

**The Effect of Language of Instruction and Contextual Factors  
on Higher-order Reading Comprehension Performance**

by

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**SUPERVISOR: Prof. S.J. Howie**

**August 2017**

# DECLARATION

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I declare that the thesis, which I hereby submit for the degree PhD in Assessment and Quality Assurance at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

.....  
N.L.M. Palane

31 August 2017

## DEDICATION

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*For my loving parents,  
Nolene and Winston*

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The author, whose name appears on the title page of this thesis, has obtained, for the research described in this work, the applicable research ethics approval. The author declares that she has observed the ethical standards required in terms of the University of Pretoria's *Code of Ethics for Research* and the *Policy and Procedures for Responsible Research*.

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## SUMMARY

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This study compares the different primary school language of instruction models found in South Africa for performance on the higher-order reading comprehension processes tested in the international, large-scale assessment, prePIRLS 2011.

The language of instruction groupings include the African languages, Afrikaans, English L1 and English L2 as an immersion model. The marked differences in performance observed on the higher-order prePIRLS 2011 items across the language models are not singular reasons for performance in themselves, but reflect embedded contextual factors that influence performance. It was, therefore, examined how language of instruction creates or restricts access to 'social tools' and 'cultural capital' which mediate the development of higher-order reading comprehension at home and at school.

It was found that socio-economic status (SES) at the school level contributes 86.06 (SE=20.48) and 98.54 (SE=17.28) score points for English (N=2 205) and Afrikaans (N=1 463) respectively as a school level indicator. For the Afrikaans LoLT grouping access to text explained 44 score points (SE=11.09). Neither SES nor access to text explained significant variance in performance for the African languages schools when examined within the language grouping (N= 12 076).

A linear regression (N=6 342) showed that low SES learners whose language of instruction is English, despite it not being their mother tongue, benefit by 20.35 score points (equivalent to half a year) from being in the English L2 group, in comparison to the African languages L1 group as a measure of achievement on the higher-order subscale. The hypothesis that SES and access to text significantly affect performance in higher-order reading comprehension was further supported by the findings of a two-level regression, showing that access to text at school contributed 32.91 score points ( $B=32.91$ ,  $SE=13.96$ ,  $p=.03$ ) to performance for English L2 low SES learners (N=480).

It is argued that better provision of text at school can mediate the development of the cognitive and metacognitive reading strategies required for higher-order reading comprehension across all language of instruction models and socio-economic strata. Print material is often more accessible to learners in English. This strengthens a pragmatic, contextually-based argument for focused prioritisation of English L2 instruction concomitant to raising the quality of home language instruction.

## KEY TERMS

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- Mother tongue
- Immersion
- Higher-order
- Reading comprehension
- Mediate
- Metacognitive
- Cultural capital
- prePIRLS
- Language of instruction
- Access to text



# LANGUAGE EDITOR

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## DECLARATION OF REVIEW & EDITING

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**The Effect of Language of Instruction and Contextual Factors  
on Higher-order Reading Comprehension Performance**

by

**Nelladee Lorraine McLeod Palane**

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## **LIST OF ACRONYMS**

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BICS	Basic Interpersonal Communicative Strategies
CALP	Cognitive Academic Language Proficiency
CFA	Confirmatory Factor Analysis
DoE	Department of Education
EE	Evaluate and Examine Content, Language and Textual Elements
HLM	Hierarchical Linear Modelling
ICC	Intraclass Correlation Co-efficient
IEA	International Association for the Evaluation of Educational Achievement
II	Interpret and Integrate Ideas and Information
L1	First language of the learner (also, home language and mother tongue)
L2	Second language of the learner (also, first additional language)
L3	Second additional language or foreign language
LoLT	Language of Learning and Teaching
LoT	Language of (the) Test
OECD	Organisation for Economic Cooperation and Development
PIRLS	Progress in Reading Literacy Study
PISA	Programme for International Student Assessment
PRAESA	Project for the Study of Alternative Education in South Africa
prePIRLS	preProgress in Reading Literacy Study
RI	Focus On and Retrieve Information
SACMEQ	Southern and East African Consortium for Monitoring Educational Quality
SEM	Structural Equation Modelling
SES	Socio-economic Status
SI	Make Straightforward Inferences
SPSS	Statistical Package for the Social Sciences
UNESCO	United Nations Educational, Scientific and Cultural Organisation

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# CHAPTER 1

## CONTEXT AND AIM OF STUDY

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### 1.1 INTRODUCTION

This study aims to compare the different primary school language of instruction models found in South Africa for performance on the higher-order reading comprehension processes tested in the international, large-scale assessment, *preProgress in Reading Literacy Study 2011* (prePIRLS 2011). The effect of language of instruction, as well as the home and school context, on Grade 4 learner proficiency in the higher-level reading comprehension processes that test inferencing and the integration and critical evaluation of text, is examined.

The study integrates theory that emphasizes the importance of the home and school context in learning (Bandura, 2001; Bruner, 1996; Vygotsky, 1978;) with Cummins (1979) work on bilingual development and Bourdieu's (1986) writing on cultural capital as a research lens for interrogating the low level of reading comprehension performance observed in prePIRLS 2011 (Howie, van Staden, Tshele, Dowse & Zimmerman, 2012).

It is argued that proficiency in higher-order reading comprehension requires a supportive home and school mediatory context to emerge. The effect of the home context on student educational attainment levels has been written about extensively in academic literature (Barone, 2006; Chansa-Kabali, Serpell, & Lyytinen, 2014; Lareau & Weininger, 2003; Portes, 2000). Coleman (1975) first highlighted the role that the home plays in contributing to educational attainment. Coleman's (1975) findings suggested that disadvantage in the home was a more significant determinant of academic performance than were the educational opportunities available to the student at school – a premise which has received considerable attention (Bourdieu, 1972, 1986; Dufur, Parcel & Troutman, 2013; Giroux, 1983, 2001, 2013; Giroux & Penna, 1979; Portes & MacLeod, 1996; Pretorius & Mampuru, 2007; Prieur & Savage, 2013; Saha, 2015; Spaull, 2013; Van der Berg, 2008) and is explored further in this

study.

Higher-order thinking is regarded as important in classroom instruction globally and critical thinking and problem solving are core goals of the *Framework for 21<sup>st</sup> Century Skills* (Binkley et al., 2009). However, many developing countries such as South Africa are still far behind the rest of the world in even the attainment of acceptable literacy levels (UNESCO, 1990). In addressing the low literacy rate it is not enough that learners merely learn to read, but an intentional focus must be placed on classroom instruction that facilitates proficiency in the higher-order reading comprehension processes in order that students learn to comprehend academic text, since learners need reading skills for future academic success (Pretorius & Mampuru, 2007). Furthermore, the fact that learners are growing up in an increasingly globalised world means that strategies for literacy development must orientate curriculum and intervention around preparing learners for the global economy. The global importance of reading literacy is reflected in the focus of international organisations such as UNESCO, the World Bank, the OECD and the International Association for the Evaluation of Educational Achievement (IEA) on monitoring international literacy levels.

Literacy instruction in South African primary schools is affected by a complex multilingual approach to education. South African children learning under the additive bilingual approach espoused by the *Language in Education Policy* (Department of Education, 1997) should start their learning at school in the Foundation Phase in their home language. However, due to the reality of a diverse and multilingual population, schools often have learners in these grades who do not speak the language of instruction at home. When learners reach Grade 4, the language of learning and teaching (LoLT) switches from mother tongue instruction to the additional language, usually English.

The marked differences in performance observed on the higher-order prePIRLS 2011 items across the language models are not singular reasons for performance in themselves, but reflect embedded contextual factors that influence performance. It was, therefore, examined how language of instruction creates or restricts access to 'social tools' and 'cultural capital' which mediate the development of higher-order reading comprehension at home and at school.

Literacy development is regarded in this study as being mediated by the learner's home and school context through socio-economic status (also understood as access to cultural capital), language support and access to print material and is realised in language proficiency - particularly through reading and writing, as well as, familiarity with text. (This is further described in a discussion of the conceptual framework for the study in Chapter 4 section 4.1.)

Language is defined as the language of instruction or language of learning and teaching, also LoLT, of the learner. The learner's attained level of literacy development is operationalised as reading comprehension proficiency on the higher-order items of prePIRLS 2011. (These items are described as part of the discussion of the design and methodology of the prePIRLS study found in Chapter 2 and section 2.3.). The learner's context is examined by means of secondary analysis of home and school items derived from the survey data collected through background questionnaires administered as part of the national study.

In addition, the construct and contextual validity of the higher-level reading comprehension processes developed for the large-scale prePIRLS 2011 assessment are examined as a comparison across English L1 and English L2 performance in the South African context. This forms part of an exploration into the complexity of defining higher-order reading comprehension, especially when testing learners with different language proficiencies.

In this first chapter the research problem will be explored (1.2) followed by the purpose and significance of the study (1.3). A summary of the study will be detailed (1.4). Finally the structure for this dissertation will be outlined (1.5).

## **1.2 THE RESEARCH PROBLEM**

The fact that large-scale, international studies examining learner performance in reading comprehension have increased globally over the past thirty years (Howie & Scherman, 2017) reflects the importance of literacy to ensure participation in the global economy. Collecting and using empirical data has become standard amongst the developed countries (Beaton, Postlethwaite, Ross, Spearrit & Wolf, 1999), and is increasing amongst developing countries like South Africa where large-scale assessments have been undertaken since 1994 (Howie & Scherman, 2017).



### 1.2.1 An International perspective

International research in language and reading literacy has highlighted the extent of immigrant-background students' underachievement in many affluent countries and also the considerable variability across countries in the extent to which these students succeed academically (Cummins, 2016). Cummins (2016) argues that many findings focus erroneously on linguistic variables as a cause of underachievement in isolation from socio-economic status (SES) and societal power relations in the wider society. Cummins (2016) also states that *linguistic mismatch* and presumed lack of exposure to the dominant language (such as English L2) should not be regarded as independent causal variables, but underachievement should instead be understood as a consequence of the dynamic relationship of linguistic difference, SES and societal marginalization.

International studies provide valuable opportunities for analysis. Researchers have explored the various purposes of measuring educational achievement at this scale (Howie & Plomp, 2005). Comparing levels of national achievement among countries and identifying differences between countries highlights major determinants of national achievement and possible malleable factors (Howie & Plomp, 2005).

Despite the advantage of international benchmarking and oversight, the testing and data gathering process needs also to be tuned into the specific challenges facing our education system and be relevant and applicable to our learners at the most fundamental level. Afflerbach (2016) argues that testing practices continue to reinforce the idea that cognitive strategy and skill are the individual differences that matter most, often to the exclusion of other individual differences that have been proven to be important (for example, motivation to read). Afflerbach (2016) states that economists use the term *path dependence* to describe how powerful vested interests such as publishing and testing companies promote a narrow conceptualisation of the construct being tested. For this reason, research on this type of data needs to look beyond just learner results on the cognitive processes in order to contextualise performance.

### **1.2.2. The preProgress in International Reading Literacy Study**

This study is linked to a large-scale, international project namely, the *preProgress in International Reading Literacy Study* (prePIRLS). The large-scale assessment was conducted nationally in 2011 in accordance with the regulations of the International Association for the Evaluation of Educational Achievement (IEA). In 2011, Grade 4 learners (n=15 744) in 341 schools across all the provinces participated in the prePIRLS assessments in the language which was their LoLT during the Foundation Phase of grades 1-3. The prePIRLS reading comprehension assessment is based on more accessible texts than the international PIRLS assessments intended for Grade 4. However, the mean score of 461 was well below the international centre point of 500. (Howie et al., 2012).

South Africa has participated in two PIRLS assessment cycles, 2006 and 2011. The South African PIRLS 2006 study assessed a first population of Grade 4 learners, but also included a second population of Grade 5 learners as a national option within the study (Howie et al., 2008). Learners at both grades were tested in the eleven official languages of the country. South African Grade 5 learners obtained the lowest score of the 45 participating education systems with 302 (SE=5.6) score points, almost 200 points below the international average which is equivalent to five years of education. Grade 4 learners achieved on average 253 points (SE=4.6). For both grades average achievement was well below the international reference average of 500 points and equivalent to over six years below the international average in educational terms.

For PIRLS 2011, the South African study assessed a Grade 5 population in order to report on trends from PIRLS 2006 to PIRLS 2011, but the poor results for the 2006 African languages Grade 5 sample made the measures unstable and the IEA recommended that only English and Afrikaans be tested in 2011 at the Grade 5 level. However, to assess Grade 4 learners, South Africa opted to participate in the *preProgress in International Reading Literacy Study* (prePIRLS) 2011. The prePIRLS 2011 assessment consists of shorter texts, easier vocabulary, simpler grammar and less emphasis on higher-order reading skills than the PIRLS test. PrePIRLS tests reading skills that are foundational to success in PIRLS (Mullis, Martin, Foy & Drucker, 2012). The South African Grade 4 assessments were developed in the eleven official

languages. The three participants in the study were South Africa, Columbia and Botswana.

PrePIRLS 2011 results point to continued underperformance by South African learners with little evidence of improved reading literacy scores, despite administering an easier assessment. The prePIRLS 2011 study results revealed that South African Grade 4 learners obtained 461 (SE=3.7) score points, the lowest reading achievement score in comparison with the international centre point of 500. Learners from Botswana achieved 463 (SE=3.5), while learners from Columbia obtained over 100 points more (equivalent to 2.5 years of education) at 576 (SE=3.4) (Mullis, Martin, Foy & Drucker, 2012).

Grade 4 learners who wrote in Afrikaans and English achieved the highest average scores of 525 (SE=9.9) and 530 (SE10.1) respectively, higher than the international centre point of 500. They achieved between 100 and 150 points more than learners writing in African languages, which represents a difference of approximately two years of schooling in education terms. Only learners who wrote the prePIRLS 2011 assessment in Afrikaans or English were able to perform better in either reading informational or literary text when compared to the overall prePIRLS 2011 South African mean score of 461 points (Howie et al., 2012).

Almost one out of three South African learners (29%) could not reach the Low International benchmark. Most Grade 4 learners (71%) reached the Low International benchmark with 30% not able to attain more than the Low International benchmark. A very small number (6%) (SE=0.8) reached the Advanced International benchmark (Howie et al., 2012).

The performance for each language varied substantially for each benchmark. One out of five learners writing in English, and one out of seven in Afrikaans reached the Advanced Level, the highest international benchmark. In contrast, across all those learners writing in the African languages, about one quarter to one half could not attain the Low International benchmark, indicating that a high percentage of learners in the African languages could not read. The most severe cases were learners assessed in Sepedi (57%) and Tshivenda (53%), who could not read at a basic level. Learners assessed in siSwati appeared to have the largest percentage of learners (76%)

attaining the international benchmarks out of the African languages, followed by those assessed in isiZulu (71%) and isiNdebele (69%). A small percentage of learners assessed in African languages reached the Advanced International benchmark, but less than 1% did so of learners tested in siSwati, Setswana, Sesotho, isiXhosa, isiZulu and isiNdebele (Howie et al., 2012).

Notably, prePIRLS results point to consistent under-performance by learners from the African languages, with higher achievement for learners who completed the assessment in Afrikaans or English. Most prePIRLS learners wrote in their home language. PrePIRLS 2011 reveals that where test language and home language coincided, achievement was better in most of the eleven languages with the exception of Afrikaans, isiZulu and Sepedi where there was no significant difference (Howie et al., 2012).

### **1.2.3. National language policy in a historical context**

Language in education is a point of critical debate in South Africa where the language situation is considered by many to be extremely complex. The underlying principle of the current national policy is to retain the mother tongue as the language of instruction (particularly in the early learning phase), while ensuring access to an additional language(s).<sup>1</sup>

Between 1910 and 1948, Afrikaans and English white pupils were taught in the same classes to foster political reconciliation after the South African War. In this way, bilingual education existed as ‘dual-medium education’ (Plüddeman, 2010). However, before the Afrikaner Nationalist Party came to power in 1948, ‘dual-medium education’ was phased out and ‘parallel-medium’ and ‘single-medium’ schools (with an L2 as a compulsory subject) were accelerated under Apartheid (Plüddeman, 2010).

According to Plüddeman (2010) from 1955 to 1975, African-language speakers had to be taught in their mother tongue for all eight years of their primary schooling. Throughout secondary schooling, however, they received instruction half in English

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<sup>1</sup> The language policy for schools is guided by principles derived from the *Constitution of the Republic of South Africa* (RSA, 1996a) and the *South African Schools Act* (SASA) (RSA, 1996b).

and half in Afrikaans. After the 1976 Soweto revolt,<sup>2</sup> the use of Afrikaans as medium of instruction was phased out amongst African-language speakers. Mother tongue education was restricted to the first four grades, and English was elevated to the medium of instruction from Grade 4. The apartheid state in fact referred only to English and Afrikaans when reference was made to bilingualism. Learners who had an African language as a mother tongue had three language subjects as compulsory subjects. Plüddeman (2010) argues that this was because the system of apartheid needed blacks as cheap labour and required that they had only a limited ability in the culturally dominant languages of Afrikaans and English, and according to Plüddeman (2010), “African languages had no cultural capital” (p.10).

An additive bilingual language policy was introduced in the 1990’s (Plüddemann, 2010) with the underlying principle of maintaining the home language while providing access to and the effective acquisition of an additional language. Based on the work of North American and European researchers such as Cummins (1978) and Ramirez, Yuen and Ramey (1991), the policy was tailored to the different South African context. A comparison was made at the time between language minority groups, and domination over the African languages in South Africa.

Access to mother tongue education is enshrined in the South African constitution<sup>3</sup>. The Constitution requires the government to provide each person with education in the language of his or her choice, wherever this is possible. In this way, quality, equity and redress in the administration of educational provision is weighed against available resources<sup>4</sup>. In South Africa it has been found that, particularly amongst better educated black parents, an approach is favoured that recognises that the home language must be nurtured, even while there is strong support for ‘English only’ (Evans & Cleghorn, 2014). Despite the Constitution deeming all eleven languages to be of

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<sup>2</sup> The institution of Bantu Education by the Apartheid government led to the Soweto uprising on 16 June 1976. Beginning in Soweto it spread further and eventually brought fundamental change to the socio-political landscape of South Africa.

<sup>3</sup> The Bill of Rights in the Constitution stipulates in Section 29 that ‘everyone has the right to a basic education’.

<sup>4</sup> ‘Education for All’ represents an international commitment to ensure that every child and adult receives basic education of good quality. This commitment is based both on a human rights perspective, and on the generally held belief that education is central to individual well-being and national development (UNESCO, 1990).

equal value and parents (as represented by a democratically elected school governing body) having the power to choose the language of instruction in a particular school, many parents, nonetheless, prioritise English instruction (Woolman & Fleisch, 2006).

The Interim Constitution in 1993 recognised eleven official spoken languages, prior to which English and Afrikaans had been the only two official languages in the country. The most commonly spoken language in South Africa is isiZulu, spoken by more than one out of four people (Statistics SA, Census 2011). South Africa faces the challenge of implementing the constitutional rights of the people regarding their language preferences whilst simultaneously dealing with the historical and current realities on the ground (Howie et al., 2012).

English is spoken as a first language by only 9.6% of the population, yet it is the language of business and government. It is one of two languages officially used at schools from the Intermediate Phase onwards, although it is not the most widely spoken one at home. IsiZulu is spoken by almost 23% of the population. This is followed by isiXhosa (16%) and Afrikaans (13.5%). The smallest official language group is isiNdebele, spoken by 2.1%. Patterns of language usage reveal a strong relationship to location and province (Statistics SA, Census 2011).

The *Language in Education Policy* was published in 1997, and clarified in the *Revised National Curriculum Statement (NCS) of 2002* (Department of Education, 2002a). The underlying principal of the policy is to keep the use of home language as the language of learning and teaching, while providing access to an additional language or languages. In 2007, the largest group of Grade 3 learners had English as the language of learning and teaching (LoLT), followed by isiZulu. The proportion of Grade 3 learners learning via the medium of English was higher than for either Grades 1 or 2. While 22% of Grade 1 learners learnt via the medium of English in 2007, the corresponding figures for Grades 2 and 3 were 24% and 28% respectively. From 1998 to 2007, the percentage of Grade 3 learners with English LoLT decreased markedly, whereas those learning in the medium of Afrikaans, isiZulu and isiXhosa, increased. From Grade 4 onwards about 80% of the learners have English as their LoLT. The Department of Basic Education's report (2010) on the Language of Learning and Teaching indicated that 76% of African learners were learning in their home languages in the Foundation Phase in 2007, representing an increase over 1998.

The DoE's *Language in Education Policy* recommends that, wherever possible, the learner's first language be used for teaching and learning, especially in the Foundation Phase (Grades R-3) (Department of Education, 1997), re-iterating the fact that a policy of multilingual education underpins the country's education philosophy. Up until 2011, all learners from Grade 3 onwards, were expected to have one additional approved language as a subject. However, in 2012 this changed with the introduction of the *Curriculum Assessment Policy Statement (CAPS)* to the additional language being introduced from Grade 1. Although an additive bilingual model has been adopted in schools where the dominant first language is an African language, it is not standard practice that every learner is educated in his or her first language – more particularly in high-density urban areas where many languages co-exist. However, learners may have a greater likelihood of being educated in their first language in rural areas which are usually more monolingual.

Up to and including 2011, when PIRLS and prePIRLS data was collected in South Africa, the *Revised National Curriculum Statement Grades R-9* (commonly known as Curriculum 2005) was in place. It states that the learners' home languages should be used for learning and teaching whenever possible, particularly in the Foundation Phase when learners learn to read and write (Department of Education, 2002a).

The *Revised National Curriculum Statement Grades R-9* recognised that all learners must be taught strategies that help them to decode written text and to read with understanding. Furthermore, they should know how to locate and use information, follow a process or argument, summarise, develop their own understanding, and adapt and demonstrate what they learn from their reading (Department of Education, 2002b).

#### **1.2.4. A perspective on local research**

South African learners, for many reasons, performed poorly in PIRLS 2006 and 2011 (Howie et al., 2012) and were ranked the least proficient against the results of other participating countries despite proactive measures taken to equalize the playing field. These measures included the use of a version of the test designed for the weaker learner, and attempts to control the mean age of the learners against their international peers.

PIRLS 2006 brought to the fore several challenges that needed (and still need) to be addressed. Howie and Plomp (2006) state that teachers were found to have

inadequate subject knowledge, that teachers lacked instructional material and that communication was poor in the language of instruction. These factors are also noted by the Department of Basic Education (2010). Zimmerman's (2010) research based on PIRLS 2006 data underlined the need for teachers to acquire the teaching skills necessary for the development of language competency. Van Staden and Howie (2010) further reiterate the critical need for reading strategy instruction in the classroom.

The low level of reading comprehension and reading strategy instruction evident in the lower grades has an effect throughout learners' school careers. An adequate reading comprehension level is a critical factor in determining overall learning achievement. A learner who cannot comprehend a text is not likely to fare well from Grade 4 onwards, where reading to learn, as opposed to learning to read, becomes integral to the curriculum (Department of Education, 2002c). Moreover, the low level of language skill, as evidenced in the low reading comprehension performance, also prevents the learner from reaching a required threshold necessary for the ability to comprehend text at the higher-order level (Cummins, 2000). According to Cummins (1979), if learners have developed a sound understanding of their first (or L1, or home, or mother tongue) language, these skills will be transferred to the additional (or second, or L2) language that is introduced later. He argues that in bilingual education systems it is important for learners to develop strong literacy skills in their home language as a basis for building academic literacy proficiency that can be shared across languages (Cummins, 1978, 2000). In Grade 4, most South African learners transition to English as their language of learning and teaching (LoLT) in the classroom. However, evidence that the learners have not reached a higher level of language threshold development is seen in the extremely low achievement performance found for Grade 4 learners on the prePIRLS 2011 study. This would affect transfer of linguistic competence to the additional language despite the fact that learners are required to perform cognitively complex tasks in the additional language, namely English.

Furthermore, in the South African context the schools and classrooms are often diverse linguistic environments, and the languages may be mixed in spoken language. According to Pretorius and Mampuru (2007) the majority of learners on the African continent do not have the advantage of being able to do all or even some of their schooling in their home language. However, their findings suggest that learners in a



print-rich environment are more readily able to transfer reading skills and strategies from a second language to a first language.

Reading comprehension proficiency develops in the child through the home and school context (Vygotsky, 1978; Bruner, 1966). It is argued that the choice whether to embrace mother tongue instruction within an additive bilingual model, or early English immersion should be informed by the teaching environment and other contextual factors, such as access to print material.

Pretorius (2014) notes that the prePIRLS results indicate that reading is more than simply a language issue and should be explicitly taught and nurtured since, despite the LoLT being the home language for most learners, reading proficiency was still extremely low. The performance of the learners in the 2011 study reveal that they are not well prepared for the literacy challenges of the Intermediate Phase (Zimmerman, 2010; Pretorius, 2014). Since, learners who have been taught in their home language from grades 1-3 often begin, from Grade 4, to receive classroom instruction in an additional language – usually English.

Mother tongue instruction throughout schooling for all learners in South Africa, is observed as an educational and political ideal in a complex multilingual context. Nonetheless fluency in the additional language (for many South African learners) is perceived as a vehicle of social mobility and a means of reaping tangible socio-economic benefits (Posel and Casale, 2011). As such, it becomes necessary to weigh up the multiplicity of factors affecting the learner's future well-being, not least of which is the need for careful, timeous preparation for the National Senior Certificate in Grade 12 which is written in either English or Afrikaans. The efficacy of mother tongue instruction for African-language learners in South Africa is affected by and mediated within both concrete and nuanced factors: Critical questions need to be asked around issues such as how homogenous the language of the school or area is which determines whether the learner will indeed be instructed in their own mother tongue or in another African language predominant in the area; or on the reading and textbook resources available in the mother tongue or at all; and the language in which the teachers have been trained and are fluent, and able to convey complex concepts to a class.

Banda (2009) argues that current policy is based on Western and colonial notions of multilingualism, and that the promotion of multilingualism in South Africa should not consist of promoting eleven monolingual streams of distinctive languages in homogenous speech communities, as is the erroneous perception. Banda (2009) further posits that even though the country has eleven official languages, the majority of African-language speakers use either Nguni or Tswana-Sotho dialects, and that careful planning and cross-linguistic referencing would enable these languages to share a large amount of teaching and reading material. Given the extent to which language in schools often becomes a melting pot of the dialects spoken in the area, and the classroom the interface of more than one language, these ideas should be explored further. A shift away from discrete definitions and bounded linguistic entities is one way to create access to matters of personal identity and intergenerational communication through mother tongue endorsement. This approach could address the reality of financial and capacity constraints while taking cognisance of the socio-cultural call for indigenous languages in schools. It also offers some leeway for the possibility of realising a bilingual 'late-exit' approach.

Endorsement of bilingual transitional models, where development in the mother tongue is seen to be a prerequisite for developing proficiency in an additional language, has been vocal and pervasive in the literature (Banda, 2000; Cummins, 1992; Taylor & Coetzee, 2013; World Bank, 2005). Some proponents of this theory argue that the interdependence of literacy skills across languages takes at least five years to master (Cummins, 1992). Others state that it takes between six to eight years to learn enough of a second language in formal school environments before this language can be used as a medium of instruction (Reeves et al., 2008). Once academic mastery in the mother tongue has been attained a child will possess the necessary literacy skills to transition to the additional language. Taylor and Coetzee (2013) demonstrate that home language instruction in the early years of schooling significantly improves English acquisition in later grades. They, however, point out that in a context in which certain materials are being used, or instruction is carried out by certain teachers, English instruction from Grade 1 may be preferable and it is, therefore, vital to continue to allow schools the final decision with regard to the choice between mother tongue instruction and an immersion approach (Taylor & Coetzee, 2013).

### **1.2.5 Summation of the research problem**

At the forefront of this study is an enquiry into how contextual factors at home and at school are contributing to the observed differences in performance across the different language of instruction groupings. The study explores what the relationship is between the LoLT of the learner and his/her home and school context and how the combined effect of these factors affect the development of reading comprehension at the higher-order level. The language of instruction groupings include the African languages, Afrikaans, English L1 and English L2 as an immersion model. The significant differences in performance (on the higher-order prePIRLS 2011 items) across the language models are not singular reasons for underperformance in themselves, but reflect embedded home and school contextual factors which are contributing to weaker or stronger performance by one or other language of instruction grouping. Using language theory to identify possible variables, a contextual basis for differences in performance is explored.

Many South African parents are faced with the decision between home language education and English as an L2 language of instruction for their children in the Foundation Phase (grades 1-3). Many parents who do opt for English L2 education have gone to great lengths to access the former 'white' English LoLT schools trusting that this route will provide opportunities for their children (Sailors, Hoffman & Matthee, 2007). Mother tongue-based education is widely regarded as a fundamental prerequisite for providing the learner with the foundation required to develop text comprehension at an academic level (Cummins, 1979; Heugh, 2000). However, it is unclear what role home and school contextual factors play in the mother tongue-based language model approach. This makes it important to interrogate whether differing home and school contextual factors might better support an English immersion approach for the development of text comprehension at the higher-order, more abstract level. The study first compares how home language instruction in one of the African languages and English as non-home language (possibly as an L2 or L3) affect performance on the higher-order reading comprehension items, and then explores the effects of contextual factors on both language of instruction models at the home and school level.

Also examined is the complexity of defining a higher-order reading construct for different classroom LoLT contexts. This query is investigated by comparing English L1 and English L2 proficiency on the higher-order items and discussing the prePIRLS 2011 assessment in terms of an under-developed country context and the differing English language proficiencies found in South African classrooms.

### **1.3. PURPOSE, SIGNIFICANCE AND MAIN RESEARCH QUESTION OF THE STUDY**

This study moves beyond the finding that learners in different language of instruction groupings in South Africa perform differently on the higher-order reading comprehension items in order to explore, through multilevel analysis, how mediation in the home and at school in the form of socio-economic status (cultural capital), language support and access to print material affect literacy development. By employing a framework that embraces the importance of context, the study is not restricted to a discussion of performance on the cognitive processes required for proficiency in reading comprehension, but also embraces the importance of sociocultural factors for literacy development such as motivation to read text (also known as reader engagement), the development of metacognitive strategies through mediation and the impact of societal power relations which manifest through dominant discourses in classrooms.

Higher-order reading comprehension is of particular concern for the educational development of South African primary school learners. The results of prePIRLS 2011 and other large-scale reading comprehension assessments (for example, PIRLS 2006, 2011, SACMEQ I, II, III) indicate that literacy levels in South Africa are exceptionally low and few learners are reaching the top international levels and benchmarks. Moreover, learners perform well below the international standard. Learners who struggle to read even at the most basic level, will find the more complex texts and comprehension processes in higher grades an impediment to their educational progress.

Drawing extensively from Vygotsky (1978), this study employs a sociocognitive lens (Purcell-Gates, 2012) to explore learners' poor performance on higher-order reading comprehension tasks. The thesis puts forward a conceptual framework (Chapter 4

section 4.1.) which provides a theoretical lens for understanding how language and the learner's sociocultural context interact to hinder or aid higher-level language threshold development (Cummins, 1978) that is required for comprehension of abstract, academic text. Learners who perform well on the high-order reading tasks have well-developed higher-order cognitive functioning, including the ability to make inferences, synthesise information before interpreting it and to reflect on and evaluate information (Bloom, 1956; Krathwohl, 2002). These functions typically require the skill known as metacognition (thinking about one's own thinking) in order for the learner to carry out these tasks successfully (Flavell, 1979; Veenman, 2016). Metacognition in a learner typically develops over time in conformity to the many mediated interactions experienced both at home and at school (Vygotsky, 1978).

Learning relies on the foundation laid down, as well as, on building onto the previous layer of understanding and information (Vygotsky, 1978). This also applies, to language learning and the development of metacognitive processes for effective reading comprehension (Veenman, 2016). Notably, language thresholds, particularly for reading and writing, cannot be achieved in a resource scarce environment with poor literacy role models (Cummins, 1979).

This thesis borrows its premise from Vygotsky (1978) and those who have built on his contextually based theory of cognition by advocating that cognition develops within a particular context, and that thought processes are mediated in the home and broader social context available to each individual. Critically, contexts differ vastly. Furthermore, if language is fundamental to thought, then the ways in which language factors and contextual variables interact will impact deeply on the development and nature of higher-order cognition.

The thesis examines how language of instruction creates or restricts access to the 'social tools' and 'cultural capital' context which enable the development of higher-order reading comprehension. Taking a pragmatic approach to theory development over an ideological one, it examines the manner in which language in education choices are affecting learner reading comprehension.

In South Africa the complex multilingual context is often cited among other reasons as contributing to poor performance in reading comprehension assessment (Moloi & Strauss, 2005; Pretorius & Mampuru, 2007). Furthermore, language policy decisions

are often weighted by ideological considerations (Alexander, 1997, 2005; Banda, 2009). This study examines the language of instruction models found in South African education in order to understand the impact of home and classroom contextual factors within the language approaches. In this way the study informs an approach based on the student's context to school policy decisions regards language of instruction in the classroom.

The significance of this study is summarised by outlining that the academic debate around mother tongue education is on-going and particularly pertinent in the South African context where research has often been seated in the northern, more developed economies of the world. This study probes this difficult and 'ideologically-rich' terrain with the aim of examining data-based evidence to inform language in education theory and decisions with far-reaching social and economic implications.

The main research question for this study is: *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?*

The following research questions are also explored in the study:

*How is the construct known as 'higher-order reading comprehension processes' defined and validated in a South African context?*

*How does learner performance on the higher-order reading comprehension items compare for different language of instruction models for low socio-economic status learners?*

*What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models?*

The research questions are more fully explicated in Chapter 4.

#### **1.4. KEY CONCEPTS**

The definition of reading literacy for prePIRLS 2011 states that:

“...reading literacy is defined as the ability to understand and use those written language forms required by society and/or valued

by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment” (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009, p.19).

The definition given above of reading literacy places importance on the contextual basis of reading literacy and broadens the notion of literacy to “participation in communities” and as a practice that provides “enjoyment” to the learner. The contextual emphasis is in line with the central idea of this thesis: that of learner literacy being impacted by the home and school mediatory context in their reading literacy development.

PIRLS focuses on three aspects of learners’ reading literacy, namely:

- i) *“Processes of comprehension* that involve being able to focus on and retrieve explicitly stated information, make straightforward inferences, interpret and integrate ideas and information, and examine and evaluate content, language and textual elements.
- ii) *Purposes for reading*, which include the examination of literary experience and the ability to acquire and use information. Learners are typically exposed to narrative text for purposes of assessing literary experiences, while texts of a factual nature are used for purposes of assessing learners’ ability to acquire and use information.
- iii) *Reading behaviours and attitudes towards reading*. As part of these foci, information on the home, school and classroom contexts of learners are also gathered” (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009, p.21).

Higher-order reading comprehension was measured in prePIRLS 2011 and analysed in this study for the comparison of performance across the language of instruction groupings. The items that test the reading comprehension processes ‘make straightforward inferences’, ‘interpret and integrate ideas and information’, and

'examine and evaluate content, language and textual elements' are identified as higher-order reading comprehension processes and make up the PIRLS and prePIRLS 'Inferencing, interpreting and evaluating' subscale. The reading comprehension processes are described in Chapter 2 section 2.3.

The language of instruction groupings that were compared included African Languages, Afrikaans and English. The group 'African Languages' includes isiZulu, isiNdebele, Sepedi, Setswana, Xitsonga, isiXhosa, Tshivenda, siSwati and Sesotho. Since prePIRLS 2011 sampled schools according to the language of instruction of the school (also referred to as Language of Learning and Teaching or LoLT), the language of instruction of the learner is also the language of the test (LoT).

In order to examine the mediated learning environment to which the learner is exposed both at home and at school, language is represented as the LoLT found in South African schools. For the purposes of this study the nine African languages tested were grouped together. However, it is noted that the nine official African languages represented may display many differences from each other across the South African landscape.

Performance is compared across these three groupings for learners who speak the language at home and those who do not speak the language at home. The next differentiation is that of two prominent language groupings in South Africa. On one hand is the group receiving mother tongue instruction in the Foundation Phase (where the school follows an additive bilingual approach) and, on the other hand, is the group receiving instruction in a second language, namely English, (in line with an immersion approach to the language of instruction). A discussion of these language groupings can be found in Chapter 3 section 3.1.

English L2 refers to English as a second language. According to Reeves et al. (2008) an L2 often functions as a *lingua franca* by bridging the communication between different language groupings and can be used as the LoLT or language of instruction. According to Reeves et al. (2008) English may be experienced by learners living in rural parts of South Africa, not as an L2, but as a foreign language because it is known by so few people in the community.



## 1.5. STRUCTURE OF THE THESIS

Chapter 2 provides a *methodological overview* of the national large-scale study PIRLS and prePIRLS from which the data is drawn for secondary analysis in this study. A discussion of the international research design provides an important framework for understanding the study. An explanation of the international benchmarks and reading comprehension processes tested in the large-scale assessment outline the tasks that learners are expected to perform. The research methods in prePIRLS 2011 are described in terms of sampling, instrument development, data capturing and scoring.

Chapter 3 is a *literature review* of the research undertaken and covers the domains of language theory, cultural capital and testing higher-order reading comprehension. In this section, the important role that language and context plays in the development of higher-order cognition is argued by outlining the theory undergirding different language models; by discussing theory on cultural capital and findings on the impact of socio-economic status on educational attainment; by examining definitions of higher-order thinking, as well as the higher-order test construct; and by highlighting theory on the development of metacognition in the learner through social processes. Theory discussing the validity of language and literacy assessment is also outlined.

Chapter 4 describes the *conceptual framework* and theoretical underpinnings for this study, leading to the research questions and the research design and methods used for each research question. In this chapter, the research approach to examining the effect of language and context on higher-order development of reading comprehension is outlined by integrating the theory that forms the basis for the conceptual framework, with the operationalising of the constructs using the prePIRLS 2011 dataset. The research methods used to explore each of the four research questions are outlined.

Chapter 5 investigates the construct, as well as, contextual *validity of the higher-order reading comprehension processes*. Using the learner achievement English L1 and English L2 data, the reliability of the higher-order reading comprehension processes ('make straightforward inferences', 'interpret and integrate ideas and information' and 'evaluate and examine content, language and textual elements') is examined by means of Cronbach's Alpha analysis and Confirmatory Factor Analysis (CFA). Findings from a content analysis, Rasch person-item maps, as well as path modelling

bring to the fore the discrepancies in achievement between the English L1 and English L2 groupings, and the importance of contextual validity in testing higher-level reading comprehension processes.

Chapter 6 *compares the effect of the different language of instruction models* using single-level regression analysis on performance on the higher-order reading comprehension processes tested in prePIRLS 2011. Performance for the English, Afrikaans and African languages groupings across the L1 and L2 learner groupings is compared on the higher-order subscale and on the high and advanced international benchmarks. Performance is then compared for the African language L1 and English L2 groupings and access to text is analysed for these two groupings as a multiple regression at the home level. The African languages L1 and English L2 low SES learners are compared for performance on the higher-order subscale and high and advanced international benchmarks. The effect of access to text at the home and school level was further examined in a multilevel analysis for the same low SES English immersion subsample.

Chapter 7 further examines *the importance of contextual factors* in comparing learner performance across the different LoLT groupings. It compares the effect of the language of instruction models, while controlling for home and school contextual factors, using two-level regression analyses for performance on the higher-order reading comprehension processes. Variables that could explore the effect of language support, socio-economic status and access to text at the home and school level were used to ascertain the effect of these contextual factors for the English, Afrikaans, African languages, Additive Bilingual and English Immersion LoLT groupings.

Chapter 8 describes the *key findings and main conclusions* for the research into the construct and contextual validity of the higher-level processes; the findings of the comparison of performance across the different language of instruction models and of the results of the multilevel regression analyses examining the effect of home and school contextual factors on the different LoLT groupings. Recommendations are made for policy, practice and research.



## CHAPTER 2

# METHODOLOGY OVERVIEW OF INTERNATIONAL PIRLS AND PREPIRLS 2011

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Secondary analysis of the prePIRLS 2011 data was used in this study to investigate the effect of language of instruction and contextual factors on learner performance on the higher-order reading comprehension processes. The national project was conducted at the Centre for Evaluation and Assessment at the University of Pretoria under the auspices of the international governing body of the International Association for the Evaluation of Educational Achievement (IEA). IEA has conducted regular international assessments of reading literacy for more than 50 years (Mullis & Martin, 2013). IEA pioneered international comparative assessment of educational achievement in the 1960s to gain a deeper understanding of policy effects across countries' different systems of education.

The research methods used in developing the instruments, sampling, data collection, scoring, data capturing and data scaling and plausible values are described in this chapter. The background to the prePIRLS 2011 project is outlined (2.1). The international research design is described (2.2). The PIRLS and prePIRLS Reading Purposes and Reading Comprehension Processes are explained (2.3). Section 2.4 explains the PIRLS Contextual Questionnaire Framework and then the research methods are outlined (2.5).

### **2.1. BACKGROUND TO prePIRLS 2011**

PIRLS (Progress in International Reading Literacy Study) was inaugurated in 2001 as a follow-up to IEA's 1991 Reading Literacy Study. Conducted at five-year intervals, PIRLS 2011 is the fourth assessment in the current trend series, following PIRLS 2001 and 2006 with PIRLS 2016 underway at the time of writing up this study.

In 2011, nationally representative samples of learners in 50 education systems participated in the various assessment options included in PIRLS, bringing the total to 325 000 learners. All of the countries, institutions, and agencies involved in PIRLS

assessments work collaboratively on each round of the assessment. PIRLS is directed by the PIRLS International Study Center at Boston College. It focuses on the achievement of learners in their fourth year of schooling and the experiences they have at home and at school in learning to read. PIRLS assesses learners in their fourth year of schooling because it is at this point that they have learned how to read and are now reading to learn. PIRLS, therefore, assesses how well learners can read with understanding, and use their reading to gain new insights and information (Mullis & Martin, 2013).

The prePIRLS assessment was initiated for countries whose performance in the previous studies had been low. It was developed to provide learners from low achieving countries with an opportunity to perform at a level different from those participating in PIRLS to ascertain their levels of reading literacy (Howie et al., 2012). PrePIRLS reflects the same conception of reading as PIRLS, except is less difficult and is designed to test basic reading skills that are a prerequisite for PIRLS (Mullis & Martin, 2013). The instruments in prePIRLS 2011 have a simpler vocabulary than that used in PIRLS 2011, the texts are easier, shorter in length and have simpler grammar and syntax, placing less emphasis on higher-order reading skills (Mullis, Martin, Foy & Drucker, 2012).

## **2.2 THE INTERNATIONAL RESEARCH DESIGN FOR prePIRLS 2011**

PIRLS 2011 has a survey research design. The PIRLS 2011 conceptual framework places a child's reading literacy development within a specific context. The relationship between the national and community reading literacy context, as well as an interaction between the home and the school contexts within which the learners' reading behaviour and attitudes develop is represented in the conceptual framework as Figure 2.1. The reading outcomes are a result of these relationships and in turn have an effect on the national context. This home-school context lies within specific community and national contexts. The design of the study takes into account that reading literacy develops and may be enhanced because of these relationships (Howie, et al., 2012).

In order to provide an important context for interpreting the reading achievement results, background information is published together with the PIRLS achievement

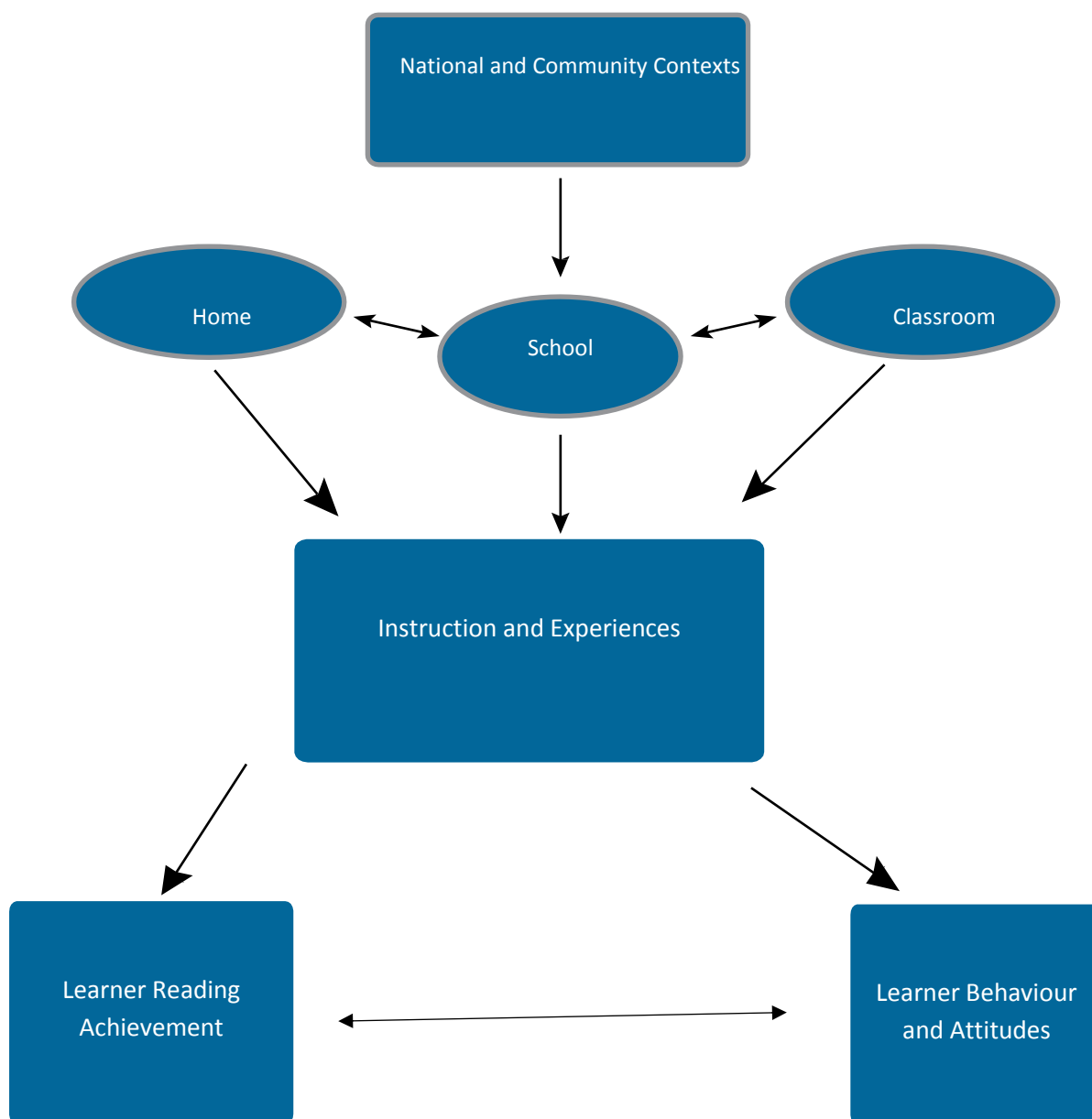
results. Learners, their parents, their teachers, and their school principals are asked to complete questionnaires about their home, school, and classroom contexts for learning to read (Mullis & Martin, 2013).

The PIRLS 2011 study requires the target grade to be that which represents four years of schooling, continuing from the first year of ISCED<sup>5</sup> Level 1 (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). All participating countries included a study population that fulfilled this criterion. As a result of needing to be representative across the eleven language groups, the South African sample for Grade 4 prePIRLS was particularly large. The Grade 5 sample in PIRLS was much smaller, as it only included learners in schools in which the Language of Learning and Teaching (LoLT) in Grades 1-3 was Afrikaans and/or English. (Howie, et al., 2012).

The *PIRLS 2011 Assessment Framework* (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009) illustrates what is meant by the contexts that develop children's reading literacy (Figure 2.1.).

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<sup>5</sup> ISCED is the International Standard Classification of Education developed by the UNESCO Institute for Statistics and provides an international standard for describing levels of schooling across countries.



**Figure 2.1. Conceptual framework for PIRLS 2011 (Mullis et al., 2009)**

### 2.2.1. The prePIRLS 2011 reading scales

Having been developed specifically for a developing context, the prePIRLS assessment is a more accessible test than the PIRLS assessment, though it follows the same design. It consists of eight reading passages and accompanying questions. Each learner writes only part of the assessment according to a systematic booklet

assembly and rotation procedure. Following data collection, learner responses are placed on a common reading achievement scale using item response theory methods that provide an overall picture of the assessment results for each country. The PIRLS achievement scale was established in 2001 so that 100 points on the scale was equal to one standard deviation across all of the countries that participated in 2001, and the scale midpoint of 500 was equal to the international average across those countries. Using passages that were administered in both 2001 and 2006 assessments as a basis for linking the two sets of assessment results, the 2006 data was also placed on this scale so that countries could gauge changes in learners' reading achievement since 2001. Following a similar procedure, the PIRLS 2011 data was also placed on the PIRLS scale. The prePIRLS 2011 scales for reading purposes include:

- Overall reading literacy scale
- Reading for literary experience, and
- Reading to acquire and use information.

In addition, the two scales for processes of reading comprehension are:

- Retrieving explicitly stated information, and
- Inferencing, interpreting and evaluating (Mullis & Martin, 2013).

The scale 'Retrieving explicitly stated information' consists of items from the *Focus on and retrieve explicitly stated information* comprehension process. The scale 'Inferencing, interpreting, and evaluating' combines items from the *Make straightforward inferences, Interpret and integrate ideas and information, and Examine and evaluate, content, language and textual elements* processes.

### **2.2.2. Plausible values**

PrePIRLS uses a matrix sampling technique for the administration of the assessment. prePIRLS 2011 consisted of six blocks of reading passages and their accompanying items for a total of four hours of testing time. These six test blocks were distributed across nine booklets with each block appearing in three booklets to enable linking between the various blocks. Booklets are distributed among learners in participating classrooms so that the groups of learners completing each booklet are approximately

equivalent in terms of learner ability. PIRLS uses item response theory scaling methods to assemble a comprehensive picture of the reading achievement of a country's entire fourth grade learner population by pooling individual learners' responses to the booklets they were assigned (Mullis & Martin, 2013).

Accuracy of measurement is improved (conversely, the amount of measurement error is reduced) at the individual level by increasing the number of items measuring the latent trait. Using the matrix-sampling design, PIRLS requires much fewer responses from each sampled student but is still able to cover a wide range of content. The plausible values approach uses all available data, students' responses to the items they were administered together with all background data, to estimate directly the characteristics of student populations and subpopulations and use these imputed scores in analyses. As explained above for the scales, the plausible value 'inferencing, interpreting and evaluating' consists of the 'Make straightforward inferences', 'Interpret and integrate ideas and information' and the 'Examine and evaluate, content, language and textual elements' reading comprehension process. The plausible value 'Retrieving explicitly stated information' consists of that one reading comprehension process (Mullis & Martin, 2013).

The Cronbach's Alpha reliability coefficient for the prePIRLS 2011 instruments is reported as being 0.93 (Foy, Martin, Mullis, & Stanco, 2011) and within the acceptable range.

### **2.3. PIRLS AND prePIRLS READING PURPOSES AND COMPREHENSION PROCESSES**

The PIRLS 2016 framework informs the processes assessed in the study. PIRLS focuses on the two overarching purposes for reading: for literary experience, and to acquire and use information. The PIRLS assessment integrates the four broad-based comprehension processes within each of the two purposes for reading: 'Focus on and retrieve explicitly stated information', 'Make straightforward inferences', 'Interpret and integrate ideas and information', and 'Evaluate and critique content and textual elements'. It is noted that the purposes for reading and the processes of comprehension do not function in isolation from one another or from the context in which students live and learn. (Mullis & Martin, 2013).



The two reading purposes and four comprehension processes form the basis for assessing PIRLS and prePIRLS. However, there are some differences in emphases across the assessments. Table 2.1 from Mullis and Martin (2013, p.16) below shows the percentage spread of purpose and processes for the two studies.

**Table 2.1. Percentages of items assessing different purposes and processes**

	PIRLS	prePIRLS
<b>Purposes for Reading</b>		
Literary Experience	50%	50%
Acquire and Use Information	50%	50%
<b>Processes of Comprehension</b>		
Focus on and Retrieve Explicitly Stated Information	20%	50%
Make Straightforward Inferences	30%	25%
Interpret and Integrate Ideas and Information	30%	
Evaluate and Critique Content and Textual Elements	20%	25%

In the prePIRLS assessment, questions that accompany each reading text were designed to target selected processes of comprehension. After a rigorous refinement process, data collection and data cleaning, the end result depicted the following results for the item percentages:

‘Focus on and retrieve explicitly stated information’ included tasks where the learner had to identify information that was explicitly stated in the text. These included a total of 57 items, which was 45% of the score points.

‘Make straightforward inferences’ included tasks such as having to infer that one event caused another event. These included a total of 35 items and correspondingly 27% of the score points.

‘Interpret and integrate ideas and information’ included reading tasks where the learner had to discern the overall message or theme of a text, infer a story’s mood or

tone and interpret a real-world application of text information. These included a total of 17 items.

'Evaluate and examine content, language and textual elements' included reading tasks such as a description of how the author devised a surprise ending, judging the clarity of information in a text, and determining an author's perspective on the central topic. These included a total of 14 items, which along with 'Interpret and integrate ideas' makes a total of 28% of the score points.

'Make straightforward inferences', 'Interpreting and integrating' and 'examining and evaluating' are higher-level comprehension processes and the prePIRLS reporting strategy combines these items into a single subscale in order to provide a stable measure of higher-order reading comprehension (Mullis, 2007).

The PIRLS and prePIRLS assessments contain an equal proportion of material assessing each purpose. The assessment passages are classified by their primary purposes, and the accompanying questions (also called items) address these purposes for reading. Passages classified as literary have questions addressing theme, plot events, characters, and setting, and those classified as informational are accompanied by questions about the information contained in the passages. In selecting texts for the PIRLS assessments, the aim is to present a wide range of text types within each purpose for reading and the goal is to create a reading experience in each assessment that is similar to authentic reading experiences (Mullis & Martin, 2013).

According to the PIRLS 2016 Assessment Framework, readers construct meaning in different ways. Therefore, PIRLS assesses four broad-based processes of comprehension typically used by fourth grade readers. These processes are further undergirded by the metacognitive processes and strategies that allow readers to evaluate their understanding and regulate their use of reading strategies. In addition, the prior experience and background knowledge that a learner brings to a text plays an important role in their understanding of the text (Klapwyk, 2011).

In the PIRLS assessments, the four comprehension processes are used as a foundation for developing the comprehension questions which are based on each reading passage. For each assessment the questions are varied in order to measure the range of comprehension processes. The length and complexity of a text also has

bearing on the complexity of the comprehension process. It is important to note that although locating and extracting explicitly stated information appears to be less difficult than making interpretations across an entire text, all texts are not equal and can vary with regard to length, syntactic complexity, abstractness of ideas, and organisational structure which impacts the difficulty of the question asked across the four types of comprehension processes (Mullis & Martin, 2013).

### **2.3.1. Focus on and retrieve explicitly stated information**

In focusing on and retrieving explicitly stated information, readers use various ways to locate and understand content that is relevant to the question. Items testing this process require the reader to focus on the text at the word, phrase and sentence level for the purpose of constructing meaning. The process may also require the reader to focus on and retrieve pieces of information from across the text (Mullis & Martin, 2013).

The PIRLS 2016 Assessment Framework outlines the range of the focus on and retrieve process as follows:

- Identifying information that is relevant to the specific goal of reading;
- Looking for specific ideas;
- Searching for definitions of words and phrases;
- Identifying the setting of a story (e.g., time and place); and
- Finding the topic sentence or main idea (when explicitly stated)

(Mullis & Martin, 2013, p. 21).

This is an excerpt from released prePIRLS literary passage 'Brave Charlotte' by Anu Stoher:

*Charlotte lived with all the other sheep on a hillside far from the farm. They had a shepherd to look after them and he had an old dog named Jack* (Mullis & Martin, 2013, p.140).

#### **Example Item (Focus on and retrieve information):**

1. Who is Jack?

#### **Example of scoring guide:**

- 1- Acceptable response

The response indicates that Jack is a dog / old sheep dog

### 2.3.2. Make straightforward inferences

The ability to ‘make straightforward inferences’ that are not explicitly stated allows readers to move beyond the surface of texts and to resolve gaps in meaning. Some of these inferences are straightforward in that they are based primarily on information that is contained in the text and readers must connect two or more ideas. The ideas themselves may be explicitly stated, but the connection between them is not, and must, therefore, be inferred. However, despite the inference not being explicitly stated in the text, the meaning of the text is understood. Skilled readers will connect two or more pieces of information and recognise the relationship even though it is not stated in the text (Mullis & Martin, 2013).

As stated in the PIRLS 2016 Assessment framework, with this type of processing, the focus may be on local meaning residing within one part of the text, the focus may also be on a more global meaning, representing the whole text. Reading tasks that may exemplify this type of text processing include the following:

- Inferring that one event caused another event;
- Concluding what is the main point made by a series of arguments;
- Identifying generalisations made in the text; and
- Describing the relationship between two characters (Mullis & Martin, 2013, p.22).

This is an excerpt from released prePIRLS literary passage ‘Brave Charlotte’ by Anu Stoher:

*When all the other sheep were sleeping, she would slip away to her special place and gaze at the moon. Even Jack did not notice. But he did not have very good ears these days* (Mullis & Martin, 2013, p.142).

#### **Example of Item (Make straightforward inferences):**

5. Why didn’t Jack notice when Charlotte went out at night?

#### **Example of Scoring Guide:**

- 1- Acceptable Response

The response indicates that Jack did not notice Charlotte because he could not hear very well.

### **2.3.3. Interpret and integrate ideas and information**

As with the more straightforward inferences, readers who are engaged in interpreting and integrating ideas and information in text may focus on local or global meanings. As readers interpret and integrate they construct meaning by integrating personal knowledge and experience with meaning that resides within the text. In this way, readers draw on their understanding of the world, as well as their background knowledge and experiences, more than they do for straightforward inferences and make connections that are not only implicit, but that may be open to some interpretation based on their own perspective (Mullis & Martin, 2013).

The PIRLS 2016 Assessment framework describes these reading tasks as:

- Discerning the overall message or theme of a text;
- Considering an alternative to actions of characters;
- Comparing and contrasting text information;
- Inferring a story's mood or tone; and
- Interpreting a real-world application of text information (Mullis & Martin, 2013, p.23).

This is an excerpt from prePIRLS informational passage ‘Caterpillar to Butterfly’ by Deborah Heiligman:

*Our butterfly could not stay in the jar. It needed to be outside with flowers and grass and trees. We watched our butterfly land on a flower. It sipped the flower’s nectar through a long, coiled tube. Maybe it was a female butterfly. Maybe someday she would lay an egg on a leaf (Mullis & Martin, 2013, p.178).*

**Example of item (Interpret and Integrate ideas and information):**

15. Put what happens to a caterpillar as it changes into a butterfly in the correct order. The first one has been done for you.

- \_\_\_ The caterpillar forms a hard shell.
- \_1\_ The caterpillar eats and grows.
- \_\_\_ The butterfly flaps its wings.
- \_\_\_ The shell of the chrysalis cracks.

**Example of scoring guide:**

- \_2\_ The caterpillar forms a hard shell.
- \_1\_ The caterpillar eats and grows.
- \_4\_ The butterfly flaps its wings.
- \_3\_ The shell of the chrysalis cracks.

**2.3.4. Evaluate and examine content, language and textual elements**

According to Mullis and Martin (2013), as readers evaluate the content and elements of a text, the focus shifts from constructing meaning to critically considering the text itself. Readers engaged in this process step back from a text in order to examine and critique it.

In evaluating and critiquing elements of text structure and language, readers draw upon their knowledge of language usage to reflect on and judge the author’s language choices and devices for conveying meaning. Using past reading experience and familiarity with the language and text structure, readers evaluate the visual and textual features used to organise the text (Mullis & Martin, 2013).

The tasks encapsulating this process are outlined in the PIRLS 2016 Assessment Framework:

- Judging the completeness or clarity of information in the text;
- Evaluating the likelihood that the events described could really happen;
- Evaluating how likely an author’s argument would be to change what people think and do;
- Describing the effect of language features, such as metaphors or tone; and
- Determining an author’s perspective on the central topic (Mullis & Martin, 2013, p.24).

This is an excerpt from prePIRLS informational passage ‘Caterpillar to Butterfly’ by Deborah Heiligman:

*Our butterfly could not stay in the jar. It needed to be outside with flowers and grass and trees. We watched our butterfly land on a flower. It sipped the flower’s nectar through a long, coiled tube. Maybe it was a female butterfly. Maybe someday she would lay an egg on a leaf* (Mullis & Martin, 2013, p.178).

**Example of item (Evaluate and examine content, language and textual elements):**

16. Think about the whole article. Why do you think the teacher brought the caterpillar into the classroom?

**Example of scoring guide:**

The response recognises that the teacher brought the caterpillar in to class for students to see it change/grow (into a butterfly) OR the response may indicate a general understanding that the teacher wanted students to learn about butterflies or about the caterpillar’s cycle of life.

The PIRLS test development team computed the passages’ word count and readability as a quantitative check of the grade appropriateness of the recommended texts. The Flesch-Kincaid Grade Level formula was used as a measure of readability. The Flesch-Kincaid Grade Level Formula uses average syllables per word and average sentence length to produce a number that represents the grade in which students can read the text (Mullis, 2007). The word count of the prePIRLS passages ranged from 396 to 484, and the Flesch-Kincaid Grade Level from 2-4 (Mullis, 2007).

### 2.3.5. International benchmark

The reading comprehension processes are integrated through the items across all the passages and categorised into difficulty level through the International Benchmark of Reading Achievement as depicted in Table 2.2. sourced from Mullis, Martin, Foy and Drucker (2012).

**Table 2.2. International benchmark of reading achievement**

<b>Advanced International benchmark</b>	
625	<p><b>When reading Literary texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Integrate ideas and evidence across a text to appreciate overall themes</li> <li>• Interpret story events and character actions to provide reasons, motivations, feelings and character traits with full text-based support</li> </ul> <p><b>When reading Information texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Distinguish and interpret complex information from different parts of text and provide full text-based support</li> <li>• Integrate information across a text to provide explanations, interpret significance and sequence activities</li> </ul>
<b>High International benchmark</b>	
550	<p><b>When reading Literary texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Locate and distinguish significant actions and details embedded across the text</li> <li>• Make inferences to explain relationships between intentions, actions, events and feelings, and give text-based support</li> <li>• Interpret and integrate story events and character actions and traits from different parts of text</li> <li>• Evaluate the significance of events and actions across the entire story</li> <li>• Recognise the use of some language features (e.g. metaphor, tone, imagery)</li> </ul> <p><b>When reading Information texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Locate and distinguish relevant information within a dense text or a complex table</li> <li>• Make inferences about logical connections to provide explanations and reasons</li> <li>• Integrate textual and visual information to interpret the relationship between ideas</li> <li>• Evaluate content and textual elements to make generalisations</li> </ul>
<b>Intermediate International benchmark</b>	
475	<p><b>When reading Literary texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Retrieve and reproduce explicitly stated actions, events and feelings</li> <li>• Make straightforward inferences about the attributes, feelings and motivations of main characters</li> <li>• Interpret obvious reasons and causes and give simple explanations</li> <li>• Begin to recognise language features and style</li> </ul> <p><b>When reading Information texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Locate and reproduce two or three pieces of information from within the text</li> </ul>



	<ul style="list-style-type: none"> <li>• Use subheadings, text boxes and illustrations to locate parts of the text</li> </ul>
<b>Low International benchmark</b>	
400	<p><b>When reading Literary texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Locate and retrieve an explicitly stated detail</li> </ul> <p><b>When reading Information texts, learners can:</b></p> <ul style="list-style-type: none"> <li>• Locate and reproduce two or three pieces of information from within the text</li> <li>• Use subheadings, text boxes and illustrations to locate parts of the text</li> </ul>

## 2.4 THE PIRLS CONTEXTUAL QUESTIONNAIRES

In order to study the community, home and school factors associated with children’s reading literacy by the fourth grade, the PIRLS and prePIRLS study includes the administering of questionnaires to learners, their parents, their teachers, and the principals of their schools. The questions are designed to measure key aspects of learners’ home and school environments (Mullis & Martin, 2013).

A **Learner Questionnaire** is completed by each learner who participates in the PIRLS or prePIRLS reading assessment. This questionnaire asks about aspects of learners’ home and school lives, including demographic information, home environment, school climate for learning, out-of-school reading behaviours, classroom engagement, and attitudes toward reading (Mullis & Martin, 2013).

**The Learning to Read Survey**, otherwise called the Home Questionnaire, was addressed to the parents or primary caregivers of each learner that took part in the PIRLS and prePIRLS 2011 data collection. It asks about language spoken in the home, preschool experiences, homework activities, home-school involvement, books in the home, and parents’ education and occupation. In addition, this questionnaire collects information on early literacy and numeracy activities, reading and quantitative readiness, and parents’ reading activities and attitudes toward reading (Mullis & Martin, 2013).

As part of the study the language teacher of each fourth grade class is asked to complete a questionnaire which is designed to gather information about teacher characteristics and classroom contexts for developing reading literacy. The **Teacher Questionnaire** asks teachers about their background and education, the school climate for learning, attitudes toward teaching, classroom characteristics and strategies for student engagement. It also includes items on reading instructional time,

approaches, activities and materials; computer and library resources; homework; and preparation to teach reading (Mullis & Martin, 2013).

The principal of each school is asked to respond to the **School Questionnaire**. It asks about school characteristics, instructional time, resources and technology, parental involvement, school climate for learning, teaching staff, the role of the principal, and learners' reading readiness (Mullis & Martin, 2013).

## **2.5. RESEARCH METHODS IN prePIRLS 2011**

Stringent regulation and oversight accompanied the processes of sampling, instrument development, data capturing and scoring.

### **2.5.1. Sampling**

A two-stage stratified cluster sampling design was employed (Foy & Joncas, 2003). During the first stage, schools were sampled in proportion to size, followed by the second stage of randomly sampling classrooms, and all the learners in them (Foy & Joncas, 2003). A sample of schools that had instruction at least up to Grade 4 level was selected. The sample was stratified explicitly by language, that is, according to the language of instruction, which resulted in 19 explicit strata. Originally 345 schools were sampled, but only 341 (99.1%) were eligible for participation. Ineligible schools included those which refused participation because of prior commitments, ones reflected on the Department of Education's Educational Management Information System but which had amalgamated with others in an area, and those that no longer existed. The participation of Grade 4 learners amounted to 15 744. In each school an intact class was sampled and all the learners present on the day of testing included (Howie, et al., 2012).

### **2.5.2. Instrument development**

All the assessment instruments were administered in the same language that learners were exposed to as LoLT from Grades 1-3 of formal education. All the instruments were developed in English over 4 years by two international committees working with the International Study Centre at Boston College, in the United States of America together with contribution from the National Research Coordinators of participating countries. As described above, the reading assessment included Grade 4-level

fictional stories and informational texts supplied by different countries. Background questionnaires were aimed at collecting data related to reading behaviour of learners were also developed (Howie et al., 2012).

Each prePIRLS booklet contains two 40-minute test blocks for a total of 80 minutes testing time per learner, followed by 15-30 minutes for a learner questionnaire. Passages selected for prePIRLS generally average 400 words in length in order to ensure that learners have ample time to read the passage and respond to the accompanying items. As an additional step to help learners locate information within the text, items are interspersed throughout the passage. Where possible, items that require learners to focus on a particular page of text are placed on the facing page, so that learners can view both the items and the relevant text simultaneously. This also means learners can provide answers to some items even if they do not complete reading the whole passage. prePIRLS items use multiple-choice and constructed response-response formats (Mullis & Martin, 2013).

### **2.5.3. Translation of instruments**

After the instruments had been developed, prepared in English and distributed by the International Study Centre, participating countries translated the assessment instruments into their local languages of instruction. While procedures are the main focus of this chapter, it should be noted that Chapter 3 section 3.9 provides a discussion of the implications of translation on the validity of the assessments. Section 3.9 also interrogates the important issue of equivalence across the assessments.

Translation procedures were stipulated to ensure standardisation of instruments across countries. The translation procedure ensured equivalence in passages and items across languages, while at the same time acknowledging that differences in expressions could occur across countries. The prePIRLS 2011 instruments had to be contextualised for the South African context and modified and then translated into the other ten official languages. Professional translators were appointed to ensure translations were of a high standard for all the languages. With relevance to the background questionnaires, only the parent and learner questionnaires were translated into all the official languages. The teacher and principal questionnaires were administered in English and Afrikaans. On completion of the translation of the assessment instruments and background questionnaires into all the official languages,

the instruments went through a process of international verification. To ensure adherence to strict quality control measures, all translated assessment instruments and questionnaires were submitted to the secretariat at the International Association for the Evaluation of Education Achievement (IEA). The secretariat appointed independent translation verifiers to assure quality, verify translated instruments for each country and ensure standardisation of instruments. Due to the large number of languages for South Africa, the IEA only verified the seven most spoken languages nationally (Howie, et al., 2012).

#### **2.5.4. Data collection**

prePIRLS 2011 consisted of 176 different instruments. All instruments were randomly assigned to learners in advance of the date of testing and were individually marked with the names of learners on each of the booklets. Data collection took the form of a one-day testing session, in which learners completed the reading achievement tests in two sessions of 40 minutes broken up by a mandatory break, followed by the completion of the learner questionnaire, for which 30 minutes had been scheduled. School and teacher questionnaires were handed to the relevant teacher and school principals upon arrival at the school on the day of testing for collection at the end of the day. Parent questionnaires were handed to learners and collected the following day, with a small incentive for learners to return these completed questionnaires as requested (Howie et al., 2012).

#### **2.5.5. Scoring**

The constructed response items were scored by mother tongue speakers - student teachers recruited from the Faculty of Education and experienced, retired teachers. They were trained over a three-day period using the comprehensive scoring guidelines provided by the IEA. Quality of scoring was assured by scoring checks throughout the process, reliability scoring and quality assurance of one in five booklets by seven independent quality assurers (Howie et al., 2012).

#### **2.5.6. Data capturing and processing**

The IEA designed a programme, *WinDEM*, which was made available to all participants to capture and verify data. *Statistical Analysis System* software was used

to access, clean and cross-check the data according to IEA requirements, after which it was converted into a *dBASE* format then imported into *WinDem* (Howie et al., 2012).

### **2.5.7. Quality assurance**

The stringent regulations provided by the IEA in the Survey Operations Procedures offer valuable procedural information to participants. Several quality control checkpoints were put in place to ensure the highest quality of data. To ensure consistency in the fieldwork within and between countries and to ensure compliance with IEA/PIRLS 2011 data collection guidelines and standards, a monitoring process was put in place. In addition to monitors from the Centre for Evaluation and Assessment, an International Quality Control Monitor (South African appointed and trained by the IEA) served as an external quality control measure and reported directly to the IEA secretariat on data collection activities in South Africa (Howie et al., 2012).



## CHAPTER 3

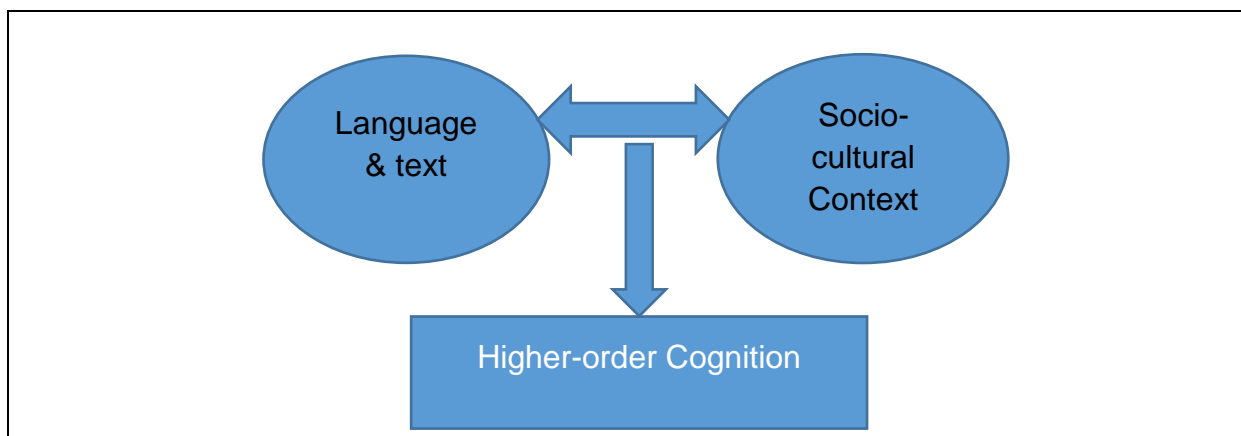
### LITERATURE REVIEW: LANGUAGE, CULTURAL CAPITAL AND TESTING HIGHER-ORDER READING COMPREHENSION

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The purpose of this chapter is to present a review of the literature on key issues related to the central research problem of how contextual factors at home and at school are contributing to significant differences in performance in higher-order reading comprehension across the different languages of instruction in South African schools. It outlines theory underpinning language in education and examines cultural capital as a framework for understanding how socio-economic factors relating to home and school impact the learner's performance. Higher-order thinking is an important goal in education and is, as such, explored for its relevance in defining higher-order reading comprehension as a complex construct of assessment. An approach to establishing construct validity in literacy assessment is also briefly described.

Section 3.1 below outlines theory of language in education as a backdrop to the current language models adopted in South African schools. Section 3.2 outlines critical literacy discourse theory to explain how literacy cannot be divorced from context and describes the role of cultural capital in literacy development. The relationship of education to socio-economic status is explored in section 3.3. In section 3.4 the broader understanding of higher-order thinking is examined and the construct higher-order reading comprehension is defined in section 3.5. Section 3.6 describes cognitive and metacognitive strategies for higher-order reading comprehension. Section 3.7 relates the development of metacognitive strategies in learning to formative mediation in home and at school. Section 3.8 illustrates the important connection between reading and writing for the development of critical thinking in literacy learning. Section 3.9 describes the importance of a holistic, contextually-based approach to validity in literacy assessment and gives an outline of key construct validity theory. Section 3.10 is an overview of the different domains touched on in this study.

Language (in the home and in the classroom) and contextual factors (in the home and at school) in education are considered in this study to have an interactive effect on the learner's development of higher-order cognition (Vygotsky, 1978). Higher-order reading comprehension is understood to develop within a social context (Vygotsky, 1978; Purcell-Gates, 2012). Likewise, Vygotsky's (1978) sociocultural theory of higher mental processes emphasises the importance of sign systems such as language, writing and number systems as mediating factors that are internalised by individuals and result in cognitive development. Vygotsky (1978) argued that the mediation of these cultural 'tools' brings about change or development in individuals. In this way, society impacts on the thought processes of the individual. These changes in individuals also result in change in society and culture. Figure 3.1 below depicts this explanation of the mediation of cognitive development through the 'tools' of society, with the examples in this case being relevant to the study, language and text (written language). Language and text both affect, and are affected, by the social context of the individual, and these factors mediate the development of the higher mental processes or higher-order cognition in the individual.



**Figure 3.1** *Mediated cognition*

### **3.1. THEORETICAL BACKGROUND OF LANGUAGE OF INSTRUCTION IN SCHOOLS**

Key facets of language theory relevant to the study are discussed in this section: The importance of home language in education, the theory underlying bilingual education and different models of bilingual education.

### 3.1.1. The importance and complexity of a home language approach to education

South Africa espouses a multilingual approach to education. Multilingualism is a policy orientation towards systemically recognising multiple languages and formally encouraging the learning of languages (Plüddemann, 2010). However, postmodernist notions of heteroglossia recognise also that *multilinguality* includes all the non-standard varieties of languages and gives each one recognition and equal standing within the formalised system. Plüddeman (2010) asserts that researchers world-wide concur that it is more effective for education to be based on the home language or mother tongue. Plüddeman (2010) argues that home language-based education is a prerequisite to promoting education quality (when measured by performance at school) and the attainment of well-developed bilingualism.

Many theorists argue that a learner-centred schooling system must establish the language that the learner knows best in order to enable literacy development (Alexander, 2006). In most African contexts, the child's home language will be one or more local or regional dialect or non-standard variety that is different from the standardised written form of the language. In a multilingual, post-colonial context such as South Africa, it becomes even more difficult in a mother tongue-based schooling system to provide access to the standard variety for learners being educated in their home language because English is often prioritised. Webb (2002) states that due to the dominance of English in South Africa, it is perceived to have more economic, social and political power than the other languages.

During the time of apartheid, English and Afrikaans were South Africa's two official languages. However, the new Constitution gave official status to eleven indigenous languages. Mesthrie (2002) has clustered predominant languages as they relate along linguistic lines:

- The Nguni languages consist of isiZulu, isiXhosa, SiSwati, Xitsonga and isiNdebele
- The Sotho languages consist of Sepedi, Sesotho and Setswana
- Tshivenda, also an indigenous language, is not classified into a group.



The Language in Education Policy (“*The South African National Educational System Language Policy*”, 1997)<sup>6</sup> has as its underlying principle a commitment to maintaining home language(s) while providing access to additional languages. As a result, the Department of Education followed an additive approach to promoting bilingualism from a mother tongue base. Kamwangamulu (2002) summarised the aims of the Language in Education Policy as promoting additive multilingualism (the maintenance of home language while providing access to additional languages) in redress of previously disadvantaged language groups.

South African children learning under the additive bilingual approach should start their learning at school from Grade 1-3 (Foundation Phase) in their home language (mother tongue). However, due to the reality of a diverse population, schools often have learners in these grades who do not speak the LoLT at home. When learners reach Grade 4, the LoLT switches from mother tongue instruction to the additional language, usually English.

### **3.1.2. Theoretical basis for bilingualism in education**

Cummins’ (2000) theory has been deeply influential in South Africa. Cummins (1979) proposes a theoretical framework which places the interaction of linguistic and socio-cultural factors as central in explaining the cognitive and academic development of bilingual children. Cummins (1979) posits that bilingualism can positively influence both cognitive and linguistic development. He further differentiates between ‘immersion’ and ‘submersion’ programmes. In immersion programmes, all the children start with little or no familiarity in the language of instruction of the school, whereas in a submersion programme a small group of children are mixed together with children who are fluent in the first language of the school and their difficulty in keeping pace with the others may be interpreted as cognitive or academic deficiencies.

Cummins (1979) identifies the need to evaluate the interaction between ‘child input’ and ‘education treatment’ factors. Cummins (1979) emphasises the importance of interaction between the “educational treatment variables and student input characteristics” (Cummins, 1979, p.241). In his Interaction Model of Bilingual

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<sup>6</sup> The National Department of Education announced the Language in Education Policy (dated 14 July, 1997): The Language in Education Policy in terms of Section 3 (4) (m) of the National Education Policy Act, 1996. (Act 27 of 1996).

Education, Cummins (1979) outlines the variables which impact cognitive, academic, linguistic and affective outcomes. Under 'background variables' he stipulates the "nature of the child's linguistic interaction and community and parental attitudes towards participation in L2 culture and maintenance of L1" (Cummins, 1979, p.241). Under 'child input variables' he lists "conceptual-linguistic knowledge and motivation to learn L2 and maintain L1" (Cummins, 1979, p.241). Variables considered under 'child process variables' are competence in L1 and L2, and motivation to learn L2 and maintain L1. 'Educational treatment variables' include pattern of program language usage, and attitudes and expectations of the teacher.

The two child input factors he isolates are conceptual-linguistic knowledge and motivation to learn L2 (the additional language) and maintain L1 (the home language or mother tongue). An important question for South African education is to what extent learners who maintain and develop their L1 in school develop higher or lower L2 levels of skill than those whose L1 is 'replaced' by L2 (Cummins, 1979). Cummins (1979) has proposed two theories which speak to this dilemma and help account for the differences observed in the outcomes of immersion and submersion programmes, as well as to provide a theoretical framework for understanding the relationship between language and thought in the bilingual child. Cummins (1979) explains that the "threshold hypothesis is concerned with the cognitive and academic consequences of different patterns of bilingual skills" (Cummins, 1979, p.243), while "the developmental interdependence hypothesis addresses the functional interdependence between the development of L1 and L2 skills" (Cummins, 1979, p.243).

### **3.1.3. Additive, subtractive and immersion models of language in education**

Cummins (1979) argues that under certain conditions, access to two languages in childhood can accelerate aspects of cognitive growth. Under an 'additive' situation (where the child's L1 is not under threat of replacement by the additional exposure to L2) the child benefits by having relatively high levels of competence in both languages, unlike in a 'subtractive' situation where bilinguals often have less than native-like ability in both languages (Cummins, 1979). The threshold hypothesis assumes that those aspects of bilingualism which might positively influence cognitive growth are unlikely to come into effect until the child has attained a certain minimum or threshold level of competence in a second language. Similarly, if a bilingual child attains only a very low

level of competence in the second (or first language), interaction with the environment through that language is likely to be impoverished. Cummins (1979) further clarifies that attainment of a lower level of bilingual threshold of development is necessary to avoid negative cognitive effects, but the attainment of a second, higher level of bilingual competence might be necessary to lead to accelerated cognitive growth.

As the learners progress through the grades, their language skills need to support the increasingly abstract and symbolic nature of the type of cognition required by the curriculum of the higher grades. According to Cummins (1979) children in additive bilingual programmes enjoy the benefits of improved cognitive functioning as they progress in their L2 ability. Furthermore Cummins (1979) advocates that full immersion is preferable to partial immersion in an L2 in the first years of schooling where the learners benefit from the intensive exposure to the L2 within the positive second language environment. Learners in this scenario perform better in their L1 skills later in their schooling career. Critical to the higher threshold level is the maintenance of strongly supported L1 language skills (at home and in school) throughout the immersion into the L2.

The developmental interdependence hypothesis proposes that the level of L2 competence which a bilingual child attains is determined by the level of competence developed in the L1 prior to starting school (Cummins, 1979). According to Cummins (1979) the “prerequisites for acquiring literacy skills are instilled in most middle-class majority language children by their exposure to linguistic experience in the home” (Cummins, 1979, p.240) and the ability to extract meaning from printed text can easily be transferred from one language to another. Children who are interrupted in the mother tongue development before the abstract level phase of thinking have lower educational attainment (Cummins, 1979). In this regard, Cummins (2000) distinguishes between BICS (Basic Interpersonal Communicative Skills) and CALP (Cognitive Academic Language Proficiency) stating that learners need five to seven years to develop the academic skills required in a context-reduced and cognitively challenging classroom environment. Basic Interpersonal Communicative Skills (BICS) refer to conversational fluency which develops through social interaction from birth and becomes differentiated from Cognitive Academic Language Proficiency (CALP), after early stages of schooling. CALP (Cummins, 1979) is the ability to understand and express concepts and ideas relevant to success at school in both oral and written

modes. Cummins (2000) uses the word 'academic' to explain that this is a language acquired in school. BICS and CALP emerge from a framework which makes a distinction between context-embedded and context-reduced situations and cognitively demanding and cognitively undemanding tasks (Cummins, 2000).

Plüddeman (2010) uses the term 'subtractive bilingualism' to refer to schooling that requires the learner to abandon their mother tongue or home language as LoLT too early, typically after only three or four years' use. Plüddeman (2010) explains that this results in poor academic performance, weakened bilingualism, and an English language assimilationist position.

### **3.2. CULTURAL CAPITAL AND ACCESS TO DOMINANT DISCOURSE**

Bourdieu and Passeron's (2000) theory of cultural capital has reference to the South African educational context. Language policy often reflects the existing power differential in the political processes of a country (Alexander, 1997, 2003; Heugh, 2000, 2017; Plüddeman, 2010) and Bourdieu's (1986, 1991) work lends itself to the analysis of how social inequality is reproduced through language in education. Alexander (1997) notes the disjuncture evident in a society requiring one to be proficient in the dominant language, while maintaining the conditions whereby such proficiency remains unattainable. Alexander (1997, 2003, 2005) argues for the languages spoken by the majority to be elevated to positions of power and status alongside English.

#### **3.2.1. Critical discourse theory**

New Literacy Studies researchers, for example, Street (1993, 2014) and Gee (2000, 2015), explore a definition of literacy as 'cultural practice' which is not limited to autonomous development (Piaget, 1952, 1959) in the individual. This sociocultural position is relevant to this enquiry into how literacy contexts at the different levels of home, classroom and school impact on the learner's development of higher-order reading comprehension. Cultural capital as expounded by Bourdieu (1986, 1991) examines the extent to which the cultural grouping in which the learner is situated facilitates or debilitates progress. Language and cultural capital (also seen as the learner's mediating context) are linked in a complex way and have an interactive effect on the learner's literacy and reading comprehension proficiency.

It is argued by literacy studies theorists that literacy practices are constructed within a cultural context. School literacy is one of multiple literacies to which the learners might be exposed, but is often very different from more prevalent cultural and personal literacies (Belzer, 2002). In fact, Belzer (2002) claims that school literacies are so far removed from the realities of minority groups that they are an alienating practice that could account for the 'reading crisis' in South Africa. Arguably, learners may implicitly be required to make an affiliation shift in order to be successful at school. This embracing of the dominant discourse – access to which may be a prerequisite for cultural mobility – might be at the expense of home or community identity. Most schools regard successful learners as those who conform to particular ways of behaving and speaking and 'doing reading'. Learners who contest the dominant discourse of the ideal student may be seen as disruptive and difficult and will feel some pressure to conform. Heath (1983) recommends establishing a safe space for learners to be apprenticed into dominant school literacies while still valuing and recognising their existing community literacy practices.

Heath (1983), in particular, highlights the formative role of home and community discourse and literacy practices in preparing children for mainstream education and the disjuncture that seems evident between home and school. Heath (1983) and Street (2014) show that the decontextualized discursive essays and responses required in some exams favour a particularly middle-class orientation towards literacy.

Critical theorists bring into question the current mainstream, market-driven ideology of neoliberalism that places a focus on efficiency and accountability at a cost of improving learning (Hursh & Henderson, 2011; Giroux, 2013). It is argued by critical theorists that the classroom should be a place in which learners are made aware of the tensions between ideologies and policies that impact upon their lives. The theorists contend for the space to empower the learners by deconstructing the world and words around them, while constructing words and worlds of their own (Giroux, Flecha, Macedo & Castells, 1999). Teachers are encouraged to open up for the learner a literacy that engages and enables all students, including those from the poor and working classes, to contribute to society and work for social, economic and political change (Freire,

1972). Critical literacy endeavours to 'open the eyes' of the learner to the possible play of power within a text and to how a reader's own perspectives will position them as they read. Language literacy practice is seen as a vehicle to promote the learners' autonomy and raise their cultural consciousness, enabling them to critique ideas in a number of ways in order to understand and interpret various literacies (Giroux, 2001). In this way, the hidden curriculum (as the unstated social norms and moral beliefs) that is transferred through the socialization process found in classroom and social relationships is laid bare (Giroux, 1983).

### **3.2.2. Language and cultural capital**

Bourdieu and Passeron (2000) highlight the value placed on the culturalization that occurs in the initial period of the learner's life. Vygotsky's (1978) socio-historical theory of mediation is key to understanding how the learner benefits from important, culturally embedded literacy experiences where such mediation and cultural capital is available to the learner in the early stages of development. Gee (2015) asserts that literacy and reading challenges emerge from socio-economic imbalances. This imbalance is exacerbated in the South African context by multilingual and multi-literacy challenges, as well as uneven teacher training (Fleisch, 2008). Cummins expounds the notion of CALP as the extent to which a learner is empowered in the oral and academic registers of schooling and argues that learners, for this reason, need to be educated and given access to literacy in their mother-tongue (Cummins, 2000). In the South African context, a number of researchers advocate for mother tongue instruction, as well as mother tongue enliteration as a means of equitable access to education and for reasons of cultural justice. However, despite the many advocates of the educational and cognitive benefits of primary literacy and CALP in home language, parents and School Governing Bodies in predominantly English first additional language schools often prefer English as the LoLT from the fourth year of school (De Klerk, 2002a, 2002b; De Wet, 2002; Uys, Van der Walt, Van den Berg & Botha, 2007; Webb, 2002).

According to Bourdieu (1986) capital can exist in three forms: In the 'embodied' form – described as the form of long-lasting dispositions of the mind and body; in the 'objectified' state, that is, in the form of cultural goods (for example, books, dictionaries, and instruments); and in the 'institutionalised' state (for example, educational qualifications). Bourdieu (1986) developed the theories of cultural and social capital

to explain the unequal academic achievement of learners coming from the different social classes. In this way, he broke away from the common sense view that ascribed academic success or failure to the effect of natural aptitudes (Bourdieu, 1986). Bourdieu (1986) made an explicit break from the functionalist definition of education, which ignored the way that the educational system reproduces the social structure, in order to explain that academic success depends on the cultural capital invested over time by the family. Social capital, on the other hand, is defined in terms of the learner's network of relations, or membership to a group, which has access to cultural capital (Bourdieu, 1986). With relevance to a choice between mother tongue education or an immersion approach, many parents choose to place their children in an English school where English is their L2 because of the opportunities and possible social mobility that an education in the dominant language of the country represents (Evans & Cleghorn, 2014; Woolman & Fleisch, 2006).

The theory of cultural capital has direct implications for the way we understand the investment of an initial caregiver's time into a young learner and the quality of that 'cultural transmission', or the time and nature of the investment of a teacher and school into the preschool or Foundation Phase learner. When the theory is considered in conjunction with sociocultural theory, it becomes evident that that the key formative influences in the learner's life at home and at school should provide access to both the symbolic and concrete tools necessary for learning. Coleman (1975) asserts that equality of educational opportunity cannot be realised while the home environment is deficient in providing the necessary structure to place all learners on an equal footing in the classroom.

### **3.3. THE IMPACT OF SOCIO-ECONOMIC STATUS ON LEARNING**

The South African educational system exists within a highly inequitable society. Howie (2001) has described South Africa's education system as having the characteristics of both richer countries and poorer countries. Fleisch (2008) also reflects on this in describing the country as having two nations. Spaul (2011) reiterates this by arguing that South Africa is still a tale of two schools: one which is wealthy and functional, while the other is poor. Furthermore, South Africa is multicultural and multilingual, a fact which raises many challenges within the education system.

According to Gustafsson (1998), there has been a slight decrease in the correlation between SES and achievement observed internationally in recent decades. However, this does not apply in South Africa where SES seems to play an increasing role and parental educational level is of critical importance. Parents' location in the socio-economic structure is considered as a key determinant in learner reading comprehension proficiency.

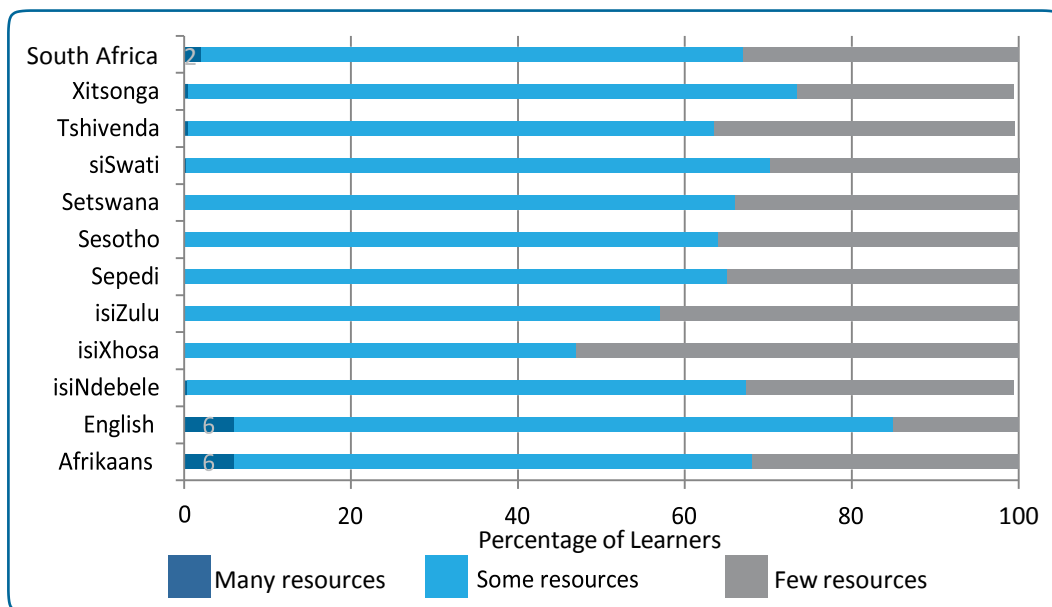
Van der Berg and Louw (2007) explored the 2000 SACMEQ II (Southern and East African Consortium for Monitoring Educational Quality) dataset which comprises literacy and numeracy data for some 42 000 pupils from 2 300 government and non-government schools in twelve African countries. Using multilevel analysis, they found that the correlation between individual SES and mean school SES in South Africa is fourth highest in the sampled countries, reflecting the fact that South Africa remains a highly stratified country (Van der Berg & Louw, 2007). Van der Berg and Louw (2007) show that students in the two wealthiest schooling quintiles exhibit a positive relationship between test performance and socio-economic status. By contrast there is no visible relationship between SES for students in the poorest three quintiles with the slope being almost completely flat over this wide range of SES, pointing, according to Van der Berg and Louw (2007), to widespread inadequacy in resource management. Spaul (2011), reporting on the SACMEQ III dataset, shows that socio-economic status has the largest impact on student performance, but describes the effect as non-linear, meaning that wealth has a greater effect on student performance at higher levels of affluence. In fact, both individual SES and school SES are found to be significant. However, it was concluded that a school's overall socio-economic status has a greater impact on learner performance than does a child's individual status (Spaul, 2011). Spaul (2011) states that placing a poor child in a wealthy school is likely to more than compensate for any negative effects of a poor home background. He further notes that the poorer students who attended wealthy schools experienced gains to school SES similar to wealthy students. Spaul (2011) argues that the qualities of affluent schools aid student learning and, as a result, performance.

Shortages of reading resources and lack of infrastructure, such as school libraries and poor working conditions, are strongly associated with poor achievement. Howie et al. (2012) found that South Africa had one of the lowest levels of library provision amongst



all the countries participating, including systems which are economically more impoverished. Urban and suburban schools achieve much higher scores than those in rural areas. Notably, almost half of the Grade 4 learners that participated in prePIRLS 2011 came from schools in remote rural areas and achieved more than 100 points less than their urban peers (Howie et al., 2012).

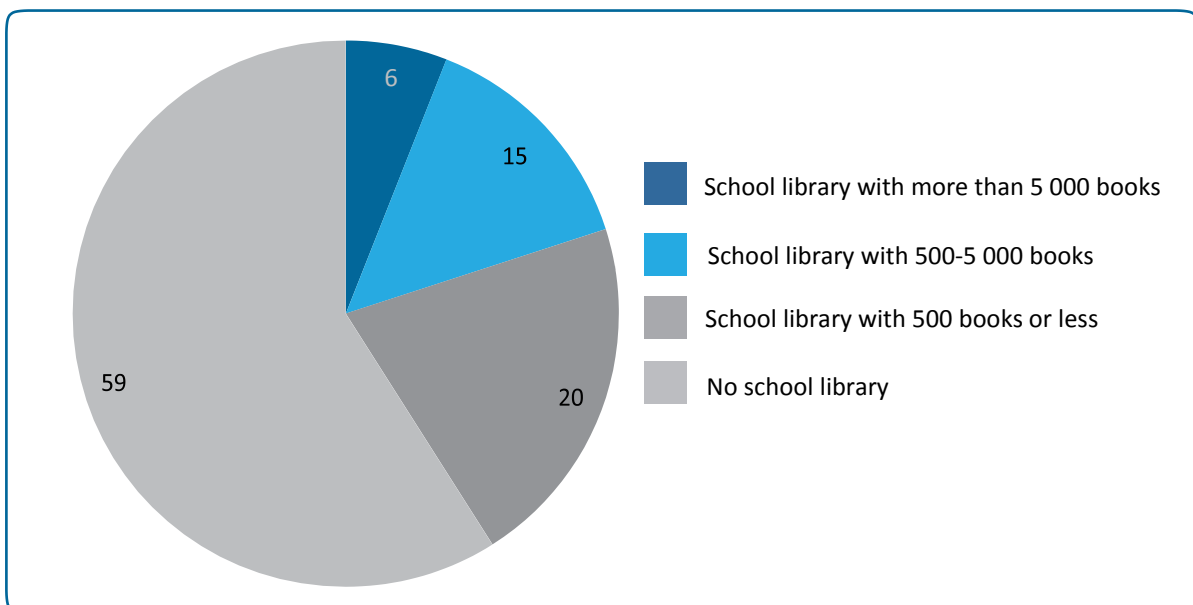
In prePIRLS far fewer learners in South Africa can be categorised as living in homes with many resources (such as books in the home, children’s books in the home, children’s own bedroom and internet connection) than internationally (Howie et al., 2012). However, in comparison with the other countries participating in prePIRLS, they did have more resources at home than those in Colombia or Botswana. Two percent of South African learners had many resources at home and most of these come from the groups assessed in Afrikaans or English, in addition to a few assessed in isiNdebele, siSwati, Tshivenda and Xitsonga. See Figure 3.2 below.



**Figure 3.2 Grade 4 learners’ resources for learning at home (Howie et al., 2012, p.61)**

According to Howie et al., (2012), as was the case internationally, there was a relationship between achievement and the extent of the resources at home. The achievement gap was substantial with those having *many resources* achieving 204 points more than those with *few resources*.

The principals that participated in the prePIRLS 2011 survey were asked about school and classroom resources and the extent to which teaching and reading was affected by shortages. Almost all learners (96%) were affected (only 4% considerably) by shortages in school and classroom resources, with only 4% not affected. Schools not affected by shortages achieved more than 100 points more than those affected a lot. More than half (59%) of the Grade 4 learners were in schools without school libraries, and these schools achieved on average 155 points less than schools with libraries. Only 6% of Grade 4 learners attended schools with well-resourced libraries. Only 30% of learners whose teachers reported having a classroom library had access to more than 50 books in this library (Howie et al., 2012). See Figure 3.3 below.



**Figure 3.3 prePIRLS Grade 4 learners in schools with libraries (Howie et al., 2012, p.90)**

Teachers in the national prePIRLS 2011 study reported experiencing problems with the provision of textbooks and learning materials and of finding instruction more difficult due to the lack of resources. About 30% of learners were in classrooms with no classroom library or reading corner and a further 40% were in classes where there are very few books in the existing classroom library. Moreover, very few teachers use a variety of children’s books as a basis for instruction (Howie et al., 2012).

Notably, it was found in the prePIRLS 2011 study that the majority of South African teachers spent most of their instructional time on basic reading skills and strategies and less time on more inferential types of skills. Teaching of most reading skills and strategies (such as making generalisations, describing text style and structure, and determining the author's perspective) was introduced at a much later stage for South African learners than internationally (Howie et al., 2012).

### **3.4. UNDERSTANDING HIGHER-ORDER THINKING**

This study is focused on the higher level or more cognitively complex processes required in reading comprehension and, as will be explicated below, cognition is described here as being fostered within, and through, and because of a social context (Vygotsky, 1978). Furthermore, the nature of complex cognition is explored first in general terms, and then in relation to reading comprehension. The development of higher-order and metacognitive skill is seen here as being reflective of the nature of the mediatory home and school context.

#### **3.4.1. A broad understanding of higher-order thinking**

General discussions about the constituents of higher-order thinking include elements such as non-algorithmic, complex, multiple solutions, nuanced judgement and interpretation, multiple criteria (possibly conflicting) uncertainty, self-regulation, imposing meaning and effortful (Kallio, 2011). Kitchener, King and de Luca (2006) argue that thinking becomes more complex, differentiated, and integrated as one ages. The integration of contradiction into an overriding whole is the key aspect of 'post-formal' thinking (Kallio, 2011). Kuhn and Weinstock (2002) argue that it is not just about critical evaluation of different perspectives, but also to create a meaningful, self-referential conclusion from them. According to Perkins and Salomon (1989) experts reason with schemata that provide them with a large knowledge-base of domain-specific patterns. The experts are able to rapidly recognise the situations where these patterns apply and to use these patterns to reason and come to a solution (Perkins & Salomon, 1989).

#### **3.4.2. Higher-order thinking in the classroom**

Higher-order thinking is regarded as important in classroom instruction globally. Critical thinking and problem solving are core goals of the framework for 21<sup>st</sup> Century

Skills (Binkley et al., 2009). However, distinguishing between lower-order and higher-order thinking skills is not always clear-cut (Lewis & Smith, 1993). 'Thinking skills', 'reasoning', 'critical thought', and 'problem solving' are terms that are sometimes used indiscriminately. Lewis and Smith (1993) make the distinction between how higher-order thinking is understood in the scientific disciplines where *problem solving* is fundamental, in contrast to the manner in which it is more often employed in the humanities in the form of *critical thought*. Theorists such as Facione (1984) have proposed that since critical thinking is an active process that includes the construction of an argument (not just the evaluation of one) the broadly recognisable steps of problem solving are followed in the process of critical thinking. Ennis (1993) further argues that critical thinking and problem solving are interdependent. However, assessment standards and curricula generally do not exhibit this possible interdependence between the science and the humanities, and for the most part it is very difficult to reconcile the two domains when specifying criteria for items at any point in the hierarchy of cognitive tasks. Problem solving traditionally follows a clear pattern of understanding or isolating the problem, analysing the problem by exploring solutions, executing the solving of the problem, and finally monitoring and self-regulating your problem solving (Sternberg, 2001). An attempt has been made to map critical thinking to these processes (Ennis, 1993). In critical thinking arguments are clarified, then these arguments are evaluated against the evidence and reasoning provides an evaluation of a text. In so far as an argument is *constructed* during critical thinking we are able to reconcile critical thinking with problem solving as two different forms of higher-order thinking that both require an *extension* of the knowledge available to the student, a 'filling in of the gap' in order to solve a challenging problem (Bartlett, 1958; Lewis & Smith, 1993). Recent conceptualisations of higher-order thinking attribute increasing importance to the role of metacognition (Afflerbach, 2016; Flavell, 1979; McNamara, 2011; McNamara, Ozuru, Best, O'Reilly, 2007; Veenman, Van Hout-Wolters & Afflerbach, 2006; Veenman, 2016; Wang, Haertel & Walberg, 1990).

### **3.4.3. Distinguishing between higher-order and lower-order processes**

Bartlett (1958) distinguishes lower- from higher-order thinking by emphasising the process of filling in information that is missing when engaging in higher-order thinking. This forms a basis for a key theme in reading theory where it is argued that higher-

order thinking in reading comprehension occurs when one moves past the basic understanding or decoding of a text and injects one's own pre-existing knowledge into the meaning-making process (McNamara,2011; Palincsar & Brown,1984, 1989). The argument that basic processes form the foundation of a hierarchy that extends up to more complex cognitive processes (such as integration and evaluation) has been widely accepted across the disciplines (Bartlett,1958; Bloom,1956; Krathwohl, 2002;). Resnick (1987) believes higher-order and lower-order thinking skills are interwoven. Moreover, understanding is contingent on making inferences and using information beyond what is written in the text (Resnick, 1987). Furthermore, Newman (1990) explains that higher-order thinking is relative, and that a task requiring higher-order thinking by one individual may require only lower-order thinking by someone else. This, however, is disputed by Afflerbach, Cho and Kim (2015) who differentiate clearly specified boundaries between higher-order and lower-order thinking by arguing that if the student's work does not venture beyond a literal understanding, despite it being more challenging for that particular student, it does not entail higher-order thinking. McNamara (2012) further emphasise the importance of considering the needs of individual readers through sensitivity to the interactions among tasks, processes, and individual differences among students.

### **3.5. TESTING HIGHER-ORDER READING COMPREHENSION**

The assessment of the learners on prePIRLS 2011 at the level of the items is framed by the inferences that are made about their abilities as a result of their scores on those items (Kane, 1992; Messick, 1990; Shepard, 1993). Definitions and an explanation of the PIRLS and prePIRLS reading purposes and comprehension processes of the reading processes tested in PIRLS are described in Chapter 2 section 2.3.

Proficiency in the higher-level processes are indicative of the development of CALP (Cognitive Academic Language Proficiency) as outlined by Cummins (2000), who further posited that threshold development up to an ability to use the language in a written academic form in the mother tongue was a precondition for transference of linguistic L1 (home language) skill into L2 (additional language) proficiency.

The movement from the more concrete tasks, such as searching for specific information in a text and retrieving that specific information, to inferential tasks where

a more nuanced understanding of the language is required, and then further on in cognitive complexity to integrating and interpreting a larger portion of text, or ultimately evaluating a writer's use of text structure or word choice, is not easily mastered by the learner. Becoming proficient in these skills does not occur automatically. The proficient reader employs reading strategies effectively in order to comprehend a complex text. This understanding will have developed over time through mediation in the home and classroom.

During an intervention on a Grade 4 class comprising 44 learners where the class teacher taught both English and isiZulu, Pretorius (2014) found that improved decoding skills helped to support the learners' basic, literal understanding of texts. Performance in answering literal questions improved first, but the more open-ended inferential questions that required learners to make connections in the text and to process information at a deeper level took longer to develop.

Proficiency in the higher-level processes that test knowledge of text structure can be indicative of proficiency in reading comprehension (McGee, 1982). McGee (1982) examined sixty good and poor readers in Grades 3 and 5 from different elementary schools for text recall in relation to their awareness of text structure. His findings indicate that learners who were aware of text structure were more proficient in text recall. Understanding text structure and moving beyond retrieving of information in a text requires higher-level cognitive processing.

### **3.5.1. Higher-order thinking in the prePIRLS 2011 assessment**

The prePIRLS 2011 reading achievement scores are segmented into two subscales namely, 'Retrieving explicitly stated information', and 'Inferencing, interpreting and evaluating'. The prePIRLS 2011 assessment consists of items designed against the criteria of four reading comprehension processes (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). The easier reading comprehension processes, namely, 'Focus on and retrieve explicitly stated information' and 'Make straightforward inferences' are defined using terms such as 'straightforward', 'text based', 'literal', 'automatic' and 'local' (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). These terms are common to definitions of lower-order thinking processes (Bloom, 1956; Krathwohl, 2002; Bartlett, 1958). When answering items that reflect this construct, learners are not required to move past a literal interpretation of the text or to demonstrate

understanding of the whole passage. In the prePIRLS assessment, the easiest of these tasks that orientate on retrieving information fall into the most basic level of comprehension by only requiring the learner to scan the text alongside the item and recognise an uncomplicated answer in the form of a single word or sentence. The most basic reading skills of decoding and vocabulary recognition are nested within these tasks because of the sentence or short paragraph text structure.

On the other hand, the reading comprehension processes 'Interpret and integrate ideas and information', and 'Examine and evaluate, content, language and textual elements' processes are defined by phrases and terms such as 'may relate details to overall themes and ideas', 'draw on understanding of the world', 'interpretation', 'perspective', 'background knowledge', 'infer motive', 'construct a mental image', 'critical consideration of the text', 'knowledge of the world', 'judge and question the author's perspective/skill', 'stand apart from the text', 'take a personal perspective or an objective view'. The terms are indicative of higher-order thinking since definitions of higher-order tasks typically include a learner's use of background or prior knowledge in order to extrapolate meaning from or beyond the text, the use of own interpretation, the construction of meaning and critical analysis (Afflerbach, 1986, 1990). Interestingly, metacognition is seen as transcending the processes (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). Similarly, the PISA 2018 Draft Analytical Framework (OECD, 2016) situates monitoring (metacognitive) processes in the background of text processing and emphasises the fact that it makes up a different, metacognitive processing level (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). In a similar vein to the prePIRLS assessment, metacognitive processes are represented, but not directly assessed. This is understandable considering the extensive discourse in the literature that addresses the difficulty of testing metacognitive processes (Flavell, 1979; Schraw, 1998; Veenman, 2016). However, the highly reflective nature of metacognition and (according to Sternberg, 2001) its integral part in problem solving, suggests metacognition itself is a form of higher-order thinking.

Of particular interest to this study, is the process 'Make straightforward inferences'. In the attempt to delineate higher-order processing requirements in comprehension tasks from lower-order ones, the 'Make straightforward inferences' process exhibits some intriguing characteristics. In the hierarchy of reading comprehension processes, this

process follows on from the most basic, retrieval of information level. The PIRLS Assessment framework differentiates between the skilled and unskilled reader by explaining that skilled readers make the kinds of inferences required by tasks that test this process automatically (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). In describing this process, the assessment framework also explains that readers are required to follow an author's leading toward an obvious conclusion that is not explicitly stated. This explanation suggests that the reader is required to 'fill in a gap' – and, in fact, the word 'inference' implies this. Furthermore, the assessment framework states that learners should move past local meaning to *global* meaning and complete tasks representative of this process that have to do with the *whole* text. In this way, the definition of 'Make straightforward inferences' is nudged into the conceptual territory of some higher-order thinking definitions.

### **3.5.2. Defining the interaction between the higher-level processes and item difficulty**

Texts are different in terms of how complex the sentences are, how abstract the concepts in them are, and in relation to the organisation of the text (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009) and this impacts on the difficulty of items. Even the more basic processes can form difficult tasks if they are situated within a more challenging text. The PISA Draft Assessment Framework (OECD, 2016) that is developed for the international study testing 15 year olds on reading literacy defines the manipulation of the difficulty of the items by describing 'scan and locate tasks' (the close equivalent of 'Retrieve Explicitly Stated Information' in PIRLS):

“In **scan and locate** tasks, difficulty is conditioned by the number of pieces of information that the reader needs to locate, by the amount of inferencing required, by the amount and prominence of competing information and by the length and complexity of the text” (OECD, 2016, p.27).

The position of tasks designed to test lower-level processes within an item with difficult phrasing – or phrasing that requires a certain level of linguistic proficiency, or a learned understanding through classroom instruction of assessment phrasing techniques – brings into focus the complexity of assigning that item to a lower order of assessment entirely on the basis of the definition of the process. Text, item and learner differences



play a role in how difficult the item is within each reading comprehension process. The learners tested have varying levels of background knowledge for each text upon which the items are based. Learners also have varying levels of test-wiseness and reading strategy knowledge afforded them from classroom instruction (Nsamenang, 2009). Notably, learners also have varying levels of language proficiency. If a learner experiences automaticity due to language proficiency in the “Make straightforward inferences’ process, it could be argued that for that learner the process is experienced as a lower-order task, but for the learner who uses effort to figure out the meaning, by using, for example, contextual cues, the comprehension process may be experienced as higher-order. If we define higher-order thinking as relative to the challenge it poses for the student, an item that represents a process that is categorised as ‘straightforward’ may still in fact be a higher-order thinking challenge for some learners. Moreover, if a learner has a grasp of higher-order skills (ability to make inferences and to plan and organise information), they will be able to comprehend more complex text and question types (Afflerbach, 1990). These skills should be developed in the early years of schooling so that students can cope with more complex texts later (Afflerbach, 1986, 1990).

### **3.6. COGNITIVE AND METACOGNITIVE READING STRATEGIES**

The use of reading strategies aids higher-order reading comprehension in the learner. Reading strategies can be separated into cognitive reading strategies and metacognitive reading strategies (Keer, 2004). Cognitive strategies are mental and behavioural activities. During cognitive strategies, learners use existing knowledge, make use of re-reading, and alter reading speed to aid comprehension. Metacognitive strategies are self-monitoring and self-regulating activities (Flavell, 1976; Keer, 2004; Simons, 1994) and metacognition generally refers to the awareness, monitoring and self-regulating of cognitive strategies. Metacognitive strategies are evident when a learner is aware of applying a certain cognitive strategy and of their own cognitive abilities (Keer, 2004). Flavell (1976) explains that metacognition can be described as being aware of our thinking as we perform a specific task and then using this awareness to control what we are doing. Flavell (1976) investigated the different kinds of metacognition and the relation between metacognition and cognition. Kuhn (2000) states that as metacognition develops it becomes more explicit and increasingly under

the individual's conscious control. She states that 'metastrategic knowing' is metaknowing about procedural knowing and that developmentally, increasing meta-level awareness and control is possibly the most important area for observing change. Schraw and Dennison (1994) separate the measurement of metacognitive awareness into knowledge of cognition and the regulation of cognition.

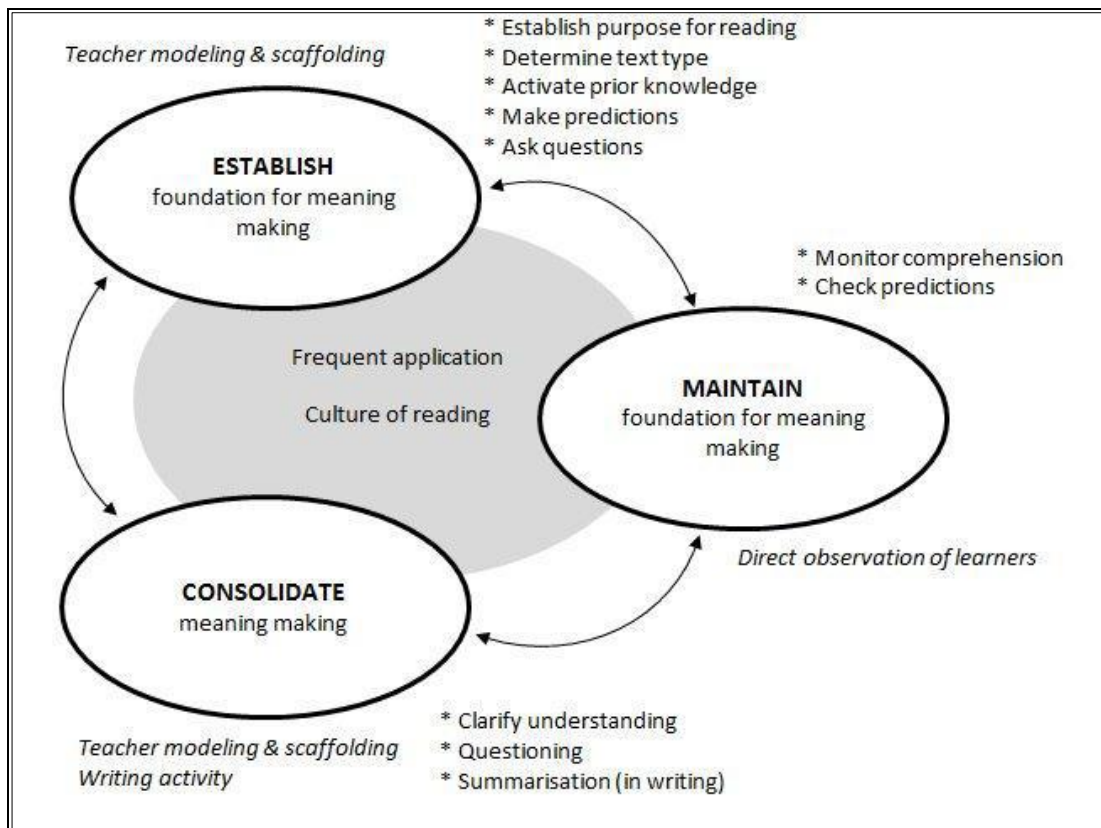
According to Corkill and Koshida (1993) metacognition is separable from other cognitive constraints on learning such as aptitude and domain knowledge and cannot be predicted on that basis. Kuhn (2000) states that more individual variation occurs in metacognition on difficult tasks. Kuhn (2000) writes that metacognitive awareness may play a greater role in the performance of complex tasks than in highly automated ones. According to Schraw (1998) high metacognitive students used fewer strategies, but solved problems more effectively than low metacognition students regardless of measured ability level.

Schraw (1998) advocates four general ways to improve cognition: to promote an understanding of how important metacognition is, to improve knowing about cognition, to improve the regulation of cognition and to foster an environment that promotes awareness of metacognition. According to Schraw (1998) the three essential metacognitive skills of a good strategy user include: planning, monitoring and evaluating. Planning is described as predictions, strategy sequencing, allocating time or attention selectively before beginning a task. Monitoring is described as on-line awareness of comprehension, for example, testing oneself periodically while learning. Evaluation is seen as the appraisal of one's regulatory processes with regard to learning, for example, re-evaluating one's goals and conclusions (Schraw, 1998). In summary, skilled readers carefully allocate cognitive resources when reading and engage in deliberate, flexible strategies and regularly self-monitor.

Wang, Haertel and Walberg (1990) found metacognition to be the most salient predictor of learning, surpassing other cognitive and motivational traits of student. Metacognitive skills, albeit only moderately correlated to intelligence, contribute to learning performance on top of intellectual ability and can account for 17% of variance in learning (Veenman, Van Hout-Walters & Afflerbach, 2006). In an overview of studies with students (9-26 years) performing different tasks in various school

domains, Van der Stel and Veenman (2008) estimated that metacognitive skills accounted for 40% of learning outcomes.

Understanding of cognition and metacognition is relevant to understanding the strategies required by a reader to comprehend a more complex text or to employ the higher-order processes required to complete a comprehension task. These processes have been described by Klapwyk (2011) and her model is included below (Figure 3.4).



**Figure 3.4 Reading strategy instruction framework (Klapwijk, 2011, p.244)**

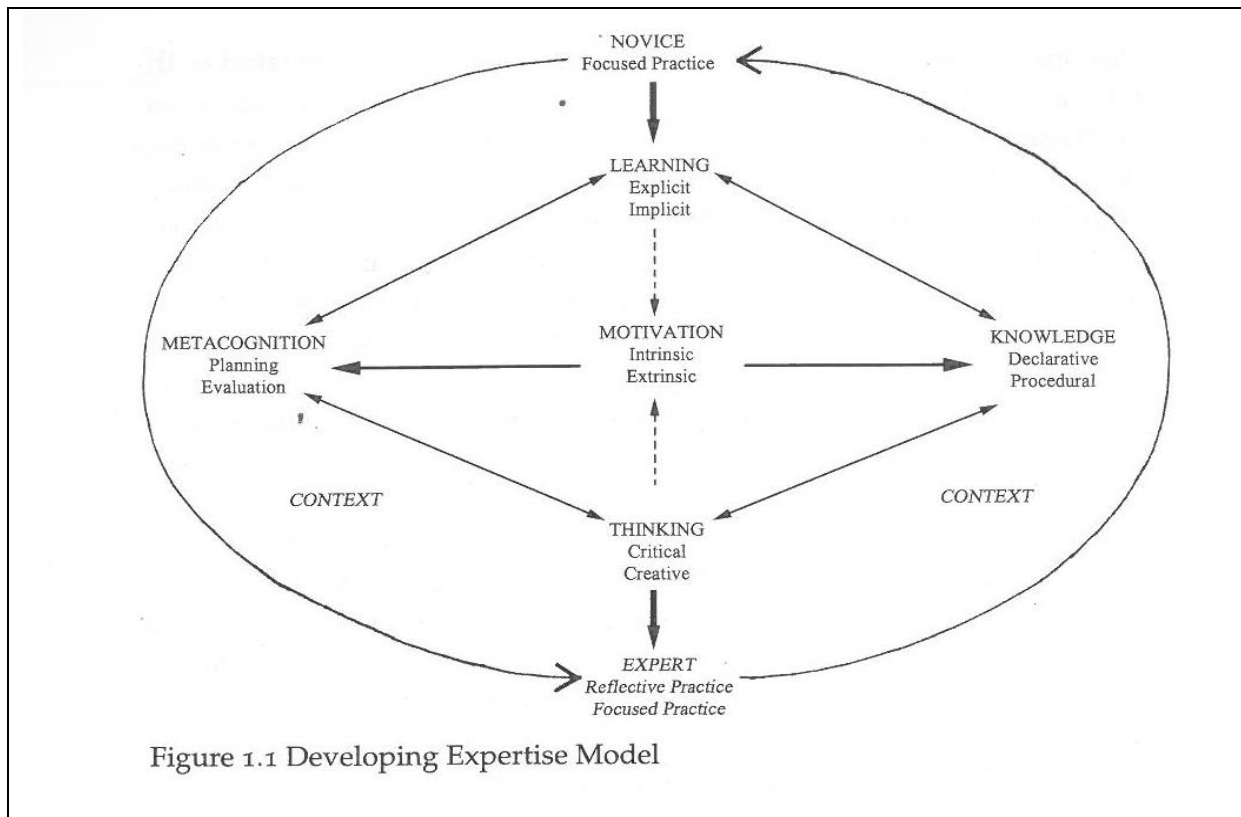
According to Klapwijk (2011) the reader's existing knowledge of a specific topic plays an important role in text interpretation in reading comprehension. Learners do not necessarily activate prior knowledge spontaneously while reading, even if they do possess prior knowledge about the topic. Activating prior knowledge is usually done by pre- and post- reading discussions between the teachers and learners. The teacher could select three main ideas from the text and ask learners to recall previous experiences related to the main ideas. Furthermore, summarisation is an integral part of competent reading, but learners have difficulty producing summaries of text passages unless they are taught to do so.

### **3.7. THE DEVELOPMENT OF METACOGNITION THROUGH SOCIAL PROCESSES**

Metacognition in reading is core to the development of effective strategies for learning, and for mastering skills such as reading proficiency at a higher level of processing (Flavell, 1979; Klapwijk, 2011). Congruence is noted between the development of metacognition and Vygotsky's (1978) concept of mediation in the home and classroom, which, when effective, leads to better learning experiences in the learner. Highly developed metacognitive skills, are dependent on the quality of mediative experiences available to the learners in their different literary contexts. Veenman (2016) states that students acquire a repertoire of self-instructions either through reading practice, or by observing good reading models such as parents or teachers.

#### **3.7.1. Metacognitive processes in the development of expertise**

Sternberg (2001) explains that metacognitive skills refer to people's understanding and control of their own cognition. Seven metacognitive skills are particularly important: "problem recognition, problem definition, problem representation, strategy formulation, resource allocation, monitoring of problem-solving, evaluation of problem-solving" (Sternberg, 2001, p.159). Critically, all of these skills are modifiable and the learner is able to develop them with adequate mediation (Feuerstein, 1980). Furthermore, gifted individuals excel in metacognitive skills (Sternberg, 2001). Sternberg (2001) offers a model (Figure 3.5) for developing general expertise through a metacognitive feedback loop found to be most effective when operating within a specific domain. The model reflects the process of developing mastery or expertise in any domain. The feedback loop can be applied to the process of moving toward mastery of reading comprehension. A learner who is becoming more proficient in reading comprehension moves through the levels of competence from the more basic skill of retrieving localised information, on to the higher-level processes which ultimately require an understanding of the whole text. Sternberg (2001) further explains that gifted individuals who excel in metacognitive skills are those who develop expertise more rapidly or to a higher level than do non-gifted learners.



**Figure 3.5 Developing expertise model (Sternberg, 2001. p.6)**

### **3.7.2. The cognitive and metacognitive processes in mastering reading comprehension**

Since metacognition is highly developed in gifted individuals, we begin to understand the importance of this skill in the mastery of reading comprehension. Klapwijk (2011) puts forward a model (Figure 3.4) depicting reading comprehension through strategy utilisation that also emphasises the role of metacognitive processes as in Sternberg's (2001) model for acquiring general expertise (Figure 3.5). Klapwijk's (2011) model includes teacher modelling and scaffolding of reading strategies. These strategies rely on executive cognitive functions and metacognitive awareness. They include establishing a purpose for reading, determining text type, activating prior knowledge, making predictions, asking questions, monitoring comprehension, clarifying understanding, summarisation and the consolidation of meaning making (Klapwijk, 2011). Domain organisation (prior knowledge of both text structure or of the information contained in the text), self-monitoring during reading, and an awareness of inner speech are higher-order and metacognitive in nature. Reading comprehension can be improved through strategy instruction, which further enhances

metacognition, but it is, arguably, contingent on the level of development in the learner of the language she/he is reading in, as well as, the learner's access to text and the teacher's domain understanding of reading comprehension strategies.

### **3.7.3. Internalising metacognitive processes through interaction**

The sociocultural concept of learner self-regulation comes initially from Vygotsky (1978) and includes mentoring of the learner by a 'more capable other' – that is, a more skilled person or a textbook. Vygotsky (1978) describes learners' self-regulated, higher psychological processes (strategies), such as analysing, synthesising, planning, monitoring, and evaluating. As learners internalise these processes through interaction with the more capable other (such as the teacher), the internalised processes can eventually become the learner's own inner speech, which provides ongoing guidance to the learner and is the basis of self-regulation. Feuerstein (1980) argues that learners can be taught to use cognitive and metacognitive abilities, resulting in greater aptitude for learning.

Proficiency in reading comprehension for the learner's L1 or L2 develops in the learner in a similar manner to Sternberg's metacognition-based 'developing expertise model' (Figure 3.5). That is, the learner becomes more proficient in reading comprehension as they become more adept at selecting appropriate reading strategies with awareness, and monitoring their understanding of the text as they proceed. It follows that better performance in the higher-level processes is, in part, indicative of the learner's access to the shaping of the metacognitive abilities that occur in the classroom and at home through mediatory experiences.

Vygotsky's (1978) research into the development of cognitive functions showed that this process is not a matter of genetic abilities growing into a mature state (Piaget, 1952), but that it is the emerging and spurious development of ways of thinking and being in the world that stem from how a person engages in activities where they are supported by cultural artefacts and interactions with others. The social environment is not just the *place* in which development happens, it is in fact what *makes* development happen. In this way, Vygotsky's Sociocultural Theory of Mind illuminates the processes of cognitive development (Vygotsky, 1978).

In Sociocultural Theory, the development of higher forms of consciousness occurs through a process of internalisation. These functions initially occur as interaction between people, but are then changed into their psychological nature as well (Vygotsky, 1978; Feuerstein, 1980). According to Vygotsky (1978) there is no need for the teaching of a particular skill to be contingent on developmental readiness since development occurs through exposure to, and engagement in, activities that are beyond a learner's current level of ability. Vygotsky explains that the Zone of Proximal Development is the level of performance a learner is able to reach presently with assistance, and which is indicative of their future unassisted performance. Likewise, Lidz and Gindis (2003) state that abilities are not innate, but are emergent and dynamic. Vygotsky (1978) purports that increasing self-regulation of cognitive processes and capacities is part of the transformation from basic to higher cognitive functions. The transformation is characterised by the increasing role of self-formulated plans and goals in the regulation of behaviour and cognitive activity (Diaz, Neal & Amaya-Williams, 1990).

#### **3.7.4. The impact of inadequate mediation for metacognitive development**

Poverty and inequality is an impediment to the environmental and cultural richness that Vygotsky purports is critical to optimal cognitive development (Vygotsky, 1978). Building on Vygotsky's (1978) theory, Feuerstein (1980) has developed the theory of Mediated Learning Experience. According to this theory, low IQ scores can be attributed to a child having under-developed cognitive structures as a result of inadequate mediation (Jensen & Feuerstein, 1987). Feuerstein (1980) believed intelligence test scores could be raised by means of a mediated learning experience in which the mediator helps a subject to create and expand his or her experience. Feuerstein (1980) has developed programmes which through metacomponential training aim to enhance in the learner the use of general rules and strategies in problem-solving. Feuerstein (1980) argues that aptitude is not a stable trait and demonstrates that learners can be taught to use cognitive and metacognitive techniques, resulting in greater aptitude for learning the language and other subjects.

Kozulin (2000) identified the workings of 'maternal verbal guidance' which highlights the interaction between the mother and the child, including how she prompts the child with verbal cues and questions to facilitate and model problem solving. Kozulin (2000)

purports that 'maternal verbal guidance' is a strong predictor of children's scholastic achievement in maths and reading skills. Theorists strongly advocate that the quality of parental mediation influences the child's learning potential (Feuerstein, 1980; Kozulin, 2000; Vygotsky, 1978). Cognitive development and learning, according to Vygotsky (1978), essentially depends on the child's mastery of symbolic mediators, their appropriation and internalisation in the form of psychological tools. According to Vygotsky (1978) "creating an imaginary situation can be regarded as a means of developing abstract thought" and, in this way, play has a direct relationship to cognition (Vygotsky, 1978, p.103). Kozulin (2000) argues that by facilitating activities directed at appropriation and internalisation of psychological tools and development of higher psychological functions, an emphasis on process leads to the development of metacognitive awareness and control which are characteristic of higher psychological functions.

According to O'Reilly and Bornstein (1993) teachers systematically socialise the student's attention to seek out certain facets of knowledge. Similarly, mother and child jointly construct the baby's linguistic and social development and lay the foundation for future interactions in others (O'Reilly & Bornstein, 1993). Bruner (1996), as a field interactionist, terms the building and connecting of learning, the 'dual landscapes' of consciousness and action. Children and adults learn better in a supportive environment (Johnston, 2004). Furthermore, neuroscience research highlights the distinct advantage of high support conditions (Fischer, Daniel, Immordino-Yang, Stern, Battro & Koizumo, 2007).

### **3.7.5. Social theory and the import of context on the individual**

The cycle of poverty is disruptive to the critical relationship that should be established for successful mediation between the first caregiver and the child. According to Capra (1996) people's actions are deeply influenced by the presence, actions and attitudes of other people around them – and their actions directly and deeply influence all others who share their space. Capra (1996) perceives a movement in academic discourse away from an abstract conception of worldview, to a more practical understanding of the integral wholeness of living systems and he emphasises the systemic, interconnected and interdependent nature of contemporary problems. Vygotsky (1978) found that intellectual life is fundamentally social and that language is very



important. Furthermore, he stated that “children grow into the intellectual life around them” (Vygotsky, 1978, p.88). Engeström (2001) developed ‘activity theory’ which purports that people acquire the deep-seated rules and patterns of behaviour characteristic of their context. Giddens (1984) in his explication of ‘structuration theory’ states that it is the reflexive form of the human agent’s ability to ‘know’ that is most deeply involved in the recursive ordering of social practices. That is, ‘reflexivity’ is described by Giddens (1984) as a continuous monitoring of actions which human beings display and expect others to display, making us reflexive and purposeful in our actions.

Johnston (2004) explains that the powerful and subtle ways teachers use language might explain their students’ success in becoming literate and suggests that language actually creates realities and invites identities. A teacher’s choice of words assumes “ways of being a self” and of being together in the classroom (Johnston, 2004, p.9). Bandura (2001) argues that socialising children’s attention to where they are being successful develops self-efficacy or agency and that we can purposely create the perception that the environment is responsive to our actions (Bandura, 2001; Bruner, 1996). From a cognitive-field interactionist learning theory perspective, learning is situated and learning is emergent and interactive. Likewise, Resnick (1987) explains that discourse is cognition is discourse and that when tunings and affordances are sufficiently matched, the individual can enter into a particular interactive situation. Furthermore, Borkowski, Chan and Muthukrishna (2000) argue that most of the major components of metacognition are (or can be) developed and reshaped by carefully planned classroom and home-based learning experiences.

Sternberg (2001) is a proponent of a dynamic view of intelligence and views abilities as forms of ‘developing expertise’. Developing expertise is defined as “the ongoing process of the acquisition and consolidation of a set of skills needed for high level of mastery in one or more domains of life performance” (Sternberg, 2001, p.159). Similarly, Feuerstein (1980) espouses the notion of ‘cognitive modifiability’ which is implicit in his conviction that low cognitive performance is not necessarily a stable characteristic of an individual since corrective intervention can change a person’s cognitive structure.

Sternberg (2001) argues that individuals are constantly in a process of developing expertise when they work within a given domain, although they differ in rate and asymptote of development. In his developing Expertise Model (Figure 3.5), he defines metacognitive skills as “people’s understanding and control of their own cognition” (Sternberg, 2001, p.6). Kaniel (2003) has developed a metacognitive decision-making model that includes the processes of goal setting, planning and execution. The model promotes the development of processes such as analysis, synthesis, induction, deduction, transformation, analogical transfer, mental imagery and categorical reduction (Kaniel, 2003; Kaniel, Licht & Peled, 2000).

### **3.8. THE CONNECTION BETWEEN READING AND WRITING FOR HIGHER-LEVEL LANGUAGE DEVELOPMENT**

Advances in cognitive and developmental theory show critical connections between reading and writing based on their identical or similar knowledge representations, cognitive processes, contexts and contextual constraints (Fitzgerald & Shanahan, 2000). Fitzgerald and Shanahan (2000) concur that these partial correlations between reading and writing are amenable to the development of critical thinking in the learner.

According to Fitzgerald and Shanahan (2000) reading and writing are connected because they depend on identical or similar knowledge representations and cognitive processes. Therefore, their developments might parallel each other. When a learner reads s/he is composing a text in her mind – and, therefore, writing and reading skills must be integrated.

According to Strømsø and Bråten (2010) one of the most advanced writing skills, requiring competence in higher-order and critical cognition, is multiple-documents literacy. Multiple-documents literacy has to do with locating, evaluating, and using diverse sources of information for the purpose of constructing and communicating an integrated representation. It entails evaluating the trustworthiness of each source based on information about the source itself (for example, the author or document type) and making sense of information sources that present conflicting views on the issue. Strategies are particularly needed when individuals read multiple, challenging, conflicting documents on a complex issue. Multiple-documents comprehension requires deliberate, goal-directed, attentional, transformative, and integrative processing (Strømsø & Bråten, 2010). When working with multiple documents learners

must be able to compare and contrast the content of the text being read with the content of related texts to create a coherent understanding of the text. They make inferences and connect information between texts. Learners evaluate the characteristics of different texts (for example, text types, author and prose styles (Strømsø & Bråten, 2010).

The term “literate” is used when describing someone who can both read and write. However, these skills are usually seen as two separate skills and are often assessed as such.

### **3.9. VALIDITY IN LANGUAGE AND LITERACY ASSESSMENT**

When analysing the effects of language on learner performance, particularly on the reading comprehension process requiring higher-order reasoning where item phrasing and text complexity affect difficulty, the validity of the test and construct must be reflected upon. Learners of differing backgrounds and dialects will appear to underperform if their interpretation of an item is erroneous (Archer, Scherman, Coe & Howie, 2010; Gipps & Stobart, 2009). According to Gipps and Stobart (2009) 21<sup>st</sup> century assessment must account for the cultural contexts of assessment. When considering fairness in testing, one must reflect on what comes before an assessment (such as access and resources) and its consequences (interpretations of results and impact) in conjunction with the assessment design itself (Gipps & Stobart, 2009). Gipps and Stobart (2009) suggest when one cultural group designs a test to reflect their own values and preoccupations it could be biased and, in that way, it might disadvantage test takers from other cultural groups.

Validity theory has gone through a number of transitions. Cronbach and Meehl (1955) developed the notion of the ‘nomological net’. Here the construct to be measured is located in a conceptual space showing its hypothesized connections to other constructs and observed behaviours. These theoretical relationships are then tested empirically through correlational and experimental studies. Cronbach and Meehl (1955) summarize the following key points:

- “1. A construct is defined implicitly by a network of associations or propositions in which it occurs.

2. Construct validation is possible only when some of the statements in the network lead to predicted relations among observables. While some observables may be regarded as "criteria," the construct validity of the criteria themselves is regarded as under investigation.

3. Many types of evidence are relevant to construct validity, including content validity, inter-item correlations, intertest correlations, "test-criterion" correlations, studies of stability over time, and stability under experimental intervention. High correlations and high stability may constitute either favourable or unfavourable evidence for the proposed interpretation, depending on the theory surrounding the construct" (Cronbach & Meehl, 1955, p. 299-300).

Though the debate has changed course numerous times, interrogating validity still consists of stating hypotheses and challenging them by seeking evidence to the contrary. Shepard (1993) draws on Messick's (1989) argument in order to elaborate on this process, stating that validity studies must address both the internal structure of the test and external relations of the test to other variables.

Messick's (1989) framework (Table 3.1 as depicted in Shepard (1993)) identifies the full set of questions implied by a unified theory of validity. The argument-based approach to validation highlights the importance of evidence and adopts the interpretive argument as the framework for collecting and presenting validity evidence. Kane (1992) explains:

"One (a) decides on the statements and decisions to be based on the test scores, (b) specifies the inferences and assumptions leading from the test scores to these statements and decisions, (c) identifies potential competing interpretations, and (d) seeks evidence supporting the inferences and assumptions in the proposed interpretive argument and refuting potential counterarguments" (Kane, 1992, p. 527).

**Table 3.1. Messick’s Facets of Validity Framework**

	Test Interpretation	Test Use
<b>Evidential Basis</b>	Construct Validity	Construct Validity + Relevance/ utility
<b>Consequential Basis</b>	Value Implications	Cultural Implications

Logical analysis of test content, as well as, empirical confirmation of hypothesized relationships are both essential to defending the validity of test interpretations; however, neither is sufficient alone. The basic principles of construct validation were laid out by Cronbach and Meehl (1955). The concept has grown as the field has come to understand the nature of hypotheses, claims, and counterclaims that must be investigated to support applied test uses. Construct validation entails a search for both alternative meanings and unintended consequences as well.

According to Shepard (1993), validity must be established for different uses of a test and all types of test use require multiple sources of evidence for construct validation. Messick (1990) defines validity as:

“an integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the *adequacy* and *appropriateness of interpretations and actions* based on test scores or other modes of assessment” (Messick, 1990, p.5).

Shepard (1993) argues that in practice, validity evidence is often simplistic and incomplete. He further suggests that the integrative nature of construct validity is not understood or that its demands are perceived to be too complex to be implemented (Shepard, 1993).

Test validity is relative to the context in which the test is administered. It is, arguably, never absolute and entirely independent of culture. Verification of the validity of the test is done within the context of a culture and a socio-economic and linguistic reality.

Tymms and Coe (2009) make the assertion that a construct such as reading may appear the same across cultures, but can, in practice, be very different and that assessments that seek to assess reading in different scripts in the same scale, such

as PIRLS, should be interpreted in a manner that is mindful of the differences between language structures. Tymms and Coe (2009) provide an illustration of the continua on which all tests can be placed. It shows the tension between different goals in the construction of the test that is often observed in assessment.

Deep functioning of the brain	↔	Developed competencies
Tests of fundamentals	↔	Educational tests
Culturally universal	↔	Culture-specific
Easier to move across cultures	↔	Hard to move across culture

**Figure 3.6 Tymms and Coe’s illustration of the continua associated with test use (Tymms & Coe, 2009, p.472)**

When dealing with literacy, the issue of whether one is assessing the same thing with reading assessments in different languages, however carefully equated, must be interrogated. PIRLS uses a collaborative approach in every aspect of the assessment. Each participating country provides significant input in the development of an assessment in order to render it as free of culture and language bias as possible. Tymms and Coe (2009) endorse test development processes where translation and adaptation are intended from the start and consider this intention to make success far more likely. However, Ziegler and Goswami (2005) illustrate stark differences in reading acquisition across cultures as a result of the phonological composition of the languages pointing to the possibility that the underlying construct being tested is not the same across languages. Makalela (2013) further emphasises that bilingual or multilingual learners benefit cognitively when they have the leeway to use ‘translanguaging’ across different languages when interpreting a text.

Modern conceptions of validity embrace all aspects of assessment and construction, administration, scoring, generalization, extrapolation, and decision-making (Kane, 1992). Examining a nuanced view of what we are truly testing when we assess reading comprehension in our educational context, contributes to greater understanding and will result in an informed focus when addressing the need for improved reading in South Africa. The idea of fairness in equitable assessment goes

beyond only cultural fairness (Howie, Venter & van Staden, 2008). Ultimately validity is concerned with the consequences of using the assessment (Gronlund, 1998).

When adapting tests from one culture/language to another, it is important to consider methodological and cross-cultural factors. Apart from ensuring linguistic equivalence, that is, eliciting the same required linguistic structures, Peña (2007) emphasizes the importance of functional equivalence, cultural equivalence, and metric equivalence when adapting or translating tests. Functional equivalence refers to ensuring that both the instrument and the elicitation do examine the required construct, while cultural equivalence refers to how members of each culture interpret the meaning of each test structure. Metric equivalence, on the other hand, refers to equivalence in item difficulty (Peña, 2007). On the one hand, it is easy to accept that there are general language processing measures that can be picked up with well-validated tools that cross national boundaries. But when dealing with literacy, the issue of whether one assesses the same thing with apparently equated reading assessments in different languages and scripts comes to the fore.

According to van den Berg (1986) when a child experiences two different languages at home and at school, assessing the child's abilities and achievement in either language puts the child at a disadvantage (Van den Berg, 1986). Van den Berg (1986) asserts that the ideal theoretical recommendation is to carry out a bilingual assessment, that is, to test the child in the home language and the language of instruction. However, this ideal solution is not always possible. Difficulties in implementation stem from challenges such as the large number of languages, the tremendous amount of variation in the usage of tribal languages as they are spoken at home, the rapid evolution of these languages over time, difficulties related to translations into and from these languages, and the dearth of professionals who can deliver assessments in multiple languages (Van den Berg, 1986).

Test instruments and background questionnaires are often developed in English and then translated into the national languages of the participating countries. It is important that one checks carefully the implied meaning of items to ensure comparability of the measured constructs. One popular and simple technique to ensure equivalence of different languages is back-translation. This means that a certain instrument is first

translated into a target language by one translator and then re-translated by another into the original language. The re-translation can then be compared to the original instrument and discrepancies resolved. Persons of the same ability should have the same chance of answering an item correctly, regardless of his or her cultural background or language of assessment (Stubbe, 2011).

For PIRLS the translation of the reading assessment and questionnaire is embedded in an elaborate translation verification process. Participating countries must ensure that the translation process is carried out by an experienced translator. Stubbe (2011) suggests that even instruments developed in only one language may be biased towards certain regions due to the linguistic features of a local area. Archer, Scherman and Howie (2013) note that reliability is important because stable results are an indication of validity. Consistency gives an indication of the ability of items to measure the same variable or construct where inconsistent items do not measure the same construct. Test validity is therefore evident where one finds a high overall item-correlation.

According to Messick (1996) the ideal forms of directness in testing rarely exist since construct underrepresentation and construct-irrelevant variance are present to varying degrees. Messick (1990) states that validity becomes a unified concept when it is recognised that construct validation is not as important as content, criteria, and consequences. Similarly, Gipps and Stobart (2009) claim that “fairness is a sociocultural issue, rather than simply a technical one” (Gipps & Stobart, p.110). They argue that there is never cultural neutrality when selecting the test content.

### **3.10. SUMMARY OF THE LITERATURE REVIEW**

A broad range of domains within reading theory have been touched upon. These conceptual fields include *language theory* (Alexander, 1997, 2003, 2005; Banda, 2000, 2009; Cummins, 1978, 1979, 1981, 1992, 2000, 2016; De Klerk, 2002a, 2002b; Heugh, 2000, 2017; Makalela, 2004, 2013), theories that explain the role of *context in learning* (Bourdieu, 1972, 1986, 1991; Bourdieu & Passeron, 2000; Bruner, 1966, 1996; Resnick, 1987; Vygotsky, 1978), theory on *higher-order thinking and metacognition* (Flavell, 1976; Kaniel, 2003; Sternberg, 1986, 1998a, 1998b, 2001;



Veenman, 2016), theory on *higher-order reading comprehension* (Afflerbach, 1986, 1990, 2016; Afflerbach, et al., 2015; McNamara, 2011, 2012), and *validity theory* (Messick, 1989, 1990, 1996; Shepard, 1993). The literature of a number of theorists is drawn from in this study in order to understand how higher-order reading comprehension in the South African learner might be affected by an interactive effect of language factors, as well as, home and classroom contextual variables. The interaction of these factors is considered formative in developing the higher-order cognition and metacognition required for achievement on higher-order reading tasks. The theory encompassed in this literature review forms the basis for the conceptual framework illustrated in Chapter 4, Figure 4.1. An enquiry into both the validity of the higher-order reading comprehension processes, and the nature of higher-order reading comprehension as a construct in large-scale assessment is also undertaken in Chapter 5.



## **CHAPTER 4**

# **CONCEPTUAL FRAMEWORK AND METHODOLOGY FOR THE STUDY**

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In this chapter the conceptual framework for this study is presented and argued (4.1.). In section 4.2. the research design and questions are presented. The research paradigm is outlined (4.3.) and the research method for each of the research questions is described (4.4.) In 4.5. issues of validity and reliability are addressed, while in 4.6. ethical considerations are discussed.

The design and methods used in this study to analyse the prePIRLS 2011 data are presented in this chapter to describe and argue the relevance and appropriateness of the analyses performed to address each of the research questions that follow in chapters 5, 6 and 7.

### **4.1. CONCEPTUAL FRAMEWORK**

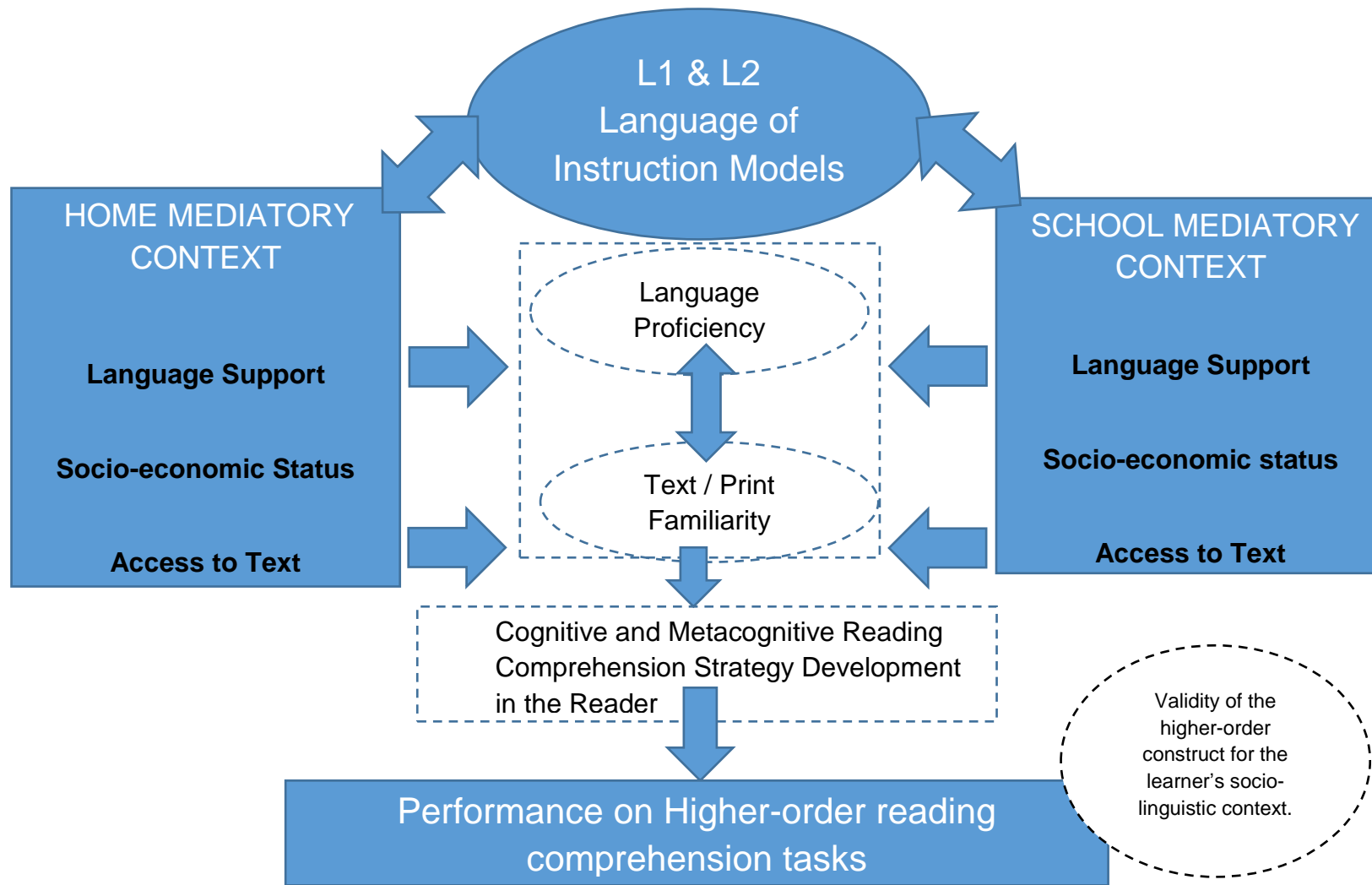
The conceptual framework for this study is embedded in Vygotsky's (1978) 'Sociocultural Theory of Mind' which espouses the importance of context in the development of higher psychological processes. The study investigates the interactive effect of the learner's language of Learning and Teaching (LoLT) or 'language of instruction' and context (home and school) on performance in the higher-order reading comprehension processes. More broadly, it interrogates how language, in the South African context, might act as a gatekeeper to the mediation of learning which is available to the learner through his/her home and school context.

The conceptual framework below is drawn from the extensive body of work on bilingual education produced by (Cummins, 1979, 1981, 1992, 2000) as discussed in Chapter 3 section 3.1, as well as being a synthesis of the full ambit of literature reviewed in Chapter 3 and then summarised in section 3.10.

Cummins (1979) developed the Interaction Model of Bilingual Education which includes the following variables: background variables; child input variables (including conceptual-linguistic knowledge and motivation to learn L2 and maintain L1); child process variables (including competence in L1 and L2 and motivation to learn L1 and

L2); and educational treatment variables. The background variables pertain to the nature of the child's linguistic interaction and community, as well as, parental attitudes toward participation in L2 culture.

The literature of the theorists discussed in Chapter 3 and summarised in Section 3.10 is drawn from in this study in order to understand how higher-order reading comprehension in the South African learner might be affected by an interactive effect of language factors, as well as, home and classroom contextual variables and is depicted in Figure 4.1. The interaction of these factors is considered formative in developing the higher-order cognition and metacognition required for achievement on higher-order reading tasks.



**Figure 4.1** *Interactive effect of language of instruction and the learner's mediatory context on higher-order reading comprehension*

As depicted in the conceptual framework (Figure 4.1. *Interactive Effect of Language of Instruction and the Learner's Mediatory Context on Higher-order Reading Comprehension*) learning, as mediated through the home and school context, impacts critically on the formation of cognition and metacognition, more especially, on the higher-order cognitive and metacognitive skills required for higher-order comprehension of a text. The interactive relationship between LoLT and the mediatory contexts manifests in many ways. The language of instruction of the student is, in the South African context often determined by the home contextual factors such as SES and parents' language. The LoLT of the school will determine how much language in the home (both verbal and written) is available to augment and scaffold the learner's literacy development (depending on the degree of congruence or incongruence between the language used mostly at home and that used mostly at school). The school mediatory context is affected by the LoLT of the school because the LoLT of the school determines the language that the teachers use in the classroom and nature of the available text. Furthermore, SES and geographical position of the school will, likewise, determine the LoLT of the school. These bi-directional relationships suggest that the relationship between school LoLT and the mediatory contexts is, to a large extent, interactive.

It must be noted, however, that socio-economic status of the learner might affect the LoLT of the school that the learner attends because of the close relationship between language and geographical area, as well as the possibility that higher SES families seek out English medium schools (see discussion in Section 1.2.4). The SES of the learner is not directly and immediately affected by the LoLT of the school. In this instance the relationship is not bi-directional. However, in the case of language support and access to text it is argued that the LoLT of the school might affect the learner's access to language support in the LoLT at home and the availability of print material in the LoLT of the learner, particularly where the LoLT of the school differs from the home language. Nonetheless familiarity with print can be developed regardless of whether the text is in the L1 or L2 (Section 4.1.4).

Likewise, the amount of text in the home does not determine the LoLT of the school that the learner attends. However, home access to text is likely to correlate well with SES, which does affect the school attended by the learner. In the SA context the LoLT of the learner might affect the degree to which text in the home becomes accessible

to the learner because print material is arguably not available to the same extent in every language.

#### 4.1.1. Language of instruction

To examine the mediated learning environment the learner is exposed to both at home and at school, language is represented as the Language of Learning and Teaching (LoLT) found in South African schools. For the purposes of this study the nine African languages tested were grouped together. However, it is noted that the nine official African languages represented may display many differences from each other across the South African landscape.

A comparison of three language of instruction groupings is made: English, Afrikaans and African languages. The group 'African Languages' includes isiZulu, isiNdebele, Sepedi, Setswana, Xitsonga, isiXhosa, Tshivenda, siSwati and Sesotho. Since prePIRLS 2011 sampled schools according to the language of instruction of the school, the language of instruction of the learner is also the language of the test (LoT).

Performance is compared across these three groups for learners who speak the language at home and those who do not speak the language at home. Performance is then compared for the African Languages grouping home language/L1 (an additive bilingual language model) and the English L2 immersion language model.

The following assumptions regarding the **additive bilingual** mother tongue as LoLT (L1) approach are drawn from Cummins' (1979) extensive theory on bilingualism. The limitations of the dataset and the parameters of this study meant not all of these elements could be included in the analysis, but they are referenced here since they form an important part of the general discussion on bilingualism in education.

*A supportive home mediatory context* that promotes higher-order literacy development and text comprehension at the abstract level includes:

- a home-based foundation in the learner's mother tongue (L1);
- mother tongue (L1) literacy resources at home.

*A supportive L1 school mediatory context* includes factors that promote higher-order reading strategy development during the foundation phase of schooling:

- instruction in the classroom in the mother tongue (L1) of the learner;

- teachers that have deep domain understanding and sound pedagogical practices in reading instruction;
- adequate literacy resources (books and instructional material) in the learner's mother-tongue (L1) in the classroom and a school library including L1 literacy resources;

The following assumptions regarding L2 English LoLT **immersion model** are drawn from Cummins' (1979) extensive theory on bilingualism. As above, the limitations of the dataset and the parameters of this study meant not all of these elements could be included in the analysis, but they are referenced here since they form an important part of the general discussion on bilingualism in education.

*A supportive home mediatory context* that promotes higher-order literacy development and text comprehension at the abstract level includes:

- a home-based foundation in the learner's mother tongue (L1)<sup>7</sup>;
- a home environment that supports the learning of L2;
- English (L2) literacy resources at home, and mother tongue (L1) literacy resources are also important.

*A supportive school mediatory context* includes factors that promote higher-order literacy development:

- teachers that are fluent in English (L2);
- teacher that have deep domain understanding and sound pedagogical practices in reading instruction;
- an environment in which the learner is immersed in the L2<sup>8</sup>;
- high motivation factor to learn the language within the given context<sup>9</sup>;
- adequate literacy resources (books and instructional material) in English (L2) in the classroom and a school library including L2 literacy resources;

The above conceptual framework (Figure 4.1) is conceptualised for any of the 'language of instruction' models found in schools, as well as an additive bilingual and an immersion approach to the language of instruction in the classroom. However, a

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<sup>7</sup> This is not a variable in the analysis.

<sup>8</sup> This is not a variable in the analysis.

<sup>9</sup> This is not a variable in the analysis.

notable limitation to the framework, is that in order for an additive bilingual model to be fully realised, learners whose medium of instruction is their mother tongue must gradually shift over to the L2 as LoLT. The implication is that learners who received a sound mother tongue foundation will transfer their foundational L1 literacy development to their L2 and, arguably, perform better than the immersion group in the later school grades in the L2. It is beyond the scope of this study to examine this, since this study only examines performance as it relates to the learners' socio-linguistic context at the end of the foundation phase. In the South African context, most African language speakers who received instruction in their mother tongue in the foundation phase will complete their first year of the intermediate phase of schooling in their L2 (usually English). This study uses Grade 4 learner achievement data of learners writing in their foundation phase LoLT. As such, it does not examine the degree to which a foundational mother tongue-based education might ultimately benefit learners in their L2 attainment and reading comprehension proficiency, or whether English L2 attainment is ultimately (in the higher grades) improved by a protracted mother tongue foundation which would entail more years of mother tongue medium of instruction exposure than just Grades 1-3 which is currently the norm.

#### **4.1.2. Home mediatory context**

The constructs found in the home mediatory context are informed by Cummins' (1979) theory of L1 and L2 development and Bourdieu's (1991) writing on cultural capital. The conceptual framework identifies the three areas: language support, access to text and socio-economic status as having an effect on the learner's development of cognitive and metacognitive reading strategies.

##### **4.1.2.1. Language Support**

Language support in the home for the language of the test (also the language of instruction from grades 1-3), operationalised as how often either parent uses the LoT, impacts directly on oral language proficiency in the LoT and may, in the case of an L2, contribute to learner motivation to become more proficient in the additional language (Cummins, 1979). The language spoken most predominantly in the home will also affect the language in which print material is available in the home. Whether the LoT is an L1 or L2 the degree to which the language is spoken in the home by the mother or father is considered in this conceptual framework to contribute to literacy development in the learner in the form of language support.



#### 4.1.2.2. Access to Text

Access to text in the home has import on the learner's familiarity with text and their engagement with print material which affects their reading comprehension performance (Brese & Mirazchiyski, 2010; Chansa-Kabali, Serpell, & Lyytinen, 2014; Cummins, 1978, 1979, 1981,1992, 2000, 2016). Text access or access to print material in this study is measured in terms of the number of children's books in the home and how many of these books are in the language of the test. Access to text in the home directly impacts the learner's familiarity with books and print in general.

#### 4.1.2.3. Socio-economic Status

Socio-economic status is an important factor in the South African context and is considered in this study at the home level by the employment status of the mother and father, which, given the high unemployment rate in South Africa (Statistics SA, Census 2011) is a direct reflection of the income available in the home to augment the learner's educational and more, especially, literacy needs. The education level of the parents was initially included as a measure of SES, but these variables did not contribute toward a stable scale and were removed.

### **4.1.3. School mediatory context**

A number of school factors impact on learner performance. Contextual factors found to have affected learner performance are discussed in Chapter 3 section 3.3.

#### 4.1.3.1. Language Support

The extent to which a learner's language teacher has studied the language of the test and the pedagogy of teaching reading reflect the language support received in the classroom and affect general educational attainment and, specifically, reading comprehension performance (De Wet, 2002; Fleisch, 2008; Giroux, & Penna, 1979; Moloji, & Strauss, 2005; Spaul, 2013; Taylor & Coetzee, 2013; Uys, Van der Walt, Van den Berg & Botha, 2007). The language support received in the classroom affects the learner's language proficiency and development of cognitive and metacognitive reading strategies required for higher-order reading comprehension.

#### 4.1.3.2. Access to Text

In this study, the school having an existing library and the number of different book titles in the library is included to denote the learner's access to text at school level which affects general educational attainment and reading comprehension proficiency specifically (Bloch, 2006; Block, 1998; Bourdieu & Passeron, 2000; De wet, 2002; Murray, 2002; Pretorius & Mampuru, 2007; Spaull, 2013; Taylor & Coetzee, 2013).

#### 4.1.3.3. Socio-economic Status

Socio-economic status is an important consideration in the educational attainment of students (Coleman, 1975, 1998; Dufur, Parcel & Troutman, 2013; Giroux & Penna, 1979; Portes & MacLeod, 1996; Pretorius & Mampuru, 2007; Prieur & Savage, 2013; Saha, 2015; Spaull, 2013; Van der Berg, 2008). In South Africa schools are clearly divided by a stark difference between poorer and wealthier schools (Howie, 2001). In this study, the socio-economic grouping of a school is differentiated by the degree to which the school has a shortage of school buildings and grounds, as well as a shortage of instructional materials that affect the capacity of the school to instruct the learners; Low SES schools are reflected where 50% or more of the learners come from disadvantaged homes and where capacity to provide instruction is affected by an inadequacy of library books.

#### **4.1.4. The learner's 'mediatory context' in cultural capital terms**

Within the home and school mediatory contexts cultural capital (Bourdieu & Passeron, 2000) is important in the learner's literacy development and is discussed in Chapter 3 section 3.2. Cultural capital is embodied in the three identified contextual elements of language support, SES and access to text constituting the two (home and school) mediatory levels within which the learner has access to mediation (Vygotsky, 1978) for literacy development.

Language of instruction and cultural capital are assumed to have an effect on learner performance in this study. The observed elements of the latent construct 'cultural capital' as defined by Bourdieu (1986) are present in the factors constituting the home and school contexts which mediate the learning environment of the child. In the home, cultural capital is evident in the language and interaction between parents and their children, in the physical literary resources supplied, as well as in the cognitive mediation made available by the manner in which parents facilitate literary

experiences in the home (Bourdieu, 1986; Coleman, 1975, 1998; Portes, 2000). These supportive home mediatory experiences facilitate access to more complex reading comprehension by developing language proficiency in the LoLT, by mediating an understanding of text, and ultimately through mediating the development of learner cognition. Cognition that is relevant to literacy development is the critical ability to self-regulate or employ metacognitive skills while reading, as well as building up 'background information' or prior text knowledge and the ability to draw from this resource in a meaningful way (Rapp, Broek, McMaster, Kendeou & Espin, 2007).

Cultural capital (Bourdieu & Passeron, 2000) is evident in the passing on from teacher to learner, instruction that affords the learner with the skills that make texts more accessible. The teacher is, arguably, a more effective conveyor of these reading skills if his/her own proficiency in the language of learning and teaching is well-developed and he/she has deep domain knowledge of teaching reading comprehension. Cultural capital is not only limited to the teacher, but the classroom or school itself will afford each learner with a level of cultural capital through the literacy resources available in the LoLT of the classroom. However, a differential in access to cultural capital often emerges through an imbalance in the amount of resources available to the learner (Gee, 2000). Furthermore, the level of support and motivation to be found in the classroom or school for learning the LoLT (Alexander, 2003; Belzer, 2002) or for developing higher-order literacy strategies can also be perceived of as a measure of cultural capital available to the learner.

The fact of whether the dominant form of cultural capital found in the learner's environment is aligned to the learner's language of learning and teaching, or not, matters to the formation of reader language proficiency which impacts on learner performance in the higher-order reading comprehension processes. Access to a culturally dominant language may afford the learner access to cultural capital which more easily allows for social mobility (Bourdieu, 1986; Posel & Casale, 2011). On the other hand, if the home language of the learner is the language of instruction, this facilitates the transfer of the learner's own cultural wealth, and, moreover, it has been strongly argued that cognition is aided by instruction being received in the mother-tongue (Alexander, 1997, 2003, 2005; Cummins, 1978, 1979, 1981, 1992, 2000; Heugh, 2000, 2017; Kamwangamalu, 2002; Pluddemann, 2010; UNESCO 1990). It is also argued that bilingual learners have a cognitive advantage due to the use of two or more languages (Cummins, 1992).

Notably, the conceptual framework does not indicate that the language of instruction has a direct effect on higher-order reading comprehension performance, but directs causality to the interactive and combined effect of language of instruction and contextual factors, also understood as cultural capital, depicted by the two-way arrows between Language of Instruction and the two Mediatorial Contexts.

The high socio-economic inequality found in the South African educational context (Howie, 2001) translates into an educational sector in which underperformance observed within a particular LoLT grouping might be explained by SES and other contextual factors. A school of a certain LoLT is often predictably situated within a particular socio-economic stratum within the South African educational landscape (Refer to Chapter 3 section 3.3. for a discussion of SES and education in South Africa.) Furthermore, the relationship between LoLT and SES is, arguably, self-perpetuating where the language of instruction 'creates' a certain mediatory context through the cultural capital embodied in the areas of language support, SES and access to print material which become available to the learner because of the LoLT of the school. Likewise, the mediatory context, in turn, then determines the language of instruction of the school (perhaps through the language that teachers are able to teach in or the availability of instructional material in a certain language). This interaction between LoLT and mediatory context is depicted in the two-way arrows between 'Language of Instruction' and the School Mediatorial Context in the illustration of the conceptual framework (Figure 4.1). Likewise, a bi-directional relationship is depicted for the Home Mediatorial Context since language support and access to text for the learner is, arguably, the most effective where the LoLT of the school is the same as the language spoken in the home (and the language of the majority of the print material in the home), thereby augmenting the development of language proficiency and print familiarity. Nonetheless, it is noted that SES and language support are likely to merely determine the LoLT of the school which the learner attends in a one-directional relationship.

The home and school contexts provide the supporting mediatory context within which the learner develops expertise in language proficiency and the acquired 'text/print familiarity' skills necessary for successful reading comprehension. These provide a cognitive foundation in the learner for establishing a successful metacognitive or self-regulatory approach to reading texts, as well as the cognitive ability to draw from prior knowledge and integrate this knowledge during text comprehension in order to build a cohesive representation of the text in the learner's mind (Keer, 2004).

Furthermore, the long-held understanding that context matters deeply to learning is pivotal to this study (Purcell-gates, 2012; Resnick, 1987; Rogoff, 2003; Vygotsky, 1978). Descriptions of higher-order cognitive processes are often divorced from social context in academic literature.

Purcell-Gates (2012) explains that this way of describing cognitive processes is changing:

“...I believe we are all heading for in multiple scientific disciplines, a stance that views in-the-head cognitive processes as irretrievably subject to contextual factors on a number of social levels” (Purcell-Gates, 2012, p.465).

Purcell-Gates (2012) advocates a sociocognitive lens be applied to reading theory and this approach is well-suited to a study into performance on higher-order reading comprehension and its relationship to contextual factors (including language factors). Whereas theorists such as Piaget (1952, 1959) viewed cognitive development as separate from the context of the child, others like Vygotsky (1978) and Bruner (1966) argued that thinking developed within and as a result of social interaction. Situated cognition theory states that cognition cannot be separated from context (Resnick, 1987; Smith & Semin, 2004). In this study, the development of higher-order reading ability is seen as contingent on the contextual factors that have shaped the learners' thought processes over time. These contextual factors affect and are affected by the language of instruction to which the learner is exposed in the initial, highly formative years of schooling.

#### **4.1.5. Language proficiency and text / print familiarity**

Language Proficiency, Text/Print Familiarity, and Cognitive and Metacognitive Reading Comprehension Strategies are important beyond the scope of the study, but are not operationalised as variables in the analyses as there are no relevant measures available in the prePIRLS dataset. These constructs are conceptually important because they represent the steps between the impact of the contextual factors and the learner's observed performance on the higher-order items.

*Language proficiency* is understood in this framework as the level to which the learner has developed language competency in the language of instruction in the oral and written forms. The extent of the learner's vocabulary (Grigorenko, 2009; Klapwijk,

2013; Pretorius & Klapwijk, 2016), their ability to decode words phonetically (Ziegler & Goswami, 2005) and the level of automaticity in word recognition (Metsala & Ehri, 2013) has bearing on the learner's proficiency in the written form of the language and will affect the learner's reading competence. Critical for reading comprehension is the learner's ability to make inferences from words or sentences (Eason, Goldberg, Young, Geist & Cutting, 2012; Pretorius & Klapwijk, 2016, Snow, 2010).

Learners who have sufficient access to text at home and at school will develop *familiarity with print* and be able to read content-rich texts (Snow, 2010). Learners that are familiar with text also understand text features and genre and will have been made aware of an 'author's point of view' (Snow, 2010). Familiarity with print also increases the possibility of the learner having a high motivation to read which aids reading proficiency (Cummins, 2016; Guthrie, Wigfield & VonSecker, 2000).

#### **4.1.6. Cognitive and metacognitive reading comprehension strategies**

The importance of *cognitive and metacognitive strategies* has been outlined in Chapter 3 section 3.5. A learner with a supportive home and school mediatory context who has sufficiently developed his/her language proficiency and is familiar with print will have had the opportunity to develop the necessary cognitive and metacognitive reading comprehension strategies required for higher-order reading comprehension. Of particular importance is the reader's ability to build a mental representation of the text (Keer, 2004; Palincsar & Brown, 1984, 1989; Rumelhart, 1975) and access prior knowledge (Afflerbach, 1990; Kendeou & O'Brien, 2016; Snow, 2010). The ability to evaluate a text is integral to higher-order, critical thinking (Chafee, 1985; Halpern, 2002). Higher-order reading comprehension is also characterised by metacognitive strategies during reading, including comprehension monitoring and a comprehension repair mechanism (Flavell & Wellman, 1975; McNamara, 2011; Snow, 2010).

#### **4.1.7. Performance on higher-order reading comprehension tasks**

The observed construct and dependent variable for each analyses in this study is the higher-order subscale of the prePIRLS 2011 dataset. Performance on the higher-order tasks is also observed in the items included in the High and Advanced International Benchmarks in prePIRLS 2011 across the literary and informational texts. The IEA does not directly use the terminology 'higher-order' and 'lower-order' in the prePIRLS 2011 assessment framework.

The prePIRLS 2011 reading achievement scores are segmented into two plausible values that represent the subscales namely, 'Retrieving explicitly stated information', and 'Inferencing, interpreting and evaluating'. Plausible values are explained in Chapter 2 section 2.2. The prePIRLS 2011 assessment consists of items designed against the criteria of four reading comprehension processes (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). 'Focus on and retrieve explicitly stated information' and 'Make straightforward inferences') are defined using terms such as 'straightforward', 'text based', 'literal', 'automatic' and 'local' (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). These terms are common to definitions of lower-order thinking processes (Bloom, 1956; Krathwohl, 2002; Bartlett, 1958). When answering items that reflect this construct, learners are not required to move past a literal interpretation of the text or to demonstrate understanding of the whole passage. In the prePIRLS assessment the easiest of these tasks that orientate on retrieving information fall into the most basic level of comprehension by only requiring the learner to scan the text alongside the item and recognise an uncomplicated answer in the form of a single word or sentence. The most basic reading skills of decoding and vocabulary recognition are nested within these tasks because of the sentence or short paragraph text structure.

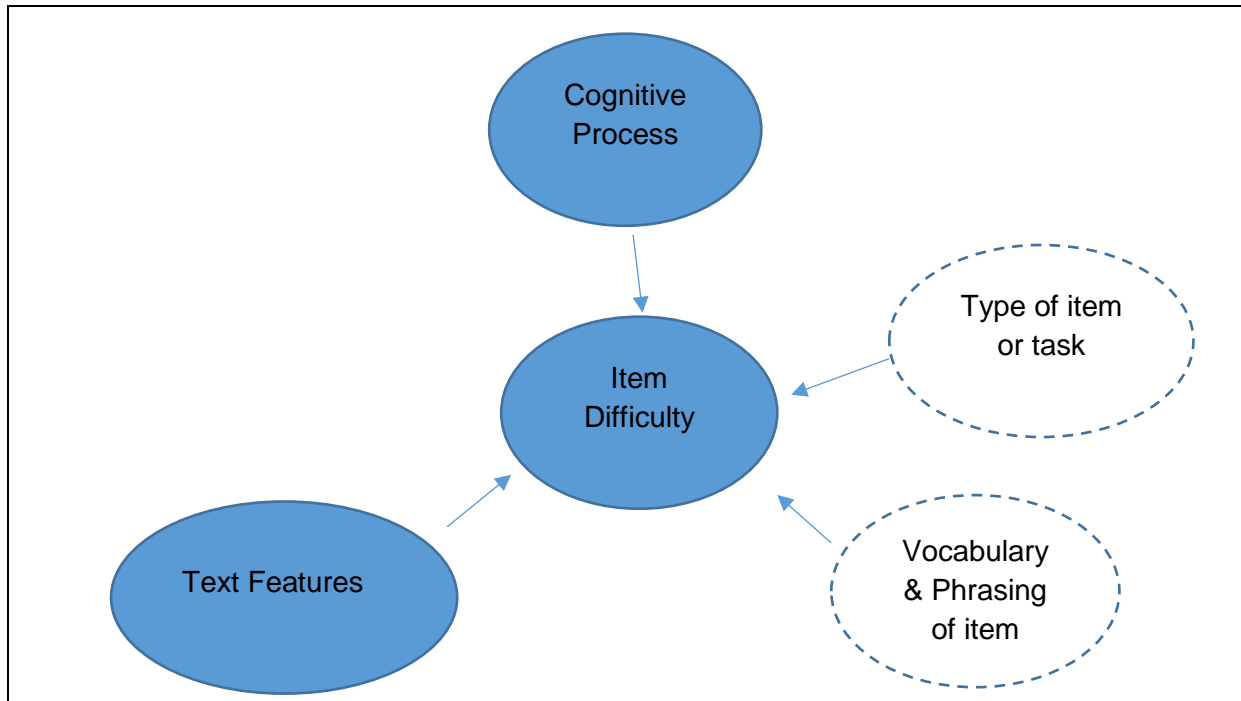
The 'Make straightforward inferences' is the least difficult of the processes allocated to the higher-order subscale in the prePIRLS assessment. The reading processes 'Interpret and integrate ideas and information' and 'Examine and evaluate content, language, and textual elements are defined in the PIRLS Assessment Framework (Mullis & Martin, 2013) by phrases and terms such as 'may relate details to overall themes and ideas', 'draw on understanding of the world', 'interpretation', 'perspective', 'background knowledge', 'infer motive', 'construct a mental image', 'critical consideration of the text', 'knowledge of the world', 'judge and question the author's perspective/skill', 'stand apart from the text', 'take a personal perspective or an objective view'. The terms are indicative of higher-order thinking since definitions of higher-order tasks typically include a learner's use of background or prior knowledge in order to extrapolate meaning from or beyond the text, the use of own interpretation, the construction of meaning and critical analysis (Afflerbach et al., 2015). Interestingly, metacognition is seen as transcending the processes (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009).

As the higher-order reading comprehension construct is the main dependent variable in the analyses conducted in this study, it is important to establish the validity of this construct. (Refer, also, to Chapter 3 section 3.9.) The exploration into the validity of the construct in Chapter 5 considers the reliability of the higher-order items and the relationship between the hierarchical cognitive processes and the difficulty of the items. Taking into consideration that prePIRLS 2011 was developed as a large-scale international assessment the validity of the construct is examined in terms of the context of the South African learner and the impact that learning in an L1 or L2 might have on the reader. Familiarity with reading comprehension assessment (also, 'test-wiseness') (Nsamenang, 2009) may make many of the higher-order items relatively easier for learners who have much exposure to those kinds of items due to a more effective school mediatory context. This opens up the possibility that the term 'higher-order' could be a relative term, and include items in a developing context that are precluded in a developed context.

Furthermore, the study draws on Messick's Validity Framework (1989) which argues for a unified theory of validation in which the validity of the construct is examined with the purpose of the assessment in mind, thus drawing in relevant contextual factors as part of the validation process. As such, the *construct* 'higher-order reading comprehension' in the prePIRLS 2011 assessment must be fully explicated prior to exploring how *performance* of the South African learners on the higher-order reading comprehension items is related to the contextual factors that impact on the literacy development of the learners.

A closer analysis of the prePIRLS 2011 items for the purpose of establishing reliability and validity investigates the relationship between the cognitive (reading comprehension) process and item difficulty. This relationship is depicted in Figure 4.2.





**Figure 4.2** *The components of item difficulty*

In this study, it is explored whether the cognitive processes that frame the design of the items conform to the expected hierarchical levels of complexity from lower-order up to the higher-order cognitive processes (Bloom, 1956; Krathwohl, 2002) by mapping the difficulty of the items to learner ability. In exploring the item difficulty, text features (Snow, 2010) are also considered. In the above figure (Figure 4.2) it is also recognised that vocabulary and phrasing and the type of item, for example, multiple choice or constructed response, affect item difficulty.

#### **4.1.8. Summary of constructs reflected in the conceptual framework**

The following Table 4.1. connects the constructs in the conceptual framework to variables selected from the prePIRLS 2011 contextual questionnaires. Literature references substantiate the use of the variable and the inclusion of the construct in the model.

**Table 4.1. Summary of constructs reflected in the conceptual framework**

<b>Construct in Conceptual Framework</b>	<b>Item in prePIRLS 2011</b>	<b>Academic References to Corresponding Items</b>
<b>Language of Instruction (L1 &amp; L2)</b>	Child spoke the language of the test before s/he began school	Alexander, 1997, 2003, 2005; UNESCO 1990;
	How often the child speaks the language of the test at home	Heugh, 2000, 2017; Pluddemann, 2010;
<b>Language Support at Home</b>	How often the father speaks the language of the test to the child	Cummins, 1978, 1979, 1981; 1992, 2000; Kamwangamalu, 2002; De Klerk, 2002a, 2002b; Banda,
	How often the mother speaks the language of the test to the child	2000, 2009; De Wet, 2002;
<b>Language Support at School</b>	Teacher studied the language of the test as part of formal education	Uys, Van der Walt, Van den Berg, & Botha, 2007; Fleisch, 2008; Giroux, & Penna, 1979; Moloji, & Strauss, 2005; Spaul, 2013;
	Teacher studied pedagogy of reading as part of formal education	De Wet, 2002; Taylor & Coetzee, 2013;
<b>Access to text at Home</b>	Number of children's books in the home	Chansa-Kabali, Serpell, & Lyytinen, 2014; Brese & Mirazchiyski, 2010;
	Number of children's books in the home in the language of the test	Cummins, 1978, 1979, 1981, 1992, 2000; Janks & Makalela, 2013;
<b>Access to text at School</b>	School has an existing school library	Block, 1998; Murray, 2002; De Wet, 2002; Bloch, 2006; Pretorius & Mampuru, 2007;
	The number of books with different titles in the school library	Taylor & Coetzee, 2013 Bourdieu, 1972, 1986; 1991; Bourdieu & Passeron, 2000; Spaul, 2013;

Construct in Conceptual Framework	Item in prePIRLS 2011	Academic References to Corresponding Items
<b>Socio-economic Status at Home</b>	The employment status of the father	Portes, 2000; Barone, 2006; Lareau & Weininger, 2003;
	The employment status of the mother	Chansa-Kabali, Serpell, & Lyytinen, 2014;
<b>Socio-economic Status at School</b>	Capacity to provide instruction affected by shortage / inadequacy of school buildings, grounds	Coleman, 1975, 1998; Giroux & Penna, 1979; Giroux, 1983, 2001, 2013;
	Capacity to provide instruction affected by shortage / inadequacy of instructional materials	Bourdieu, 1972, 1986; Portes & MacLeod, 1996; Saha, 2015; Van der Berg, 2008; Prieur & Savage, 2013; Dufur, Parcel & Troutman, 2013; Spaul, 2013; Pretorius & Mampuru, 2007.
	Percentage students of school come from disadvantaged homes	
	Capacity to provide instruction affected by shortage / inadequacy of library books	

## 4.2. RESEARCH DESIGN AND SPECIFIC RESEARCH QUESTIONS

As a precursor to exploring the main research question it was deemed important to investigate the construct and contextual validity and reliability of the higher-level reading comprehension processes tested in the prePIRLS 2011 large-scale assessment. This is encapsulated in the following specific research question: *How is the construct known as ‘higher-order reading comprehension processes’ defined and validated in a South African context when considered in contrast to the lower-order reading comprehension processes tested in prePIRLS 2011?* Structural equation modelling, multiple regression, Rasch analysis and content analysis of a sub-sample of the assessment items in the prePIRLS 2011 dataset were conducted in order to investigate this research question.

The second specific research question in this study is: *How does learner performance on the higher-order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as*

*LoLT and English L2 as LoLT for low socio-economic status learners?* Secondary analysis of the data by means of a student level linear regression and a chi square test was conducted in order to research this question.

Another specific research question included in this section is: *What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?* This research question is included in order to ascertain what the effect of access to text is on the subsample derived for the English L2 grouping, as well as, to first examine a single-level analysis of access to text that provides a comparison with the findings of the multilevel analyses exploring contextual factors, as part of the main research question which follows below.

Multilevel analysis is used in order to address the main research question: *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?* Secondary analysis is an appropriate approach to examining this research problem since it requires empirical data and the prePIRLS 2011 dataset contains the contextual variables obtained from the large-scale survey data, as well as, the sample size required for the multilevel statistical analysis. The variables were identified from the constructs in the conceptual framework which, likewise, were drawn from the reviewed literature found in Chapter 3. The research method for each of the above questions is outlined in section 4.4.

### **4.3. RESEARCH PARADIGM**

The research was conducted within a post positivist paradigm. Cresswell (2008, 2009) explains that post positivism represents the thinking after positivism and questions the traditional notion of absolute truth of knowledge. Cresswell (2009) states that post positivists hold a deterministic philosophy in which causes probably determine effects or outcomes. The study, as secondary analysis of a large-scale dataset using statistical methods, is situated within this paradigm since it employs empirical observation and measurement.

#### 4.4. RESEARCH METHODS

The research questions outlined in section 4.2 relate to the methodology in the sections that follow. The research questions are discussed in terms of sample, instruments, variables, procedures and data analysis and appear in the following order: First the enquiry into the construct validity of the higher-order items is described; then the research into the language of instruction models being compared in terms of performance is outlined; lastly the interrogation of the effect of language of instruction and the contextual factors on higher-order reading comprehension performance at the home and school level is explained. The results of the analyses for each of these research enquiries are reported in Chapters 5, 6 and 7.

##### 4.4.1. Construct validity of the higher-order items

Research into the construct validity of the higher-order items in the prePIRLS 2011 dataset was conducted and the following sections outline the research methodology used in this enquiry. The section describes the sample, instruments, variables, procedures and data analyses conducted in interrogating the research question: *How is the construct known as 'higher-order reading comprehension processes' defined and validated in a South African context when considered in contrast to the lower-order reading comprehension processes tested in prePIRLS 2011?*

The prePIRLS 2011 reading comprehension processes are described in Chapter 2 section 2.3.

##### 4.4.1.1. Sample

Data from the items of the South African prePIRLS 2011 English Achievement Booklets 4, 5 & 9 (Foy, 2013) were used with a sample size of N=543 English learners. The passages that have not been released are not named here or described. This included two 'literary experience' passages (one released) and two 'informational' passages (one released). The booklets included the passages: *Trend Informational Passage A* (passage not released by IEA), Caterpillar to Butterfly, *Trend Literary Passage A* (passage not released by IEA) and The Lonely Giraffe. The items from these passages included a total of 67 items. Since this research had a particular focus on establishing construct validity, the data from only the English LoLT sample were used in order in order to minimise any confounding effects associated with using data across a broad range of language groupings. Furthermore, the English language

grouping is of particular interest to the overall study in terms of the L1 and L2 groupings embedded in the data.

In order to cut the data on English L1 and English L2 learners the variable indicating whether the learner spoke the language of the test before school (variable name 'ASBH03A') was used. The learners that responded yes, they did speak the language of the test before school were categorised as the English L1 sample ( $n=204$ ). The learners that responded no, they did not speak the language of the test before school were categorised as the English L2 sample ( $n=215$ ).

#### 4.4.1.2. Instruments

English Achievement Booklets 4, 5 & 9 (Foy, 2013) were used in the analysis. The passages included:

*Trend Informational Passage A* is an informational passage that forms a link between the selected booklets 4, 5 and 9. This passage is a trend passage and is not released. *Caterpillar to Butterfly* is the second informational passage selected. This passage is released and can be found in the 'PIRLS 2011 User Guide for the International Database' (Foy & Drucker, 2013). Using the context of a child's classroom with the child narrating, the writer explains how caterpillars turn into butterflies by describing the cycle from caterpillar to chrysalis to butterfly.

*Trend Literary Passage A* is a trend passage and is not released.

*The Lonely Giraffe* is a released literary passage that is a story about a giraffe who is lonely because he is much taller than the other animals. When the river floods, he saves the day and after that he is never lonely again (Foy & Drucker, 2013).

#### 4.4.1.3. Variables

All the items for the passages selected were used in the analyses. The items spanned the four reading comprehension processes stipulated in the prePIRLS 2011 Assessment Framework (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). These processes are described in Chapter 2 section 2.3.

- Examine and Evaluate Content, Language, and Textual Elements (named *EE* in model)  
The number of items in this sample for this reading process was 6.
- Interpret and Integrate Ideas and Information (named *II* in model)  
The number of items in this sample for this reading process was 15.

- Make Straightforward Inferences (named *SI* in model)  
The number of items in this sample for this reading process is 18.
- Focus on and Retrieve Explicitly Stated Information (named *RI* in model)  
The number of items in this sample for this reading process is 28.

The booklets selected contained a common passage (*Trend Informational Passage A*) used as a link for conducting multiple imputation for missing values in the items, ten imputations were generated (Arbuckle, 2014).

#### 4.4.1.4. Data Analysis

The research steps took the following course: The items were sampled from the achievement booklets and the reliability of the factor groupings were established by conducting a Cronbach's Alpha and Confirmatory Factor Analysis (CFA). A content analysis of the items informed the reason for outliers identified in the CFA. Next the item difficulty was explored by means of Rasch analysis. Then the influence of text selection on item validity was investigated by means of a multiple regression. Lastly, path modelling informed the validity enquiry. A non-parametric independent samples test, the Mann Whitney, was conducted on separate English L1 and L2 groups to compare the item difficulty of the four reading comprehension processes for the two language groups and the results were interpreted.

Step 1: Established a reliability measure with Cronbach's Alpha

Cronbach's Alpha of the sampled items was analysed using SPSS (version 23.0). Cronbach's Alpha was used to establish the internal consistency of items in order to investigate whether all the items measure the same concept (Cramer & Howitt, 2004). Measures with an alpha of 0.75 or more are considered to be internally consistent (Cramer & Howitt, 2004).

Step 2: Conducted a Confirmatory Factor Analysis

The next step was to model the constructs using structural equation modelling. To model the four comprehension constructs, a Confirmatory Factor Analysis (CFA) was conducted in IBM Amos version 23 (Arbuckle, 2014). Amos has the advantage of offering analysis for dichotomous data, as is the case with most prePIRLS items.

Confirmatory factor analysis permits testing hypotheses about the data (Cramer & Howitt, 2004). An important difference between Amos and software that performs factor analysis is that Amos not only performs an exploratory factor analysis, but also runs a confirmatory factor analysis. In this type of model, it can be tested whether certain variables are truly indicators of one concept, but not of another, and as in the case of this analysis, to explore whether the items that were designed to test the higher or lower-order processes cluster together under their expected groupings.

A factor loading is a correlation coefficient between a variable and a factor (a cluster of variables). Loadings can take positive and negative values between -1 and +1. If a variable has a factor loading of 0.8 on factor A, then this means it is strongly correlated with factor A (Cramer & Howitt, 2004). IBM Amos was used to conduct the CFA by modelling the relationship among the items and the latent traits.

#### Step 3: Conducted a Content Analysis of outlier items

The outlier items were identified by means of the CFA and these items were examined in terms of the vocabulary and phrasing, item type and position in the text for reasons why they did not load highly onto the reading comprehension processes that they were designed to test.

#### Step 4: Explored item difficulty with Rasch analysis

To examine the spread of the item difficulties, the data were analysed with Winsteps version 3.92.0 (Linacre, 2016). The advantage of a Rasch model is that it builds a hypothetical unidimensional line along which items and persons are located according to their difficulty and ability measures (Boone, Stave & Yale, 2014). The items that fall close enough to the hypothetical line contribute to the measurement of the single dimension defined in the theory of the reading comprehension processes as test constructs. Those that fall far from it are measuring another dimension which is irrelevant to the main Rasch dimension. Misfitting items are indications of construct-irrelevant variance. Long distances between the items on the line indicate that there are big differences between item difficulties so people who fall in ability close to this part of the line are not as precisely measured by means of the test. Misfitting items are indications of construct-irrelevant variance and gaps along the unidimensional continuum are indications of construct under-representation (Linacre, 2016).



Step 5: Examined the influence of text selection (since texts have different *features* which may or may not impact on item difficulty) by means of multiple regression

To examine the influence of text selection on item difficulty, a multiple regression was done in SPSS using item difficulties as the outcome variable ( $n=67$  items), and comprehension constructs (EE, II, SI, RI) and text selection (passages) as predictors with each predictor being coded from least difficult to most difficult.

Step 6: Path modelling of the reading comprehension processes

The data ( $N=543$ ) was then run through Winsteps 3.92.0 (Linacre, 2016) to make a person measure per reading comprehension process (Rasch Person Measure). For every learner that wrote a measure was formed for that group of items. Path modelling informed the validity of the enquiry and allowed for testing the theoretical relationships amongst the comprehension processes. Path models were run in IBM Amos version 23 (Arbuckle, 2014). Two path models were compared. The first separates the reading comprehension processes to include the inferencing process with the lower-order construct. The second includes the straightforward inferencing reading comprehension process as part of the higher-order construct. A lower chi square (and no significance) indicated better model fit.

Step 7: Explored the effect on validity of the construct of separating out the embedded English L1 and L2 groupings in the data

The English L1 ( $n=204$ ) and English L2 ( $n=215$ ) were split from the full sample ( $N=543$ ) using the variable that identifies the learners that spoke the LoT before they started school (ASBH03A) as described in 4.4.1.1. The data were run through Winsteps 3.92.0 (Linacre, 2016) to obtain a person measure per reading comprehension process (Rasch person measure). A non-parametric independent samples t-test, the Mann Whitney, was conducted on the Rasch item difficulties of English L1 and L2 speakers to compare the item difficulty of the four reading comprehension processes for the two language groups. The Mann-Whitney was used due to the non-normality of distributions and the small sample size of items ( $n=67$ ). Path modelling (IBM Amos version 23) reflected the English L1 and English L2 language groups for a comparison of how the comprehension processes related to the lower- and higher-order constructs for these two groupings. The first path model separates the reading comprehension processes to include the inferencing process with the lower-order construct. The

second includes the straightforward inferencing reading comprehension process as part of the higher-order construct. A lower chi square (and no significance) indicated better model fit.

#### 4.4.1.5. Summary

The table below (Table 4.2.) summarises the analytical techniques described in this section.

**Table 4.2. Summary: Construct validity of the higher-order items**

Research Question	Analytical Techniques	Sample
How is the construct known as 'higher-order reading comprehension processes' defined when considered in contrast to the lower order reading comprehension processes tested in prePIRLS 2011?	1. Cronbach's Alpha in SPSS	<b>prePIRLS 2011 English assessment:</b> Items ( $n=543$ ) from achievement booklets 4, 5 & 9.  <b>Booklet 4</b> ( <i>The Lonely Giraffe &amp; Trend Informational Passage A</i> ).  <b>Booklet 5</b> ( <i>Trend Informational Passage A &amp; Caterpillar to Butterfly</i> ).  <b>Booklet 9</b> ( <i>Trend Literary Passage A and Trend Informational Passage A</i> ).  The <b>English L1</b> ( $n=204$ ) and <b>English L2</b> ( $n=215$ ) were split from the full sample ( $N=543$ ) using the variable ASBH03A (Coding: English L1=yes, English L2=No).
	2. Confirmatory Factor Analysis in Amos;	
	3. Content Analysis (not statistical package)	
	4. Rasch Analysis in Winsteps	
	5. Multiple regression in SPSS	
	6. Path modelling in Amos	
	7. Mann-Whitney Test in SPSS	

#### 4.4.2. Comparison of the language of instruction models

A comparison of performance on the higher-order reading comprehension construct for the language of instruction models in South Africa was conducted and the following sections outline the research methodology used in this enquiry. The section describes the sample, instruments, variables, procedures and data analyses conducted in interrogating the research question: *How does learner performance on the higher-*

*order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as LoLT and English L2 as LoLT for low socio-economic status learners?*

Another research question included in this section is: *What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?* This research question is included in order to ascertain what the effect of access to text is on the subsample derived for the English L2 grouping, as well as, to first examine a single-level analysis of access to text that provides a comparison with the findings of the multilevel analyses exploring contextual factors.

#### 4.4.2.1. Sample

Chapter 2 section 2.6 outlines the sampling procedure for the national prePIRLS 2011 large-scale assessment. The full sample of N=15 744 learners was used to compare the language of instruction groupings: African languages ( $n=12\ 076$  learners), English ( $n=2\ 205$  learners) and Afrikaans ( $n=1\ 463$  learners), representing 76.7%, 14% and 9.3% respectively. The African languages grouping includes all nine African languages sampled as described in section 4.1.1.

Learners that did not speak the language of the test before school or never speak the language of the test at home and wrote in English are compared to the learners who wrote in an African language and did speak the language of the test before school or sometimes / always speak the language of the test at home.

In order to compare the African Language home language (L1) learners and the English L2 learners of *low socio-economic status*, a sub-sample of the prePIRLS 2011 national sample was analysed comprised of learners exposed to an English immersion language model, as well as learners comprising the additive bilingual model of language in education. Afrikaans learners were removed from this dataset. Non-mother tongue English learners who wrote in English, and learners writing in the African languages as a mother tongue, with both groups identified as having a low socio-economic background through the Learning to Read Survey administered to parents and the school contextual questionnaire administered to the principals of the schools that were tested. From the parent 'Learning to Read Survey' the item read:

Did your child speak the language of the test before she/he began school? Where this was answered as 'yes' it was taken to indicate home language, whereas 'no' indicated the language of the test – and therefore the LoLT of the school's foundation phase - was not the learner's home language. In the school questionnaire the item read: Approximately what percentage of students in your school have the following backgrounds? Where it was indicated that the learners 'come from economically disadvantaged homes' and option 4 was selected 'more than 50% of the students come from economically disadvantaged homes' this was taken to indicate that the learners falling within this ambit came from low socio-economic backgrounds. Since at this point the number of African learners stood at 5 858 and the English group at 484, these two groups were then made further comparable by randomly selecting the same number of African learners as found in the English group. Outliers (a total of eleven selected with SPSS (version 23.0) as being three standard errors above the mean) were then also removed from the dataset. In this way the sample size and homogeneity of variance were better equalized (Field, 2009).

The low SES subsample created was used in step 5 of the data analysis described in this section (4.4.2.4.) was derived at by removing the African L1 group for a focus on the English L2 low SES learners (N=480) from 26 schools.

#### 4.4.2.2. Instruments

The contextual questionnaires for the prePIRLS 2011 national study are described in section 2.4. In this study items are drawn from three background questionnaires which include the Learner Questionnaire, the Home Questionnaire and the School Questionnaire.

The assessment framework and development of the prePIRLS 2011 achievement booklets is discussed in Chapter 2 section 2.3. The higher-order items comprising the 'Inferencing, interpreting and evaluating' plausible value' from the prePIRLS 2011 booklets are used in these analyses as discussed in Chapter 2 section 2.2.1.

#### 4.4.2.3. Variables

Performance was compared across the three language of instruction groups for learners who speak the language at home and those who do not speak the language at home. Two variables were used to indicate this distinction. One from the Home Questionnaire which asked whether the child spoke the language of the test before

starting school and the other from the Learner Questionnaire which asked how often the learner spoke the language of the test at home. The variables are listed in Table 4.3 below.

**Table 4.3. Table of variables**

Variable Name	Variable Description	Categories	% Missing
ITLANG_Recoded	Language of Test	1=Afrikaans 2=English 3=African Languages	None
ASBH03A_Recode_NP	Child spoke the LoT before school	0=No 1=Yes	22.2 (Missing=7.2 System Missing=15.0)
ASBG03_Recoded_Combined	Speak LoT at home	0=Never 1=Sometimes / Always	16.2
ACBG03A_Recoded_N	Percentage learners disadvantaged in the school	0=50% or more 1=Less than 50%	8.6
Additive_bilingual_model	Additive bilingual LoLT	0=Not additive bilingual model 1=Additive bilingual model	None (only African language learners)
English_immersion_model	Immersion LoLT	0=Not immersion model 1=Immersion model	None (only English learners)
African_HL_asLoLT	African language learners speak LoLT at home	0=All not African plus African not speaking LoLT at home 1=African LoLT is spoken at home	16.2
Engschool_HL_asLoLT	English learners speak LoLT at home	0=All not English plus English not speaking LoLT at home 1=English speaking LoLT at home	16.2
Afrikaschool_HL_as_LoLT	Afrikaans learners speak LoLT at home	0=All not Afrikaans plus Afrikaans not speaking loLT at home 1=Afrikaans speaking LoLT at home	16.2
ASBH15A_Recoded_NP	No. of children's books in the home	0=0-10 1=11-25 2=26-50 3=51 and above	28.2 (Omitted=13.1 System Missing=15.0)
ACBG09_Recoded_N	Existing School Library	0=No 1=Yes	7.9

Variable Name	Variable Description	Categories	% Missing
Language of Instruction	African Language L1 learners and English L2 low SES	0=African Language L1(low SES) 1=English L2 (low SES)	None (only low SES subsample)
BksLoT	Children's books in language of the test at home	0=No 1=Yes	16.5% (English L2 low SES learners only)
ACBG09A	Number of books with different titles in the school library	0=No library 1=Less than 500 2=More than 500	None (English L2 low SES learners only)

For the HLM analysis a student weighting was used at level 1 and the class weighting at level 2. (Since there was only one class sampled per school, class and school are equivalent.) Level 1 variables are weighted on the group mean and level 2 variables on the grand mean. List wise deletion of missing data was selected. The dependent variable was the higher-order plausible value.

A discussion of the benchmarks is included in Chapter 2 section 2.3.

#### 4.4.2.4. Data Analysis

The following steps were taken for the data analysis processes:

Step 1: Compared the L1 and L2 learners for the three language groupings

First descriptives comparing the L1 and L2 learners for the three language groupings were conducted in the IDB Analyzer (version 3.0) and then descriptives showing the performance on the International Benchmarks for learners of the African languages L1 model and English L2 model were tabulated. The IDB Analyzer is specifically designed to take into account the weighting required for prePIRLS data. Used in conjunction with SPSS (version 23.0) the IDB Analyzer takes into account the sampling information and the multiple imputed achievement scores to produce accurate statistical results (Martin & Mullis, 2012).

Step 2: Compared the effect of LoLT on performance

Next, a multiple regression was conducted in the IDB Analyzer (version 3.0) that showed the difference in performance for the different language of instruction models, followed by linear regression that highlighted the difference in performance between the African languages L1 and English L2 group specifically.

Step 3: Compared the effect on performance of access to text at home and at school for home language instruction across all language models

The effects on learner performance of children's books at home and a library at the school were then compared for home language as LoLT and for the African Languages L1 group and the English L2 group by means of a multiple regression run as a single-level analysis at the learner level.

Step 4: Compared performance for the African Languages L1 and English L2 language models at the lowest SES

A comparison of learner performance of the African languages L1 group and the English L2 group for the lowest SES was made using linear regression in the IDB Analyser and a Pearson chi square test in SPSS.

Step 5: Compared the effect on performance of access to text at home and at school for the English L2 language model at the lowest SES

The effect of access to text at home and at school on English L2 low SES learners was explored by means of a two-level regression using hierarchical linear modelling (HLM) (version 7). For this analysis the variables used as predictors indicated the number of children's books at home (BksLoT) in the language of the test (level 1 or home level) and the number of books with different titles found in the school (ACBG09A) at level 2 or school level.

According to Raudenbush and Bryk (2002), data that has a nested structure of learners within classrooms and classrooms within schools is best analysed using multilevel analysis. With hierarchical linear models each of the levels is formally represented by its own sub-model. The sub-models express relationships among variables within that given level and specify how variables at one level can influence relationships found at another level. For this analysis a two level model was required, with learner-level variables nested within school-level variables.

Hierarchical linear modelling (HLM) was conducted on low SES English L2 learners (N=480) in order to explore the effect of access to text at home and school on this grouping. The number of schools in the analysis were 26. An explanation of how the sample was derived is given in section 4.4.2.1. For each analyses the student weighting was used at level 1 and the class weighting (equivalent to the school

weighting in this study) at level 2. Level 1 variables were centred on the group mean and Level 2 variables on the grand mean. The null model was calculated to account for between class variance using the dependent variable ASRIIEO which included all five of the plausible values for the higher-order subscale.

Unstandardised co-efficients were reported due to the PIRLS achievement data being on the plausible value scale of 0-1000 (as discussed in Chapter 2 section 2.2.2).

#### 4.4.2.5. Summary

The table below (Table 4.4.) summarises the analytical techniques described in this section.

**Table 4.4. Summary: Comparison of the languages of instruction**

Research Questions	Analytical Techniques	Sample
<i>How does learner performance on the higher-order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as LoLT and English L2 as LoLT for low socio-economic status learners?</i>	1. Linear and multiple regression in IDB Analyzer at the student / home level 2. Pearson chi square test in SPSS 3. Multilevel Regression using Hierarchical Linear Modelling (HLM)	Full sample (N= 15 477) used for comparison of three language of instruction groupings. Sub-sample (n=6 342) of low socio-economic status learners consisting of African language L1 and English L2 language of instruction learners.
<i>What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?</i>		For the HLM analyses English L2 low SES learners were sampled (N=480)

#### 4.4.3. Effect of language instruction and contextual factors on performance

The final question that required analysing was how the different language of instruction models and contextual factors at the home and school level affect performance on the higher-order reading comprehension construct. The following sections outline the research methodology used in this enquiry. The section describes the sample,



instruments, variables and data analyses conducted in interrogating the research question: *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?*

#### 4.4.3.1. Sample

Chapter 2 section 2.6 outlines the sampling procedure for the national prePIRLS 2011 large-scale assessment. The full sample of N=15 744 learners was used to compare the language of instruction groupings: African languages ( $n=12\ 076$  learners), English ( $n=2\ 205$  learners) and Afrikaans ( $n=1\ 463$  learners), representing 76.7%, 14% and 9.3% respectively. The African languages grouping includes all nine African languages sampled as described in section 4.1.1.

#### 4.4.3.2. Instruments

The contextual questionnaires for the prePIRLS 2011 national study are described in section 2.4. In this study items are drawn from all four background questionnaires which include the Learner Questionnaire, the Home Questionnaire, the Teacher Questionnaire and the School Questionnaire. The assessment framework and development of the prePIRLS 2011 achievement booklets is discussed in Chapter 2 section 2.3. The higher-order plausible value was used for all the analyses in this section (plausible values are discussed in Chapter 2 section 2.5).

#### 4.4.3.3. Variables

Performance was compared across the three language of instruction groups for learners who speak the language at home and those who do not speak the language at home. Two variables were used to indicate this distinction. One from the home background questionnaire which asked whether the child spoke the language of the test before starting school and the other from the learner background questionnaire which asked how often the learner spoke the language of the test at home.

Below are tables of all the variables (Table 4.5) and factors (Table 4.6) used for the analysis of the research into how language of instruction and contextual factors affect learner performance.

**Table 4.5. Table of variables**

Variable Name	Variable Description	Categories	% Missing
ITLANG_Recoded	Language of Test	1=Afrikaans 2=English 3=African Languages	None
Additive_bilingual_model	Additive bilingual LoLT	0=Not additive bilingual model 1=Additive bilingual model	None (only African language learners)
English_immersion_model	Immersion LoLT	0=Not immersion model 1=Immersion model	None (only English learners)
African_HL_asLoLT	African language learners speak LoLT at home	0=All not African plus African not speaking LoLT at home 1=African LoLT is spoken at home	16.2
Engschool_HL_asLoLT	English learners speak LoLT at home	0=All not English plus English not speaking LoLT at home 1=English speaking LoLT at home	16.2
ASBG03_Recoded_Combined	Speak LoT at home	0=Never 1=Sometimes / Always	16.2
TextSchool	Number of books with different titles in school library	0= Few books with different titles 1= Many books with different titles	None
ACBG03A_Recoded_N	Percentage disadvantaged learners in the school	0=50% or more 1=Less than 50%	8.6

**Table 4.6. Table of factors**

<b>Factor</b>	<b>Description of Variables</b>	<b>Cronbach's Alpha</b>	<b>Factor Analysis Principal Component</b>
Text available in Home including in LoT (TextHome)	Number of children's books in the home (ASBH15A) Books for child in LoT (ASBH15B)	.669	.867
Teacher LoT and Pedagogy part of formal education (LangSuppSchool)	LoT part of formal education of Teacher (ATBR20A) Pedagogy part of formal education of Teacher (ATBR20B)	.770	.902
Shortage of buildings and materials (SESSchool)	Shortage of school buildings affects capacity (ACBG10AC) Shortage of materials affects capacity (ACBG10AA)	.853	.934

It is noted that the factor 'Text available in Home including in LoT' found in the table above had a Cronbach's Alpha measure of .669. A result of 0.75 or more (Cramer & Howitt, 2004) would have strengthened the reliability measure. After consideration the factor was deemed sufficiently robust for inclusion in the analysis.

#### 4.4.3.4. Data Analysis

Learners were sampled from the language of instruction groupings in South Africa. Language support, SES and access to text scales and variables were established at the home and school level. First the Null models were run (Mplus version 7.4) reflecting the between-school variance for each language grouping and the full sample. Two-level regression analyses were conducted to compare performance of the different language of instruction groupings and the effects of the different contextual factors at the student and school level. The results were discussed.

Multilevel analysis was conducted using Mplus (version 7.4) in order to explore the contextual factors affecting performance on the higher-order subscale. According to Bickel (2007), data is hierarchical when observed or measured units are inherently grouped at greater units of analysis and hence may be nested within higher levels of analysis. For the purposes of this study, a two level model is required, with student-level variables nested within school-level variables.

Fit indices establish whether, overall, the model is acceptable. The following criteria were used to evaluate the fit of the model (Stancel-Piątak, Mirazchiyski & Desa, 2013):

Good fit of the model:

Comparative Fit Indices (CFI)  $\geq .95$ ;

Tucker Lewis Index (TLI)  $\geq .95$ ;

Root Mean Square Error of Approximation (RMSEA)  $\leq .05$ ;

Standardized Root Mean Square Residual (SMR)  $\leq .05$

Acceptable fit of the model:

Comparative Fit Indices (CFI)  $\geq .90$ ;

Tucker Lewis Index (TLI)  $\geq .90$ ;

Root Mean Square Error of Approximation (RMSEA)  $\leq .08$ ;

Standardized Root Mean Square Residual (SMR)  $\leq .10$

The data were analysed as follows:

Step 1: Scales were derived and variables selected to depict the home and school mediatory contexts

For the multilevel analysis in Mplus (version 7.4.) factors were derived and variables selected that reflected the constructs in the conceptual framework for SES, language support and access to text both for the home and school level. Table 4.6 depicts the composition and reliability of the scales and the variables used.

Step 2: Data were prepared for Mplus analysis

The data were prepared for Mplus (version 7.4) and imported including all five plausible values. Variables were weighted at the student (within) level (studclwgt) and school (between) level (schlwgt). For all the models the student (home) level variables were group mean centred and the school level predictors were grand mean centred (Stancel-Piątak, Mirazchiyski & Desa, 2013).

Step 3: Null Model

Null models for each language grouping, as well as the full sample were run to establish the intraclass correlation (ICC) for the interpreting plausible value variable (ASRIIEO) which indicated the between school variance for each grouping.

Step 4: The effect on performance of attending schools with the different LoLTs is explored.

Two-level regressions were run using the full national sample to analyse the effect on performance of attending an African languages LoLT, English LoLT and Afrikaans LoLT school for a comparison of all three.

Step 5: The home and school mediatory contexts were described by examining the variables and their association with learner mean average.

Step 6: The effect on performance for the language groupings within the home and school mediatory contexts were compared.

The variables for SES, language support and access to text were analysed using two-level regression within the three LoLT samples to explore whether these contextual factors make a significant contribution to the variance observed in learner performance.

Step 7: The effect on performance of having a home language as LoLT is described.

The effect on performance for learners in African and English schools whose home language was the language of instruction was analysed by means of a two-level regression at the school level using the full sample of learners.

Step 8: The effect of the home and school mediatory contexts on English L2 and African Languages L1 learners was explored.

A comparison was made by means of a two-level regression of African Languages L1 learners and English L2 learners at the home and school level on the full sample of learners.

#### 4.4.3.5. Summary

The table below (Table 4.7.) summarises the analytical techniques described in this section.

**Table 4.7. Summary: The effect of language of instruction and contextual factors**

Research Question	Analysis Technique	Sample
<i>What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?</i>	1. Multilevel Regression using Mplus software	Full prePIRLS 2011 national sample used (N=15 447).

#### 4.5. ISSUES OF VALIDITY AND RELIABILITY

Validity and reliability for the prePIRLS2011 instruments and research process are dealt with extensively in the PIRLS 2011 technical report (Martin, Mullis & Kennedy, 2007). The Cronbach's Alpha reliability coefficient for the prePIRLS 2011 instruments is reported as being 0.93 (Foy, Martin, Mullis, & Stanco, 2011) and within the acceptable range. Furthermore, research into the validity of the higher-order reading items is described in Chapter 5 which found that the higher-order reading comprehension processes exist in the data and have a good reliability (Table 5.1).

#### 4.6. ETHICAL CONSIDERATIONS

Permission to conduct the prePIRLS 2011 study in the sampled schools was obtained from the Minister of Education, school principals, teachers and parents and ethical clearance was obtained from the University of Pretoria. For secondary analysis of the data for this study ethical clearance was obtained from the University of Pretoria. A commitment to the use of accepted academic referencing standards and the avoidance of plagiarism was made. A commitment was undertaken to uphold the highest research standards when working with the data and presenting the findings.



## CHAPTER 5

# EXPLORING CONSTRUCT VALIDITY OF THE HIGHER-ORDER READING COMPREHENSION PROCESSES IN CONTEXT

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The purpose of this chapter is to describe the findings of the research exploration into establishing the validity and reliability of the reading comprehension process as higher-level (higher-order) and lower-level (lower-order) processes. It was investigated whether these processes can be differentiated from each other as belonging at a significant level to either the higher-order or lower-order grouping, when analysing performance for the English learner sample.

First the construct validity of each reading comprehension process was explored and outlier items were examined. Then the relationship between the four cognitive reading comprehension processes to item difficulty was explored for the full sample of English learners, as well as for separate English L1 and English L2 subsamples. Item difficulty was further examined by separating factors such as text selection and the cognitive processes to understand their effect on the difficulty of an item. The processes were modelled onto their corresponding higher or lower order latent trait to determine the correlation between the processes and the higher- or lower-order construct for the full sample, for English L1 and for English L2. The separation of the sample into L1 and L2 groupings provided some explanation for the initial weak cohesion observed between items within comprehension constructs. The methodology is described in Chapter 4 section 4.4.

Section 5.1 revisits the importance of context in the discussion of construct validity (see also Chapter 3 section 3.9) and states the relevant research question. In section 5.2 the results of the reliability analysis are given. Section 5.3 describes the results of analysing the validity of the constructs. Section 5.4 describes the results of a content analysis into outlier items. In section 5.5 the results of the enquiry into item difficulty are presented for the full sample of English. In section 5.6 the results of the analysis of factors affecting item difficulty are given. The results of modelling the processes onto their latent traits for the full sample of English learners are presented in section

5.7. Section 5.8 compares item difficulty and item grouping for the English L1 and English L2 samples. Section 5.9 provides a discussion of the results.

## **5.1. VALIDATING THE CONSTRUCT 'HIGHER-ORDER READING COMPREHENSION'**

Research into the construct validity of the higher-order items in the prePIRLS 2011 dataset was conducted to explore the research question: *How is the construct known as 'higher-order reading comprehension processes' defined and validated in a South African context when considered in contrast to the lower-order reading comprehension processes tested in prePIRLS 2011?*

The prePIRLS 2011 reading comprehension processes are described in Chapter 2 section 2.3. A discussion of testing higher-order reading comprehension is found in Chapter 3 section 3.5.

The higher-order reading comprehension construct is the main dependent variable in the analyses conducted in this study, and, therefore, it is important to establish the validity of this construct. The exploration into the validity of the construct considers the reliability of the higher-order items and the relationship between the hierarchical cognitive processes (Bloom, 1956; Krathwohl, 2002) and the difficulty of the items. Taking into consideration that prePIRLS 2011 was developed as a large-scale international assessment, the validity of the construct is examined in terms of the developing context of the learner and the validity of the items for both the English L1 and English L2 language of instruction groupings. Familiarity with reading comprehension assessment, also known as 'test-wiseness' (Nsamenang, 2009), may make many of the higher-order items relatively easier for learners who have more exposure to those kinds of items due to a more effective school mediatory context. This opens up the possibility that the term 'higher-order' could be a relative term, meaning that the different item groupings that are classified in a test as either higher- or lower-order may perform differently across contexts and for L1 or L2 learners.

Furthermore, the study draws on Messick's Validity Framework (1989) which argues for a unified theory of validation in which the validity of the construct is examined with the purpose of the assessment in mind, thus drawing on relevant contextual factors as part of the validation process. As such, the *construct* 'higher-order reading comprehension' in the prePIRLS 2011 assessment must be fully explicated prior to



exploring how *performance* of the South African learners on the higher-order reading comprehension items is related to the contextual factors.

## **5.2. RELIABILITY ANALYSIS OF THE READING PROCESSES**

As described in Chapter 4 section 4.4.1.1, data from the items of the South African prePIRLS 2011 English Achievement Booklets 4, 5 & 9 (Foy, 2013) were used with a sample size of N=543 English learners which is made up of an English L1 sample ( $n=204$ ) and an English L2 sample ( $n=215$ ). Since this research had a particular focus on establishing construct validity, the data from the English Language of Learning and Teaching (LoLT) sample were used in order to minimise any confounding effects associated with using data across a broad range of language groupings.

Table 5.1. depicts the Cronbach's Alpha results of the reliability analysis run for each reading comprehension process. There are 67 items in total. The least reliable reading is from the 'Examine and evaluate content, language, and textual elements' (named EE in the model) process at .510. The lower reliability is possibly due to the fact that there were only six items available in the sample. The other processes indicate high internal consistency of the items making up each comprehension process. The higher-order reading comprehension processes 'Interpret and integrate ideas and information' (named // in model) and 'Make straightforward inferences' have strong reliability readings at .812 and .846 respectively (see Section 4.4.1.4. for a discussion of the interpretation of the Cronbach's Alpha measurement).

**Table 5.1. Results of reliability analysis for the cognitive processes**

Reading Comprehension Process	Reading Comprehension Process Level	Number of Items for each Reading Comprehension Process in booklets 4, 5 & 9	Cronbach's Alpha for each Reading Comprehension Process
Examine and Evaluate Content, Language, and Textual Elements (named <i>EE</i> in model)	Higher	6	.510
Interpret and Integrate Ideas and Information (named <i>II</i> in model)	Higher	15	.812
Make Straightforward Inferences (named <i>SI</i> in model)	Higher	18	.846
Focus on and Retrieve Explicitly Stated Information (named <i>RI</i> in model)	Lower	28	.769

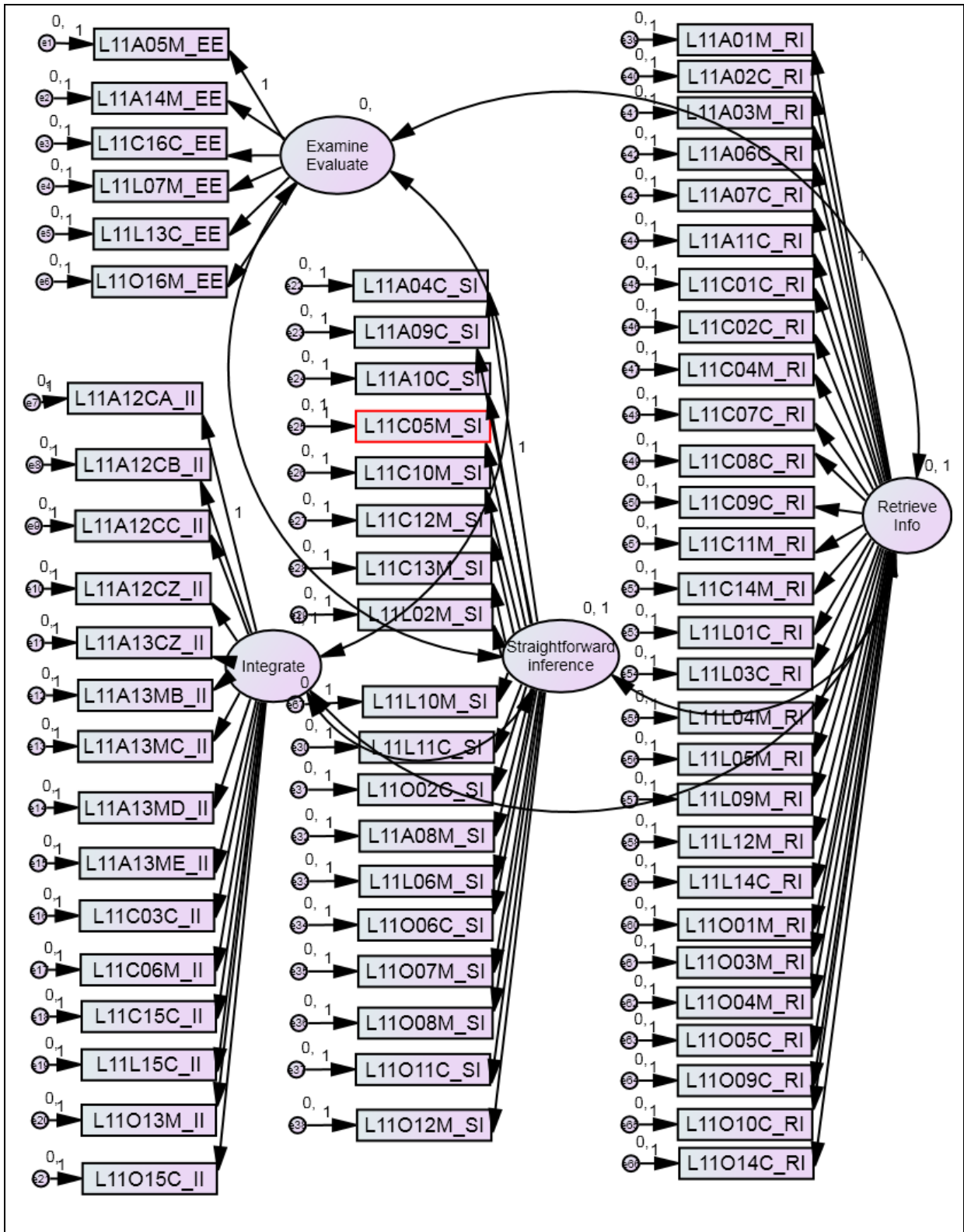
### 5.3. EXAMINING THE VALIDITY OF THE CONSTRUCT

After observing the Cronbach's Alpha as consistent with expectations that these items are cohesive and form a construct around the four comprehension processes under scrutiny (three higher-order and one lower order), the next step was to model the constructs using structural equation modelling. To model the four comprehension constructs, a Confirmatory Factor Analysis (CFA) was conducted in IBM Amos version 23 (Arbuckle, 2014).

The booklets selected contained a common passage (*Trend Informational Passage A*) used as a link for conducting multiple imputation for missing values in the items, ten imputations were generated (Arbuckle, 2014). For the CFA, it was hypothesised that each of the items were predicted by one of the following latent traits according to their classification during item development (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009):

- Examine and Evaluate Content, Language, and Textual Elements (named *EE* in model)
- Interpret and Integrate Ideas and Information (named *II* in model)
- Make Straightforward Inferences (named *SI* in model)
- Focus on and Retrieve Explicitly Stated Information (named *RI* in model)

The model is depicted in Figure 5.1.



**Figure 5.1 Model of the reading comprehension items and their corresponding latent traits**

In total five models were run using Bayesian Analysis in Amos (version 23), one for each imputation. The pooled imputation results showed that the 'Examine and

evaluate content, language, and textual elements' (EE) factor has the most items which loaded above .5, with 5 of the 6 items meeting this criterion. The 'Interpret and integrate ideas and information' (II) factor had 10 out of 15 items which loaded above .5 (66% of items), and 'Straightforward inferencing' (SI) had 7 out of 18 items (39%). The 'Focus on and retrieve explicitly stated information' (RI) factor had the fewest items which loaded strongly, with 10 out of 28 (35%). The model was overall a weak fit for the data, with a posterior predictive  $p$  value of 0.00 (the desired level is 0.5). The CFA model indicated that the comprehension structures exist in the data, but that some of the items do not load highly onto their theoretical latent trait (the reading processes or constructs). The factor loadings per item are depicted in Table B.1. in Appendix B.

In summary, the comprehension processes form valid constructs but, as observed in Table B.1 (Appendix B) many of the items do not load highly onto the cognitive process for which they were developed. This raises questions about whether these 'outlier' items are testing what they were developed to test in the learner. Reasons for the resultant outlier or low fitting items were explored through a content analysis of a sample of these items.

#### **5.4. CONTENT ANALYSIS OF OUTLIER ITEMS**

Although the CFA model indicated that the comprehension structures exist in the data, some of the items did not load highly onto their theoretical latent trait (reading comprehension process). A content analysis of the outlier items in Caterpillar to Butterfly of the items that loaded at .3 or below was undertaken. Caterpillar to Butterfly had one low-fitting item in the interpret and integrate group (II), four low-fitting items in the straightforward inferencing group (SI) and six outliers in the retrieve information (RI) group, however, only six of these items fell below the .3 mark. Three of the items examined in the content analysis came from the straightforward inferencing group (SI) and three came from the retrieve information group (RI). The released passage and items for the assessment Caterpillar to Butterfly can be found in the 'PIRLS 2011 User Guide for the International Database' (Foy & Drucker, 2013).

The comprehension questions were examined using face validity to see whether the item might be better fitted to testing a different comprehension process, or whether there were unintentional confounding factors in the development of the items that

might be affecting the extent to which the item loaded onto its latent trait. The model depicted in Figure 5.3 was used to guide this analysis, and, as such, considerations of vocabulary, item phrasing, text features and the item or task type were considered. Table 5.2 below outlines the analyses of the six items identified for this purpose.

**Table 5.2. Content analysis of low fitting items**

Items	Factor Loading	Comprehension	Passage	Item content analysis	Difficulty on Item Map
L11C11M_RI	0.26	Retrieve information	Caterpillar to Butterfly	Some <i>inference</i> required since it is not explicitly stated (using the same words) that a butterfly came out of the shell. Picture does not clearly look like a butterfly and might confuse a reader who is not following the storyline.	Below 50 logits
L11C08C_RI	0.32	Retrieve information	Caterpillar to Butterfly	Although this item is a retrieve information item and works as such because the information is explicitly stated, the item type is 'constructed response' which makes it more difficult for the reader who has to explain in words and not just select a response as in the multiple-choice tasks. Furthermore, the answer indicating how big the caterpillar is, is a comparison to the child's finger and not just an expected measurement – this requires more conceptual understanding from the reader.	Below 50 logits
L11C07C_RI	0.38	Retrieve information RI	Caterpillar to Butterfly	The answer is located within a lot of text. The concept of shedding is perhaps foreign to many of the readers and, moreover, 'shed' is a low frequency word.	On 50 logits
L11C10M_SI	0.33	Straightforward Inferencing	Caterpillar to Butterfly	This might be testing vocabulary more than inferencing, although the reader would not be able to make the inference without understanding the meaning of the word 'changes'.	Below 50 logits
L11C12M_SI	0.07	Straightforward Inferencing	Caterpillar to Butterfly	This is possibly a difficult concept for the readers, and the item is difficult (above 50 logits on the item map). The complexity of the text which requires some prior knowledge means this item possibly does not fit in with this lower-order process.	Above 50 logits
L11C13M_SI	0.38	Straightforward Inferencing	Caterpillar to Butterfly	Readers often do not refer back to text when answering items. Although this item requires inferencing to answer it, the distractors given might prompt the reader to give his / her own opinion of the reason why the butterfly cannot stay in the jar.	Below 50 logits

Since the items examined in the content analysis were from the lower-level reading processes, it is interesting to note that the confounding influences identified in this small sample affect the factor loading of the item onto its latent trait, but did not make the item more difficult than would be expected for an item in the lower-order category (see item map for the position of the logits to the items in Figure 5.3). However, an RI cognitive process is made more difficult by the information required to be retrieved by the reader being situated in amongst more conceptually complex or dense text as in item 12 (L11C12M\_SI) which falls on the item map at above 50 logits. Placing the RI item in amongst dense text is likely to be a purposeful raising of the difficulty level of the item on the part of the designer, in contrast to the *unintentional* design of possibly confusing the learner with the graphics as observed in item 11 (L11C11M\_RI) described above. However, in both instances the item loaded weakly onto the cognitive construct being tested.

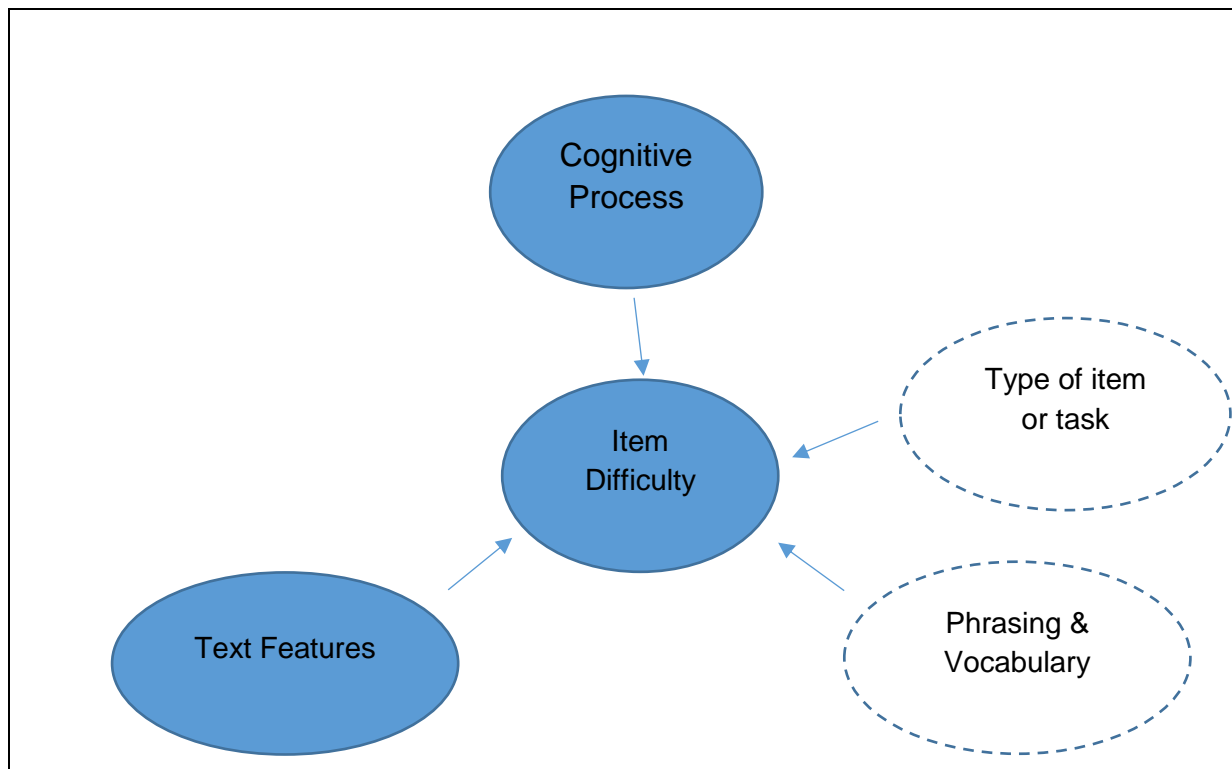
In summary, the item factors that affected factor loading onto the latent traits and, as such, affected the testing of the reading comprehension constructs were either intentional or unintentional factors in the design of the items. The intentional factors (intended to increase the difficulty of the item) such as placing the text to be retrieved within more conceptually complex or dense text (Brown, Afflerbach & Croninger, 2014; Eason, Goldberg, Young, Geist & Cutting, 2012) or using more linguistically complex phrasing and vocabulary and a more difficult task type (such as constructed response), may have added a 'confounding factor' in the testing of this sample of learners as evidenced by the weak loading of the items onto the cognitive construct or latent trait. Possible unintentional factors in the design of the item that affected factor loading were identified as: Illustrations that distracted from the correct answer, doubling up of the reading comprehension processes (both RI *and* SI) and unintentionally complex phrasing or low frequency vocabulary.

Since the enquiry was not only to verify that the items perform similarly within the processes that they were designed and developed for, but, furthermore, to investigate whether one can differentiate between the higher-level and lower-level processes, item difficulty was explored next.



## 5.5. EXAMINING ITEM DIFFICULTY

A closer analysis of the prePIRLS 2011 items for the purpose of establishing reliability and validity investigates the relationship between the cognitive (reading comprehension) process and item difficulty. This relationship is depicted below in Figure 5.2 (also see Chapter 4 section 4.4.1. for further discussion of the graphic).



**Figure 5.2** *The components of item difficulty*

To examine the spread of the item difficulties, the data were analysed using a Rasch model with Winsteps version 3.92.0 (Linacre, 2016). The item map in Figure 5.3 illustrates the spread of item difficulty across the four reading comprehension constructs of the four sampled passages for the full English sample (N=543). The more difficult items extend toward the top of the item map and the least difficult items are at the bottom.

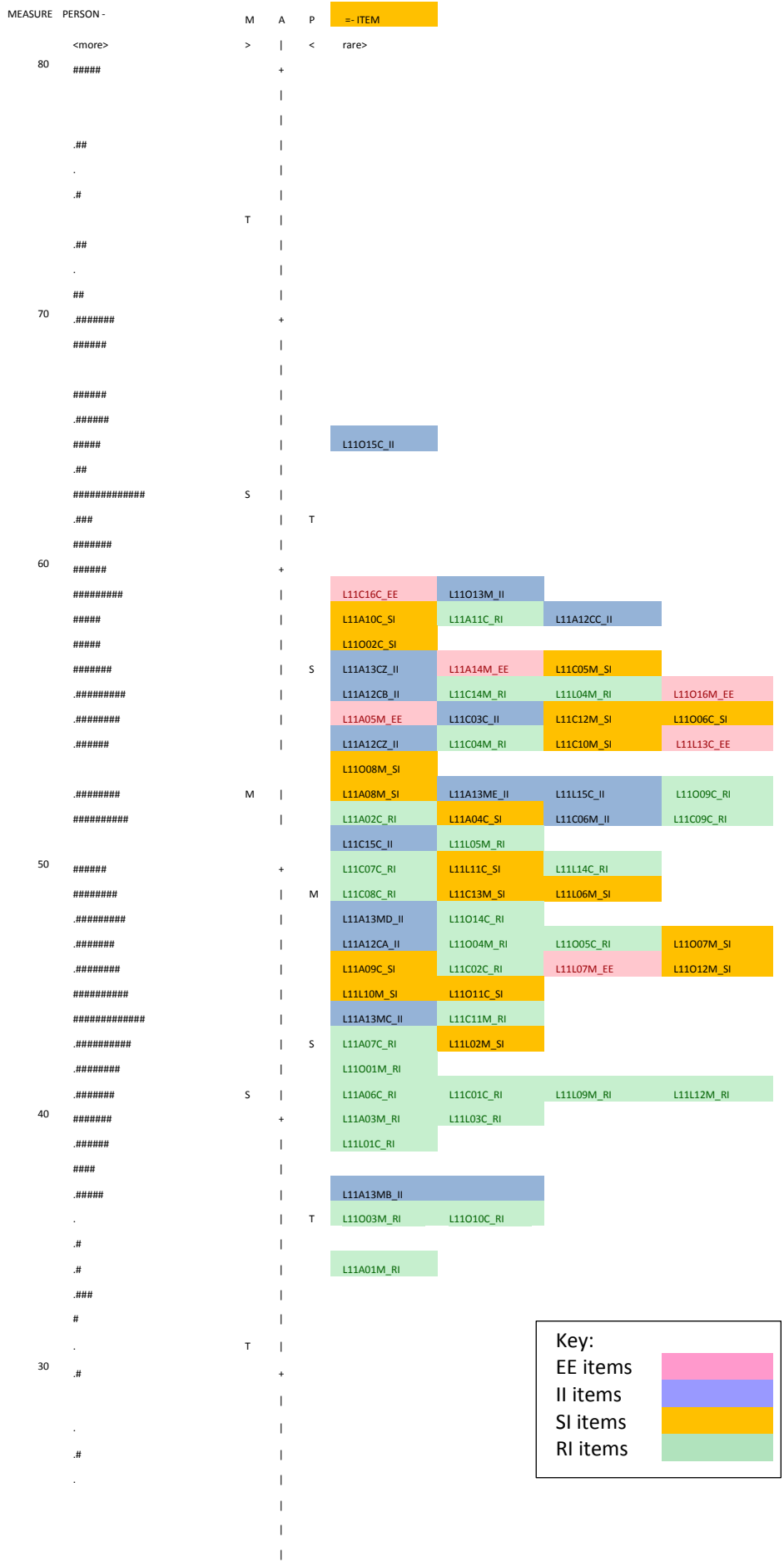
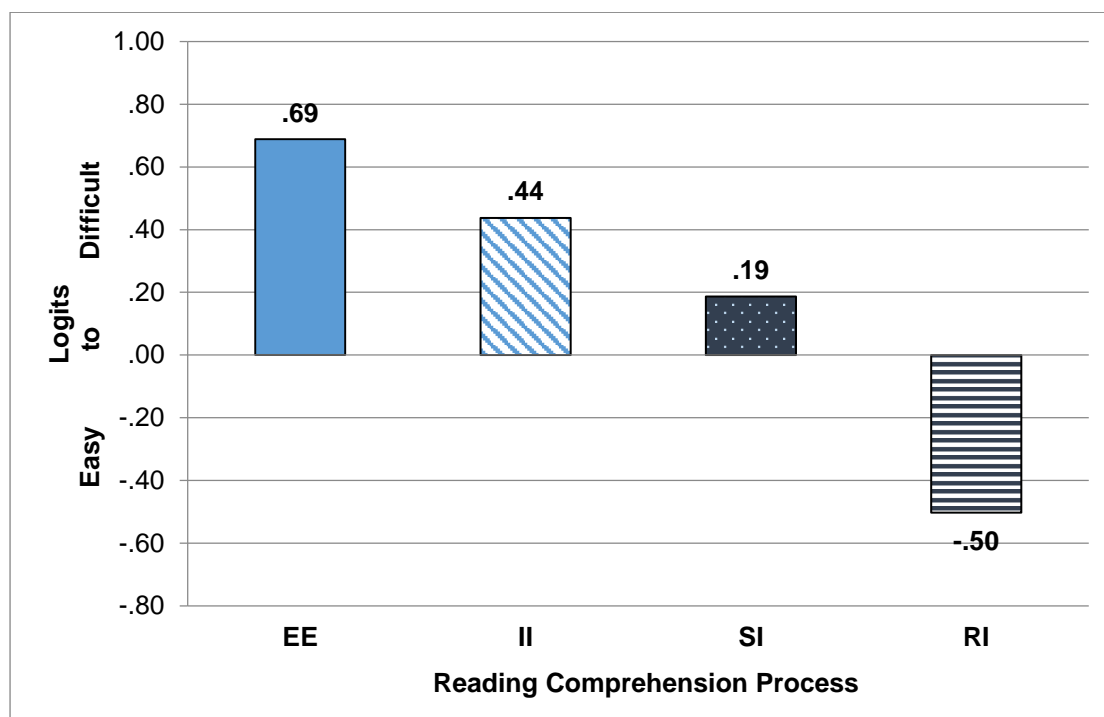


Figure 5.3 Item map indicating item difficulties for the English learners

In the above item map we see that for the full sample, the students mean was about half a standard deviation higher ( $M = 0.45$ ,  $SD = 1.58$ ) than the items ( $M = 0.00$ ,  $SD = 0.59$ ). The data fit the Rasch Model well, with a chi-square of 17620.09 ( $p = .139$ ). Thus when looking at the L1 and L2 groups together, the passages were too easy for the group as a whole and there were not enough items to measure those with higher abilities. Item difficulties were derived and statistically compared using SPSS version 23. The item difficulty is on a logit scale which ranges from -5 to +5.



**Figure 5.4 Item difficulties of the English grouping (logit scale from -5 to +5)**

‘Examine and evaluate content, language, and textual elements’ (EE) items ( $M = 0.69$ ,  $SD = 0.66$ ) were significantly more difficult than ‘Focus on and retrieve explicitly stated information’ (RI) items ( $M = -0.50$ ,  $SD = 0.94$ ) with a moderate effect size ( $p = 0.019$ ,  $r = 0.460$ ). ‘Interpret and integrate ideas and information’ (II) items ( $M = 0.44$ ,  $SD = 0.99$ ) were also significantly more difficult than RI items with a moderate effect size ( $p = 0.007$ ,  $r = 0.433$ ). Therefore the higher-order items, EE & II, are more difficult and may be hierarchically on a higher level than the SI and RI items as depicted in Figure 5.4.

These results indicate that the difficulty of the items confirms the presence and hierarchy of the cognitive construct groupings from the least difficult which are the lower-order items that test retrieval of specific information in the text (RI), increasing

in difficulty to the items requiring an ability to make an inference (SI), then becoming more difficult as items test the integration and interpretation (II) of a text, with the most difficult items requiring the learner to evaluate textual elements (EE).

## 5.6. FACTORS INFLUENCING ITEM DIFFICULTY

In exploring the item difficulty, text features (Snow, 2010) are also considered (see Figure 5.2). This is depicted below in Table 5.3 as text selection. The choice of text determines the characteristics of a text, such as the genre and conceptual complexity. It is recognised that vocabulary and phrasing affect item difficulty.

To examine the influence of text selection on item difficulty, a multiple regression was conducted in SPSS using item difficulties as the outcome variable ( $n=67$  items), and comprehension constructs (EE, II, SI, RI) and text selection (the passages) as predictors with each predictor being coded from least difficult to most difficult.

It was found that comprehension is a moderate predictor,  $\beta=.477$  ( $p=.000$ ) whereas text selection is a small predictor,  $\beta=.250$  ( $p=.023$ ). The overall model had an adjusted  $r^2=0.245$  ( $p=.000$ ). Notably, removing the variable 'text selection' weakened the model, showing that both comprehension construct and text characteristics are important predictors of item difficulty. Refer to Tables 5.3 and 5.4.

**Table 5.3. Multiple regression depicting the effect of process and passage on item difficulty**

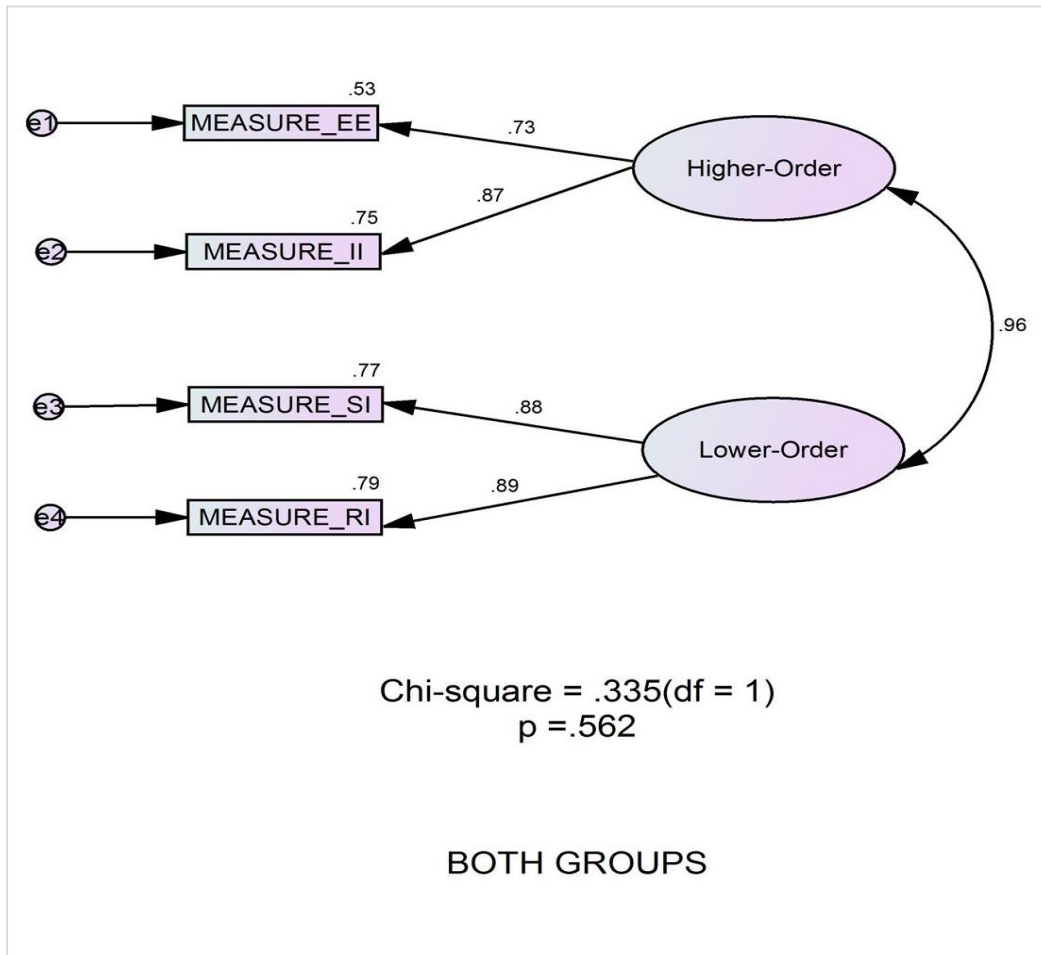
Model	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	-1.455	.342		-4.250	.000
Comprehension Process	.453	.102	.477	4.438	.000
Text selection	.222	.095	.250	2.325	.023

**Table 5.4. Effect size of multiple regression**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.518	.268	.245	.831

### **5.7. MODELLING THE PROCESSES TO THE HIGHER- AND LOWER-ORDER SUBSCALES**

Analysis of Variance confirmed that the higher level processes EE and II are significantly more difficult than RI which is the lowest level reading comprehension process requiring the learner to retrieve information. SI (straightforward inferencing), however, is not significantly different from the more difficult or easier constructs, suggesting that it may fall with either the higher- or lower-construct. Path modelling allowed for testing the theoretical relationships amongst the comprehension processes. Two path models depicted below (Figures 5.5 and 5.6) showed that the inferencing process SI fits well with the other two higher-order interpreting and evaluating comprehension processes (EE and II) in the models for the South African data as expected in the design of the test.



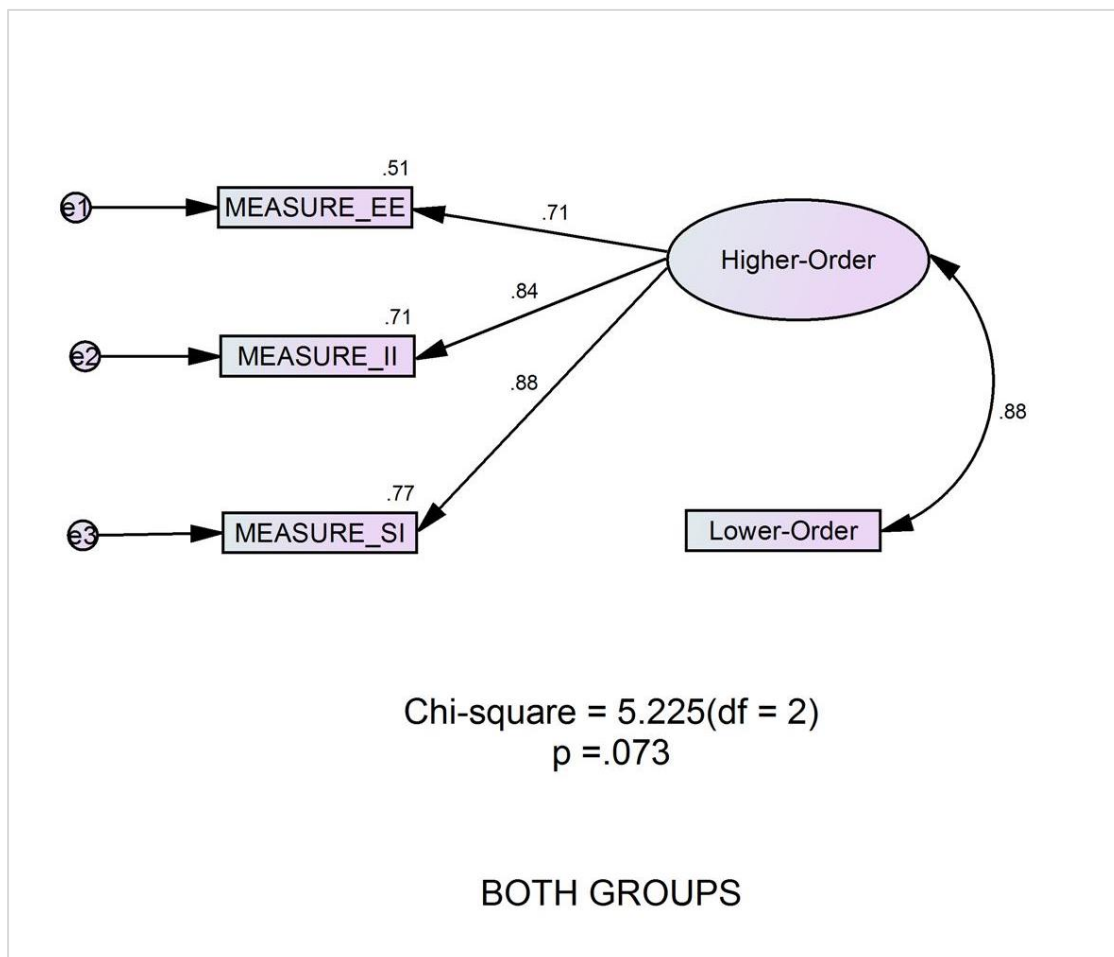
**Figure 5.5 Model depicting the relationship between the processes and the higher- and lower-order latent traits**

The relationship among these constructs were modelled using Amos (refer to Chapter 4 section 4.4.1.5 for a discussion of the method). Figure 5.5 above shows the squared multiple correlations ( $r^2$ ) for the observed reading processes (items), as well as the standardised regression weights of the latent traits to the observed items. In this model, the EE process had the lowest amount of variance explained, with 53% of its variance accounted for by the higher-order latent trait, the remaining 47% is accounted for by its error term (unique factor). All observed variables had statistically significant squared multiple correlations ( $p < 0.05$ ). The latent traits, higher-order construct and lower-order construct correlated highly at .96 ( $p < 0.000$ ). Overall the model fit the data well, with  $\chi = .335$  ( $p = .562$ ).

In Figure 5.5 SI was found to load strongly onto the *lower-order* construct (latent trait) (.77). This result indicates that the relationship between SI and the lower-order latent trait is contrary to what is expected in the design of the test as per the Assessment Framework for prePIRLS 2011 (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009).

The inferencing process has a strong relationship with the lower-order latent trait when examined in the full sample. (The processes and subscales are described in Chapter 2 section 2.3 and Chapter 4 section 4.1.6.)

The model fit is not improved in Figure 5.6 below by moving the SI item grouping to load onto the higher-order latent trait  $\chi= 5.225$  ( $p=.015$ ).



**Figure 5.6 Modelling the inferencing process to the higher-order latent trait**

In Figure 5.6 SI loads just as highly onto the higher-order latent trait (.77), but the better model fit results for the first model suggest that the items reflecting the ‘Straightforward inferencing’ (SI) comprehension process are experienced more as lower-order tasks, rather than higher-order tasks for the full sample of English learners.

## 5.8. COMPARING ITEM DIFFICULTY FOR ENGLISH L1 AND ENGLISH L2 LEARNERS

The full sample of English learners (N=543) were separated into English L1 ( $n=204$ ) and English L2 ( $n=215$ ) learners (see Chapter 4 section 4.4.1) The item difficulties of

English L1 and English L2 were compared using item maps. Using path modelling the correlation between the four reading processes and the higher- and lower-order constructs were explored.

### **5.8.1. Comparison of the spread of item difficulty for English L1 and English L2**

The item maps are a visual summary of the relationship between item difficulties and learner proficiencies as they emerge in the test. The items are ranked from the easiest (at the bottom) to the most difficult (at the top). The item map in Figure 5.7 illustrates the spread of item difficulty across the four reading comprehension constructs for booklets 4,5 and 9 for the English L1 group. Figure 5.8 is, likewise, an item map depicting the person-item measures for the English L2 group.

When looking at the Rasch item map in Figure 5.7 for the L1 English sample, we see that the assessment was very easy for this group, their mean ( $M=1.29$ ,  $SD=1.70$ ) was more than a standard deviation above that of the item mean ( $M=0.00$ ,  $SD=1.14$ ). The data fit the Rasch Model well with chi-square = 5636.19 and  $p=1.0000$ .



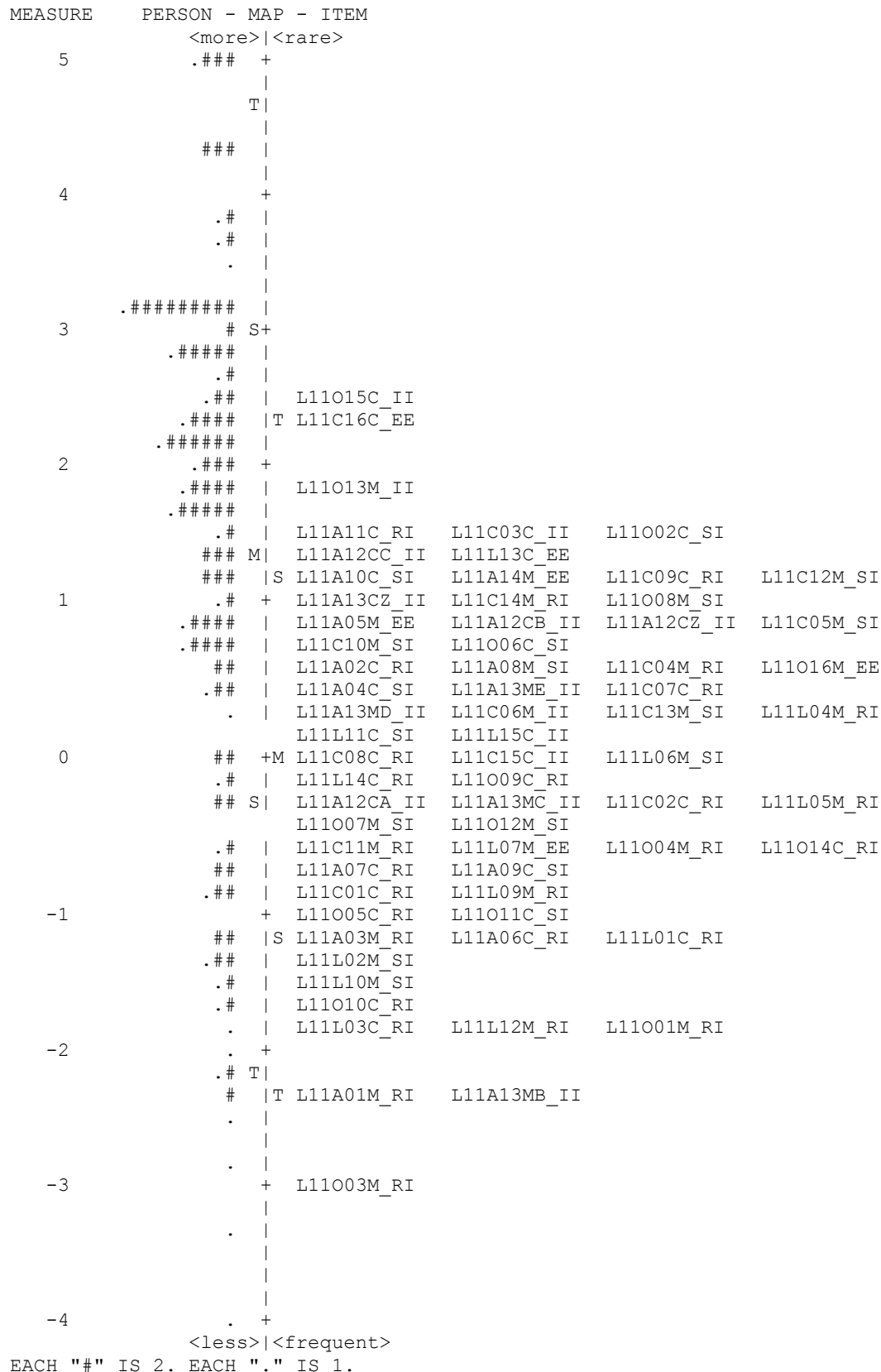


Figure 5.7 Person - Item measures for English L1

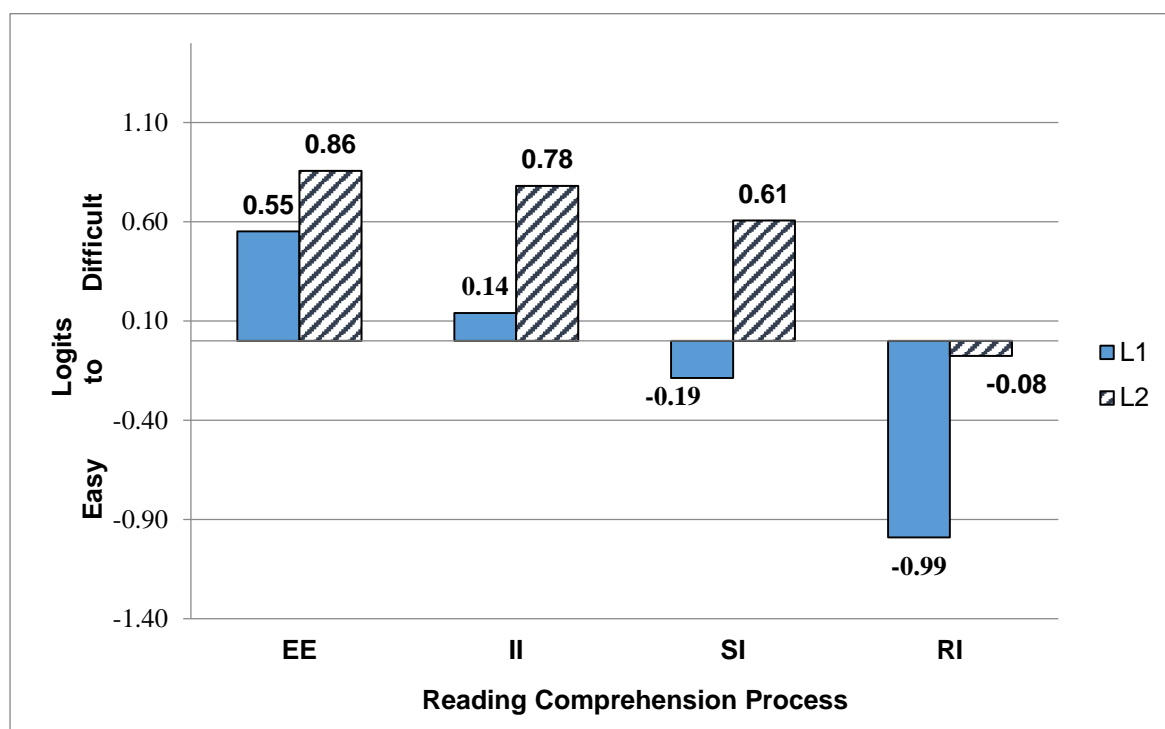
In Figure 5.7 the item threshold mean value is set at zero. The estimated learner proficiency values have a higher mean than the item mean which suggests that the test is targeted below their proficiency. Many of the learners are positioned in the top half of the map, indicating that their proficiency is high in comparison to the items and many of the English L1 learners would have experienced this test as easy.

The Rasch item map (Figure 5.8) for the English L2 group indicates that the estimated learner proficiency values have a slightly lower mean ( $M=-0.17$ ,  $SD=1.34$ ) than the item mean ( $M=0.00$ ,  $SD=0.97$ ) which suggests that the test is targeted slightly above their proficiency. Although slightly difficult, overall items are well-targeted to the student proficiency of the English L2 group. The test is better targeted for the Grade 4 second language speaking group than for the English L1 sample. The data did not fit the Rasch Model as well as previously, with  $\chi^2 = 7506.61$  ( $p=.0000$ ). Although slightly difficult, overall items are well-targeted to the learner proficiency of the English L2 group.



The item difficulties were statistically compared using SPSS version 23 and depicted in Figure 5.9. Difficulties are on a logit scale which ranges from -5 to +5. A comparison of all four processes across the L1 and L2 groups using a non-parametric independent samples test, the Mann-Whitney, shows that they are significantly different from each other ( $U=1\ 376.500$ ,  $p=.000$ ) with a moderate effect size ( $r=.333$ ).

However, a comparison of the higher-order evaluating (EE) and interpreting (II) items for English L1 and English L2 showed no significant difference in the learner performance on these items between the two groups. In contrast, a comparison of the inferencing (SI) process for English L1 and English L2 shows that the L2 learners found these items significantly more difficult ( $U=82.000$ ,  $p=.011$ ) with a moderate effect size ( $r=-.422$ ). Moreover, a comparison of the English L1 and English L2 for the retrieval (RI) reading process shows that the L2 learners found these lower-order items significantly more difficult ( $U=215.500$ ,  $p=.004$ ) with a moderate effect size ( $r = -.386$ ). This is depicted in Figure 5.9.



**Figure 5.9 Comparison of the English L1 and English L2 item difficulties**

The lack of any significant difference between the L1 and L2 group for the higher-order items suggest that these items did not challenge the L1 group. A greater spread of difficulty in the design of the higher-order items may have shown more variance in

performance between the L1 and L2 group. The higher-order items were easier for the L1 group than for the L2 group, and the lower-order items were extremely easy for the L1 group, but well-targeted to the L2 group.

The significant difference in performance between the L1 and L2 grouping on the items requiring the learners to retrieve information from the text (RI) and to make inferences (SI) suggests that this group of learners have not yet mastered these basic reading comprehension skills. This analysis shows that there is a critical difference between the L1 and L2 grouping in their ability to make inferences when reading a text. Moreover, the English L2 grouping found the lower-order task of retrieving information from the text significantly more difficult than the L1 group.

### **5.8.2. Comparison of English L1 and L2 item fit to the higher- and lower- order constructs**

Path Modelling of the English L1 and English L2 data show a comparison of how the items load onto the higher- and lower-order latent traits for the two different socio-linguistic groupings.

Figure 5.10 below shows the squared multiple correlations ( $r^2$ ) for the observed comprehension processes (items), as well as the standardised regression weights of latent traits to the observed items. In this model, the EE variable had the lowest amount of variance explained, with 53% of its variance accounted for by the higher-order latent trait, the remaining 47% is accounted for by its error term (unique factor). All observed variables had statistically significant squared multiple correlations ( $p < 0.05$ ). The latent traits, that is, the higher-order construct and lower-order construct, correlated highly at .96 ( $P < 0.000$ ) suggesting that separating the processes may be unnecessary. Overall the model fit the data well, with  $\chi = 0.281$  ( $p = .596$ ).

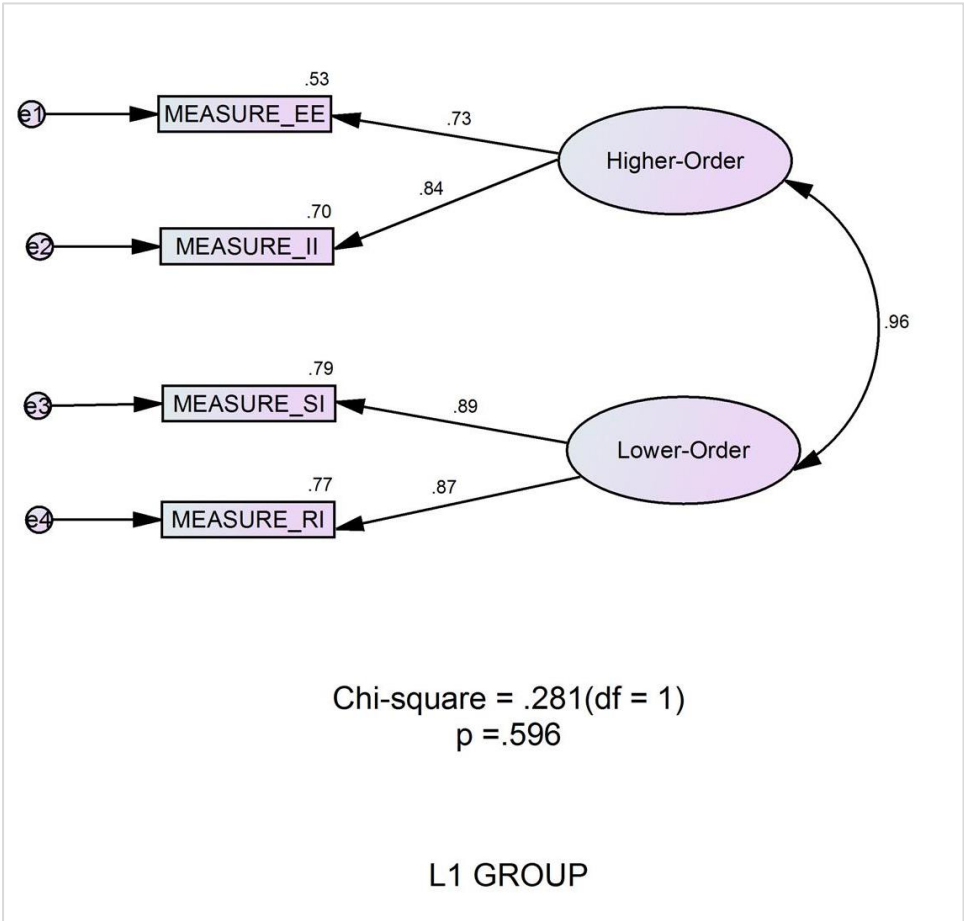


Figure 5.10. English L1 model fit for the higher- and lower-order constructs

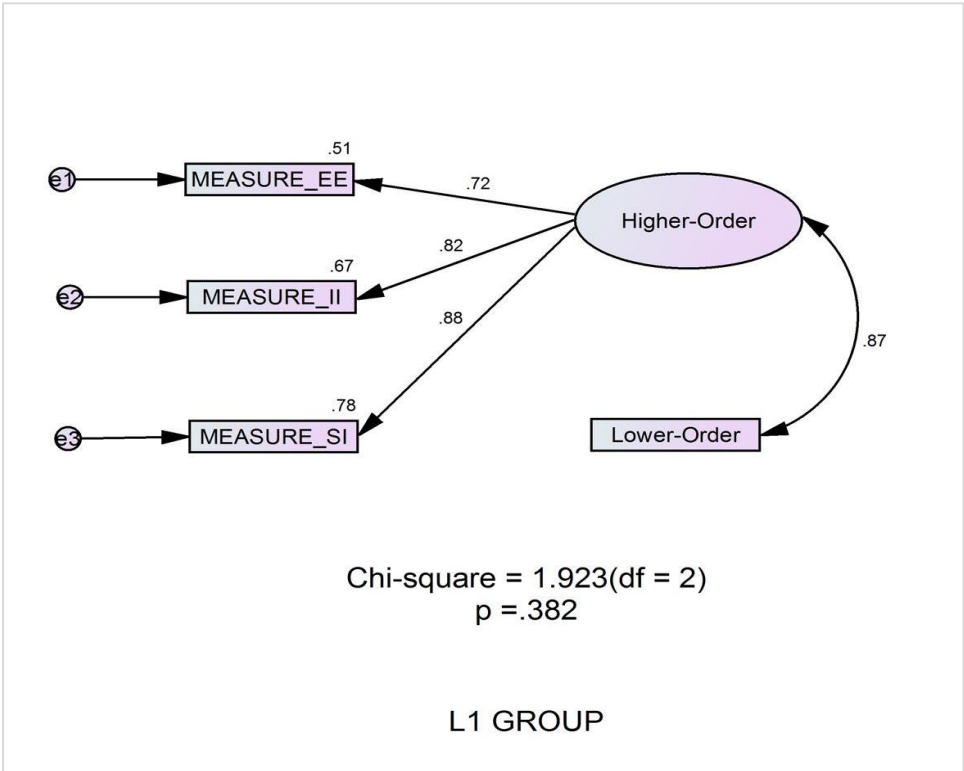
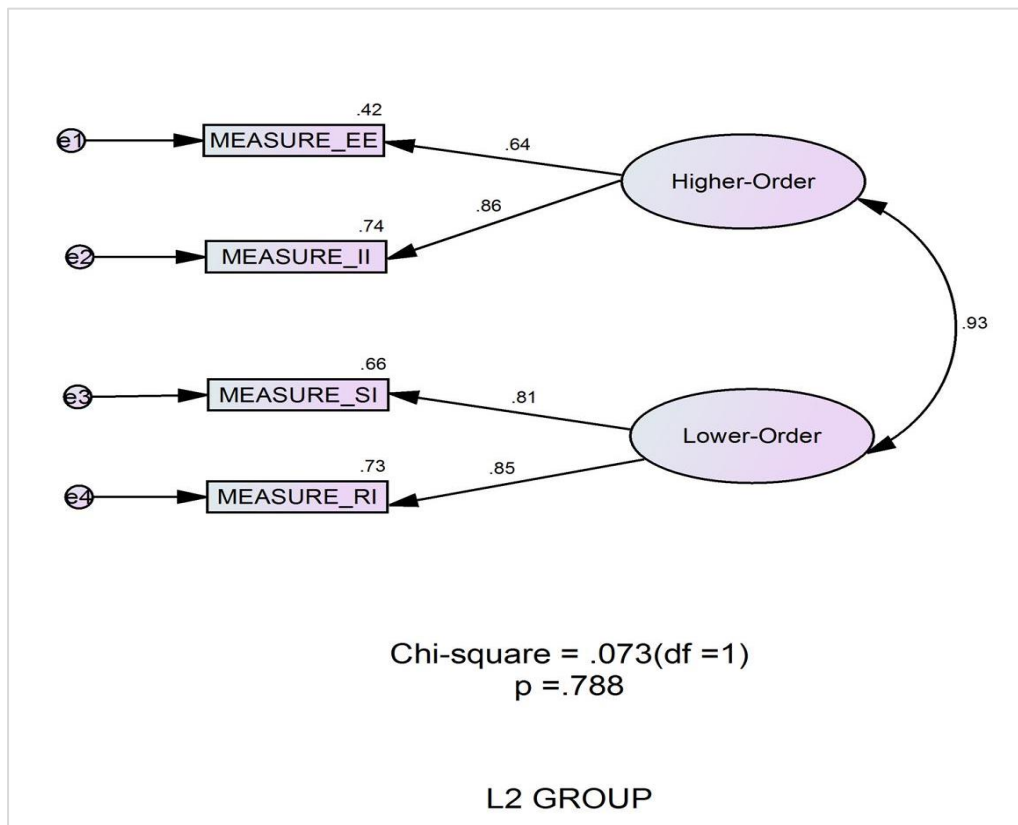


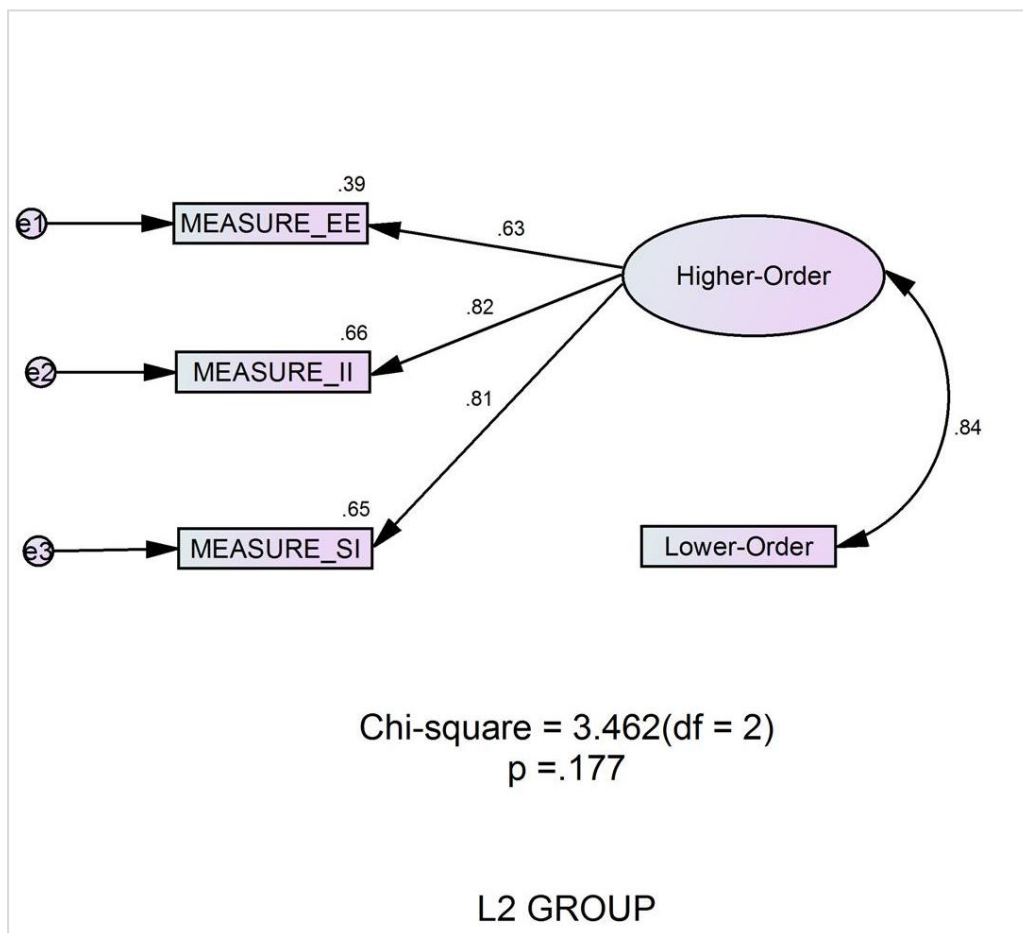
Figure 5.11. English L1 model changed for fit to the higher- and lower-order constructs

Moving the inferencing (SI) item grouping to fit with the higher-order latent trait (Figure 5.11) does not improve the overall model fit for the L1 group  $\chi= 1.923$  ( $p=.382$ ). The amount of variance explained by the inferencing (SI) item grouping in this model is slightly less (78%). Interestingly, SI loads as highly onto the higher-order latent trait than the other two processes (EE=51% and II=67%). However, this model shows that for the L1 group the SI process is a better fit to the lower-order latent trait when considered within the overall model for this test.



**Figure 5.12 English L2 model fit for the higher- and lower-order constructs**

In Figure 5.12 for the English L2 sample the data fit the model very well  $\chi= 0.073$  ( $p=.788$ ). This model depicts a better fit to the data than for the L1 group (or full sample). The inferencing comprehension process for the L2 group clusters better with the lower-order retrieval items to form a lower-order construct in the test.



**Figure 5.13 English L2 model changed for fit to the higher- and lower-order constructs**

In Figure 5.13 the model is not improved for the L2 group by moving the SI item grouping to load onto the higher-order latent trait  $\chi = 3.462$  ( $p = .177$ ). This suggests that for the L2 sample this item grouping fits notably better with the lower-order construct. Since the inferencing and retrieval items were both very difficult for the English L2 group, it is possible that these items cluster and work together as a construct in the test for the L2 group. The interpreting (II) and evaluating (EE) items are extremely difficult for the L2 grouping and form their own higher-order cluster in the test.

## 5.9. DISCUSSION OF THE VALIDITY OF THE HIGHER-ORDER AND LOWER-ORDER CONSTRUCT

The cohesiveness of the assessment's four reading comprehension processes were explored (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). Confirmatory Factor Analysis (CFA) indicated that the comprehension structures exist in the data. Items



that did not load highly onto their corresponding reading comprehension process were then analysed in terms of the confounding influences that can stem from intentional or unintentional item development factors and affect the validity of the construct.

The analyses showed that the items cluster together in their reading processes and that the processes differ (in the expected hierarchical order) from each other. This suggests that item difficulty is influenced by the reading process employed in the development of the item. Other factors that contribute to the hierarchical pattern of difficulty include text features (and possibly, but not explored here, the phrasing of an item, the vocabulary used and the type of task).

It was postulated that the reading comprehension process (used in the design of the item) and text features would affect item difficulty. A multiple regression model with *comprehension* (EE, II, SI, RI) and *text selection* (two released passages and two unreleased passages) as predictors showed that both comprehension processes and text are significant predictors of item difficulty.

Using path modelling it was found that the *Make Straightforward Inferences* (SI) reading comprehension process explains a similar amount of the variance in the higher-order construct as for the lower-order construct for the full English sample. For the L1 group the model is not improved by positioning the SI item grouping with the higher-order cluster and for the L2 group the data is also (and more so than for the full sample and L1 group) better fit to a model where SI remains classified with the lower-order trait. This observation contributes to the discussion on how factors, such as separating out first or second language, might affect the categorisation of a reading comprehension task. Since the test was targeted below the proficiency of the L1 learners the higher-order constructs do not appear to have challenged these learners and SI (which was also experienced as easy) clustered well with the other two higher-order constructs (II and EE), but better with RI. The higher-order constructs did not discriminate well from the lower-order processes for this more proficient group, and instead the items were all relatively easy across the reading comprehension processes.

The item maps (Appendix C) show that both the higher-level processes and the lower-level processes affect the difficulty of the item and, furthermore, appear to be affected

by the learner's sociolinguistic (L1 and L2) context. These findings suggest a multi-faceted definition of higher-order reading comprehension (McNamara, Jacovina & Allen, 2016; Afflerbach, et al., 2015).

Many top-performing countries had a relative strength in the interpreting, integrating, and evaluating reading comprehension skills and strategies compared to their reading achievement overall in PRLS 2011 – Hong Kong SAR, the Russian Federation, Singapore, Northern Ireland, and the United States, as well as the Canadian province of Ontario and the US state of Florida. (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). This adds to the enquiry of whether a higher-order item is a higher-order item in every context. Countries where these particular types of items are often used in classroom assessments may mean that familiarity with the item type elicits a more automatic and practiced response from the learner. Learners that need to think deeply to answer an item might be said to be engaging in a higher-order task, regardless of the comprehension process.

These analyses indicate that the higher-order construct is reliable and valid - more so when separating out the socio-linguistic groupings embedded in the sample - which lays the foundation for consequent research into learner performance for the different language groupings. It was found that the test is well-targeted to the English L2 learners (Appendix C summarises the findings of the item maps), but easy for the English L1 grouping. This finding is important for placing the research of the consequent chapters in perspective. Notably, it was found that the English L2 learners are not at the same level of proficiency in higher-order reading comprehension as the English L1 learners despite their medium of instruction having been the same over the foundation phase of schooling. The L2 grouping had not mastered the tasks that required retrieval of information and straightforward inferencing and experienced these items as significantly more difficult than the L1 grouping. Understanding that learners with different socio-linguistic contexts, even within the same language of instruction, differ markedly in their ability to perform on the different comprehension processes has important considerations for the development of items and the reporting of results in large-scale testing.



## CHAPTER 6

### **COMPARING THE EFFECT OF DIFFERENT LANGUAGE OF INSTRUCTION MODELS ON LEARNER PERFORMANCE**

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This chapter addresses the research question: *How does learner performance on the higher-order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as LoLT and English L2 as LoLT for low socio-economic status learners?*

Another research question addressed in this section is: *What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?* This research question was included in order to ascertain what the effect of access to text is on these two language models in a single-level analysis for comparison with the findings of the multilevel analyses exploring contextual factors as home and school mediatory contexts as part of the main research question. The analyses in this chapter lay the ground work for the results of the multilevel analyses conducted in Mplus (version 7.4) that bring together the full model described in the conceptual framework as 'home and school mediatory contexts'. The findings of these analyses follow in Chapter 7.

Due to the importance of considering socio-economic status in the South African context and due to the fact that the English L2 low SES learners identified for comparison of performance to the African language L1 learners created a distinct subsample in this study, this dataset (N=480) was used to analyse the effect of access to text at the home and school level in a two-level analysis using hierarchical linear modelling (HLM). The findings are described in this chapter (section 6.6.) as a continuation of the research into the effect of access to text for the low SES English immersion (L2) group.

This chapter provides a comparison of the performance on the higher-order subscale of the learners whose language of instruction is an African language as a home

language or L1, and Learners who are receiving instruction in English, where English is not their home language (L2 learners). As a point of reference, an understanding of the performance of learners across the three language groupings English, Afrikaans and the African languages is explored, as well as a comparison within the groupings of performance on home language in contrast with L2 is explored. The Afrikaans grouping is retained in these initial analyses because it is important to understand performance on the different language models in the context of the entirety of the South African language in education landscape, but the latter sections focus on the performance of the African languages L1 grouping and the English L2 language of instruction models.

This chapter establishes the foundation for a comparison of language support, access to text and socio-economic status (described as home and school mediatory contexts) across the language groupings in Chapter 7 by describing learner performance as affected by access to text (in the form of children's books at home and school library books with different titles) explored for the English L2 and African Languages L1 at the learner level in single-level analyses, and then for the low SES English L2 learners at the school level in a two-level HLM analysis.

All the variables used in the analysis for this section are described in Chapter 4 section 4.4.

Section 6.1 describes the results of a comparison of the different language of instruction models on performance on the higher-order subscale. The performance of learners writing in Afrikaans L1, African languages L1 and English L2 are compared against performance in English L1 in Section 6.2. Learner performance for African Languages L1 and English L2 are compared in section 6.3. The effect of access to text at home and at school is compared in section 6.4. In Section 6.5. the African languages home language group and the English L2 language model are compared across the lowest socio-economic level. The effect of access to text for the same sample of low SES English L2 learners is explored at the home and school level in a two-level analysis. The findings of the chapter are discussed in section 6.7.

## **6.1 COMPARISON OF THE LANGUAGE OF INSTRUCTION MODELS**

A comparison of three language of instruction groupings is made: English, Afrikaans and African languages. The group 'African Languages' includes isiZulu, isiNdebele,

Sepedi, Setswana, Xitsonga, isiXhosa, Tshivenda, siSwati and Sesotho. Since prePIRLS 2011 sampled schools according to the language of instruction of the school the language of instruction of the learner is also the language of the test.

The analysis is conducted at the learner level and learners whose LoT / LoLT are English as an L2 may be in a school where they find themselves in amongst peers who are mostly English first language speaking or the school may be predominantly English second language speaking.

### **6.1.1. Comparing the different language of instruction groupings**

Table 6.1 below shows the difference in mean performance for learners who spoke the language of the test before starting school: 1= LoT Afrikaans; 2 = LoT English; 3 = LoT African Language. The table indicates that mean performance on the higher-order subscale improves where learners spoke the language of the test before going to school for each of these three language groups, but that this difference is more marked for English and Afrikaans. Afrikaans, however, has only 48 learners that wrote the test in Afrikaans but did not speak the LoT before going to school. English has 835 who spoke the language of the test before school and 866 learners who did not. Mean performance on the higher-order subscale for this group is 495.72 (SE=9.78). The African languages group who spoke the language of the test before school has a mean performance of 431.01 (SE=4.42), showing that on this subscale there is still a marked difference between these two groups of learners.

Of particular interest are the two highlighted groups in the Table 6.1: The English learners that are at a school where their LoLT is English, but this is not a language they spoke before starting school and the African language learners whose LoLT was an African language from Grades 1 - 3, but would have transitioned at the start of Grade 4 to an English LoLT.

The African language learners whose LoLT is their L1 (or language that they spoke before school) perform better than those learners for whom it is their L2, but still have an average that is more than 60 score points less than the English L2 learners.

**Table 6.1. Learner performance across language groupings for L1 and L2**

<b>Language of Test</b>	<b>Spoke LoT before School</b>	<b>Sample size (n)</b>	<b>Percent</b>	<b>Percent SE</b>	<b>Higher-order Subscale MEAN</b>	<b>MEAN SE</b>
Afrikaans	Yes	1009	95,65	1,24	535,66	11,33
	No	48	4,35	1,24	480,63	12,60
English	Yes	835	48,35	4,12	573,94	11,55
	No	866	51,65	4,12	495,72	9,78
African Language	Yes	7 705	87,77	1,07	431,01	4,42
	No	1 793	12,23	1,07	405,52	5,56

### 6.1.2. Performance on the International benchmarks for African L1 and English L2

Performance of the African Languages L1 and English L2 grouping was compared across the prePIRLS 2011 International Benchmarks.

Mean performance on the international benchmarks depicted in Table 6.2. shows that almost twice as many African L1 learners failed to reach the 'Below 400 points' compared to the English L2 learners. The English L2 learners have 14.3% of learners in the 'At or above 550, but below 625' category compared with only 4.0% for the African languages L1 learners, which means notably more English L2 learners fall into the highest international benchmark.

**Table 6.2. International benchmarks reached by English L2 and African languages L1**

Language of Learning and Teaching	International Reading Scale Benchmark Reached				
	Below 400	At or above 400, but below 475	At or above 475, but below 550	At or above 550, but below 625	At or above 625
English L2	20.9%	33.1%	27.9%	14.3%	3.9%
African language L1	37.0%	37.3%	21.5%	4.0%	0.3%

### 6.2. THE EFFECT ON PERFORMANCE OF THE DIFFERENT LANGUAGE OF INSTRUCTION MODELS

The multiple regression tabulated in 6.3 below (conducted in the IDB Analyser version 3.0) indicates that there is 49.55 (t-value significant at -9.06) decrease in score points

when the learner writes in English as an L2 (language not spoken before school) compared to an English L1 learner which is used in this analysis as the constant.

**Table 6.3. Results of a multiple regression comparing language models**

Model						Unstandardised			Standardised		
	Constant	SE	t	$\Delta R^2$	SE	B	SE	t	$\beta$	SE	t
	559.13	10.87	51.44	.28	.04						
English L2						-49.55 **	5.85	-8.48	-.20**	-.02	-9.06
Afrikaans LoT						-23.72	14.44	-1.64	-.07	.04	-1.66
African Languages LoT						-125.18**	11.36	-11.02	-.59**	-.04	-14.03

\*t-value >1.96; \*\*t-value > 2.58

Notably, the full group of African Language learners achieve 125.18 (t-value significant at 14.03) score points less than the English first language learners and approximately 75 score points less than the English L2 learners, comparable to two years of schooling. The effect size for this model is moderate at .28. There are no controls for socio-economic status or other contextual factors in place in this model.

### 6.3. COMPARING PERFORMANCE OF AFRICAN LANGUAGES L1 AND ENGLISH L2 LEARNERS

Linear regression analyses were conducted showing the effect of LoLT on performance for both the additive bilingual and immersion groups (Table 6.4).

The 'additive bilingual' variable used in the linear regression tabulated below separates the African language learners into those that spoke the language of the test before school (learners receiving instruction under an additive bilingual model) and those that did not (African language learners who are not receiving instruction in their home language). The number of learners for each grouping and their mean averages are reflected in Table 6.1.



**Table 6.4. Linear regression model for African languages L1 on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	418.27	0.01						
Additive Bilingual LoLT			12.74**	2.72	4.69	.11**	.02	4.83

\*t-value >1.96; \*\*t-value > 2.58

Analysis of the African language learners L1 (also referred to in this study as the additive bilingual language model) indicates that learners benefit by 12.74 ( $B=12.74$ ,  $t=4.69$ ) score points on a single-level linear regression by being in this language grouping. This shows that African language learners benefit from receiving instruction in a language that they spoke before starting school.

The ‘immersion LoLT’ variable used in the linear regression tabulated below separates the English language learners into those that spoke the language of the test before school (English home language learners that spoke the language of the test before school) and those that did not (learners who are receiving instruction in English under an immersion model). The number of learners for each grouping and their mean averages are reflected in Table 6.1.

**Table 6.5. Linear regression model for English L2 on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	534.83	0.15						
Immersion LoLT			-39.1**	5.24	-7.4	-3.8**	.04	-8.70

\*t-value >1.96; \*\*t-value > 2.58

Learners that receive instruction in English as an L2 (also referred to as an immersion language model in this study) score 39.1 ( $B=-39.1$ ,  $t=-7.4$ ) points less than learners receiving instruction in English L1.

#### 6.4. COMPARING THE EFFECT OF ACCESS TO TEXT AT HOME AND SCHOOL ON PERFORMANCE

Since access to text is an important contextual factor in this study, multiple regression analyses at the learner level were conducted showing the effect of an additive bilingual and an immersion LoLT with access to text at home and at school on performance.

The variable ‘number of children’s books’ presents the following frequencies:

**Table 6.6. Number of children’s books at home and language of LoLT**

Number of Children’s Books in the Home	English Immersion %	Additive Bilingual %
0-10 books	66.9	64.9
11-25 books	20.2	20.2
26-50 books	8.6	8.5
51 and above books	4.3	6.5

For both groupings, more learners fall into the lowest category of 0-10 books, however, more learners in the additive bilingual language model grouping have 51 or more children’s books.

**Table 6.7. Multiple regression model for additive bilingual LoLT and children’s books at home on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	421.45	0.01						
Additive Bilingual LoLT			13.28**	2.95	4.49	.11**	.02	4.60
Children’s Books at Home			.77	2.07	.37	.01	.02	.37

\*t-value > 1.96; \*\*t-value > 2.58

Notably, learners receiving instruction in an African Language at the L1 level do not benefit at a significant level from having children’s books at home. Possibly, where there are children’s books at home these books are not being read to or by the

learners, and therefore, not having an effect on learner performance. It is possible there is too little motivation for the learners to engage with the text in the home.

**Table 6.8. Multiple regression model for immersion LoLT and children’s books at home on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	541.06	0.17						
Immersion LoLT			-37.5**	4.69	-8.01	-3.7**	.04	-9.50
Children’s Books at Home			14.10**	4.45	3.17	.11**	.03	3.30

\*t-value >1.96; \*\*t-value > 2.58

Learners receiving instruction in English L2 benefit at a significant level by 14.10 ( $B=14.10$ ,  $t=3.17$ ) score points from having children’s books at home. This model, however, has a small effect size at 0.17.

The variable ‘School has a library’ presents the following frequencies:

**Table 6.9. School has a library**

School has an Existing Library	English Immersion %	Additive Bilingual %
No	41.1	67.7
Yes	58.9	32.3

Notably, a greater percentage of learners do have a library in their school than do not within the English immersion LoLT grouping. Within the African LoLT grouping more learners do not have access to a library at their school. Although access to children’s books at home is similar for the two groups (as seen in Table 6.6.), the English immersion students have access to better resources by attending an English LoLT school.

**Table 6.10. Multiple regression model for immersion LoLT and school has a library on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	515.89	.27						
Immersion LoLT			-33.0**	4.69	5.86	-.32**	.05	-5.89
School has a library			34.83**	11.44	3.04	.33**	.09	3.56

\*t-value >1.96; \*\*t-value > 2.58

A single level multiple regression indicates that learners receiving instruction in English L2 are likely to benefit by 34.83 score points when the school has a library ( $B=34.83$ ,  $t=3.04$ ). This model has a small effect size at .27. This indicates that learners receiving instruction in English as an L2 benefit significantly from access to a library at their school.

**Table 6.11. Multiple regression model for additive bilingual LoLT and school has a library on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	423.55	.01						
Additive Bilingual LoLT			8.81**	2.70	3.26	-.07**	.02	3.46
School has a library			6.36	4.76	1.33	.07	.05	1.35

t-value >1.96; \*\*t-value > 2.58

Interestingly, the model above indicates that learners receiving instruction in their L1 as an African language do not benefit at a significant level by having a school library. This finding may indicate that other contextual factors play a more important role in learner performance for this grouping.

For all the above analyses in this chapter the African L1 and English L2 groupings were created by separating the learners according to those who spoke or did not speak the language of the test before school. The models below (Table 6.10 and Table 6.11) indicate the effect on performance when learners 'never' or 'sometimes/always speak' the language of the test at home.

The frequencies of the variable 'language of test as LoLT' present the number of learners for each category as follows:

**Table 6.12. Frequency of language of test spoken at home**

How often do you speak the LoT at home	Afrikaans LoLT	English LoLT	African Languages LoLT
Never	27	295	736
Sometimes / Always	1330	1 710	9 093

A multiple regression was run at the learner level to explore the effect on performance of learners who speak the language of the test at home, as well as, the effect of access to text at home on learner performance for these LoLT groupings.

**Table 6.13. Multiple regression model for home language as LoLT and children’s books at home**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	552.32	.28						
African Languages HL as LoLT			2.30	4.11	.56	.02	.04	.56
Afrikaans HL as LoLT			51.85**	6.32	8.20	.32**	.04	7.64
English HL as LoLT			58.16**	5.57	10.44	.49**	.04	12.68
Children’s books at home			11.21**	2.02	5.55	.09**	.02	5.74

*t-value* >1.96; *\*\*t-value* > 2.58

Learners that often speak the LoT at home are likely to benefit by 51.85 score points for Afrikaans and 58.16 score points for English. In this model, there is no significant benefit for the African languages group L1 that receive instruction in the language that they speak at home. Furthermore, learners are likely to benefit by 11.21 score points ( $B=11.21$ ,  $t=5.55$ ) across this full sample from having children’s books at home. However, the model has a small effect size.

**Table 6.14. Multiple regression model for home language as LoLT and books at school**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	528.05	.26						
African Languages HL as LoLT			1.11	3.81	.29	.01	.04	.29
Afrikaans HL as LoLT			43.74**	5.90	7.42	.26**	.04	6.42
English HL as LoLT			46.38**	6.17	7.52	.39**	.04	8.61
School has a Library			18.03**	4.34	4.16	.18**	.04	4.37

*t-value >1.96; \*\*t-value > 2.58*

Learners that often speak the LoT at home benefit by 43.74 score points for Afrikaans and 46.38.16 score points for English. In this model, there is no significant benefit for the African languages group L1 that receive instruction in the language that they often speak at home. Furthermore, learners are likely to benefit by 18.03 score points ( $B=18.03$ ,  $t=4.16$ ) across this full sample from having a school library. The model has a small effect size.

## 6.5. COMPARING PERFORMANCE FOR AFRICAN LANGUAGES L1 AND ENGLISH L2 LOWEST SES GROUPS

Of particular interest in this study is the effect of low socio-economic status on performance for learners receiving instruction in the different language of instruction models.

In order to explore the effect of SES on learner performance of learners receiving instruction within an additive bilingual and immersion approach a sub-sample of the learners in disadvantaged schools was created using the variable that identifies the learners in schools in which more than 50% of learners are from disadvantaged homes.

The variable ‘percentage learners disadvantaged in the school’ when tabulated with the English immersion and additive bilingual grouping presents the following frequencies in terms of the number of learners for each category:

**Table 6.15. Immersion and additive bilingual learners percentage disadvantaged**

Percentage learners disadvantaged in the school	Not English Immersion	English Immersion	Not Additive Bilingual	Additive Bilingual
50% or less	326	281	263	1 567
More than 50%	314	484	1 396	5 858

The frequencies of this variable indicate that more learners within both the immersion and the additive bilingual grouping fall into the lower SES grouping. Proportionally, more learners within the English immersion grouping fall into the higher SES bracket than is observed for the additive bilingual model and, interestingly, the English L1 grouping (not English immersion) is split almost equally between the low SES and the high SES bracket. Notably, these frequencies suggest that English immersion as a LOLT is not just the experience of learners in high SES schools, but is also, and more so, the experience of low SES learners.

The study also investigated whether belonging to either the non-mother tongue English LoLT (low SES) group or the African Languages LoLT as equal to mother tongue (low SES) group results in a significantly better chance of performing better on the higher-order prePIRLS 2011 subscale.

Further analysis also used performance on the High and Advanced International Benchmarks as a demonstration of proficiency in higher-order reading comprehension (see Chapter 2 section 2.3. for a description of the international benchmarks).

A two-level analysis using hierarchical linear modelling explores the effect of access to text on the low SES English L2 grouping (N=480) in section 6.6.

### 6.5.1. Linear regression comparing African languages L1 and English L2 low SES performance

A linear regression of the specified sample (described in Chapter 4 section 4.4.2.) was conducted to investigate the effect of language of instruction on the performance of the learners from low SES backgrounds.

**Table 6.16. Linear regression results for effect of language of instruction on the higher-order subscale**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	453.84	0.3						
Language of Instruction			20.35**	6.38	3.19	.18**	.05	3.35

*t-value >1.96; \*\*t-value > 2.58*

The linear regression results (Table 6.16) revealed that learners from a disadvantaged background whose LoLT is English despite it not being a language spoken before they started school (n=6 342), benefit by 20.35 score points ( $B = 20.35$ ,  $t\text{-value} = 3.19$ ) from being in the English LoLT group, in comparison to the African languages (LoLT spoken before they started school) group as a measure of achievement on the higher-order subscale.

The African Language L1 group was then reduced through random sampling for equivalence with the English L2 group (resultant combined sample was n=968) and outliers removed before running the regression again. The results of this regression are depicted in Table 6.17 below.

**Table 6.17 Linear regression results for effect of language of instruction on reduced sample**

Model	CONSTANT	$\Delta R^2$	Unstandardised			Standardised		
			B	SE	t	$\beta$	SE	t
	455.79	0.4						
Language of Instruction			17.34*	7.13	2.43	.20*	.08	2.46

*t-value >1.96; \*\*t-value > 2.58*

The results indicate a 17.34 regression co-efficient ( $B=17.34$ ) with a  $t\text{-value}$  of 2.43 which is significant at the 0,05 level. Learners from a disadvantaged background



whose LoLT is English despite it not being their mother tongue, benefit by 17.34 score points (equivalent to just under half a year) from being in the English LoLT group, in comparison to the African languages LoLT group (despite this being their mother tongue) as a measure of achievement on the higher-order subscale.

### 6.5.2. Comparison of African languages L1 and English L2 Low SES on the International benchmarks

Since the items across the achievement booklets are classified according to difficulty levels in the IEA stipulated benchmarks, with the items assessing higher-order reading comprehension ability in the High and Advanced benchmarks, achievement on this scale is also an indication of learners' ability to comprehend text using higher-level processing.

**Table 6.18. Percentage of learners in language groups meeting highest level benchmarks**

	At or above 475, but below 550	At or above 550
African Language L1	80.7%	19.3%
English L2	61.4%	38.6%
Total	68.9%	31.1%

By combining benchmarks 4 (550) and 5 (625) as an indication of the highest level of reading comprehension tested on this assessment and retaining benchmark 3 (475) which includes inferential questions and the more difficult access and retrieve items, a chi square test was conducted to ascertain whether there is an association between the learners' LoLT and the likelihood of falling into the highest (combined) benchmark. The association was found to be significant. The results of the chi square test showed that the learners in the English non-mother tongue low SES group are statistically more likely to fall in the highest level combined benchmark ( $\chi^2 (1) = 14.948, p = .000$ ) than the African languages mother tongue low SES group.

## 6.6. EXAMINING THE EFFECT OF ENGLISH L2 INSTRUCTION AND ACCESS TO TEXT ON PERFORMANCE IN LOW SES SCHOOLS

Since access to text contributes significantly at the learner level (single-level analysis) for the English immersion grouping as described in Tables 6.7 and 6.8 at both the home ( $B=14.10$ ,  $t=3.17$ ) and school ( $B=34.83$ ,  $t=3.04$ ) level, hierarchical linear modelling (HLM) was conducted on low SES English L2 learners ( $n=480$ ) in order to explore the effect of home and school level access to text within a two-level regression analysis on this grouping. The number of schools in the analysis were 26. The research method for this analysis is outlined in Chapter 4 section 4.4.2.

### 6.6.1. Null model for English L2 low SES grouping

First the null model was calculated, to account for between school variance (only one class from each school was sampled and, therefore, class is equivalent to school). The intra-class coefficient (ICC) showed that between class differences accounted for much of the variance in reading achievement at 43%, and therefore HLM was a recommended form of analysis. The summary of the null model is described below.

The null model has no explanatory variables and can be described as:

Level-1 Model

$$ASRIIE01_{ij} = \beta_{0j} + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

Mixed Model

$$ASRIIE01_{ij} = \gamma_{00} + u_{0j} + r_{ij}$$

$\beta_{0j}$  is the level 1 intercept,  $\gamma_{00}$  is the mean value of the level 1 outcome across all level 2 units and  $u_{0j}$  is the deviation from the grand mean.

**Table 6.19. Final estimation of fixed effects**

Fixed Effects	Coefficient	Standard Error	p-value
For INTRCPT1, $\beta_0$			
INTRCPT2, $\gamma_{00}$	482.75	15.11	<0.001

The final estimation of fixed effects (with robust standard errors) presents a coefficient of 482.75 (B=482.75, SE=15.11).

**Table 6.20. Final estimation of variance components**

Random Effect	Standard Deviation	Variance Component	p-value
For INTRCPT1, $u_0$	58.99	3480.05	<0.001
level-1, $r$	67.75	4590.22	

From the variance components indicated in Table 6.20 it is evident that 43% of the variance in performance can be explained at school level meaning that less than half of the differences in the scores for learners can be explained by the differences between schools. The reliability estimate for this model was .909.

The effect of access to text at home and at school on English L2 low SES learners was explored and the results are presented below.

### 6.6.2. Two-level model showing effect of access to text for English L2 low SES learners

For this analysis, the variables used indicated the number of children's books at home in the language of the test (level 1 or home level) and the number of books with different titles found in the school (level 2 or school level). The model explored can be presented as follows:

Level-1 Model

$$ASRIIE01_{ij} = \beta_{0j} + \beta_{1j}^*(BKSL0T_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01}^*(ACBG09A_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

Most (75%) of the English L2 learners had books at home in English (see table 6.21).

**Table 6.21. Children's books in English in the home**

Children's Books in the Home in the Language of the Test (in English)		
	n	%
No	98	25%
Yes	303	75%

More than half of the English L2 learners (59%) attended a school with no library (see Table 6.22) and only 29% attended a school with more than 500 books in the library. English L2 learners were not exposed to a print rich environment at school in general.

**Table 6.22. Availability of school library and number of books with different titles**

Number of Books with Different Titles in the School Library		
	n	%
No Library	287	59
Less than 500 books	53	12
More than 500 books	140	29

Mixed Model:

$$ASRIIE01_{ij} = \gamma_{00} + \gamma_{01} * ACBG09A_j + \gamma_{10} * BKSLOT_{ij} + u_{0j} + r_{ij}$$

**Table 6.23. Final estimation of fixed effects for access to text at home and at school**

Fixed Effects	Coefficient	Standard Error	p-value
For INTRCPT1, $\beta_0$			
INTRCPT2, $\gamma_{00}$	479.79	12.54	<0.001
ACBG09A, $\gamma_{01}$	32.92	13.96	0.027
For BKSLOT slope, $\beta_1$			
INTRCPT2, $\gamma_{10}$	0.00	0.00	0.929

For low socio-economic English L2 learners access to a school library with a number of different titles significantly (at the .05 level) affects the learner’s performance positively ( $B=32.92$ ,  $SE=13.96$ ,  $p=.027$ ). Interestingly, access to children’s books in the home in the language of the test has no significant effect for learners in this low socio-economic bracket when modeled in a two-level analysis that accounts for the between school variance.

**Table 6.24. Final estimation of variance components for access to text at home and school**

Random Effect	Standard Deviation	Variance Component	p-value
For INTRCPT1, $u_0$	49.98	2498.44	<0.001
level-1, $r$	67.76	4592.71	

From the variance components indicated in Table 6.24 it is evident that 35% of the variance in performance can be explained at school level by this model. The reliability estimate for this model was .880.

Hierarchical linear modelling (Raudenbush, Bryk & Congdon, 2011) at the student- and school - levels suggest that access to a school library with a number of different titles explains considerable variance in performance at the school level ( $B=32.91$ ,

SE=13.96) for the sample (N=480) of low SES English L2 learners. This model accounted for 35% of the variance explained in reading achievement.

## **6.7. DISCUSSION OF THE COMPARISON OF THE DIFFERENT LANGUAGE OF INSTRUCTION MODELS**

The above analyses explored how the language group of learners affects performance on the higher-order and more cognitively complex items in prePIRLS 2011. It was found that across the lowest socio-economic strata, *the learners whose LoLT was English for the Foundation Phase of their schooling performed better than the mother tongue LoLT African learners* on the higher-level reading processes assessed in the higher-order subscale, in the High and Advanced benchmarks and found in the more difficult items.

Particularly interesting in the above analyses is the indication that *access to text at home and at school plays a significant role in the performance of the English L2 group* when the data were analysed at the learner level. This finding should be considered in the context of the negative affect observed on performance of writing in an L2 contrasted with the English L1 learners. *Access to text does not have a significant effect on the African language L1 learners.*

Cummins (1979) suggests that the immersion model works better for the middle-class learner (as opposed to the poorer learner) because of the access during early childhood to parental reinforcement of the nature and importance of text (language used in an abstract form and in a manner other than the interpersonal or communicative). This mediation allows for the development of a threshold level of language in the child due to the exposure to and motivation given to engage with print material. This results in the ability to cope with immersion in the additional language. The findings of this section suggest that even low SES learners in the South African context that are exposed to an immersion model benefit by access to text in the home, but that this effect is diminished when the between school variance is accounted for in the analysis. Moreover, text at school has a significant effect on performance for the English L2 learner.

Access to text at the school level for the low SES immersion group contributes 33 score points, with the between school variance for this low SES subsample found to be 35%. *When analysed at the school level access to text at home for the English L2*

*low SES grouping did not make a significant contribution to performance on the higher-order subscale. These findings suggest that in the South African context access to text at school may play a more pivotal role in learner performance on the higher level reading comprehension processes than access to text at home. Furthermore, access to text at school appears to have more of an effect on performance than the socio-economic status of the English L2 learners.*

Cummins' (1979) suggestion that the immersion model often does not work well for poorer learners because the home literacy context during early childhood is often inadequate for threshold language development was not found to reflect as such in these findings. It was found that the immersion group performed better on the higher-order items than the additive bilingual, home language group. The impact of SES for each of the language of instruction groupings is particularly pertinent to the South African educational context. It is possible that the immersion group (despite having the same low SES home mediatory context experienced by the additive bilingual group with regard to their mother tongue development) has the advantage of a stronger school or classroom mediatory context either through language support or access to text for the learning of English and attaining proficiency in reading comprehension.

The results of further multilevel modelling described in Chapter 7 examine the interactive effect of the language of instruction and the home and school mediatory contexts on performance on the higher-order reading subscale.



## CHAPTER 7

# EXPLORING THE EFFECT OF THE LANGUAGE OF INSTRUCTION AND HOME AND SCHOOL MEDIATORY CONTEXTS ON PERFORMANCE

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In Chapter 6 it was found that the language of instruction in the South African context has a notable effect on learner performance on the higher-level reading comprehension processes that require the learner to be able to make inferences, interpret and integrate a reading passage, as well as, critically evaluate the text during reading. Exploring the underlying contextual factors that contribute to these findings are central to this study.

The first steps into the exploration of the effect of access to text at home and school, and the association of access to text and the language of learning and teaching (LoLT) with socio-economic status (SES), were taken in the previous chapter. This chapter further explores and interrogates the findings that emerged in Chapter 6.

A summary of the findings from the previous chapter are: i) Observed better performance by the low SES English L2 immersion group over the low SES African languages L1 grouping (section 6.5); ii) the finding that access to text at home is more likely to affect the English L2 learner performance than the African language L1 learner (section 6.4); iii) the indication that the effect of access to text at home on the low SES English L2 immersion learner is notably diminished by two-level modelling that accounts for the between school variance, in which case school level access to text contributes up to 33 score points to performance (section 6.6.); iv) the finding that access to text *at school* significantly benefits the English L2 immersion grouping despite controlling for socioeconomic status when analysed as a subsample (N=480).

This chapter addresses the research question: *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?*

The approach taken to addressing this (main) research question, included applying language theory in order to derive the conceptual framework described and illustrated



in Chapter 4 section 4.1 as the *Interactive Effect of Language of Instruction and the Learner's Mediator Context on Higher-order Reading Comprehension*. In this chapter this framework is tested in regard to its effectiveness in the South African context as a model for describing higher-order performance for each of the different language of instruction groupings.

In this chapter the home and school *mediatory contexts* described in the conceptual framework are analysed using a confirmatory approach to observe the effect on each language grouping for performance on the higher-level reading comprehension processes. The research methodology for this chapter is explained in Chapter 4 section 4.4.3. All the analyses described in this chapter were conducted as two-level (home and school) regression analyses using multilevel modelling. The variables used are presented (4.4.3.3) and the steps in the analyses are described (4.4.3.4).

In section 7.1 the results of the Null model across the language groupings is given. The effect on performance of attending schools with the different LoLTs is given in section 7.2. Section 7.3 describes the home and school mediatory contexts by examining the contextual variables and their association with learner mean average. Section 7.4 compares the effect on performance for the language groupings within the home and school mediatory contexts. The effect on performance of having a home language as LoLT is described in section 7.5. Section 7.6 describes the effect of the home and school mediatory contexts on English L2 immersion learners and African Languages L1 additive bilingual learners. Section 7.7 discusses the effect on performance of the different language of instruction models and the home and school mediatory contexts.

## **7.1 THE RESULTS OF THE NULL MODEL ACROSS THE LANGUAGE GROUPINGS**

The table below gives the output from the Null models for each of the three language groupings, African languages, English and Afrikaans in terms of the sample size, class groupings and the grouping effect on performance at the school level, that is, the intraclass correlation (ICC) for the higher-order plausible value variable (ASRIIEO) (see Chapter 2 section 2.2.2. for an explanation of plausible values) which consists of all the 'Straightforward inferencing', 'Interpret and integrate ideas and information' and the 'Evaluate and examine content, language and textual elements' items.

**Table 7.1. Null model for African languages, English and Afrikaans**

	Full sample	African Languages	English	Afrikaans
Average number of learners	15 744	12 076	2 205	1 463
Number of classes	341	250	62	47
Average class size	46.17	48.30	35.56	31.13
Intraclass correlation for variable ASRIIE0	0.56	0.40	0.54	0.46

In the above Table 7.1 the ICC for the full sample is 56%, for the African languages it is 40%, for the English LoT group it is 54%, and for the Afrikaans LoLT group 46% of the variance in performance is explained at the between-school level. The high levels of variance explained by the learner belonging to a particular school LoLT is worth noting and may be attributed to the developmental context and high levels of inequality found in South Africa. The lower ICC for the African grouping indicates that this grouping might be less affected by SES differences between schools (possibly due to most of them being of a lower SES which would result in a lower differential) than is suggested by the notably high ICC for the English grouping. Interestingly, the low SES English immersion subsample (section 6.6) has an ICC (calculated in HLM and reported in the previous chapter) of 43% which brings it close to the African languages grouping between school variance reflected here as 40%. This suggests that even where SES is being controlled for, the between school variance is still considerable. Notably, the Afrikaans LoLT grouping has an eight percent less between-school effect than the English grouping, suggesting that the learner is less affected by the school which the learner attends in this grouping than for the English grouping. The following table (Table 7.2) gives a comparison of the effect on performance of attending a school in each of the LoLT groupings as a basis for the findings before adding the factors associated with home and school mediatory contexts to the analyses. Analysing the effect of school LoLT without contextual factors lays the foundation for exploring the

*interaction* between school LoLT and the mediatory contexts. For some of the LoLT groupings the school LoLT itself explains a large proportion of the between-school variance when no other factors are controlled for, as is discussed in the next section.

## 7.2. THE EFFECT ON PERFORMANCE OF ATTENDING AN AFRICAN LANGUAGE, ENGLISH OR AFRIKAANS LOLT SCHOOL

Performance on the higher-order items was examined by analysing the effect at the school level of a learner attending an African, English or Afrikaans LoLT school. The three models reported on below (Table 7.2.) were run separately as two-level models using the full sample of learners (N=15 744) with the school LoLT the only variable.

**Table 7.2. The effect of different languages of instruction at school**

	Estimate (School Level)	SE	Est./SE	R-square	SE	Est./SE
School African LoLT	-97.29***	11.03	-8.82	0.37***	0.06	5.94
School English LoLT	93.15***	14.00	6.65	0.26***	0.06	4.14
School Afrikaans loLT	80.93***	15.21	5.32	0.08***	0.032	2.63

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

All three models had findings that were significant at the .001 level. Learners receiving instruction at a school where the language of instruction was one of the African languages from Grades 1-3 experience a decrease in 97.29 score points (B=-97.29, SE=11.02). In contrast, learners at an English medium school are more likely to benefit by 93.15 score points (B=93.15, SE=14.00) on performance on the higher-order subscale. These three models, however, display differences in the amount of variance in learner performance explained by each one. Interestingly, 37% of the variance in learner performance for the African LoLT grouping is explained by this model which has only the LoLT of the school as a single descriptor. Notably, 26% of variance in learner performance is explained by the learner attending an English LoLT school. In contrast, only eight percent of the variance in learner performance is explained by the learner attending an Afrikaans LoLT school. This suggests that for

the Afrikaans LoLT grouping other contextual factors are more likely to contribute at a significant level to learner performance. The performance of the different LoLT groupings is further explored by controlling for home and school contextual factors using the home and school mediatory contexts described in terms of the variables used in the next section.

### 7.3. DESCRIPTION OF THE HOME AND SCHOOL MEDIATORY CONTEXTS

The *home mediatory context* is explained by considering access to text, language support and socio-economic status in the home. *Text at Home* is represented by a scale that is composed of the number of children’s books in the home and the number of these books that are in the language of the test.

**Table 7.3. Number of children’s books in the language of the test for each LoLT**

Language of Instruction	Categories	Number of learners whose children’s books are mainly <u>not in the language of the test</u>	Number of learners whose children’s books are mainly <u>in the language of the test</u>
African Languages LoLT	0-10 books	2 368	2 180
	11-25 books	781	627
	26-50 books	342	260
	51 and above books	210	266
English LoLT	0-10 books	118	669
	11-25 books	18	340
	26-50 books	4	186
	51 and above books	10	134
Afrikaans LoLT	0-10 books	59	427
	11-25 books	24	135
	26-50 books	25	105
	51 and above books	18	83

In Table 7.3. the African languages grouping has more learners with children’s books in the home that are not in the language of the test, except for the category which reflects the greatest number of children’s books in the home at ‘51 and above’ (and is possibly a reflection of the highest SES grouping), whereas for English and Afrikaans more of the books in the home for each category are in the language of the test. The fact that African language learners have less access to text at home in the form of children’s books in the language of the test might affect their performance. The average mean performance of learners for whom the books are mostly not in the language of the test is 432.82 (SE=1.2) and the average mean performance of learners for whom the books are mainly in the language of test is 467.63 (SE=1.3), indicating approximately a 35 score point increase on the higher-order subscale for learners where the children’s books in the home are in the language of the test.

*Language Support at Home* indicates how often the language of the test is spoken at home by the child.

**Table 7.4 How often the child speaks the language of the test at home**

How often do you speak the LoT at home?	Afrikaans LoLT	English LoLT	African Languages LoLT
Never	27(2%)	295 (15%)	736 (7%)
Sometimes / Always	1330 (98%)	1 710 (85%)	9 093 (93%)

In Table 7.4. Learners who never speak the language of the test at home have a mean average of 425.26 (SE=2.42) and learners who sometimes or always speak the language of the test have a mean average of 454.43 (SE=.84).

English has more learners with both mothers and fathers who do *not* speak to them in the language of the test (822 and 752 learners, respectively, with only 482 learners with fathers that speak to them in English and 474 learners with mothers who speak to them in English as the LoT). In comparison, for the African languages and Afrikaans, more parents speak to the learners in the LoT (See Appendix A). This reflects the socio-linguistic context of learners who are at English LoLT schools, but are not hearing the language at home to the same degree as first language speakers.

It is possible that this contextual factor does not have an adverse effect on learner performance since the mean of learners whose parents do not speak the language of the test to them is slightly higher (459.11, SE=2.0) than those of learners whose parents do speak the language of the test to them (456.32, SE=1.2) across all the LoLT groupings.

*SES at Home* is reflected in the employment status of the mother and father and is included here in order to give an idea of the effect of home SES on learner performance.

**Table 7.5. *Employment status of the mother and father***

Language of Instruction	Father / Mother	Not working	Working part-time	Working Full-time	Not Applicable
African Languages	Father	383	1 133	1 974	7 049
	Mother	799	1 145	1 404	7 191
English	Father	75	136	907	634
	Mother	202	208	731	611
Afrikaans	Father	17	115	614	350
	Mother	56	140	457	443

In Table 7.5 the employment status of the mother and father is an indication of what resources are available in the home that create an environment conducive to adequate literacy development. Although a large number of parents preferred to select the option not applicable, those parents that did respond provide insight into the effect of home SES since it was found that there is a vast disparity in performance (about 40 score points) on the higher-order subscale between the learners whose parents are not working (father=438.38, SE=3.8; mother=445.11, SE=2.7) or only working part-time (father=438.45, SE=2.3; mother=451.09, SE=2.3) and those whose parents have full-time employment (father=482.10, SE=1.7; mother=486.31, SE=2.0). Interestingly, the mother working part-time shows some mean improvement in learner scores (six score point increase), whereas, in terms of learner performance, the father working

part-time is equivalent to his being unemployed. The high level of missing data in these variables meant that it could not reliably be used in the analyses, and SES was thus indicated at the school level (Tables 7.9, 7.10.)

The *school mediatory context* is explained by considering access to text, language support and socio-economic status of the school. *Text at School* was represented by a variable that differentiated the number of different titles available in the school library.

**Table 7.6. School Library containing books with different titles**

School Library			African Languages	English	Afrikaans
books with a number of different titles					
Few	books	with	10 195 (84%)	106 (5%)	41 (3%)
different titles					
Many	books	with	1 881 (16%)	2 099 (95%)	1 422 (97%)
different titles					

In Table 7.6 it can be seen that for most of the African languages learners, access to text at school consists of books with the same titles. Learners in the English and Afrikaans groupings are more likely to have access to books with different titles. Learners that have many books with different titles benefit in their mean average by approximately 15 score points (few titles=429.75, SE=1.7; many titles=445.84, SE=.8).

*Language Support at School* is a scale composed of the variables describing whether the training in the language of the test was part of the formal education of the teacher and whether reading pedagogy was part of the formal education of the teacher. The spread of learners across the LoLT groupings who have teachers who received this training is described below in tables 7.7 and 7.8.

**Table 7.7. Formal training of the teacher included the language of the test**

<b>Extent of training</b>	<b>African Languages</b>	<b>English</b>	<b>Afrikaans</b>
Not at all	1 402 (14%)	0 (0%)	132 (11%)
As an introduction to it	2 696 (26%)	474 (25%)	415 (35%)
As an area of emphasis	6 144 (60%)	1 430 (75%)	653 (54%)

**Table 7.8. Formal training of the teacher included reading pedagogy**

<b>Extent of training</b>	<b>African Languages</b>	<b>English</b>	<b>Afrikaans</b>
Not at all	914 (10%)	114 (6%)	182 (16%)
As an introduction to it	3 471 (37%)	691 (38%)	517 (45%)
As an area of emphasis	5 112 (53%)	1 007 (56%)	440 (39%)

Learners whose teachers were trained in the language of the test as an area of emphasis benefit by approximately 25 score points (450.28, SE=1.0) from those whose teachers were not trained in it at all (425.89, SE=1.9).



SES at School can be measured by how much the shortage or inadequacy of school buildings and the shortage or inadequacy of instructional materials affects the school's capacity to function effectively.

**Table 7.9. Capacity to provide Instruction affected by inadequate school buildings**

Capacity	African Languages	English	Afrikaans
Affected a lot	9 638 (89%)	1 361 (76%)	611 (58%)
Not affected	1 168 (11%)	436 (24%)	446 (42%)

**Table 7.10. Capacity to provide instruction affected by shortage of materials**

Capacity	African Languages	English	Afrikaans
Affected a lot	10 267 (93%)	1 396 (78%)	593 (56%)
Not affected	716 (7%)	401 (22%)	464 (44%)

As a measure of SES it is interesting to note that across all the language of instruction groupings more learners are affected by the shortage and inadequacy of buildings and materials. Those that are affected a lot by a shortage of school buildings have a mean average of 433.43 (SE=0.8) and those not affected have a mean average of 475.65 (SE=2.3) which is approximately a 40 score point difference. Similarly, those learners in schools that are affected a lot by an inadequacy of materials have a mean score of 432.73 (SE=0.7) and learners that are not affected benefit by approximately 60 score points with a mean of 495.80 (SE=2.7).

An indicator of school SES used in the analyses is the variable that differentiates the number of learners in the school that come from disadvantaged homes. Learners that came from schools where more than 50 percent of the learners were from disadvantaged homes had a mean average of 430.96 (SE=0.76). Learners from schools where less than 50 percent of learners came from homes that were

disadvantaged had a mean average of 464.14 (SE=1.81), suggesting a score point increase of 30 for those in less disadvantaged schools.

#### **7.4. COMPARING THE EFFECT ON PERFORMANCE OF THE LANGUAGE OF INSTRUCTION GROUPINGS WITH THE MEDIATORY CONTEXTS**

The language of instruction groupings African languages, English and Afrikaans were compared using a multilevel analysis applying Mplus (see chapter 4 for details) to account for the between-school variance identified in (section 7.1) using the variables identified in the home and school mediatory contexts and described above in section 7.3. In this section first the results of the African languages grouping will be described (7.4.1). Next the results of the analysis using the English LoLT grouping will be outlined (7.4.2). Lastly the findings of the Afrikaans LoLT grouping will be explained (7.4.3).

##### **7.4.1. Home and school mediatory context of African languages LoLT schools**

The African LoLT schools were analysed within the home and school mediatory context in a two-level (that is, learner level and school level) analysis within the African languages sample (N=12 076). The learner level represents the home mediatory context.

**Table 7.11. The effect of home and school mediatory factors on performance of African languages LoLT schools**

Level	Mediatory Factors	Unstandardised (Intrcpt = 425.79)		STDYX Standardised (Intrcpt = 8.37)	
		Estimate	SE	Estimate	SE
LEARNER	Access to Text	-0.97***	0.23	-0.09***	0.02
	Language Support	-2.17***	0.32	-0.11***	0.02
	TextHome with Language Support	1.09**	0.40	0.05**	0.02
SCHOOL	Access to Text	-9.17	12.71	-0.06	0.08
	Language Support	0.36	1.00	0.03	0.09
	SES	-29.49	17.08	-0.23	0.13
	SES with TextSchool	0.00	0.01	-0.03	0.08
	SES with Language Support	-0.32**	0.11	-0.19***	0.05
<b>R-SQUARE</b>					
LEARNER		0.02***	0.00		
SCHOOL		0.06	0.06		

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

RMSEA=0.00; CFI=1.00; TLI=1.07; SRMR (within)=0.00; SRMR (between)= 0.01

The model fit indices (Table 7.11) show good model fit (Chapter 4 section 4.4.3.4). Overall, these contextual factors describe very little of the variance in performance. In the light of the findings of Table 7.2, that showed that the variance explained solely by the learner attending an African languages school stands at 36%, this result, determined by examining the effect of contextual factors, might have been expected.

At the learner level the mediatory context related to the home examined here accounts for two percent of the explained variance, but at the school level the mediatory context examined in this model does not explain variance in learner performance at a significant level. There is a weak negative association between learner performance and children's books in the home, as well as with speaking the language of the test in the home which contradicts assumptions. It is possible that learners are not being encouraged to engage with the text, and that the degree to which the language of the test is spoken in the home does not have a significant effect on learner performance. Children's books in the home in the language of the test has a strong positive association with how often the language of the test is spoken in the home, suggesting that the text available in the home may be in the language of the test.

As shown in Table 7.2 there is a decrease in learner performance of 97 score points from being in an African languages LoLT school ( $B=-97.29$ ,  $SE=11.02$ ). SES at the school level suggests no significant effect on performance on the higher-order subscale, possibly because of the large number of learners that come from disadvantaged backgrounds within this grouping. Teacher training in the language of the test and in reading pedagogy (school level language support) showed no significant effect on learner performance for the African language LoLT grouping. The home (learner level) and school mediatory contexts do not explain much of the variance in learner performance. The low performance observed by this grouping seems to orientate around the school language of instruction as the main explanatory variable for learner performance which requires further exploration.

#### **7.4.2. Home and school mediatory context of English LoLT schools**

The English LoLT schools were analysed within the home and school mediatory context in a two-level (learner and school) analysis within the English sample (N=205).

**Table 7.12. The effect of home and school mediatory factors on performance of English LoLT schools**

Level	Mediatory Factors	Unstandardised (Intrcpt = 527.59)		STDYX Standardised (Intrcpt = 17.22)	
		Estimate	SE	Estimate	SE
LEARNER	Access to Text	-1.60**	0.60	-0.08**	0.03
	Language Support	-2.26*	0.93	-0.07*	0.03
	TextHome with Language Support	-0.03	0.18	-0.00	0.02
SCHOOL	Access to Text	17.86	59.57	0.04	0.12
	Language Support	0.63	2.26	0.02	0.78
	SES	86.06***	20.48	0.58***	0.09
	SES with TextSchool	0.00	0.01	0.03	0.10
	SES with Language Support	-0.20	0.17	-0.14	0.17
	R-SQUARE				
LEARNER		0.01*	0.00		
SCHOOL		0.34**	0.10		

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

RMSEA=0.02; CFI=0.99; TLI=0.86; SRMR(within)=0.00; SRMR(between)=0.01

The model fit indices (Table 7.12) show good model fit (Chapter 4 section 4.4.3.4). The model explains one percent of learner performance at the learner level and 34 percent at the school level. The home mediatory context represented at the learner level shows there is a strong negative association with both children's text in the language of the test and performance, as well as with how often the learner speaks the language of the test at home which contradicts assumptions. It is possible that, although text is available in the home, learners are not engaging with the text to an extent that will improve performance. Furthermore, the data indicates that speaking the language of the test at home does not necessarily result in better performance.

As shown in Table 7.2, learners are likely to benefit by 93 score from being in an English LoLT school ( $B=93.15$ ,  $SE=14.00$ ,  $p=0.00$ ). Access to books with many different titles at school and teacher training in the language of the test or reading pedagogy are not significant factors explaining learner performance. SES at school level, however, contributes 86 score points to learner performance in this LoLT grouping ( $B=86.06$ ,  $SE=20.48$ ,  $p=0.00$ ). Nonetheless, there was no significant association found between text at school and language support.

#### **7.4.3. Home and school mediatory context of Afrikaans LoLT schools**

The Afrikaans LoLT schools were analysed within the home and school mediatory context in a two-level (learner and school) analysis within the Afrikaans LoLT grouping ( $N=1\ 463$ ).

**Table 7.13. The effect of home and school mediatory factors on performance of Afrikaans LoLT schools**

Level	Mediatory Factors	Unstandardised (Intrcpt = 516.55)		STDYX Standardised (Intrcpt =8.03)	
		Estimate	SE	Estimate	SE
LEARNER	Access to Text	-0.43	0.63	-0.02	0.04
	Language Support	-5.18***	1.04	-0.14***	0.03
	TextHome with Language Support	0.62*	0.32	0.08*	0.04
SCHOOL	Access to Text	44.10**	11.09	0.11**	0.06
	Language Support	-2.98	1.77	-0.20	0.13
	SES	98.54***	17.28	0.73***	0.11
	SES with TextSchool	0.01	0.01	0.11	0.06
	SES with Language Support	0.33	0.38	0.16	0.19
<b>R-SQUARE</b>					
LEARNER		0.02*	0.01		
SCHOOL		0.55***	0.14		

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

RMSEA=0.08; CFI=0.88; TLI=-0.08; SRMR (within)=0.00; SRMR (between)=0.03

The model fit indices (Table 7.13) show good model fit (Chapter 4 section 4.4.3.4). This model explains two percent of the variance at the learner level and 55 percent of the variance at the school level. The results shown in Table 7.2 indicate that attending an Afrikaans LoLT school itself only explains eight percent of the variance in learner performance. Therefore, it might have been expected (as was confirmed) that contextual factors such as described in the school mediatory context would contribute a significant proportion of the explanation for the variance in performance.

Interestingly, there is a strong negative correlation with often speaking the language of the test at home and learner performance. This suggests that speaking the language of the test more than learners who perhaps speak the language rarely at home does not positively affect performance. This could be explained by considering that learners who have more than one language in the home might benefit from having access to other cultural capital that they can draw on, or that purely verbal exposure to the language might have little benefit in reading comprehension performance, particularly on the higher-order items.

Table 7.2 showed that learners in Afrikaans LoLT schools benefit by an increase in 80 score points ( $B=80.93$ ,  $SE=15.21$ ,  $p=0.00$ ). Within the school mediatory context learners who are at schools with a variety of titles in their library benefit by 44 score points to learner performance on the higher-order subscale ( $B=44.10$ ,  $SE=11.09$ ,  $p=0.00$ ). Teacher training in the language of the test or reading pedagogy are not significant factors. The SES of the school, however, is a significant factor contributing 98 score points to learner performance ( $B=98.54$ ,  $SE=17.28$ ,  $p=0.00$ ).

It is interesting that the mediatory contexts created in these models vary significantly in the amount of variance explained for each language grouping. SES is strongly associated with improved performance for the higher performing English and Afrikaans LoLT schools. The mediatory contexts identified explain 55% of the variance in performance for the Afrikaans learners, which is eight percent more than was explained in the null model at 46%. The better fit of the model might also be explained by the fact that the Afrikaans grouping is a more homogenous grouping than the African languages and English LoLT grouping as sampled and described in this study. Whereas the African languages grouping and English language grouping is more likely to be made up of learners that speak different languages in different contexts, the Afrikaans grouping is more homogenous as a socio-linguistic grouping. This factor



might also contribute to the significant benefit accrued by the grouping to having access to text at school. A more monolingual grouping would benefit by having more print material in the LoT, and from teachers that are using only one language to teach, as well as from a community and home environment that reinforces and, importantly, provides motivation for the learning of a language to the level of higher-order comprehension. This is reinforced by the finding that access to text at school is not associated with increased SES which suggests that access to this form of cultural capital is not SES dependent.

SES between the schools was an important explanatory variable in performance. Interestingly, although the between-school variance identified in the null model for the Afrikaans LoLT grouping (Table 7.1) is only six percent more than for the African languages LoLT grouping (46% and 40%, respectively), SES was found to contribute 98 score points to learner performance for the Afrikaans LoLT grouping, in contrast with the African languages grouping where SES was not identified as a significant indicator affecting learner performance. This reinforces the finding that most of the variance for the African languages grouping is explained by the school LoLT (Table 7.2) and not by contextual factors. The high level of diversity found in the multilingual grouping may be contributing to the variance observed at the school LoLT level.

#### **7.5. COMPARING THE EFFECTS OF HOME LANGUAGE INSTRUCTION ON PERFORMANCE FOR THE AFRICAN LANGUAGES AND ENGLISH**

The effect on performance for learners in African and English schools whose home language was the language of instruction - where learners who spoke the language of the test (sometimes/always) at home were differentiated from those who never spoke the test at home - was analysed at the school level using the full sample of learners (N=15 744).

The results (Table 7.14) indicated that, when considered within the full sample of learners (N=15 744), learners' score points decreased by 95.15 score points (B=-95.15, SE=11.72) significant at the .001 level from being in an African language L1 school. Learners are likely to benefit by 128.87 score points (B=128.87, SE=15.09) significant at the .001 level from being in an English L1 school. It is notable that home language instruction for the African languages grouping does not outweigh the effect

of being in the African languages LoLT grouping when compared within the national sample to the English L1 LoLT grouping.

**Table 7.14. The effect on performance of learners having home language as LoLT for African and English learners**

	Estimate	SE	Est./SE	R-SQUARE	SE	Est./SE
African HL/L1 LoLT	-95.15***	11.72	-8.12	0.32***	0.06	5.28
English HL/L1 LoLT	128.87***	15.09	8.54	0.32***	0.06	5.36

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## 7.6. COMPARING THE EFFECTS OF ENGLISH L2 AND AFRICAN LANGUAGES L1 INSTRUCTION ON PERFORMANCE

A comparison was first made of African Languages L1 learners (additive bilingual model) at the home and school level on the full sample of learners without including the variables in the mediatory contexts to form a basis for comparison to the full model. The results are tabled below (Table 7.15).

**Table 7.15. Comparison of African language L1 learners at the learner and school level**

	Additive Bilingual Model on Learner level	Additive Bilingual Model on School level
No. of Learners	15 744	15 744
Intraclass Correlation (ICC)	0.56	0.56
Estimate	1.50***	-9.14***
SE	0.34	1.16
Est./SE	4.44	-7.85
R-SQUARE	0.00*	0.33***
SE	0.00	0.06
Est./SE	2.24	5.15

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

The results indicate that African Language L1 learners (additive bilingual) benefit at the home level by 1.50 score points ( $B=1.50$ ,  $SE=0.34$ ) significant at the .001 level from being in an additive bilingual model of instruction. However, at the school level for each point of decrease in an additive bilingual model learners have a 9.14 score point increase ( $B=9.14$ ,  $SE=-7.84$ ,  $p=0.00$ ). This model explains 33% of learner variance at the school level.

Schools with learners following an additive bilingual language model (Table 7.16) were then analysed with the home and school mediatory contexts in a two-level (learner and school) analysis within the full sample ( $N=15\ 744$ ).

**Table 7.16. The effect of home and school mediatory factors on performance of African languages L1 (additive bilingual) LoLT schools**

Level	Mediatory Factors	Unstandardised (Intrcpt = 451.49)		STDYX Standardised (Intrcpt = 6.28)	
		Estimate	SE	Estimate	SE
LEARNER	Access to Text	-1.02***	0.21	-0.09***	0.02
	Language Support	-2.29***	0.30	-0.11***	0.01
SCHOOL	TextHome with Language Support	0.85**	0.30	0.05**	0.02
	Additive Bilingual language model	-8.96***	1.17	-0.56***	0.06
	Access to Text	-4.44	13.56	-0.02	0.05
	Language Support	0.73	0.90	0.09	0.08
	SES	15.71	13.97	0.09	0.08
	SES with Text School	-0.00	0.01	-0.01	0.07
	SES with Language Support	-0.26**	0.10	-0.15**	0.05
	SES with Additive Bilingual Model	-0.32	0.17	-0.16	0.09
R-SQUARE					
LEARNER		0.02***	0.00		
SCHOOL		0.34***	0.07		

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

RMSEA=0.01; CFI=0.98; TLI=0.90; SRMR (within)=0.00; SRMR (between)=0.05

The model fit indices (Table 7.16) show good model fit (Chapter 4 section 4.4.3.4). This model explains two percent of learner variance in performance at the home level and 34% at the school level. There is a decrease of 8 score points in performance for every point of increase in the additive bilingual model ( $B=-8.96$ ,  $SE=1.17$ ,  $p=0.00$ ) confirming the findings reported in Chapter 6 based on a single-level analysis. In this model there is a significant negative correlation to learner performance for both children's books at home in the language of the test, and the learner speaking the language at home more often. A significant association, however, exists in this model between these two variables, suggesting that learners who speak the language of the test often also have more books in the language of the test at home.

SES is not significantly associated with learner performance in this model, and SES is also not significantly associated with the additive bilingual model. SES has a weak negative association with teachers whose main area of study was the LoT and who studied reading pedagogy. This indicates that as SES increases, school language support decreases, suggesting that teachers who studied the language of the test might teach at lower SES schools.

In summary, while the model describes 34% of the variance in learner performance at the school level, the contextual factors in the home and school mediatory contexts appear to be of less importance than the language model itself in explaining performance.

A comparison was made of English L2 learners at the home and school level on the full sample of learners ( $N=15\ 744$ ) without including the variables in the home and school mediatory contexts as a basis for analysing the immersion model with the home and school mediatory contexts. The results are tabled below (Table 7.17.)

**Table 7.17. Comparison of English L2 learners at the learner and school level**

	<b>Immersion Model on Learner level</b>	<b>Immersion Model on School level</b>
No. of Learners	15 744	15 744
Intraclass Correlation (ICC)	0.56	0.56
Estimate	2.20***	9.60***
SE	0.53	1.39
Est./SE	4.12	6.92
R-SQUARE	0.00*	0.27***
SE	0.00	0.06
Est./SE	2.05	4.35

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

The results indicate that L2 English learners benefit at the home level by 2.20 score points ( $B=2.20$ ,  $SE=0.53$ ) significant at the .001 level from being in an English immersion model of instruction. In comparison, learners benefit by 9.60 ( $B=9.60$ ,  $SE=1.39$ ) significant at the .001 level from being in an English immersion model at the school level.

Schools with learners following an immersion language model (Table 7.18) were analysed with the home and school mediatory contexts in a two-level (learner and school) analysis within the full sample ( $N=15\,744$ ).

**Table 7.18. The effect of home and school mediatory factors on English L2 (Immersion) LoLT schools**

Level	Mediatory Factors	Unstandardised (Intrcpt = 452.02)		STDYX Standardised (Intrcpt =6.30)	
		Estimate	SE	Estimate	SE
LEARNER	Access to Text	-1.01***	0.21	-0.09***	0.02
	Language Support	-2.29***	0.30	-0.11***	0.01
	TextHome with Language Support	0.85**	0.30	0.05**	0.02
SCHOOL	Immersion model	9.27***	1.38	0.50***	0.06
	Access to Text	1.51	13.23	0.01	0.05
	Language Support	0.58	0.91	0.03	0.05
	SES	16.11	14.50	0.10	0.09
	SES with Text School	-0.00	0.00	-0.01	0.07
	SES with Language Support	-0.27**	0.10	-0.15**	0.05
	SES with Immersion Model	0.30*	0.15	0.18*	0.09
<b>R-SQUARE</b>					
LEARNER		0.02***	0.00		
SCHOOL		0.28***	0.06		

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

RMSEA=0.01; CFI=0.99; TLI=0.94; SRMR (within)=0.00; SRMR (between)= 0.04

The model fit indices (Table 7.18) show good model fit (Chapter 4 section 4.4.3.4). The model explains two percent of the variance at the learner level and 28% of the variance in learner performance at the school level. This model exhibits a similar home mediatory context to the additive bilingual model with a significant positive association between the learner speaking the language of the test and children's books in the home in the language of the test.

There is an increase of 9 score points in performance for every point of increase in the immersion model ( $B=9.27$ ,  $SE=1.38$ ,  $p=0.00$ ) confirming the finding reported in Chapter 6 based on a single-level analysis. The immersion model is weakly associated with SES (suggesting that there might be an association between an increase in SES and the immersion model), but SES was not shown to significantly affect learner performance. Notably, access to text at the school level showed no significant effect on performance for this model which was analysed within the national sample ( $N=15\ 744$ ). This finding does not concur with the results presented in Chapter 6 where the effect of access to text was found to significantly affect performance when analysed as a descriptor for the low SES subsample of 480 learners.

In summary, while the model describes 28% of the variance in learner performance at the school level, the contextual factors in the home and school mediatory contexts appear to be less salient than the language model itself in explaining performance. Learner performance was shown to have a strong, positive correlation with attending an English LoLT school (Table 7.2). However, unlike for the English LoLT grouping, SES is not a significant descriptor for the immersion model.

## **7.7. DISCUSSION OF THE EFFECT OF THE DIFFERENT LANGUAGES OF INSTRUCTION AND MEDIATORY CONTEXTS ON PERFORMANCE**

The effect of language of instruction and the mediatory contexts for each of the three groupings (African languages, English and Afrikaans) on performance on the higher-order reading comprehension subscale were compared. The effect on performance of the mediatory contexts and the African languages as a home language and English as a home language were analysed. Furthermore, the performance of learners receiving instruction in English L2 (immersion model) and African languages L1 (additive bilingual model) when considered within the mediatory contexts was compared.



*The school's language of instruction contributes significantly to the levels of variance observed in performance.* Learners receiving instruction at a school where the language of instruction was one of the African languages from Grades 1-3 are likely to have a 97.29 score point decrease ( $B=-97.29$ ,  $SE=11.02$ ) in contrast to the learners at an English medium school who are likely to benefit by 93.15 score points ( $B=93.15$ ,  $SE=14.00$ ). Learners benefit by 128.87 score points ( $B=128.87$ ,  $SE=15.09$ ) significant at the .001 level from being in an English L1 (LoLT as home language) school. In addition, learners benefit by 9.60 score points ( $B=9.60$ ,  $SE=1.39$ ) significant at the .001 level from being in an English L2 school where learners are learning in English despite it not being a home language.

*The effect of access to text observed at the home level* (Chapter 6 section 6.4) in a single-level analysis at the learner level *was diminished in a two-level analysis* across all language of instruction groupings, where the between-school variance was elevated in importance.

Interestingly SES was not a significant contextual factor affecting performance for the African languages group, but *SES at the school level explained much of the variance* in performance for English learners ( $B=86.06$ ,  $SE=20.48$ ,  $p=0.00$ ) and Afrikaans learners ( $B=98.54$ ,  $SE=17.28$ ,  $p=0.00$ ) when analysed within the LoLT sample.

According to these findings, *verbal language support* (where the learner often speaks the language of the test) *does not translate into better performance* in higher-order reading comprehension.

The findings of a two-level analysis indicate that *learners are likely to benefit by 9.60* ( $B=9.60$ ,  $SE=1.39$ ) significant at the .001 level *from being in an English immersion model* at the school level. In contrast, at the school level for each point of decrease in an additive bilingual model learners have a 9.14 score point increase ( $B=9.14$ ,  $SE=-7.84$ ,  $p=0.00$ ) in performance.

Within the school mediatory context *Afrikaans LoLT learners who are at schools with a variety of titles in their library benefit by 44 score points* in learner performance on the higher-order subscale ( $B=44.10$ ,  $SE=11.09$ ,  $p=0.00$ ).

It was shown in Chapter 6 section 6.6 that the English L2 low SES group ( $N=480$ ) who came from schools in disadvantaged areas benefited by 32.92 score points from having access to text at school ( $B=32.92$ ,  $SE=13.96$ ,  $p=0.027$ ). *Neither access to text*

*nor SES at the school level were significant* contributing factors to performance for this relatively small sample ( $n=866$ ) when analysed within the full national sample ( $N=15\ 744$ ) using the home and school mediatory contexts as an analytical framework. However, 28% of the variance in learner performance for the immersion grouping was explained by the language model at the school level, suggesting that the better performance observed by the English immersion grouping over the additive bilingual grouping is associated with the English LoLT school mediatory context within which the English L2 learners are found. Interestingly, the performance of the English immersion learners was not found to be significantly affected by SES.

The home and school mediatory contexts were best suited as an analytical framework to the Afrikaner LoLT grouping. This suggests that *characteristics of the Afrikaner LoLT grouping contribute to the better model fit*. The Afrikaner LoLT grouping is a more linguistically homogenous grouping in South Africa (when compared to the African languages and English LoLT groupings as sampled and defined in this study) and the learner that is immersed within a congruent home and school environment might benefit from and be motivated to gain from the cultural capital (found in many forms, as well as in the form of print material at school) that is available in such a context. Notably, access to text as a form of cultural capital was not found to be associated with the SES of the school. This suggests that cultural capital in the form of access to text may affect performance regardless of SES.

The findings of these models suggest that the better performance of the immersion grouping over the additive bilingual grouping cannot be attributed to SES or the other contextual factors examined using the home and school mediatory framework and, therefore, much of the variance in performance may be attributable to the language model itself. This finding signifies the importance of closely examining the *interactive effect between the language model of the school and the mediatory contexts*.



## CHAPTER 8

### FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

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The role of language in the multifaceted challenges facing education in South Africa has at times been emphasised, and at other times downplayed. Nonetheless, the multilingual complexity facing educators and policymakers remains politically nuanced and, as such, evidence from the data of researchers in this field needs to be conscientiously reflected upon. The effect of the language of instruction of the school and contextual factors on performance in higher-order reading comprehension has been examined by means of a comparison across language of instruction groupings in South Africa in this study and the conclusions are presented below.

The research is summarised (8.1) and key findings for each research question are outlined (8.2). Section 8.3 provides a reflection on the conceptual framework. Next, a discussion of the methodology is given in section 8.4. The main conclusions are explored (8.5) and recommendations for policy, research and practice are given in section 8.6. Lastly, closing thoughts are presented (8.7).

#### **8.1 SUMMARY OF THE RESEARCH**

At the forefront of this study is an enquiry into how contextual factors at home and at school are contributing to the observed differences in performance across the different language of instruction groupings in the South African data in the international study Progress in International Reading Literacy Study. The study explores what the relationship is between the language of learning and teaching (LoLT) of the learner and his/her home and school context and how the combined effect of these factors affect the development of reading comprehension at the higher-order level. The language of instruction groupings include the African languages, Afrikaans, English L1 and English L2 as an immersion model. The significant differences in performance (on the higher-order prePIRLS 2011 items) across the language models are not singular reasons for underperformance in themselves, but reflect embedded home and school contextual factors which are contributing to weaker or stronger performance by one or other language of instruction grouping. Using language theory to identify possible variables, a contextual basis for differences in performance is explored. Also examined

is the complexity of defining a higher-order reading construct for different classroom LoLT contexts.

The following four research questions were examined:

1. *How is the construct known as 'higher-order reading comprehension processes' defined and validated in a South African context when considered in contrast to the lower-order reading comprehension processes tested in prePIRLS 2011?*
2. *How does learner performance on the higher-order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as LoLT and English L2 as LoLT for low socio-economic status learners?*
3. *What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?*
4. *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?*

In South Africa the complex multilingual context is often cited among other reasons as contributing to poor performance in reading comprehension assessment (Moloi & Strauss, 2005; Pretorius & Mampuru, 2007). Furthermore, language policy decisions are often weighted by ideological considerations (Alexander, 1997, 2005; Banda, 2009). This study examines the language of instruction models found in South African education in order to understand the impact of home and classroom contextual factors within the language approaches. In this way the study informs an approach based on the student's context to school policy decisions regards language of instruction in the classroom. The significance of this study is summarised by outlining that the academic debate around mother tongue education is on-going and particularly pertinent in the South African context where research has often been seated in the northern, more developed economies of the world.

The study comprised secondary analysis of the assessment and survey data of the preProgress in Reading Literacy Study 2011 (prePIRLS 2011). In this section a summary of the research design is given for the three key areas of exploration: Firstly an examination of the reliability and validity of the higher-order reading construct was undertaken (see Chapter 5). Secondly, performance on the higher-order reading comprehension construct was compared across the language of instruction models at the student level and the effect on performance of access to text at the home and school level was explored (see Chapter 6). Thirdly, the contextual factors affecting performance on the higher-order construct were examined through multilevel analysis at the home and school level (see Chapter 7).

The examination into the reliability and validity of the higher-order test construct took the following course: The items were sampled from the achievement booklets and the reliability of the factor groupings were established by conducting a Cronbach's Alpha test and Confirmatory Factor Analysis (CFA). A content analysis of the items informed the reason for outliers identified in the CFA. Next the item difficulty was explored by means of Rasch analysis. Then the influence of text selection on item validity was investigated by means of a multiple regression. English L1 and L2 language groupings were compared for item performance. Path modelling informed the validity enquiry and the results were interpreted.

Next, for the comparison of performance on the higher-order construct across the different language of instruction models the research process took the following course: First the descriptives comparing the L1 and L2 learners for the three language groupings were analysed in the IDB Analyzer (version 3.0) and then descriptives showing the performance on the International Benchmark for learners of the African languages L1 model and English L2 model were tabulated. Next, a multiple regression was conducted that showed the difference in performance for the different language of instruction models, followed by a linear regression that highlighted the difference in performance between the African languages L1 and English L2 group specifically. The effects on learner performance of children's books at home and a library at the school were then compared for the African Languages L1 group and the English L2 group by means of single-level regression analysis. A comparison of learner performance of the African languages L1 group and the English L2 group for the lowest SES was made using linear regression and a Pearson chi square test. The same sample of English L2

low SES learners were used in a two-level HLM (version 7) analysis to explore the impact of access to text at the home and school level on this grouping.

Thirdly, the contextual factors affecting performance on the higher-order construct were examined at the home and school level using the theoretical framework graphically represented as the *Interactive Effect of Language of Instruction and the Learner's Mediatory Context on Higher-order Reading Comprehension* and described in Chapter 4 section 4.1. The research in this section took the following course: Learners were sampled from the different language of instruction groupings in South Africa. Next, language support, SES and access to text variables were identified and described at the home and school level in terms of their effect on learner performance in order to represent the home and school mediatory contexts described in the conceptual framework. A two-level (home and school level) regression was conducted in Mplus (version 7.4) to compare the effect of language of instruction and contextual factors on performance on the higher-order reading comprehension construct across five LoLT groupings.

## **8.2. SUMMARY OF KEY FINDINGS**

The key findings for each of the research questions are summarised below and then discussed.

### **8.2.1. Construct validity of the higher-order reading comprehension construct in the South African context**

Research into the construct validity of the higher-order items in the prePIRLS 2011 dataset was conducted to explore the research question: *How is the construct known as 'higher-order reading comprehension processes' defined and validated in a South African context when considered in contrast to the lower-order reading comprehension processes tested in prePIRLS 2011?*

The key findings of Chapter 5 are summarised and then discussed below:

1. The reading comprehension constructs in prePIRLS 2011 cluster together to form factor groupings, but items in the sample were observed to load weakly (see Section 5.3 and Appendix B).
2. The item difficulties indicate a distinct hierarchical nature (ordered from the

'Retrieval of information' items as easiest to the 'Examine and critique textual elements' which is the most difficult) to the reading comprehension constructs. However, the processes are scattered throughout the item map, indicating that the constructs or cognitive processes are nonetheless interwoven with each other. This suggests that other factors, aside from the comprehension processes, contribute to item difficulty (see Section 5.5, Figure 5.3 and Figure 5.4).

3. Item difficulty is affected by the level of the reading comprehension process employed in the design of the item and by text features (see Section 5.6, Table 5.3 and Table 5.4).
4. Rasch analysis showed that the items perform differently for the English L1 and L2 groups on the prePIRLS 2011 assessment. The assessment is better targeted to the English L2 group which affirms the contextual validity of the test (which was developed for less proficient learners). Path models that explored the effect of clustering the inferencing comprehension process with the higher- and lower-order latent traits, revealed that model fit varies across the full sample, L1 and L2 groupings. The best model fit is observed for clustering the inferencing process with the lower-order construct in the L2 grouping. Nonetheless, the L1 group experience the inferencing reading process as significantly easier than the L2 grouping. These findings suggest that defining a process as higher- or lower-order is relative to the socio-linguistic context of the learner writing the test (see Sections 5.7 and 5.8).
5. The 'Examine and evaluate' items and the 'Integrate and interpret' items which are higher-order items are not significantly more difficult for English L2. The 'Straightforward inferencing' (higher-order) and 'Retrieve information' (lower-order) items *are* significantly more difficult for English L2. However, the more proficient learners in English L1 do not have many higher-order items fitted to their proficiency in the test. A better spread of more difficult items might have affected the above result. The ability to make inferences was observed to be an important difference between home language speakers and the English L2 grouping. Home language speakers of English are less likely to experience the task of making an inference as difficult. These findings have import on the

teaching of English L2 for higher-order reading comprehension attainment and should inform test development and the reporting of learner results both nationally and in large-scale assessment (see Sections 5.7 and 5.8).

## **DISCUSSION OF THE KEY FINDINGS**

The item maps of the English L1 and English L2 groupings (Figures 5.7 and 5.8) indicated that the test was better targeted to the English L2 group. Since the prePIRLS 2011 test is targeted at countries with underdeveloped economies where Grade 4 learners often struggle with the standard of the PIRLS test, the finding that the English L2 group is better targeted speaks to the contextual validity of the test. It is relevant to note, however, the marked difference in performance across the L1 and L2 language of instruction groupings, which is also described in Chapter 6 (where performance across LoLT groupings is explored).

Of particular relevance to these findings is the discussion of higher-order cognition and testing in Chapter 3 sections 3.4 and 3.5. The validity of the four reading comprehension processes as constructs was described in terms of the output of the Confirmatory Factor Analysis (CFA) analysis and the reliability measure of Cronbach's Alpha, with the finding that these constructs do indeed exist in the data. It was also concluded that the reading comprehension processes influence item difficulty with the cognitive constructs appearing to be hierarchical in nature (Bloom, 1956; Krathwohl, 2002; Bartlett, 1958).

With these factors established it was important to understand what differentiated the higher-order constructs from the lower-order constructs and whether the definition of 'higher-order' is generalisable across contexts, since it was also concluded that the cognitive processes are interwoven as evidenced by the distribution of the item difficulties of the four processes (Resnick, 1987).

Of particular interest was the reading process 'Straightforward inferencing' which, conceptually, straddles the area between the more definitely lower-order 'Retrieval of information' comprehension process and the higher-order processes.

Modelling the reading comprehension process onto the latent traits of higher- and lower-order constructs for the English L1 and English L2 groups indicated that the inferencing process fits better with the lower-order processes for both of the subsamples. The higher-order processes were experienced as easier by the L1



grouping, as evidenced in the item maps for the two languages (see Chapter 5 section 5.8). The L2 learners experience the inferencing process as significantly more difficult than the L1 learners. The level of language development (L1 or L2) has an impact on how learners are able to respond to the different processes embedded in the reading comprehension tasks. It also suggests that classroom instruction for English L2 learners should focus on the inferencing process as a means of moving the English L2 learners towards proficiency in the higher-order reading comprehension processes.

The type of text was also (along with the reading comprehension process) found to impact on item difficulty. Texts vary in length, syntactic complexity, abstractness of ideas, and organisational structure (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009) and this impacts on the difficulty of items. Even the more basic processes can form difficult tasks if they are situated within a more challenging text – this was observed in the interwoven nature of the different reading comprehension processes across the item maps. The different aspects affecting item difficulty are all part of what makes up the complexity of defining a higher-order construct.

The importance and nature of higher-order reading comprehension needs to be understood by the Foundation Phase and the Intermediary Phase language teachers who teach both the home languages and the additional languages. The low performance observed across the language groupings on the higher-order prePIRLS subscale suggests that these processes need to be introduced earlier and the method of instruction needs to be re-examined, especially for English L2 learners. The processes themselves do not determine the difficulty of items alone – they contribute to it (along with text complexity, task type and the item vocabulary and phrasing). This suggests that these processes can be introduced alongside the more foundational reading levels using easier texts that have less difficult concepts or organisational structures, and items with less difficult phrasing and diction. Furthermore, the difference in item difficulty for the inferencing process for the L1 and L2 learners suggests a different instructional approach is required for L1 and L2 learners when teaching the different reading processes.

An important finding in this chapter is that the English L2 learners are not at the same level of proficiency in higher-order reading comprehension as the English L1 learners despite their medium of instruction having been the same over the foundation phase of schooling.

Understanding that learners with different socio-linguistic contexts, even within the same language of instruction, differ markedly in their ability to perform on the different comprehension processes has important considerations for the development of items and the reporting of results, particularly in large-scale testing.

### **8.2.2. Comparison of performance on higher-order reading comprehension for the different language of instruction models**

The following two research questions were explored: *How does learner performance on the higher-order reading comprehension items compare for different language of instruction models, and, specifically, for African languages home language / L1 as LoLT and English L2 as LoLT for low socio-economic status learners?*

*What is the effect of access to text at home and at school on learners' performance for the African languages L1 and English L2 language of instruction models and, specifically, for English L2 as LoLT low socio-economic status learners?*

The key findings of Chapter 6 are summarised and then discussed below.

1. Mean performance on the higher-order subscale improves where learners spoke the language of the test before going to school for each of the three language groups (African Languages, English and Afrikaans), but this difference is more marked for English and Afrikaans (see Table 6.1).
2. Learners who completed their Foundation Phase in English as an L2 perform better on the prePIRLS 2011 higher-order subscale when writing in their L2 than African language learners who completed their Foundation Phase of schooling in their mother tongue and wrote the assessment in their L1 across the lowest SES of sampled learners (see Table 6.16).
3. Learners who completed their Foundation Phase in English as an L2 are significantly more likely to fall into the High and Advanced prePIRLS 2011 International Benchmarks when writing in their L2 than African language learners who completed their Foundation Phase of schooling in their mother tongue and wrote the assessment in their L1 across the lowest SES of sampled learners (see Table 6.18).

4. The substantially weaker performance observed of the low SES additive bilingual group (compared to the low SES immersion group) suggests that these learners have not acquired sufficient language proficiency and text familiarity to transition to L2 as LoLT in Grade 4, and require more time to reach a sufficient level of language proficiency in their L1 before transitioning (see Section 6.5).
5. The better performance of the immersion group was notably affected by exposure to print materials in the home and school environment. For learners in the low SES English L2 group access to text at the school level explains variance in performance by 33 score points. Access to text in the home and at school may promote language development to the abstract level required for higher-order reading comprehension (see Section 6.6).
6. The marked difference in performance associated with learners receiving instruction in the different LoLT groupings suggests that the language instruction models in the foundation phase are not conducive to equal opportunity for learners to succeed at school (see Tables 6.1, 6.2, 6.3, 6.4 and 6.5).

## **DISCUSSION OF THE KEY FINDINGS**

The performance of South African Grade 4 students on the higher-order subscale in prePIRLS 2011 is compared between students writing in English for whom it is not their home language, (immersion model) and students writing in their home language (additive bilingual model) in the African languages tested within the lowest socio-economic grouping. Using linear regression, it was found that learners from the most disadvantaged sector of South Africa, whose Language of Learning and Teaching (LoLT) is English in the Foundation Phase (Grade 1-3), but who do not speak English as a home language perform better on the higher-order reading comprehension subscale, compared with those having mother tongue instruction across the same grades and socio-economic status.

A high level of language development is critical for learners to master the higher-order items which require whole text understanding, the ability to make inferences, to integrate information, as well as, to evaluate text. Furthermore, language and literacy development is impacted by access to text. Performance for learners in the English

immersion group benefited notably by access to text at the home and school level, in contrast to learners in the additive bilingual group for whom any significant variance in their performance could not be ascribed to access to text at either level. It is possible that the better availability of English text, over text in the African languages, (Reeves et al., 2008) in South Africa may contribute significantly to literacy development for those who have access to English print material.

Differences in performance across language of instruction are indicative of unequal quality of instruction across the LoLT groupings. Changing the LoLT does not address the underlying problems, but providing at least high quality English L2 (alongside quality L1 instruction) from the start of school is a possible means of addressing inequality. This requires a shift in the conversation from an emphasis on the possible advantage of late exit L1 (Reeves et al., 2008; Plüddeman, 2010) to the provision of quality English L2 (Uys, Van der Walt, Van den Berg & Botha, 2007) for every learner from an early age, regardless of LoLT.

This study suggests that learners receiving instruction in English as an L2 perform better on the higher-order reading comprehension subscale in the prePIRLS 2011 assessment than their African Language counterparts receiving instruction in and writing the test in their mother tongue at the lowest SES for both language groupings. The complexity inherent in the debate of whether learners should rather receive instruction in English over an African language that is their home language requires much consideration. Many parents would prefer that schools do offer instruction in English (Webb, 2002; De Wet 2002). However, many schools are unable to support an English LoLT for reasons such as:

- The teachers not being equipped to instruct a class in English because they lack the prerequisite skills to teach English at an academic level (Uys, Van der Walt, Van den Berg & Botha, 2007).
- Teachers have insufficient English L2 instructional resources (Uys, Van der Walt, Van den Berg & Botha, 2007).
- The community within which the school is found does not support the learning of English as a second language and English becomes a foreign language for these learners and, as such, extremely difficult to master (Reeves, et al., 2008).

However, the availability of resources in a home language will also affect learners whose LoLT is the L1 where the L1 is an African language. Lack of educational materials in African languages may cause parents to move their children to well-resourced English-medium state schools (De Klerk, 2002a, 2002b; Webb, 2002; Reeves, et al., 2008). The lack of print material in all the home languages in equal quality and quantity suggests that mother tongue education in every African language as a blanket policy for every context will not provide the best opportunity for every learner.

### **8.2.3. The effect of different language of instruction models and contextual factors on performance**

The following research question was explored: *What is the effect of language of instruction and (home and school) contextual factors on higher-order reading comprehension performance?*

The key findings of Chapter 7 are summarised and then discussed below.

1. High levels of variance are explained by the learner belonging to a particular school due to the developmental context of South Africa. The between-school variance is higher for the English and Afrikaans language groupings than for the African language group (which, nonetheless, had a between-school variance of 40%). This result also speaks to the finding that SES within the English and Afrikaans language groupings is a significant explanatory variable in the performance of learners, possibly due to a greater differential in wealth within these groupings when compared to the African languages grouping (see Table 7.1).
2. Language of instruction across the national sample contributes significantly to the levels of variance observed in performance. Learners receiving instruction at a school where the language of instruction was one of the African languages from Grades 1-3 are likely to have a 97.29 score point decrease ( $B=-97.29$ ,  $SE=11.02$ ) in contrast to the learners at an English medium school who are likely to benefit by 93.15 score points ( $B=93.15$ ,  $SE=14.00$ ). Learners benefit by 128.87 score points ( $B=128.87$ ,  $SE=15.09$ ) significant at the .001 level from being in an English L1 (LoLT as home language) school. In addition, learners

benefit by 9.60 score points ( $B=9.60$ ,  $SE=1.39$ ) significant at the .001 level from being in an English L2 school where learners are learning in English despite it not being a home language (see Table 7.2).

3. SES was not a significant contextual factor affecting performance for the African languages group, but SES at the school level explained much of the variance in performance for English learners ( $B=86.06$ ,  $SE=20.48$ ,  $p=0.00$ ) and Afrikaans learners ( $B=98.54$ ,  $SE=17.28$ ,  $p=0.00$ ) when analysed within the LoLT sample (see Section 7.4).
4. The effect of access to text observed at the home level in a single-level analysis at the learner level was diminished in a two-level analysis across all language of instruction groupings, where the between-school variance was elevated in importance (see Section 7.4).
5. Within the school mediatory context Afrikaans LoLT learners who are at schools with a variety of titles in their library benefit by 44 score points to learner performance on the higher-order subscale ( $B=44.10$ ,  $SE=11.09$ ,  $p=0.00$ ). Moreover, it was found that access to text did not show a strong association with SES. This finding suggests that cultural capital in the form of print material at school is accessible to these learners regardless of their SES (see Table 7.13).
6. Learners are likely to benefit by 9.60 ( $B=9.60$ ,  $SE=1.39$ ) significant at the .001 level from being in an English immersion model at the school level. In contrast, at the school level for each point of decrease in an additive bilingual model learners have a 9.14 score point increase ( $B=9.14$ ,  $SE=-7.84$ ,  $p=0.00$ ) in performance. Furthermore, the findings of these models suggest that the better performance of the immersion grouping over the additive bilingual grouping cannot be attributed to SES or the other contextual factors examined using the home and school mediatory framework. Arguably, the language model itself a salient predictor of performance (see Tables 7.15 and 7.17).

7. Neither access to text nor SES were significantly contributing factors to performance for low SES English immersion model learners when analysed within the full national sample (N=15 744). However, the significant effect of access to text identified for the lowest SES English immersion subsample suggests that access to text explains much of the variance in performance for that grouping. Moreover, 28% of the variance in learner performance for the immersion grouping was explained at the school level, suggesting that the better performance observed by the English immersion grouping over the additive bilingual grouping is associated with the English LoLT school mediatory context within which the English L2 learners are found. Interestingly, in contrast to the English school LoLT learners, the performance of the English immersion model learners was not found to be significantly affected by SES (see Section 7.4).
8. According to these findings, verbal language support (where the learner often speaks the language of the test) does not translate into better performance in higher-order reading comprehension (see section 7.4).

## **DISCUSSION OF THE KEY FINDINGS**

Notably, learner variance was mostly explained across the language groupings at the school level. Socio-economic status (SES) contributes positively to learner performance in the English and Afrikaans groupings, but shows no effect in the African language grouping. Both SES and the school LoLT itself were found to contribute to the school mediatory context that affects learner performance on the higher-order reading comprehension subscale.

The home and school mediatory contexts were best suited as an analytical framework to the Afrikaner LoLT grouping. The Afrikaner LoLT grouping is a more linguistically homogenous grouping in South Africa (when compared to the African languages and English LoLT groupings as sampled and defined in this study) and the learner that is immersed within a congruent home and school environment might benefit from the motivation to gain from the cultural capital (found in many forms, as well as in the form of print material at school) that is available in such a context. As was found for the English L2 lowest SES grouping, access to text is significant in describing the variance in performance for learners at the school level for the high-performing Afrikaans

language of instruction grouping and is not associated with higher socio-economic status.

### **8.3. REFLECTIONS ON THE CONCEPTUAL FRAMEWORK**

The contextual factors affecting performance on the higher-order construct were examined at the home and school level using the theoretical framework graphically represented as the *Interactive Effect of Language of Instruction and the Learner's Mediatory Context on Higher-order Reading Comprehension* and described in Chapter 4 section 4.1. The theoretical lens set out in chapter 4 provided an informative framework for exploring the import of language and contextual factors on the development of higher-order thinking and reading comprehension in the learner. This process is described more fully in Chapter 3 section 3.7.

Employing the conceptual framework for each language model highlighted the differences between the language of instruction groupings which are discussed in the findings and conclusions. The conceptual framework was drawn from language theory, but the analyses done here should serve to refine the framework. Further research is necessary to explore in detail the effect that various contextual factors might have on the dependent variable. However, the conceptual framework worked as an effective tool for discerning differences between the language groupings.

It was found that certain aspects of the framework for the development of higher-order reading comprehension were seen to bear more weight in the results of the analysis. For example, factors that were highly significant in the single (student) level analysis, contributed less when analysed within the classroom clusters using multilevel analysis. The large amount of variance explained at the school level, suggests that the framework might be amended in the South African context to indicate the greater import of the school mediatory context over the home mediatory context. Another aspect to consider within the South African context (given the results of this study) would be to incorporate in the model the impact of the language diversity to which the learner is exposed as a result of the multilingual nature of South African society which may affect the nature of the cultural capital available to the learner.

It was found that language support (as operationalised in this study) had some effect on performance at the home level, but was not a significantly contributing factor across all the LoLTS at the school level. For this reason, the factor 'language support' could



arguably be removed from the conceptual framework since verbal proficiency is unlikely (according to these findings) to contribute as significantly as access to print and SES to proficiency in higher-order reading comprehension.

A limitation of the framework is the important aspect of access to text being accompanied by *motivation* on the learner's part to read the available text. Also, ascertaining the effect of intangible factors such as the *cultural capital* available to a learner in any particular 'LoLT plus mediatory context' combination, that is not related to socio-economic status of the school, is also problematic using the lens provided by this conceptual framework.

Critically, the conceptual framework depicted the relationship between the school LoLT and the mediatory contexts to be interactive. This factor was supported by the finding that for some of the LoLT groupings more of the variance in the model was explained by the school LoLT as a single predictor. This finding suggests that the conceptual framework can be refined to more clearly illustrate this interactive effect.

The conceptual framework also included the importance of interrogating the construct validity of the higher-level comprehension processes which informed the enquiry in Chapter 5 into the bearing that context has on the validity of the construct. It was particularly important to reflect this in the conceptual framework because the use of a reading test designed as an international large-scale assessment and administered in a multilingual and multicultural context is an on-going and pertinent debate (Grigorenko, 2009; Tymms & Coe, 2009; Ziegler & Goswami, 2005; Makalela, 2013).

#### **8.4. REFLECTIONS ON THE METHODOLOGY**

A limitation of the types of analyses used was the difficulty in exploring embedded contextual factors, as opposed to those that could more easily be operationalised by the prePIRLS 2011 data. Furthermore, attempts to operationalise the constructs were limited by missing data in some of the variables in the dataset that consequently had to be excluded from the analysis. The grouping together of the nine African languages into one grouping was a decision taken for practical purposes and because the variation in achievement was very similar amongst the African languages (and substantially different to the other two languages), but the comparison of such a large grouping to the others needs consideration.

The data did not allow for a comparison of the learners' performance when writing in English (home language LoLT African language learners who wrote the test in English compared with English L2 LoLT) which would inform the efficacy of the additive bilingual early exit approach currently adopted by many schools. However, considerations for a mother tongue *late exit* approach could be made using these findings. The poor(er) results in the higher-order tasks observed in the additive bilingual group means the learners may not yet have attained a sufficient language competency threshold (Cummins, 1979) and would benefit from continuing with mother tongue instruction well into the Intermediate Phase before transitioning to the additional language as LoLT. A limitation of the study is that the additive bilingual model is premised on the idea that the initial intensive instruction in the mother tongue will benefit the learner with improved English or additional language acquisition. It is not possible (with the prePIRLS 2011 dataset alone) to ascertain whether the lower proficiency observed by the mother tongue learners against the English L2 LoLT learners will later translate into comparable or even better English reading comprehension in the later grades.

## **8.5. MAIN CONCLUSIONS**

This section discusses the three main conclusions derived from the research.

**Main Conclusion 1: English L2 learners require a different instructional strategy to achieve similar reading comprehension performance to their English L1 peers.**

A focus on language instruction where the quality of the learner's L1 and English L2 teaching are made equally robust could significantly contribute to closing the wide differential in the quality of education across South Africa and facilitate improved access to the global economy.

As was revealed in Chapter 6, in South Africa, English L2 learners perform better on the higher-order reading comprehension items than the African language L1 learners across the lowest SES. Therefore, the current language in education debate needs to shift in emphasis *to how can all learners receive better and earlier English L2 instruction* (parallel to receiving quality L1 instruction)? Learning a home language and learning English as an L2 are equally important for the South African learner because

of both the importance of home language instruction (Cummins, 1978) and because the learner must eventually write their final secondary school examination (namely, the National Senior Certificate) and then continue in tertiary (higher) education in either English or Afrikaans.

English L2 learners perform poorly when compared to English L1 learner performance, despite having had access to English as a LoLT throughout the Foundation Phase (see Table 6.1). This suggests that English L2 requires a different instructional approach to bring English L2 learners up to the same language proficiency level as English L1 learners. As was demonstrated in Chapter 5, teaching higher-order reading comprehension to L2 learners may require an emphasis on inferencing as the first step to comprehension of more abstract text.

It was demonstrated in Chapters 6 and 7 that language of instruction has a significant effect on performance on the higher-order reading comprehension items. However, the findings indicate that classroom instruction in the home language may not be the best choice in every context, and the availability of learning material and instructional support in a language must weigh on the language of instruction options available to schools.

It was demonstrated in this study that English L2 learners outperform the African languages L1 grouping (see Chapter 6). Moreover, the prePIRLS 2011 assessment is an easier assessment than the PIRLS 2011 assessment administered to Grade 4 learners internationally. The expectation placed on learners in many of the South African Foundation Phase classrooms is lower than the international standard. Learners need to be better taught how to answer items at the higher-order level in the early phase of schooling and learning to read (Zimmerman, 2010) to bring about alignment with the international standard.

The cultural dominance of English prevalent in South Africa manifests in motivation for parents to have their children be instructed in English (De Wet, 2002), a perception of social mobility (Posel & Casale, 2011) and access to print material in English (Reeves et al., 2008). These weighty cultural capital factors may indirectly contribute to the better performance observed of the English L2 learners on the higher-order reading comprehension items and benchmarks over the African languages L1 learners. The multilingual complexity of South Africa is further complicated by the influx of immigrants from the surrounding African countries. Providing learners from all sectors with quality

English L2 instruction from an early age could counteract marginalisation within South African society. Adequate home and school mediatory contexts are critical for every learner to develop their home language and further research is needed to provide better quality mother tongue support and instruction to learners in order to improve reading comprehension performance in their L1. Further research is required to explore whether, for the lowest SES learners, early immersion in English L2 with their L1 as a subject can provide critical access to print material for the development of higher-order reading comprehension as indicated in these findings.

**Main Conclusion 2: Access to text at the school level was found (see Section 6.6) to contribute significantly to the overall performance of the lowest socio-economic grouping of English L2 learners.**

Access to print material should be considered a means of levelling the opportunity between the economically advantaged and disadvantaged learners. In the South African context access to text at school may compensate for low socio-economic status of the home and of the school.

The findings of Chapter 6 suggest that providing adequate text at school can make up for the lack of access to text at home for the disadvantaged learner. Providing the learner with text at school and, hence an opportunity to engage with text, substitutes the lack of instruction in the home and at school (as discussed in Section 3.3) and affords the disadvantaged learner the opportunity to develop the cognitive and metacognitive skills required for reading comprehension. Section 3.7 provides discussion of how access to text contributes to the development of cognitive and metacognitive skills. Notably, reader engagement and motivation to read available text is also critical for literacy development (Cummins, 2016). It is possible that where there is adequate access to text, the LoLT groupings that are less likely to benefit from access to text may not be motivated to engage with the text either due to the home environment not placing a high value on reading or the school not facilitating engagement with and motivation to read text.

As depicted in the conceptual framework for this study, access to print material may contribute to the development of abstract and critical thought necessary for higher-order comprehension (Vygotsky, 1978). The deficiencies evident in the education

system in the provision of quality text/print material may be negatively affecting the development of higher-order thinking in the form of cognitive and metacognitive skills necessary for proficiency in higher-order reading comprehension (Veenman, 2016). In alignment with the theoretical framework for the development of higher-order reading comprehension laid out in this study, a focus on developing metacognitive skills may compensate for an inadequate mediatory context in early schooling.

**Main Conclusion 3: The LoLT of the learner, socio-economic status and access to text at the school level are important factors in learner performance on the higher-order reading subscale.**

It was demonstrated through the multilevel models in Section 7.4 that socio-economic status significantly explains variance in learner performance in the higher performing LoLT groupings of English and Afrikaans. The conceptual framework (Figure 4.1) used in this study and derived from prevalent language theory, formed the basis for the multilevel model that explained 55% of learner variance for the Afrikaans LoLT grouping (see Table 7.13) with access to text at the school level observed to contribute 44 score points to learner performance.

With reference to the literature review of Section 3.2 and further discussion of the learner's mediatory context in cultural capital terms in Section 4.1.4, it is possible that the conceptual framework used in this study more effectively describes a LoLT grouping such as the Afrikaans LoLT grouping that is relatively homogenous as a socio-linguistic grouping. The cultural capital (Bourdieu, 1991) available to the Afrikaans learner who has Afrikaans print material available both at home and at school may contribute to his/her motivation to engage with text (Cummins, 2016). The challenge for South African education is to make text available to every learner in a form that is likewise invested with the cultural capital that motivates the learner to engage with the print material. Moreover, it is possible that the homogeneity of the LoLT grouping strengthens some forms of cultural capital (for example, access to print material at school) and contributes positively to learner performance.

## **8.6. RECOMMENDATIONS**

In this section the findings of Chapters 5, 6 and 7 form the basis for recommendations

made with regard to policy, practice and research.

### **8.6.1. Policy**

Monitoring of the education system has repeatedly shown that the level of learner achievement is well below the international standard in South Africa. Policy in South Africa needs to be aimed at raising the competency expectation that the education system has of the learner. Language curriculum expectations in the Foundation Phase may need to be revised in this regard.

Many learners do not have adequate access to text at home, and the school's role in providing the learner with the opportunity to read text as abundantly as possible is critical. Access to print material in a home language and the L2 is important.

While access to home language instruction remains the right of every learner, equal opportunity should be an important consideration in every context. Building English L2 instructional capacity for all learners (whether as the language of instruction or as a subject) from the start of school needs to be carefully considered as a means of facilitating equal learning opportunity.

### **8.6.2. Practice**

The higher-order reading comprehension processes need to be taught earlier and receive more focus. Learners also need to be encouraged to read longer and more complex texts at an earlier age. Moreover, instruction that develops metacognitive skills for reading needs to be fundamental to teaching reading.

Learners need to have access to text at school and need to be encouraged to engage with text. Critically, home language, whether it is the language of instruction or not, needs to be taught at a level which cultivates abstract reasoning and critical thought. Teachers need to be trained to teach English as an L2 and it, too, needs to be taught at a level which cultivates abstract reasoning and critical thought. Schools must prioritise and emphasise the learning of English L2 alongside home language instruction in the early grades.

It is paramount that the cultural importance of a home language be conveyed in the classroom. Furthermore, language teaching needs to expose any cultural bias hidden in literature and empower learners to challenge the dominant cultural discourse.

### **8.6.3. Research**

Further research is required into the importance of learners grasping inferencing in reading comprehension across L1 and L2 language groupings to determine the role language development has on the straightforward inferencing process for higher-order reading comprehension. This means research is required into how instruction in the classroom might be adapted for teaching the L1 or L2 learner. Further research is required into how to support South African teachers to provide better home language instruction, coupled with focused English L2 instruction, from the start of school.

Notably, further research is required into raising the expectation of reading comprehension levels in classrooms, particularly in higher-order reading comprehension. This should include how to improve learner engagement with text and motivation to read.

Findings (as well as the feedback into the education system) are limited when the measurement of reading comprehension is reduced to the cognitive processes. Testing of reading comprehension is strengthened by the inclusion of factors such as motivation to read, reader engagement, metacognitive strategy development in the reader and the impact of societal power relations on young readers. An approach to including these factors needs to be further examined.

## **8.7. CLOSING THOUGHTS**

This study has attempted to demonstrate the effect that language of instruction and context has on the development of higher-order literacy in the Grade 4 learner. The premise that language of instruction (observed as the L1 and L2 of the learner) and context (seen as home and school mediatory contexts) interact and affect the development of higher-order cognition for reading comprehension has been explored and forms the framework for these findings.

The conceptual framework used in this study interrogates how language, in the South African context, might act as a gatekeeper to the mediation of learning which is available to the learner through his/her home and school context. An interactive effect was observed in the analyses between the language model itself and the mediatory contexts. The learner either benefits or is at a disadvantage as a result of the LoLT of his/her school. Minority languages or languages for which print material at school is

not easily available may not provide the same level of access to this form of cultural capital which is available to learners whose LoLT is more culturally dominant or whose socio-linguistic context is more homogenous. It is important to develop all the official languages and to provide learners with the opportunity to read and write in their home languages whilst also facilitating broader access to global opportunities.

The choice of language at school and classroom level is made within a context. It is this context which determines the quality of instructional mediation available to the learner in the form of text resources and teacher instruction. Furthermore, it is this quality of mediation for learning which establishes the learners' repertoire of reading strategy and cognitive and metacognitive skills for reading comprehension proficiency. Therefore, it is important that these considerations drive the learning of language in the Foundation Phase.

The difference between schools in performance on the higher-order reading comprehension levels can be explained to a large extent by the language of instruction of the schools. The underlying factors causing the significant variance were explored. The limitation of this study means further research is required into embedded contextual determinants of performance. Further research is also required into how certain socio-linguistic groupings facilitate access to different forms of cultural capital.

It is suggested that home language instruction does not in itself determine better performance on the higher-order reading comprehension benchmarks. It is argued that access to text can to some extent compensate for inadequate instruction in the home and at school. However, access to text is limited by the learner's motivation to read the available print material and his or her ability to engage with the text. These factors are affected by the different forms of cultural capital available to learners in different socio-linguistic groupings.

An amplification of focus needs to be on improving English L2 instruction. It is possible that early immersion in English L2 with strong support for home language learning can be a vehicle for across the board quality educational provision. Cummins (1979) suggests that the immersion model works better for the middle-class learner (as opposed to the poorer learner) because of access during early childhood to parental reinforcement of the nature and importance of text (language used in an abstract form and in a manner other than the interpersonal or communicative). This mediation allows



for the development of a threshold level of language in the child and the ability to cope with immersion in the additional language. In this study it was found that low SES learners exposed to an immersion model benefit notably by access to text at school. South Africa's multilingual language-in-education policy needs to be undergirded by sound instructional practice for both the home language and the additional languages right throughout the learner's school career with access to print material regarded as critical for educational equality.



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# APPENDICES

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**Appendix A:** Tables of Variables

**Appendix B:** Table of Factor Loadings for the Items

**Appendix C:** Item Maps of English L1 and L2 Learners

## Appendix A: Tables of Variables

Table A.1. *Table of Factors*

<b>Composition of Variable indicating Text at Home (TextHome)</b>	<b>Description of variables constituting the scale</b>	<b>Valid Percent</b>	<b>Cronbach's Alpha (standardised)</b>	<b>Inter-item Correlation</b>	<b>Factor Analysis Principal Component</b>
ASBH15A	Number of children's books in the home	85		.502	
ASBH15B	Books for child in LoT	85		.502	
TextHome	Text available in Home including in LoT	85	.669	–	.867

<b>Composition of Variable indicating Language Support at School (LangSuppSchool)</b>	<b>Description of Variable</b>	<b>Valid Percent</b>	<b>Cronbach's Alpha (standardised)</b>	<b>Inter-item Correlation</b>	<b>Factor Analysis Principal Component</b>
ATBR20A	LoT part of formal education of Teacher	95		.625	
ATBR20B	Pedagogy part of formal education of Teacher	95		.625	
LangSuppSchool	Teacher LoT and Pedagogy part of formal education	95	.770		.902



<b>Composition of Variable indicating SES at School (SESSchool)</b>	<b>Description of Variable</b>	<b>Valid Percent</b>	<b>Cronbach's Alpha (standardised)</b>	<b>Inter-item Correlation</b>	<b>Factor Analysis Principal Component</b>
ACBG10AC	Shortage of school buildings affects capacity	92		.743	
ACBG10AA	Shortage of materials affects capacity	92		.743	
SESSchool	Shortage of buildings and materials	92	.853	—	.934

**Table A.2. Language of Test Spoken by the Parents**

	<b>African Languages</b>	<b>English</b>	<b>Afrikaans</b>
Language of the Test is spoken by the father	4 727	482	818
Another language is spoken by the father	1 163	822	74
Language of the Test is spoken by the mother	4 879	474	805
Another language is spoken by the mother	983	752	54

## Appendix B: Table of Factor Loadings for the Items

**Table B.1. Factor loading per item** (note: the shading indicates a well-fitting item)

Items	Factor Loading onto Process	Comprehension Process	Passage
L11O14C_RI	0.51	Retrieve Information	<i>Trend Literary Passage A</i>
L11O10C_RI	0.03	Retrieve Information	<i>Trend Literary Passage A</i>
L11O09C_RI	0.29	Retrieve Information	<i>Trend Literary Passage A</i>
L11O05C_RI	0.44	Retrieve Information	<i>Trend Literary Passage A</i>
L11O04M_RI	0.44	Retrieve Information	<i>Trend Literary Passage A</i>
L11O03M_RI	0.18	Retrieve Information	<i>Trend Literary Passage A</i>
L11O01M_RI	0.09	Retrieve Information	<i>Trend Literary Passage A</i>
L11L14C_RI	0.51	Retrieve Information	Lonely Giraffe
L11L12M_RI	0.22	Retrieve Information	Lonely Giraffe
L11L09M_RI	0.02	Retrieve Information	Lonely Giraffe
L11L05M_RI	0.41	Retrieve Information	Lonely Giraffe
L11L04M_RI	0.18	Retrieve Information	Lonely Giraffe
L11L03C_RI	0.07	Retrieve Information	Lonely Giraffe
L11L01C_RI	0.19	Retrieve Information	Lonely Giraffe

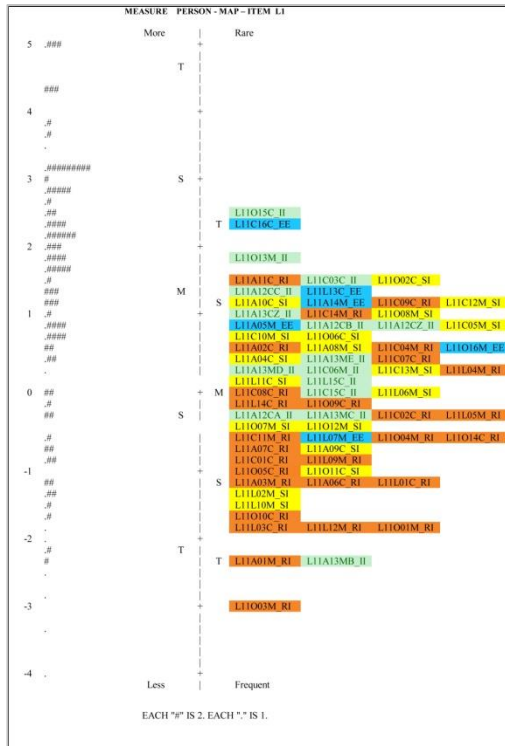
Items	Factor Loading onto Process	Comprehension Process	Passage
L11C14M_RI	0.45	Retrieve Information	Caterpillar to Butterfly
L11C11M_RI	0.26	Retrieve Information	Caterpillar to Butterfly
L11C09C_RI	0.44	Retrieve Information	Caterpillar to Butterfly
L11C08C_RI	0.32	Retrieve Information	Caterpillar to Butterfly
L11C07C_RI	0.38	Retrieve Information	Caterpillar to Butterfly
L11C04M_RI	0.54	Retrieve Information	Caterpillar to Butterfly
L11C02C_RI	0.60	Retrieve Information	Caterpillar to Butterfly
L11C01C_RI	0.40	Retrieve Information	Caterpillar to Butterfly
L11A11C_RI	0.54	Retrieve Information	<i>Trend Informational Passage A</i>
L11A07C_RI	0.55	Retrieve Information	<i>Trend Informational Passage A</i>
L11A06C_RI	0.71	Retrieve Information	<i>Trend Informational Passage A</i>
L11A03M_RI	0.56	Retrieve Information	<i>Trend Informational Passage A</i>
L11A02C_RI	0.52	Retrieve Information	<i>Trend Informational Passage A</i>
L11A01M_RI	0.85	Retrieve Information	<i>Trend Informational Passage A</i>
L11O12M_SI	0.55	Straightforward Inferencing	<i>Trend Literary Passage A</i>
L11O11C_SI	0.72	Straightforward Inferencing	<i>Trend Literary Passage A</i>

<b>Items</b>	<b>Factor Loading onto Process</b>	<b>Comprehension Process</b>	<b>Passage</b>
L11O08M_SI	0.45	Straightforward Inferencing	<i>Trend Literary Passage A</i>
L11O07M_SI	0.43	Straightforward Inferencing	<i>Trend Literary Passage A</i>
L11O06C_SI	0.28	Straightforward Inferencing	<i>Trend Literary Passage A</i>
L11O02C_SI	0.57	Straightforward Inferencing	<i>Trend Literary Passage A</i>
L11L06M_SI	0.35	Straightforward Inferencing	Lonely Giraffe
L11L11C_SI	0.75	Straightforward Inferencing	Lonely Giraffe
L11L10M_SI	0.43	Straightforward Inferencing	Lonely Giraffe
L11L02M_SI	0.23	Straightforward Inferencing	Lonely Giraffe
L11C13M_SI	0.38	Straightforward Inferencing	Caterpillar to Butterfly
L11C12M_SI	0.07	Straightforward Inferencing	Caterpillar to Butterfly
L11C10M_SI	0.33	Straightforward Inferencing	Caterpillar to Butterfly
L11C05M_SI	0.45	Straightforward Inferencing	Caterpillar to Butterfly
L11A08M_SI	0.49	Straightforward Inferencing	<i>Trend Informational Passage A</i>
L11A10C_SI	0.64	Straightforward Inferencing	<i>Trend Informational Passage A</i>
L11A09C_SI	0.74	Straightforward Inferencing	<i>Trend Informational Passage A</i>
L11A04C_SI	0.84	Straightforward Inferencing	<i>Trend Informational Passage A</i>

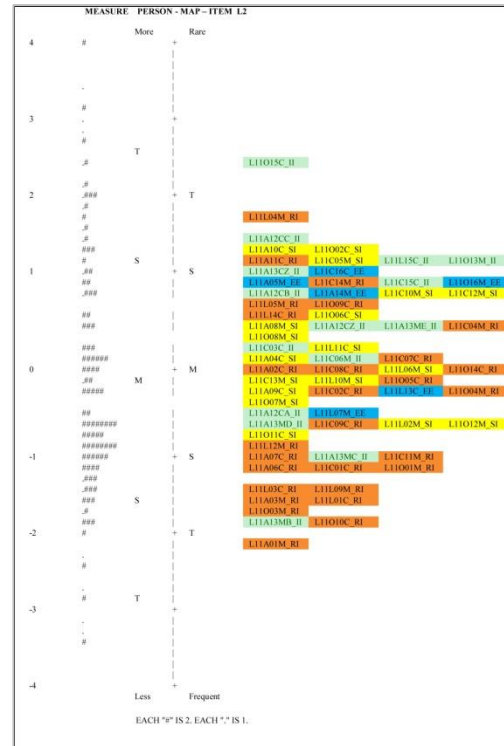
<b>Items</b>	<b>Factor Loading onto Process</b>	<b>Comprehension Process</b>	<b>Passage</b>
L11O15C_II	0.42	Interpret and Integrate	<i>Trend Literary Passage A</i>
L11O13M_II	0.52	Interpret and Integrate	<i>Trend Literary Passage A</i>
L11L15C_II	0.63	Interpret and Integrate	Lonely Giraffe
L11C15C_II	0.56	Interpret and Integrate	Caterpillar to Butterfly
L11C06M_II	0.44	Interpret and Integrate	Caterpillar to Butterfly
L11C03C_II	0.50	Interpret and Integrate	Caterpillar to Butterfly
L11A13ME_II	0.61	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A13MD_II	0.45	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A13MC_II	0.43	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A13MB_II	0.36	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A13CZ_II	0.75	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A12CZ_II	1.01	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A12CC_II	0.81	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A12CB_II	0.83	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11A12CA_II	0.85	Interpret and Integrate	<i>Trend Informational Passage A</i>
L11O16M_EE	0.79	Examine and Evaluate	<i>Trend Literary Passage A</i>
L11L13C_EE	0.37	Examine and Evaluate	Lonely Giraffe
L11L07M_EE	0.65	Examine and Evaluate	Lonely Giraffe

Items	Factor Loading onto Process	Comprehension Process	Passage
L11C16C_EE	0.63	Examine and Evaluate	Caterpillar to Butterfly
L11A14M_EE	0.57	Examine and Evaluate	<i>Trend Informational Passage A</i>
L11A05M_EE	0.72	Examine and Evaluate	<i>Trend Informational Passage A</i>

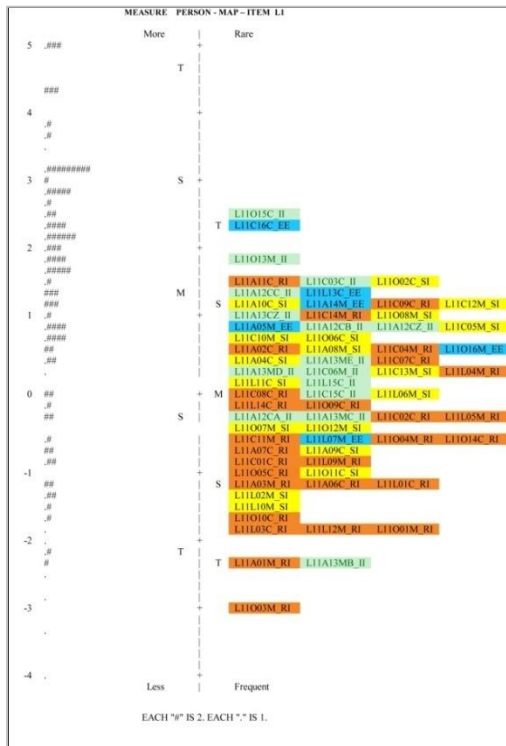
## Appendix C: Item Maps Comparing English L1 and L2 Learners



Item Map of English L1



Item Map of English L2



Item Map of both groups

Key:

