies applied by students when they interact with text or reading materials. Within this interaction, the students integrate their prior knowledge with what they are reading by underlining, summarising, extracting, guessing and paraphrasing important information to understand and comprehend the passage (Kit- ling & Chan, 2007; Preira, Laird & Deane, 1997, p. 190, as cited in Yang, 2012).

PISA's findings reveal that the cognitive strategy that affects reading performance the most is summarising. When performance of countries is compared, it is found that countries with a high percentage of students who report they can summarise effectively perform much better than countries where students report that they cannot. Further, the strategies found highly effective in summarising include checking important facts, reading through the passage, underlining important points and writing the summary in own words, whereas strategies that have moderate effectiveness include looking over (checking) the summary to ensure the summary has included the important points of each paragraph and reading the text as much as possible before summarising it. The least effective strategy involves attempting to copy many sentences as accurately as possible. Elaboration is also another effective strategy, while memorising has inconsistent correlation and does not lead to deep thinking (OECD, 2010). Conversely, Wu, Cheng, and Huang (2012) used data of participants from Hong Kong in PIRLS 2002 to show that the memorisation strategy is more powerful in predicting reading attainment than the elaboration strategy.

2.8 Meta-cognitive strategy (Q41, 42).

Meta-cognitive strategies can be defined as strategies or ability to manage and regulate cognitive strategies. Hence, meta-cognitive strategies reflect the intention, plan and tactics used by students to identify and mediate their reading (Yang, Li, & Tseng, 2012). An example of meta-cognitive strategies used in a whole process of reading activities are self-regulation, planning and monitoring self-understanding of a text (Afflerbach et al., 2013; Sani, Chik, Nik, & Raslee, 2011), as well as evaluation (Lee & Shute, 2010).

Research found that when students are proactive in selecting and monitoring their strategies in their own reading activities, it affects their reading achievement considerably (Kit- ling & Chan, 2007; Law, 2009; Mason, 2013; Neuenschwander et al., 2012; Sui-Chu Ho, 2004). Moreover, research conducted by Yang, Li, and Tseng, (2012) revealed that students with the highest achievement tended to apply monitoring and planning to activities more often compared to students who achieved moderate reading proficiency, while students who had moderate performance tended to apply those strategies more often than students who had poor reading attainment.

Another detailed study (Bernacki, Byrnes, & Cromley, 2012) used hypertext in a website environment and found that, from all strategies (seeking more information, note taking, reviewing annotations, highlighting and monitoring), only highlighting and monitoring had a significant influence on reading comprehension. This result suggests that cognitive strategies and meta-cognitive strategies are useful for different reading tasks and meta-cognitive strategies are essential for deep understanding, which then helps readers to read to learn (Nergis, 2013).

2.9 Home Language (Q19)

Various studies on the relationship between home language and reading achievement showed that they are significantly correlated. Students who have a similar language at home to the language used in the reading test experience higher achievement than students who have a different home language to the language used in the test (Broomes, 2013; Rangvid, 2010; Rosenthal, Baker, & Ginsburg, 1983). Even after controlling socioeconomic and educational background, the effect is still significant (Marx & Stanat, 2012). However, almost those significant findings come from students who came from immigrant background (not native).

2.10 Teaching Instruction (Q38)

The success of students cannot be separated from the influence of their teacher. Research carried out on the effect of school characteristics indicates that teachers have a larger effect on student achievement than other factors, such as class size or class composition (Sanders & Horn, 1994; Sanders & Rivers, 1996; Wright, Horn & Sanders, 1997, as cited in Darling-Hammond & Young, 2002). Research (both experimental and cross-sectional) revealed that teachers have a direct and indirect effect on their students' academic achievement, including reading proficiency. Several studies relating to teaching instruction asserted that it fundamentally influences student achievement (Matsumura et al., 2012; Brand & Dalton, 2012; Van Keer & Vanderlinde, 2010, Ponce, 2012; Afflerbach, 2013, as cited in Bloom & Owens, 2013; Bui & Fagan, 2013) in reading directly and indirectly affects other student characteristics that closely affect their reading capability, such as engagement, motivation and strategies in reading (Guthrie, 2013). Further, the national reading panel (2000, as cited in Tatum, 2012) found that good quality teaching instruction improves reading achievement significantly. Examples of the influence of teaching instruction are manipulating phonemes, systemic phonics instruction, fluency instruction, vocabulary development and comprehension strategies.

Another comprehensive literature review related to the effectiveness of reading instruction on reading comprehension was carried out by Mahdavi and tensfeldt (2013) showed that explicit teaching instruction on strategies had a more significant effect on student achievement. After identifying, explaining and reviewing five categories of reading comprehension: peer-learning, self-questioning, story grammar, text structure, story mapping and graphic organiser and vocabulary development, Mahdavi and

Tensfeldt (2013) suggest not using these strategies separately but combining them through integration and echoes the assertion given by the National Health Institute of Child Health and Human Development (2000) that reading comprehension strategies should be taught explicitly and not independently but through evidence-based engagement, for example, scaffolding, activation of background knowledge, skills and strategic model, guided practice, role-playing, discussion and participation. According to Mahdavi and Tensfeldt (2013), all of these strategies should be taught by providing scaffolding first before allowing the students to learn to apply it independently. Regarding scaffolding strategies, Zhang (2013) explored the use of literacy scaffolding among adult learners and proposed that balanced literacy instruction (scaffolding instruction) can be considered as a choice.

Since the data related to teaching instruction were captured from student's perspectives, that is stimulation, as well as structure and scaffolding strategies in classroom, this factor were classified into student's characteristics in this literature review as well as in data analysis

School characteristics

2.11 School facilities (Q10).

Studies related to school facilities and student academic achievement indicated inconsistent results. Some studies found this factor had a significant effect; however, other studies reported that it was insignificant. A positive relationship between school's resources and student achievement has been reported by some studies, such

as Hurd et al. (2006) and Lee and Zuze (2011). Further, Hurd et al. (2006) investigated the effect of the number of books on literacy strategy and argued that book provision is one of influential factors for the success of a literacy strategy. In addition, research conducted in an Indonesian context, particularly, revealed that school facilities not only predict student achievement significantly (Suryadarma, Surhayadi,Sumarto & Rogers, 2006) but also affect reading motivation (interest) and reinforcement of reading (Ginting, 2005). Similar results were found by Lee and Zuze (2011), who studied the effect of school resources on academic performance in Sub-Saharan Africa, comparing Botswana, Malawi, Namibia and Uganda and using data from the 2000 Southern and Eastern Africa Consortium for Monitoring Educational Quality. Their findings showed that school resources significantly affected reading proficiency consistently and to a larger degree than other school characteristics did. In addition, Xin and Crocker (2007) found that the effect of school resources on Canadian student performance was considerable in the school context but less than in a disciplinary climate.

However, other studies revealed different results. Wei et al. (2011) conducted research on the academic achievement of Canadian students and school resources using multilevel modelling and reported that the influence of school resources was insignificant on reading and mathematical achievement. A similar result was found by Taruumi and Willms (2010), who investigated the risk of families with disadvantaged backgrounds and low levels of school resources, comparing data from 43 countries that participated in PISA. They found that the effect of a low level of school resources was less significant than that of a family with a disadvantaged background.

As this study focuses on the influence of motivation and strategies in reading, school resources are considered important as it is suspected that this factor may influence student motivation, which then reinforces reading strategies.

2.12 School communities (Q4).

The reading gap has been largely recognised between school communities. Schools in large urban communities are more likely to perform better than schools in rural communities, regardless of whether the school is in a developed country or a developing country. A study conducted by Sullivan et al. (2013) suggested that, from 353 schools located in small communities ranging from < 1,000 people to large communities of > one million people (cities) in Australia, many school principals in rural and remote areas were more likely to report that a shortage of school resources, including good teaching staff and instructional materials, hinder instruction, which eventually negatively affects student academic achievement. Similar results revealed in PISA's survey showed that, in general, schools in small communities performed much worse academically and suffered more from a shortage of teachers and facilities for teaching and learning processes compared to principals whose schools were located in urban areas. In a more specific study relating to school effect, reading proficiency and student background, Subendi (2007) used HGLM analysis with an ANOVA-like approach to analyse data from the National Assessment of Educational Progress 2000 (N = 46 states) in the United States found that poor students, as well as rich students in rich schools, received the most benefit.

2.13 School sectors (Q2).

Research on the influence of school types on student achievement indicated inconsistent findings. For example, PISA found that, after controlling student characteristics, such as socioeconomic background and school demographic profile, there was no significant difference between private and public schools (OECD, 2010). Specifically in an Indonesian context, a study conducted by Newhouse and Beegle (2006) suggested that public schools, particularly junior secondary schools, provided better input for the student, leading to higher achievement than in private schools. However, a study that examined school effectiveness in Indonesia found that students who graduate from private secondary school perform better in the labour market (Bedi & Garg, 2000). Despite contrary results to the Indonesian study, House (2012) found that the better outcome of public schools can partly be influenced by better education of their parents and high test scores.

Chapter 3: Research Method

Issues explained in this chapter are related to research methodology. In the beginning, it describes the nature of the data used in this study and how they were treated for the need of the analysis. After that, it continues with reason and principles of method chosen to carried out the analyses of hierarchal linear model (HLM).

3.1 Data Analysis

This study used secondary data in the analysis. According to Sarah (2007), secondary data differs from primary data primarily based on the person who collects the data and the person who analyses the data. If the same person gathers and analyses the data, it is named primary data. However, if it is used and analysed by other person, then it becomes secondary data. According to Smith (2008,p.806) secondary data includes a 'whole spectrum of empirical forms; they can include data generated through systematic reviews, through documentary analyses as well as the results from large-scale dataset such as the national census or international survey such as the programmes for International Student Assessment (PISA)' (p. 4). Secondary data can be presented in numerical or non-numerical form. In this study, the data are numeric, as this is a quantitative study. Smith (2008) further explains that numerical data that are suitable for secondary analysis include population census, government surveys, other large-scale surveys, cohort and other longitudinal studies, other regular or continuous surveys and administrative records (p. 5). Hence, the data provided by PISA as a large-scale international survey is suitable to be used in this analysis.

Secondary data was chosen because it has some obvious advantages. Boslaugh (2007) stipulates that, first, from an economic perspective; it saves resources (e.g., money, time and energy). Second, it provides a massive dataset that represents the

sample and cannot be gathered by one person alone. Third, datasets are of high quality, since they are usually collected by experts and experienced researchers that may not be available in smaller research projects. However, Sarah (2007) also states that there are several disadvantages. First, datasets may not be compatible with the research question being asked, since they may be collected with a different focus and purpose (different research question) and in a different form. Next, the process of data collection and execution may not be known; accordingly, the researcher may not know about serious problems related to the data, for example, low participant response.

For this study, all forms of analysis and how the data were handled and used were based on the PISA technical report (OECD, 2012), which provided a guide and explanation on how the instrument was used, its relationship with the dataset and how to use the data appropriately, because the data used were taken from the PISA 2009 dataset (http://pisa2009.acer.edu.au/downloads.php, 2013).

Based on the purpose of this study, which is to examine how student factors, teacher factors and school factors contribute to the variance of reading proficiency in Indonesian students in PISA 2009, only participants from Indonesia were selected from the dataset. Initially, 5,132 students from 183 schools in Indonesia participated in the PISA reading test. However, when missing data were deleted, this was reduced to 4,483 students from 179 schools.

For practicality of interpreting the results of the data analyses, categorical data, such as gender, school community and sector, were re-coded into dummy coding. The coding was applied as ‘one’ for reference variable and ‘zero’ for others categories. This principle was applied for all categorical variables in this study, both at the student level and the school level (Dummy coding, 2013).

In addition, WLE scores were used for variables relating to student attitudes, such as reading enjoyment, diversity reading, online reading and learning strategies, as they produce less-biased data estimation. Detailed information of variables at the student and school level, the source and the coding are presented in Table 3.1.and table

Table 3.1

Variables used at the student level (Level 1)

VARIABLE CATEGORY	VARIABLE NAME	VARIABLE DESCRIPTION	INSTRUMENT/SOURCE
Outcome	PVtotAV	Plausible value total average (access, integrate, reflect)	Reading literacy test PISA 2009
Predictors:			
Language	Predictors: HMELANG	Home language not test language=1, others=0	Student Questionnaire for PISA 2009/ST19int
Learning strategies	METASUM	Meta-cognition: Summarising	Student Questionnaire for PISA 2009/ST42Q1,2,3,4,5 I write a summary. Then I check that each paragraph is covered in the summary, because the content of each paragraph should be included I try to copy out accurately as many sentences as possible before writing the summary, I read the text as many times as possible I carefully check whether the most important facts in the text are represented in the summary I read through the text, underlining the most important sentences. Then I write them in my own words as a summary
	UNDREM	Meta-cognition: Understanding and Remembering	Student Questionnaire for PISA 2009/ST41Q1,2,3,4,5,6, I concentrate on the parts of the text that are easy to understand I quickly read through the text twice After reading the text, I discuss its content with other people I underline important parts of the text. I summarise the text in my own words I read the text aloud to another person
	ELAB	Use of elaboration strategies	Student Questionnaire for PISA 2009/ST27Q04,08,10,12 When I study, I try to relate new information to prior knowledge acquired in other subjects. When I study, I figure out how the information might be useful outside school. When I study, I try to understand the material better by relating it to my own experiences. When I study, I figure out how the text information fits in with what happens in real life.

	CSTRAT	Use of control strategies	Student Questionnaire for PISA 2009/ST27Q02,06,09,11,13 When I study, I start by figuring out what exactly I need to learn When I study, I check if I understand what I have read. When I study, I try to figure out which concepts I still haven't really understood When I study, I make sure that I remember the most important points in the text. When I study and I don't understand something, I look for additional information to clarify this.
	MEMOR	Use of memorisation strategies	Student Questionnaire for PISA 2009/ST27Q01,03,05,07 When I study, I try to memorize everything that is covered in the text When I study, I try to memorize as many details as possible When I study, I read the text so many times that I can recite it. When I study, I read the text over and over again
Reading Engagement	DIVREAD	Diversity reading	Student Questionnaire for PISA 2009/ST25Q01,02,03,04,05 Magazines, Comic books, Fiction (novels, narratives, Stories, Non-fiction books, Newspapers
	JOYREAD	Joy/Like Reading	Student Questionnaire for PISA 2009/STQ24Q1,02,03,04,05,06,07,08,09,10,11 I read only if I have to Reading is one of my favourite hobbies I like talking about books with other people I find it hard to finish books I feel happy if I receive a book as a present For me, reading is a waste of time I enjoy going to a bookstore or a library I read only to get information that I need I cannot sit still and read for more than a few Minutes I like to express my opinions about books I have read I like to exchange books with my friends
	ONLNREAD	Online Reading	Student Questionnaire for PISA 2009/ST26Q1,2,3,4,5,6,7 Reading emails <Chat on line> (e.g. <MSN®>) Reading online news Using an online dictionary or encyclopaedia (e.g. <Wikipedia®>) Searching online information to learn about a particular topic Taking part in online group discussions or forums Searching for practical information online (e.g. schedules, events, tips, recipes

Teaching Instruction	STIMREAD	Teachers Stimulation of Reading Engagement 1.Never'hardly ever 2. In some lessons 3. In most lessons 4. In all lessons	Student Questionnaire for PISA 2009/ST37Q 01,02,03,04,05,06,07 In your <test language lessons>, how often does the following occur? The teacher asks students to explain the meaning of a text The teacher asks questions that challenge students to get a better understanding of a text The teacher gives students enough time to think about their answers The teacher recommends a book or author to read The teacher encourages students to express their opinion about a text The teacher helps students relate the stories they read to their lives The teacher shows students how the information in texts builds on what they already know.
	STRSTRAT	Use of structuring and scaffolding strategies 1. Never or hardly ever 2. In some lessons 3. In most lessons 4. In all lessons	Student Questionnaire for PISA 2009/ST38Q 01,02,03,04,05,06,07,0809 In your <test language lessons>, how often does the following occur? The teacher explains beforehand what is expected of the students The teacher checks that students are concentrating while working on the <reading assignment> The teacher discusses students' work, after they have finished the <reading assignment> The teacher tells students in advance how their work is going to be judged The teacher asks whether every student has understood how to complete the <reading assignment> The teacher marks students' work The teacher gives students the chance to ask questions about the <reading assignment> The teacher poses questions that motivate students to participate actively The teacher tells students how well they did on the <reading assignment> immediately after
Gender	MALE	Male=1, Female=0	Student Questionnaire for PISA 2009/STQ04Q01
Group Reading Proficiency	HIGHPROF	High Proficiency=1, others=0	New variable created
	LOWPROF	Low Proficiency=1, others=0	New variable created

	MIDPROF	Midle Proficiency= 1, others=0	New variable created
	LSTRAT	Learning strategies (combination of METASUM, CSTRAT, and UNDREM	New variable created
	LHIGHPROF	LSTRAT*HIGHPROF	New variable created
	LSTIMRED	LSTRAT*STIMREAD	New variable created
	LDIVREAD	LSTRAT*DIVREAD	New variable created
	LJOYREAD	LSTRAT*JOYREAD	New variable created
	LSTRSTRAT	LSTRAT*LSTRSTRAT	New variable created
	LONLNREAD	LSTRAT*LONLNREAD	New variable created
	LLOWPROF	LSTRAT*LOWPROF	New variable created
	LMALE	LSTRAT*MALE	New variable created
	JHIGHPROF	JOYREAD*HIGHPROF	New variable created
	JSTIMREAD	JOYREAD*STIMREAD	New variable created
	JDIVREAD	JOYREAD*DIVREAD	New variable created
	JSTRSTRAT	JOYREAD*LSTRAT	
	JONLNREAD	JOYREAD*ONLNREAD	
	JMALE	JOYREAD*MALE	
	JLOWPROF	JOYREAD*LOWPROF	
	LOWMETASUM	LOWPROF*METASUM	
	LOWUNDREM	LOWPROF*UNDREM	
	LOWCSTRAT	LOWPROF*CSTRAT	
	LOWMEMOR	LOWPROF*MEMOR	
	LOWELAB	LOWPROF*ELAB	
	HMETASUM	HIGHPPROF*METASUM	
	HUNDREM	HIGHPPROF*UNDREM	
	HCSTRAT	HIGHPPROF*CSTRAT	
	HMEMOR	HIGHPPROF*MEMOR	
	HELAB	HIGHPPROF*HELAB	

Table 3.2

Variables used at the school level (Level 2)

Names	Description
SCMATEDU	Quality of the schools educational resources
TCSHORT	Teacher shortage
VILLAGE	Village =1; other = 0
SMTOWN	Small town =1, others=0
TOWN	Town =1, others = 0
CITY	City = 1, others = 0
LARCITY	Large City = 1, others= 0
PUBLIC	Public =1, others=0
PRIGOVD	Private goverment dependent = 1, others=0
PRIVIND	Private independent=1, others=0

For descriptive statistics of variables used in this study, see appendix 1

3.2 Method of Analysis

HLM analysis.

Since students are clustered in schools, resulting in non-independent data (the basic idea is that variables that influence student attainment are more similar within a school than with other schools, as they are also influenced by school characteristics), HLM was chosen to answer the second research question. Further, HLM addresses the serious problems faced by classical statistical techniques, such as regression and ANOVA, which assumes that the characteristics of the data are independent, while, in fact, for educational research, students are structurally nested in classes, classes are nested in schools, schools are nested in districts and so on; hence, various factors can influence reading proficiency. To avoid serious problems because of non-independent data, statistical techniques assume that independent data cannot be applied in this analysis (see Stevens, 2007, p. 505).

In a more specific explanation, serious problems pointed out by Raudenbush and Bryk (1992, p. 5) regarding violation of the dependency of the data is a result of the analysis. Coefficient estimations then become bias or wrong either through aggregated or disaggregated. Aggregation is when the data are pooled into a higher

level, such as school, and school data are applied as the basis for analysis. This then loses valuable information from the student level because it ignores the variability of student scores within schools (the dependence on the data of the student level). This reduces the statistical power and compromises the ecological validity of the data from the student level (Hox, 2002; Kreft & de Leew, 1998, as cited in Beretvas, as cited in Stevens, 2007). When the data are disaggregated into the student level, the influence of all data from other levels, such as teacher and school characteristics, are then ignored, resulting in inflating the Type 1 error rate, since it affects the validity of significant value showing the relationship between school factor and student outcome. The Type 1 error rate worsens when the relationship between school factors and student performance are stronger. This dependency can be measured through intra class correlation (ICC). It is claimed that 'even an ICC that [is] slightly larger than zero can have [a] dramatic effect on Type I error rates' (Scariano & Davenport, 1987, as cited in Beretvas, as cited in Steven, 2007, p. 506).

Fortunately, according to Bryk and Raedenbush (1992), HLM, as a multilevel modelling method, can not only solve these problems but also improve the estimation of individual effects, modelling cross level effects and separate variance-covariance components.

For this study, 10 separated models were constructed. The first was a null model and nine additional models were created for separate unit analysis before the results were combined into one last final analysis. Detailed information of the variables included in each model are presented in Table 3.4. and for equitation of those model see appendix of HLM analysis.

Table 3.4

Variables included in each model

VARIABLE CATEGORY	VARIABLE NAME	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Outcome	PVtotAV Plausible value total average (access, integrate, reflect)	√	√	√	√	√	√	√	√	√
Predictors	LOWMETASUM LOWPROF*METASUM	√								
	LOWUNDREM LOWPROF*UNDREM	√								
	LOWCSTRAT LOWPROF*CSTRAT	√								
	LOWMEMOR LOWPROF*MEMOR	√								
	LOWELAB LOWPROF*ELAB	√								
	HMETASUM HIGHPPROF*METASUM		√							
	HUNDREM HIGHPPROF*UNDREM		√							
	HCSTRAT HIGHPPROF*CSTRAT		√							
	HMEMOR HIGHPPROF*MEMOR		√							

	HELAB HIGHPPROF*HELAB	√				
Learning strategies	METASUM Meta-cognition: Summarising		√		√	√
	UNDREM Meta-cognition: Understanding and Remembering		√		√	√
	ELAB Use of elaboration strategies		√		√	√
	CSTRAT Use of control strategies		√		√	√
	MEMOR Use of memorisation strategies		√		√	√
Reading Engagement	DIVREAD Diversity reading			√	√	√
	JOYREAD Joy/Like Reading			√	√	√
				√	√	√
	ONLNREAD Online Reading			√	√	√
Teaching Instruction	STIMREAD Teachers Stimulation of Reading Engagement			√	√	√
	STRSTRAT Use of structuring and scaffolding strategies			√	√	√
Gender	MALE				√	√

	Male=1, Female=0					
Group Reading Proficiency	HIGHPROF High Proficiency=1, others=0				√	√
Language	HMELANG Home language not test language=1, others=0	√			√	√
	LOWPROF Low Proficiency=1, others=0				√	√
	MIDPROF Midle Proficiency= 1, others=0				√	√
	LSTRAT Learning strategies (combination of METASUM, CSTRAT, and UNDREM		√		√	√
	LHIGHPROF LSTRAT*HIGHPROF		√		√	√
	LSTIMRED LSTRAT*STIMREAD		√		√	√
	LDIVREAD LSTRAT*DIVREAD		√		√	√
	LJOYREAD LSTRAT*JOYREAD		√		√	√
	LSTRSTRAT LSTRAT*LSTRSTRAT		√		√	√
	LONLNREAD LSTRAT*LONLNREAD		√		√	√

	LLOWPROF	√		√	√
	LSTRAT*LOWPROF				
	LMALE	√		√	√
	LSTRAT*MALE				
	JHIGHPROF		√	√	√
	JOYREAD*HIGHPROF				
	JSTIMREAD		√	√	√
	JOYREAD*STIMREAD				
	JDIVREAD		√	√	√
	JOYREAD*DIVREAD				
	JSTRSTRAT		√	√	√
	JOYREAD*LSTRAT				
	JONLNREAD		√	√	√
	JOYREAD*ONLNREAD				
	JMALE		√	√	√
	JOYREAD*MALE				
	JLOWPROF		√		
	SCMATEDU			√	√
	TCSHORT			√	√
	VILLAGE			√	√
	SMTOWN			√	√
	TOWN			√	√
	CITY			√	√
	LARCITY			√	√
	PUBLIC			√	√
	PRIGOVD			√	√
	PRIVIND			√	√

Chapter 4: Analysis and Discussion of HLM Analysis

This chapter presents the results of the analysis using HLM7 software. The analysis was run at two levels. First, the variables were analysed separately in subunits based on the research questions. Next, significant variables from all separate analyses were combined and analysed simultaneously at two levels to obtain the final model. The results of the analyses presented here are arranged according to the structure of the research questions.

4.1 Null Model (Unconditional Model)

For multilevel modelling, the first step in the analysis is to run the null model analysis. This model only contains the outcome variable in Level 1. The equation for this model is as follows:

$PVTOTAV_{ij} = \beta_{0j} + r_{ij}$ (Level 1 Model)

$\beta_{0j} = \gamma_{00} + u_{0j}$ (Level 2 Model)

where

$PVTOTAV_{ij}$ is reading proficiency of student i in school j taken from the average of plausible values from reading aspects (access, reflect and integrate),

β_{0j} is the intercept of $PVTOTAV_{ij}$ given Y is zero,

β_{0j} represents the average of reading proficiency across schools, r_{ij} is residual or deviation of student i from *PVTOTAV* (better known as error term),

γ_{00} is the average intercept (reading proficiency) across schools and u_{0j} is school deviation from the average of reading proficiency (*PVTOTAV*)

The results of the unconstrained model (null model or unconditional model) are presented in Table 4.1.

Table 4.1

Final estimation of fixed effect (with robust standard errors)

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	402.21	3.55	113.33	178	<0.001

The estimate of average reading proficiency across schools is 402.21 with a standard error of 3.55. This coefficient differs significantly from zero ($t(178) = 113.32$, $p < 0.001$).

Next, the final estimation of variance components of the null model analysis are presented in Table 5.2 and suggest that the variability of reading proficiency across schools is statistically significant ($\chi^2(178) = 5{,}526.10$, $p < 0.001$). This result allows the analysis to be run on two-level modelling of the clustering of student reading proficiency within schools.

Table 4.2

Final estimation of variance components of null model

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	46.52	2164.13	178	5526.10047	<0.001
level-1, *r*	43.68	1907.91			

This result is used to count the variance estimation within (σ^2) and between (τ_{00}) schools by calculating ICC.

$$=\frac{2{,}164.13}{2{,}164.13+1{,}907.91} = .53$$

The ICC result (0.53) shows that 53% of variability in reading proficiency scores is estimated to be between schools; therefore, it can be inferred that the remaining 47% is within schools. Since the percentage of the variance indicates a substantial amount of variability within and between schools, analysis at two levels is needed to determine how much student characteristics and school characteristics explain this variability.

4.2 How Do Learning Strategies, such as MEMOR, METASUM, UNDREM, CTRAT and ELAB, affect High and Low Reading Proficiency of Students?

To answer this question, two separate analyses were conducted relating to learning strategies for both groups. The separation of these groups was obtained by subtracting and adding the standard deviation and mean of reading proficiency. The first model (Model 2) consists of all learning variables resulting from the multiplication of all learning strategies with high and low proficient students (for the complete variables in this model see appendix HLM summary).The results of how high proficient students use learning strategies in their reading show that only METASUM has a statistically significant influence (see Table 4.3).

Table.4.3

Final estimation of fixed effects for research question 2a(high)

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	390.94	2.63	148.89	178	<0.001
For HMETASUM slope, β_1					
INTRCPT2, γ_{10}	0.16	.00	45.47	4303	<0.001

This model show that that learning strategies related to understanding and summarizing statistically has positive significant influence on reading proficiency This result can be interpreted as one unit increases on meta-cognitive strategies related to understanding and summarizing (METASUM), students score on reading proficiency will increase 0.16 points although the magnitude is not significantly different from zero. Indeed, the proportion of level one variance explained with the addition of METASUM to the model is: (1907.91-1320.45)/1907.91= .31 or 31%. Comparing to the ICC in null model, the ICC become smaller, .47% (see table 4.4)

Table 4.4.

Final estimation of variance components for research question 2a (high)

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	33.94	1152.13	178	4120.78	<0.001
level-1, r	36.34	1320.45			

Surprisingly, for low proficient students, METASUM is also the only strategy that influences student proficiency in reading significantly, yet it is in a negative influence, as shown in Table 4.5.

Table 4.5

Final estimation of fixed effects for research question 2a(low)

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	415.93	2.57	161.83	178	<0.001
For LOWMETAS slope, β_1					
INTRCPT2, γ_{10}	-0.16	.00	-42.16	4303	<0.001

This negative relationship suggests that a student who less likely to apply meta-cognitive strategy, tend to be less proficient readers. The difference also equals approximately 0.16 points. This means that average reading proficiency score, controlling for METASUM, is predicted to be 415.93. The variance left between units for low proficiency readers is 44% (ICC= .44) (see table 4.6 for the variance within and between school)

Table 4.6.

Final estimation of variance components research question 2a (low)

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	33.02	1090.011	178	4003.06	<0.001
level-1, r	37.27	1388.98			

4.3 How Do Learning Strategies, such as MEMOR, METASUM, UNDREM, CTRAT and ELAB, Influence the Reading Proficiency of Indonesian Students in PISA 2009?

For this question, variables classified as learning strategies, that is MEMOR, METASUM, UNDREM, CTRAT and ELAB, were added to the Level 1 model as grand mean centring (see appendix of HLM analysis for complete model). Since the initial model indicated that elaboration strategy (ELAB) did not influence reading proficiency significantly, it was deleted and, thus, it increased the significance of memory strategy from $p < 0.01$ to $p < 0.002$, as shown in Table 4.5.

Table 4.7

Final estimation of fixed effects for research question 2b

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	403.20	3.24	124.34	178	<0.001
For METASUM slope, β_1					
INTRCPT2, γ_{10}	0.82	0.07	10.58	4300	<0.001
For UNDREM slope, β_2					
INTRCPT2, γ_{20}	0.90	0.08	11.13	4300	<0.001
For CSTRAT slope, β_3					
INTRCPT2, γ_{30}	0.91	0.12	7.44	4300	<0.001
For MEMOR slope, β_4					
INTRCPT2, γ_{40}	0.39	0.13	3.07	4300	0.002

This result reconfirms the results of previous studies that learning strategies (either metacognitive or cognitive) have significant positive influence on reading capability. More specifically, in the context of Indonesia, strategies of control, such as figuring out what exactly they need to learn, checking if they have understood what they have read, figuring out which concepts are still not clear, ensuring to remember the most important points and searching for further information for clearer insight (CSTRAT), have the highest effect (γ_{30} = 0.91) and the memory strategy has the lowest effect (γ_{40} = 0.39). However, the elaboration strategy has a different result in an Indonesian context, which is insignificant, indicating that many students in Indonesia do not apply the elaboration strategy in their reading activities. The final model obtained in answering this question explains the variance in level one 11% (1907.91-1707.97/1909.91=.11) (see table 5.8. for the variance).

Table 4.8.

Final estimation of variance components for research question 2b

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	42.31	1789.89	178	5142.32	<0.001
level-1, *r*	41.33	1707.97			

4.4 How Do HMELANG, ONNLNREAD, STIMREAD, STRSTRAT, LSTRAT, DIVREAD and JOYREAD Influence Reading Proficiency Directly?

This model was conducted to determine the influence of learning strategies (LSTRAT), reading motivation (JOYREAD), reading diversity (DIVREAD) and home language (HMELANG), without accounting for gender, directly on reading proficiency. For this analysis, a new variable (LSTRAT) was constructed from learning strategies that have a significant effect ($p < 0.005$) on reading proficiency, that is METASUM, UNDREM and CSTRAT (the average). The result of this analysis shows that online reading and home language do not have a significant effect (see Table 4.6). This result probably relates to the context of Indonesia, where not all students have access to digital reading resources, such as the Internet or computers.

Table 4.9

Final estimation of fixed effects for research question 2c

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	403.09	3.22	125.10	178	<0.001
For DIVREAD slope, β_1					
INTRCPT2, γ_{10}	0.27	0.059	4.55	4299	<0.001
For JOYREAD slope, β_2					
INTRCPT2, γ_{20}	1.68	0.15	11.38	4299	<0.001
For STIMREAD slope, β_3					
INTRCPT2, γ_{30}	-0.41	0.09	-4.77	4299	<0.001
For STRSTRAT slope, β_4					
INTRCPT2, γ_{40}	0.19	0.08	2.33	4299	0.020
For LSTRAT slope, β_5					
INTRCPT2, γ_{50}	2.34	0.12	19.68	4299	<0.001

While examining variables that predict reading proficiency significantly in this model, it is clearly shown that learning strategy has the highest effect ($\gamma_{50} = 2.342$) and is followed by reading enjoyment ($\gamma_{20} = 1.68$). In contrast, the relationship between the stimulation given by the teacher for reading (STIMREAD) and reading proficiency was negative ($\gamma_{30} = -0.4$). This result indicates that Indonesian students tend to have a negative view of teacher stimulation for reading. The intraclass correlation (see table 5.10) is .52, suggesting that the difference between ICC form null model is only 1%. This model explained the variance in level one 14% (1907.91-1640.85/1907.91=.14)

Table 4.10

Final estimation of variance components for research question 2c

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	42.06	1769.15	178	5269.72233	<0.001
level-1, r	40.51	1640.85			

4.5 How Does the Interaction Between LSTRAT and STIMREAD, DIVREAD, JOYREAD, STRSTRAT, MALE, ONLNREAD, HIGHPROF and LOWPROF Influence Reading Proficiency Indirectly?

To determine whether interactions between learning strategy and other variables predict reading proficiency significantly, eight new variables were created by multiplying learning strategy with other variables, that was gender, high proficient students, low proficient students, reading stimulation, use of structure and scaffolding strategies, reading diversity, reading enjoyment and reading online, then the indirect effects were examined simultaneously without including other variables. The results, as shown in Table 5.7, reveal that interaction between learning strategy and student perspective of teacher instruction (structure and scaffolding) is insignificant, as expected and as reported by many studies (see teacher effect in the literature review section). Likewise, the relationship between learning strategy and online reading is insignificant, whereas the relationship between teacher stimulation and learning strategies shows a negative coefficient, indicating that, from a student perspective, teacher stimulation in reading does not have much influence on learning strategies (although the effect is small). Similarly, in terms of gender, males are less likely to apply learning strategies than female students. Whereas, when comparing high and low proficient students, it seems that students who are more likely to apply learning strategies(.14) have reading proficiency higher than other students (categorised as low and middle proficient readers) (.14) who are less likely to apply learning strategies. This result contrasts with the coefficient of low proficient students, which is –0.14.

Table 4.11

Final estimation of fixed effects for research question 2d

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	410.32	1.64	250.88	178	<0.001
For LHIGHPRO slope, β_1					
INTRCPT2, γ_{10}	0.14	0.00	51.82	4298	<0.001
For LSTIMRED slope, β_2					
INTRCPT2, γ_{20}	-0.00	0.00	-2.18	4298	0.029
For LDIVREAD slope, β_3					
INTRCPT2, γ_{30}	0.00	0.00	3.984	4298	<0.001
For LJOYREAD slope, β_4					
INTRCPT2, γ_{40}	0.00	0.00	11.35	4298	<0.001
For LLOWPROF slope, β_5					
INTRCPT2, γ_{50}	-0.14	0.00	-49.72	4298	<0.001
For LMALE slope, β_6					
INTRCPT2, γ_{60}	-0.02	0.00	-12.25	4298	<0.001

The ICC calculated in this model is .34 (see table 5.12) indicated that variance left unexplained between units (level 1 ad level 2) in this model is just 34% (ICC=.34), whereas for variance in level 1, it accounts for 61 % (1907.91-749.71/1907.91=.6)

Table 4.12

Final estimation of variance components for research question 2d

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	19.68	387.26	178	2568.89	<0.001
level-1, r	27.38	749.71			

4.6 How Does the Interaction Between JOYREAD (Reading Motivations) and LSTRAT, STIMREAD, DIVREAD, JOYREAD, STRSTRAT, MALE, ONLNREAD, HIGHPROF and LOWPROF Influence Reading Proficiency Indirectly?

To estimate which element of reading enjoyment has the most indirect effect, the same procedure is applied as in the interaction between learning strategy and other factors, resulting in seven new variables, such as JHIGHPROF (JOYREAD * HIGHPROF) and JOYSTIMREAD (JOYREAD * STIMREAD). These variables are then analysed in a separate model. The results of this model are presented in Table 4.13.

Table 4.13

Final estimation of variance components for research question 2e

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	410.88	1.63	252.78	178	<0.001
For JHIGHPRO slope, β_1					
INTRCPT2, γ_{10}	0.15	0.00	54.20	4299	<0.001
For JDIVREAD slope, β_2					
INTRCPT2, γ_{20}	0.00	0.00	5.57	4299	<0.001
For JONLNREA slope, β_3					
INTRCPT2, γ_{30}	0.00	0.00	2.74	4299	0.006
For JLOWPROF slope, β_4					
INTRCPT2, γ_{40}	-0.15	0.00	-51.00	4299	<0.001
For JMALE slope, β_5					
INTRCPT2, γ_{50}	-0.03	0.00	-13.71	4299	<0.001

The results for this model show that the only variables that have an insignificant influence on reading proficiency are reading stimulation (JSTIMREAD) and the structure and scaffolding strategy (JSTRSTRAT) (for complete model see HLM analysis in appendix), while other variables reflect that the indirect effect of enjoyment on other variables is significant, although, in general, the coefficients is smaller when compared to the coefficient of learning strategy. Again, this finding is consistent with previous studies that students who enjoy reading a lot are more likely to have high proficiency in reading (.15) and female students have higher motivation (enjoyment) in reading than male (-.03). Whereas for diversity in reading (DIVREAD) and online reading (OLNREAD) although they are significant predictors as well, the coefficients are not statistically different from 0 respectively.

Table 4.13

Final estimation of variance components for research question 2e

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	19.41	376.81	178	2398.39	<0.001
level-1, *r*	27.99	783.38			

The variance (see table 5.13) left unexplained between level 1 and level 2 is 32% (ICC=.32) and the model explains the variance in level one 59% (student level) (1907.91-783.38/1907.91).

4.7 How Do Factors at the School Level, such as SCMATEDU, TCSHORT, School Community and School Sector (Types), Influence Reading Proficiency?

To determine whether school characteristics have a direct effect on reading proficiency, all variables from the school level were added in Level 2 without adding predictors at Level 1. As there were multicollinearity issues related to school community and sector, partial analysis was carried out. Based on p-value and coefficient regression, variables with a higher p-value and smaller coefficient that may cause multicollinearity were excluded. In this model, for school community, dummy variable reflected schools in large cities were excluded (deleted from the model) and, for school sector, schools grouped as private government independent (PRIVGOD) were included instead of schools categorised as private independent, as the group had identical coefficient values to private independent, but in the opposite direction

(negative coefficient for PRIGOVD and positive for PRIVIND). The results of the final model of this analysis are shown in Table 5.14.

Table 4.14

Final estimation of fixed effects for research question 2f

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	422.34	5.43	77.79	174	<0.001
SCMATEDU, γ_{01}	0.85	0.34	2.51	174	0.013
VILLAGE, γ_{02}	-27.49	8.94	-3.08	174	0.002
SMTOWN, γ_{03}	-17.52	7.35	-2.38	174	0.018
PRIGOVD, γ_{04}	-35.23	8.51	-4.14	174	<0.001

As depicted in Table 5.9, school resources (SCMTEDU) predict the average score of reading proficiency of students significantly; however, the shortage of teachers (TCSHORT) does not have a significant influence. All school communities classified as schools in rural (–0.18) and remote areas (–0.28) have a moderately negative coefficient, indicating that students from schools located in village and small town are more likely to perform worse in reading proficiency than students study from schools in larger communities, such as towns and cities. Moreover, it seems that the further the distance or smaller the community, the worse the performance of students in reading proficiency. The results assert the findings of previous studies that find, regardless of the capital income of countries, either developing or developed countries, the gap between school performance in urban and rural areas always exists. Whereas for school sector, the result indicates that school classified as private school depend on government fund statistically significantly and negatively predict reading proficiency, suggesting that students who study at public school and private

independent school are more likely to perform better 35.23 points than students who study in private school relied on government's fund.

Table 4.15

Final estimation of variance components for research question 2f

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	40.73	1659.10	174	4076.45	<0.001
level-1, r	43.68	1908.08			

Table 4.15 shows that adding school variables only at level 2 reduce the magnitude of ICC from 53% in null model to 47%. Also the results suggest that the variance between school are still large ($u_{0=1659.10)}$

4.8 How Do Student and School Characteristics Explain Variability in Reading Proficiency?

To answer this question, significant variables of student characteristics that were analysed separately were added in the Level 1 model, including direct and indirect variables, and then reanalysed without adding school variables at Level 2. Later, after deleting insignificant variables in the Level 1 model one by one, school variables were added in the Level 2 model and rerun until the final model with all significant variables was obtained. Table 5.10 contains the results of the Level 1 model only.

Table 4.16

Final estimation of fixed effects on Level 1 only for research question 2g

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					

INTRCPT2, γ_{00}	410.66	1.613	254.64	178	<0.001
For LSTIMRED slope, β_1					
INTRCPT2, γ_{10}	-0.00	0.00	-3.02	4296	0.003
For LDIVREAD slope, β_2					
INTRCPT2, γ_{20}	0.00	0.00	5.99	4296	<0.001
For LJOYREAD slope, β_3					
INTRCPT2, γ_{30}	0.00	0.00	11.27	4296	<0.001
For LLOWPROF slope, β_4					
INTRCPT2, γ_{40}	-0.54	0.18	-2.98	4296	0.003
For JHIGHPRO slope, β_5					
INTRCPT2, γ_{50}	0.14	0.00	51.68	4296	<0.001
For JDIVREAD slope, β_6					
INTRCPT2, γ_{60}	-0.00	0.00	-4.64	4296	<0.001
For JLOWPROF slope, β_7					
INTRCPT2, γ_{70}	0.39	0.18	2.20	4296	0.028
For JMALE slope, β_8					
INTRCPT2, γ_{80}	-0.02	0.00	-12.70	4296	<0.001

The results of the analyses of this model (see Table 5.10) demonstrate a drastic and unexpected result. Variables that have been reported as having a strong significant influence on reading proficiency, such as learning strategies (LSTRAT), motivation (JOYREAD) and reading diversity (DIVREAD), become insignificant, while other variables reflecting indirect effect with other variables, such as LSTIMREAD, LDIVREAD, LJOYREAD and JDIVREAD, become significant predictors.

For learning strategies, it is shown that the indirect effect is more significant than the direct effect. For example, the variable reflecting the mediation effect of learning strategy and diversity in reading (LDIVREAD) as well as learning strategy on reading enjoyment (LJOYREAD) are more significant than learning strategy (LSTRAT) or reading enjoyment (JOYREAD), although the coefficients are not statistically greater than zero. Conversely, the mediation variable represents the interaction between learning strategy and stimulation in reading (LSTIMREAD) statistically and negatively predicts reading proficiency compared to teaching instruction (structure and scaffolding).

When comparing high and low proficient students, the results reveal that the enjoyment of high proficient students (JHIGHPRO) as well as low proficient students (JLOWPROF and learning strategy of low proficient students (LLOWPROF) are significant ($p < 0.001$). This result suggests that students with a high proficiency level in reading tend to have higher internal motivation (enjoy reading) than students who are categorised as less proficient readers. In addition, strategies in reading applied by high proficient readers become insignificant when they are analysed simultaneously with their strategy in learning. This result contradicts the conclusion made by PISA (OECD, 2010) that learning strategies are more important than enjoyment; however, it also reconfirms the findings of previous studies related to motivation (De Naeghel, Van Keer, Vansteenkiste & Rosseel, 2012a; Fulmer & Frijters, 2011; Guthrie et al., 2013; Hughes, Wen, Oi-Man & Loyd, 2008; IEA et al., 2011; OECD, 2010b; Quirk, Schwanenflugel & Webb, 2009; Becker, 2010).

For gender, the only significant difference is for males who have less motivation in reading, although it is not much greater than zero ($\gamma_{80} = -0.02$, $t(4,296) = -11.64$, $p < 0.001$). This result indicates that the gender effect in motivation is more important than in learning strategies for predicting reading proficiency.

The variance explained by the last model in this question is 373.26 / 373.26 + 746.99 = 0.33 as seen in table 5.17

Table 4.17

Final estimation of variance components on Level 1 only for research question 2g

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	19.31998	373.26164	178	2491.90793	<0.001
level-1, r	27.33120	746.99471			

Compared to the null model, this variance accounts for approximately 20% of variance. Next, the variables at Level 2 were added into the model. The results are presented in Table 5.18.

Table 4.18

Final estimation of fixed effects in both levels

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	419.32	2.38	176.39	174	<0.001
SCMATEDU, γ_{01}	0.39	0.15	2.68	174	0.008
VILLAGE, γ_{02}	-11.89	3.83	-3.11	174	0.002
SMTOWN, γ_{03}	-7.19	3.13	-2.30	174	0.023
PRIGOVD, γ_{04}	-17.27	3.69	-4.69	174	<0.001
For LSTIMRED slope, β_1					
INTRCPT2, γ_{10}	-0.00	0.00	-3.09	4291	0.002
For LDIVREAD slope, β_2					
INTRCPT2, γ_{20}	0.00	0.00	6.55	4291	<0.001
PUBLIC, γ_{21}	-0.00	0.00	-2.64	4291	0.008
PRIGOVD, γ_{22}	-0.00	0.00	-2.93	4291	0.003
For LJOYREAD slope, β_3					
INTRCPT2, γ_{30}	0.00	0.00	11.37	4291	<0.001
For LLOWPROF slope, β_4					
INTRCPT2, γ_{40}	-0.52	0.18	-2.90	4291	0.004
TCSHORT, γ_{41}	0.00	0.00	2.53	4291	0.012
For JHIGHPRO slope, β_5					
INTRCPT2, γ_{50}	0.14	0.00	50.56	4291	<0.001
TCSHORT, γ_{51}	0.00	0.00	2.34	4291	0.019
For JDIVREAD slope, β_6					
INTRCPT2, γ_{60}	-0.00	0.00	-4.59	4291	<0.001
For JLOWPROF slope, β_7					

INTRCPT2, γ_{70}	0.38	0.18	2.13	4291	0.033
PUBLIC, γ_{71}	-0.01	0.01	-2.27	4291	0.023
For JMALE slope, β_8					
INTRCPT2, γ_{80}	-0.02	0.00	-12.79	4291	<0.001

This final model shows that the intercept representing the average of all variables for a student with an average reading proficiency is significantly greater than zero (γ_{00} = 419.32, $t(174) = 163.05$, $p < 0.001$). In fact, school variables that predict the average of reading proficiency significantly are still similar to previous analyses conducted where the model only included variables in Level 2 without adding variables in Level 1, except that the magnitudes of the coefficient become smaller. The table of random effect's estimate s from this model appears below:

Table 4.19

Final estimation of variance components on Level 1 only for research question 2g

Random Effect	Standard Deviation	Variance Component	*d.f.*	χ^2	*p*-value
INTRCPT1, u_0	16.72	279.63	174	1818.22	<0.001
level-1, r	27.26	743.08			

After adding the variables in Level 2, the variance reduced from 373.26 in the model including only variables in Level 1 to 279.63. Hence, 27% of variance is still unexplained (279.63 / 279.63 + 743.07 = 0.27)., also variance unexplained between schools is still statistically significant (, u_0=279.63, p<0.001). In addition, this final accounts for variance reduce at level one (student level) 61 % (1907.91-743.08/1907.91=.61).

Chapter 5: Conclusion

Since this study investigated the influence of students' characteristics (home language, engagement, learning strategies, teaching instruction) and school characteristics (sector , communities and resource) on reading proficiency of Indonesian student in PISA 2009, this chapter summarises all the results of the analysis of those characteristics , discusses the implications of the findings, points out the limitations of this study and provides recommendations on what can be investigated in the future to enrich the body of knowledge in education so that the quality of education can be improved universally (global community) and locally (Indonesian community).

5.1 Summary

This study aimed to examine how the variability of reading proficiency of Indonesian students in PISA 2009 was explained by students characteristics, particularly their first language, learning strategy and reading engagement (motivation, diversity in reading and reading online), student's view on teaching instruction, particularly on structure and scaffolding, and stimulation, and school characteristics, such as community (area), school sector (or type), resources and shortage of teachers.

For the student characteristics, the results of the analyses showed that, in general, learning strategies and engagement in reading influence reading proficiency significantly, while having a first language that is different from the test language did not statistically have a significant influence. However, not all learning strategies and all types of reading engagement had a significant influence. Of all strategies of learning (memorising, understanding and remembering, control, elaboration, meta-cognitive:

understanding and summary), elaboration strategies were statistically insignificant. More specifically, in learning strategies, only meta-cognitive strategies dealing with understanding and summarising influenced reading proficiency of Indonesian students significantly for both high and low groups. For the high group, it was a positive result, meaning students who were more likely to apply strategies of summarising and understanding would have high proficiency in reading. While, for low proficient readers, it was a negative result, indicating that students who were less likely to apply strategies of summarising and understanding would were less likely to have high proficiency in reading. For engagement in reading, online reading did not have a significant influence. However, internal motivation (reading enjoyment) and diversity in reading have a significant influence on reading proficiency.

In this case, teaching instruction consists of teaching stimulation and structure and scaffolding strategies. In the beginning, when they were analysed together with reading engagement variables and reading strategies, they both had a significant effect on student proficiency in reading. Structure and scaffolding strategies statistically had a positive significant influence and teacher stimulation on reading engagement had a negative significant influence. This result remained the same when their relationship with learning strategies was examined together with other indirect effect variables of learning strategies; however, their value of correlation became smaller. Meanwhile, when their relationship with reading engagement, particularly internal motivation (reading enjoyment), was examined with other indirect effects of internal motivation, the variables (JSTIMREAD and JSTRSTRAT) no longer had a significant influence. This result suggests that student enjoyment in reading, according to student responses, was not influenced by stimulation nor was it influenced by structure and scaffolding techniques provided by teachers.

For school characteristics (school resources, teacher shortages, school community and school sector), only school resources had a significant influence on reading proficiency and the influence of teacher shortages was insignificant. Further, for school sector, schools categorised as public did not perform significantly differently to other schools (non-governmental schools, either private independent or private dependent on government funds); however, private schools that relied on government funds significantly performed poorly compared to public and private independent schools. However, the analysis of the final model in this study showed that students from private independent schools tended to apply learning strategies more and read a wider range of texts than students from private and public schools (this result is inferred as the coefficient value of schools categorised as private government dependent is identical to private independent but in the opposite direction). In addition, from the final model, teacher shortages significantly and negatively related to reading proficiency of students categorised as having low proficiency, however, positively predict reading achievement for students categorised as high proficient readers who have high enjoyment in reading.

To conclude, generally, the models built in this study reconfirm the findings of previous international studies in which female students have a higher interest in reading and perform better in reading text, learning strategies and internal motivation have a significant influence on reading proficiency and good quality education has more of an influence on student proficiency than student characteristics (which is not in Indonesian context), particularly family factors. Conversely, it is somewhat different in the sense that the coefficient intercept were much smaller, meaning that few students in Indonesia enjoyed reading and applied learning strategies effectively. One possible explanation in the context of this study is that teaching instruction and

teaching stimulation did not benefit the students much. Further, a surprising finding of this study suggests that only meta-cognitive strategies related to understanding and summarising predict high and low proficiency readers significantly, while elaboration and language used at home do not have a significant effect, as reported by other studies.

5.2 Implications

The implications of this study are as follows:

1. Since studies associated with learning strategies and engagement in reading report that they predict reading proficiency significantly, as proven in this study, it suggests that learning strategies should be learnt explicitly and integrated with other learning strategies in the teaching process and that all resources and stakeholders should work together to create synergy to increase student motivation in reading. For instance, teachers should choose a topic of study that attracts student interest or create collaborative work between students of high and low proficiency or of mixed gender to reduce the gap between these groups.
2. The system of curriculum in Indonesia needs to be re-evaluated, especially teaching materials, such as textbooks used in educational institutions, to determine whether they include interesting and various reading materials that prompt students to engage actively in reading and whether they have materials and instructions that require teaching learning strategies explicitly and comprehensively.
3. Professional development training should be provided to teachers to ensure that they are able to provide effective stimulation and know how to provide

structured and effective teaching instruction using scaffolding in learning strategies to help students become proficient readers.

4. School resources should be evaluated and reallocated, especially in rural and remote areas, to ensure that good quality teachers and facilities are available in towns and cities so the gap between communities can be reduced, for example, rotating teachers every two years from cities to villages and vice versa.
5. As teacher shortages do not influence reading proficiency directly, it seems that this is no longer a major problem; however, the quality of teaching is important. Therefore, it is recommended that the number of teachers employed is reduced and additional focus is placed on professional development.
6. All schools categorised as private schools that rely on government funds to enable them to improve the quality of the school and, thus, compete with public and private independent schools should be examined, supervised and guided. In addition, it is important to ensure that the funds given are used appropriately and effectively.

5.3 Limitations

This study acknowledges that it has some limitations. First, the data related to teacher stimulation and teacher structure and scaffolding learning strategies may be not reliable, as the data was gathered from a student perspective (though it had been validated) and not from direct observation or a teacher perspective. Second, although the findings of this study reflect similar results to other studies related to these student and school factors, the specific findings of this study, such as the influence of meta-cognitive strategies related to understanding and summarising on high and low proficient readers and the indirect effect of learning strategies and reading engagement,

may only be applied in a specific context (e.g., in an Indonesian context only) and not in a more general context. Third, as this study focuses only on reading engagement, learning strategies, home language and school demographic data, such as community, school sector, school resources and teacher shortages, it may miss other significant variables, such as socioeconomic status, parental involvement, parental education, home possession, school climate and leadership style. Finally, this study used pairwise deletion techniques in handling missing data, as the sample of the data was large enough. Therefore, it may miss important phenomena or significant patterns.

5.4 Further Research

The potential research issues that can be explored further include conducting similar analyses with different quantitative software, such as AMOS, LISREL, SEM or MPLUS, and applying sophisticated techniques to handle missing data, such as conducting multiple imputations instead of pairwise deletion to compare the results of this study. Further, as 27% of the variance was still unexplained in the last model, this suggests that further research could include other significant variables from student characteristics, such as parental education, parental involvement, socioeconomic status, cultural possession and amount of books, and school factors, such as disciplinary climate and leadership, to improve the fit of the model. Next, as this study examined the mediation effect simultaneously at level one together with the other direct effect of student's characteristics, it is recommended carried out the same study but in three levels such as HLM3 or in HMLM to compare the mediation effect. The last potential issue would be comparing variables in this study with other countries to see how these factors work in different contexts or in different countries.

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Appendices

DESCCRIPTIVE STATISTICS

VARIABLE AT STUDENT LEVEL (LEVEL 1)

Table 1. Descriptive Statistics of Continuous variable used in Level 1 (student's level)

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Meta-cognition: Summarising	**4483**	**30.53**	**481.71**	**512.24**	**495.2210**	**.13874**	**9.28959**	**86.296**	**-.077**	**.037**	**-1.074**	**.073**
Meta-cognition: Understanding and Remembering	**4483**	**30.02**	**482.87**	**512.88**	**497.3131**	**.13149**	**8.80364**	**77.504**	**.039**	**.037**	**-.805**	**.073**
Use of control strategies	**4483**	**54.22**	**468.57**	**522.79**	**498.5221**	**.09595**	**6.42430**	**41.272**	**.350**	**.037**	**1.965**	**.073**
Diversity reading	**4483**	**78.27**	**464.02**	**542.29**	**505.7512**	**.16946**	**11.34603**	**128.732**	**.346**	**.037**	**1.975**	**.073**
Use of elaboration strategies	**4483**	**47.03**	**478.07**	**525.10**	**502.4942**	**.09291**	**6.22088**	**38.699**	**-.042**	**.037**	**2.008**	**.073**
Joy/Like Reading	**4483**	**43.62**	**488.19**	**531.81**	**504.0087**	**.06893**	**4.61493**	**21.298**	**.565**	**.037**	**1.754**	**.073**
Use of memorisation strategies	**4483**	**52.00**	**472.52**	**524.52**	**503.2402**	**.09114**	**6.10201**	**37.235**	**.256**	**.037**	**2.095**	**.073**
Online Reading	**4483**	**80.62**	**451.29**	**531.91**	**487.4189**	**.19029**	**12.74072**	**162.326**	**-.988**	**.037**	**1.953**	**.073**
Teachers Stimulation of Reading Engagement	**4483**	**63.11**	**467.82**	**530.93**	**503.8925**	**.13607**	**9.11066**	**83.004**	**.776**	**.037**	**1.462**	**.073**
Use of structuring and scaffolding strategies	**4483**	**67.11**	**463.76**	**530.87**	**504.3597**	**.14811**	**9.91655**	**98.338**	**.534**	**.037**	**1.260**	**.073**
Plausible value total average (access, integrate, reflect)	**4483**	**408.30**	**196.11**	**604.41**	**407.7213**	**.96267**	**64.45597**	**4154.572**	**.020**	**.037**	**-.222**	**.073**
Valid N (listwise)	**4483**											

Table 2. ***Descriptive statistics of Categorical variables used in level 1***

Variable Name	Frequency	Percentage	Total
Home language similar to test language (Coded=0)	1712	38.2	4483
Home language not test language (coded=1)	2771	61.8	
Female (coded=0)	2298	51.3	
Male (coded=1)	2185	48.7	
High Proficient readers (coded=1	3742	83.5	
Not High Prof.(coded=0)	741	16.5	
Low Prof readers(coded=1)	3793	84.6	
Not categorized as low proficient readers (coded=0)	690	15.4	

Table 3. ***Descriptive Statistics of Variable created in level 1***

Percentage	N	Minimum	Maximum	Mean	Std. Deviation
	4483	477.71	515.97	497.0188	5.73586
	4483	.00	515.97	82.7731	186.04060
	4483	226445.49	270568.45	250443.8518	5356.44165
LDIVREAD	4483	222949.58	277305.42	251374.8582	6609.03826
LJOYREAD	4483	238162.77	274399.58	250507.4110	4059.74882
LSTRSTRAT	4483	221543.35	270537.84	250679.3803	5839.60076
LONLNREAD	4483	217506.47	269897.71	242269.6282	7367.12945
LLOWPROF	4483	.00	509.61	75.9884	178.19299
LMALE	4483	.00	515.97	241.8755	248.11002
JHIGHPROF	4483	.00	531.81	83.5308	187.74407
JSTIMREAD	4483	232344.77	278336.95	253972.8673	5469.54668
JDIVREAD	4483	229090.52	288395.23	254916.5233	6713.63509
JSTRSTRAT	4483	231231.82	278305.46	254208.8675	5836.67628
JONLNREAD	4483	220318.30	275320.85	245665.1430	6872.62162
JLOWPROF	4483	.00	517.61	77.4272	181.56347
JMALE	4483	.00	531.81	245.1037	251.40888
LOWMETASUM	4483	.00	512.24	75.6238	177.35928
LOWUNDREM	4483	.00	512.88	75.8661	177.92548
LOWCSTRAT	4483	.00	522.79	76.4753	179.34342
LOWMEMOR	4483	.00	524.52	77.2537	181.16689
LOWELAB	4483	.00	525.10	77.1651	180.95997

HMETASUM	4483	.00	512.24	82.7238	185.94731
HUNDREM	4483	.00	512.88	82.8673	186.27048
HCSTRAT	4483	.00	522.79	82.7281	185.94375
HMEMOR	4483	.00	524.52	83.2832	187.19070
HELAB	4483	.00	525.10	83.3265	187.28839
Valid N (listwise)	4483				

VARIABLE AT SCHOOL LEVEL (LEVEL 2)

Table 1. Descriptive Statistics of Continuous variable used in level 1

Table 4. ***Descriptive Statistics of continuous variable at level 2 (school level)***

	N	Minimum	Maximum	Mean	Std. Deviation
Quality of the schools educational resources (SCMATEDU)	179	469.15	517.55	488.7305	9.80628
Teacher shortage (TCSHORT)	179	490.70	530.40	503.1334	8.62571
Valid N (listwise)	179				

Table 5. *Descriptive statistics of Categorical variable used in level 1*

Variable Name	Frequency	Percentage	Total
Village (1=village, 0=others)	42	23.5	179
Small town (1=small town, 0=others	71	39.7	
Town (1=town, 0=others)	27	15.1	
City (1=city, 0=others	26	14.5	
Large city (large city=1, 0=others)	13	7.3	
Public school (1=public school, 0=others	84	46.9	
Private government dependent (1=private gov,0=others)	144	80.4	
Private Independent (1=Priv Indep;0=others)	119	66.5	