

Relating Academic Performance to L1 and L2 learners' scores on the SDRT and Raven's SPM

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DECLARATION

I declare that this research report is my own, unaided work. It is being submitted for the degree of Master of Education in Educational Psychology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at this or any other university.

Nabeela Gangat

Date

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This research project would not have been possible without the help of many individuals who have made numerous sacrifices in order for me to follow my dream.

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DEDICATION

I would like to dedicate this research paper to South Africa's educators'; your hard work, patience and devotion is admirable.

"Standardized tests can't measure initiative, creativity, imagination, conceptual thinking, curiosity, effort, irony, judgment, commitment, nuance, good will, ethical reflection, or a host of other valuable dispositions and attributes. What they can measure and count are isolated skills, specific facts and function, the least interesting and least significant aspects of learning."

Bill Ayers

ABSTRACT

This research study investigated the relationship between first (L1) and second language (L2) learners' academic performance and their scores on the Stanford Diagnostic Reading Test (SDRT) and the Raven's Standard Progressive Matrices (RSPM). The inherently different nature of using a verbal assessment and a non-verbal assessment are important to consider in relation to overall academic performance, especially in light of the different language demands of a verbal versus a non-verbal assessment. South Africa has a diverse language landscape, which does pose practical problems for choosing a standard language of learning and teaching, which could create some language issues. The concept of intelligence is unpacked and discussed in relation to both academic performance and reading, which requires careful navigation due to its links to both these concepts. Psychological testing and assessment in South Africa has an encumbered history, which makes research in this area valuable, especially in relation to the unique language diversity in South Africa combined with the lack of South African assessments. Language, reading and intelligence are important to consider in light of the role they to play in relation to overall academic achievement. The results revealed that L1 learners performed better compared to L2 learners on both the SDRT and the RSPM. L1 learners also performed better academically compared to their peers. These results indicated some serious implications showing that L2 learners have not been able to bridge language and learning gaps, after at least five years of being taught in English. The results also revealed that the SDRT was a better predictor of academic performance for both L1 and L2 learners. This highlighted the importance of reading within the South African school system. The under researched area of the exact impact that reading has on overall academic performance showed that South Africa's curriculum is reading heavy, which does emphasise the importance of reading to achieve academic success.

Keywords: academic performance, intelligence testing, measures of intelligence, reading, South African language diversity, Stanford Diagnostic Reading Test (SDRT), reading comprehension, auditory vocabulary, Raven's Standard Progressive Matrices (RSPM), bilingual education, English First Language Speakers (L1), English Second Language Speakers (L2)

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CHAPTER 1

INTRODUCTION

1.1. Introduction

The link between academic performance and language in South Africa is a critical concept to examine in light of the diverse language landscape. Reading is one of the most important foundational skills to access the curriculum, yet there is very little research in this critical area (Pretorius & Mampuru, 2007). Reading is often used as a benchmark to assess the success of an education system (Pretorius & Mampuru, 2007). South Africa's dismal performance in the largest national reading studies that were conducted in South Africa took place in 2006 and 2011 (Howie, Van Staden, Tshele, Dowse, & Zimmerman, 2012), which was undertaken by the International Association for the Evaluation of Educational Achievement's (hereafter IEA) Progress in International Reading Literacy Study (hereafter PIRLS). This study aimed to establish the national reading level of South Africa's learners in comparison to international benchmarks. In both 2006 and 2011, South Africa chose to assess two grades of learners, grades four and five, while most other countries chose to assess only one grade. Each learner was assessed in one of South Africa's 11 official languages, which in theory was the language of instruction that learners were educated in during Grades one to three (Howie et al., 2012).

The 2011 PIRLS national study on reading level indicated that Grade 4 learners performed well below international benchmarks, which was similar to the 2006 results, with African language learners not being able to achieve the mid-point, even though they were tested in their home language, whilst English and Afrikaans learners did relatively well. This means that learners not reaching the lowest international benchmark are unable to read basic texts

for information, which has dire consequences for academic performance. There was no overall difference between the 2006 and 2011 results for Grade 5 learners. The 2011 results indicated that Grade 5 learners were performing well below the centre point of international standards, although learners were only tested in English or Afrikaans. This means that learners who use English as a second-language were not tested in their home language, which showed a real reflection of the learner's ability to access the curriculum meaningfully.

1.2. Problem Statement and Rationale

The language issues within South Africa affect education directly, yet little research is undertaken about the real experiences of South African learners within the school context (Heugh, 2008; Pretorius & Mampuru, 2007). This research gap is a critically under researched area, which requires further investigation. The importance of reading is acknowledged and is the primary tool for accessing the education curriculum and will ultimately ensure educational success or failure (Pretorius, 2002), yet there is very little research conducted in the critical area. The link between language and literacy is poorly understood, yet impedes the learning opportunities for learners (Mbatha, 2012).

The findings and conclusions reached by Gangat (2014) in an exploratory study show that the significant differences between first and second language English learners' Stanford Diagnostic Reading Test (hereafter SDRT) reading comprehension and SDRT auditory vocabulary levels show deeper underlying issues that require further investigation. The focus of this study was centred on understanding the relationship between L1 and L2 learners' scores on the SDRT, which could have been attributed due to a language issue. The findings indicated that academic language needed to be actively taught to L2 learners, even at high school level, which indicates the language gap between L1 and L2 learners (Gangat, 2014). This was the catalyst for continuing this research project in order to delve deeper into the data

gathered in order to evaluate these critical issues further as well as to understand the comparison between a verbal and a non-verbal assessment in relation to the learner's overall academic performance.

South Africa's multilingual landscape requires careful navigation in order to cater for all South Africans in a fair and just manner. The wide use of psychological tests that are not normed for the South African population and its implications need to be carefully considered (Laher & Cockcroft, 2013). The lack of appropriate non-biased tests does mean that non-South African normed tests may be used, but the interpretation needs to be adjusted accordingly (Laher & Cockcroft, 2014). The rationale for this study is to understand the complex relationship between academic performance and a verbal and non-verbal standardised test in order to ascertain which, if any, is more appropriate for a South African multilingual population.

Assessment in South Africa is a controversial topic mostly due to its links to South Africa's tumultuous and tarnished past (Laher & Cockcroft, 2013). This historical link placed doubt on the value of psychological tests, mostly due to its exploitation where Laher and Cockcroft (2013) refer to the lower scores obtained by black children on tests that were specifically normed for white children and thereafter misused as substantiation for the inadequacy of black intellect. This widely used prejudice early in the twentieth century marked the beginning of psychological assessment in South Africa. This image was re-enforced when separate development was justified through these tests that had laid the foundation for the divisive practices of the apartheid government (Laher & Cockcroft, 2013). This encumbered history of psychological assessment makes it indispensable to explore how applicable tests are that are widely used in South Africa. Standardised testing on South Africa's school-going population is prominent yet the exact impact on a large portion of learners seems to be

ignored (Kanjee & Sayed, 2013). This research study's rationale into the relationships between two broad standardised tests is a critically under-researched area. Intelligence testing forms part of a full psycho-educational assessment. Educational psychologists' frequent use of standardised tests have far-reaching consequences on the decisions being made, based on the outcomes of the standardised tests, therefore the results of such assessments needs to be fair, reliable and equitable. The lack of South African normed tests seemed to exacerbate this problem (Foxcroft, 2004). International tests are being used due to their reliability, accuracy and standardisation but do pose unique South African issues that question its validity and reliability. In light of the wide use and importance of standardised testing within the educational context in South Africa it is extremely important to understand the relationship between actual academic performance and the test results yielded from standardised tests.

The reason why a verbal and non-verbal test was used was to ensure that learners were provided a fair opportunity to perform to their best ability in both areas. The verbal and non-verbal domains access different areas, which makes it an important area to access, especially given the complex demands of learning (Goldman, 2012). The Raven's Standard Progressive Matrices (hereafter RSPM) is a non-verbal measure, which is a supposedly a fairer non-biased assessment measure, therefore it is widely used in South Africa as a psychological assessment (Cockcroft & Israel, 2011; Owen, 1992). The SDRT is a reading and vocabulary assessment measure (Karlsen, Madden, & Gardner, 1986b), which was chosen was due to the high language demand of learners who need to meaningfully access the curriculum (Pretorius & Mampuru, 2007). Therefore, the SDRT was utilised to tap into the learner's current reading level, in order to ascertain if there is meaningful understanding of the curriculum as well as to ascertain the relationship between language ability and academic performance.

1.3. Aim

This study's specific aim is to examine whether the standardised tests that are currently utilised in South Africa match learner's academic performance. This research study is intended to initiate further conversation in this critical area due to the far-reaching implications that standardised test results have on school-age learners.

The study specifically aimed to study and examine the following, firstly, to determine if there is a significant difference between the L1 and L2 learners' scores on the SDRT, a primarily verbal assessment compared to the learners' overall academic performance. The same relationship would be examined between RSPM, a non-verbal measure of *g*, and the learners' overall academic performance. The difference, if any, will be compared to the learner's overall academic performance in order to establish if a significant relationship exists between these variables.

Secondly, the importance of psychological testing within the school setting has been established and this posits the next aim. The RSPM and the SDRT are often used to place a learner within a setting or are usually part of a larger set of assessments that may limit or expand the learner's academic choices. Therefore, a critical question will be examined to determine whether the SDRT or RSPM is a better predictor of academic performance. This is a critical aim, especially in light of South Africa's diverse language landscape coupled with the importance placed on such assessments within the educational context.

1.4. Research Questions

The following research questions that are deduced from the aim are the key questions that are going to be investigated:

1. Is there a significant difference between L1 and L2 learners' scores on the SDRT and their academic performance?
2. Is there a significant difference between L1 and L2 learners' scores on the RSPM and their academic performance?
3. Is the SDRT or RSPM a better predictor of academic performance for L1 learners?
4. Is the SDRT or RSPM a better predictor of academic performance for L2 learners?

1.5. Research Methods

The research study utilised a non-experimental design that is quantitative in nature with no random assignment (Howitt & Cramer, 2007). The data utilised was archival data that was collected by the researcher during a previous study (Gangat, 2014). A single cross-sectional set of measurements was collected and there was no manipulation of any of the variables within the research study. The research design involved a comparison between groups, also known as a between-subjects research design (Gravetter & Wallnau, 2013).

1.6. Concept Clarification

For the purpose of this research study, first and second language English speakers will be referred to as L1 and L2 respectively. L1 learners are learners who have English as a Home Language and used English primarily as the language of communication before entering formal schooling (Cummins, 1980). L2 learners are defined as those learners who use another language, besides English, such as an African home language and who have been educated in English in a formal setting for a minimum of five years (Cummins, 1980). Therefore, L1 refers to learners who use English as a home language and L2 refers to learners who use

English as a second language. The exact research parameters, which included or excluded L1 and L2 learners, will be outlined in the Methods section.

The language groupings in this research study have been separated according to Home Language use as discussed above, although the language diversity of the L2 learners required a further split within the L2 group. Therefore, there were two groups formed, namely the Nguni language group and the Sotho/Other group. Nguni language group is made up isiZulu, isiXhosa, isiNdebele and xiTsonga whilst the Sotho/Other group is made up of SeSotho, Sepedi, Setswana, which forms part of the Sotho language group whilst Shona and tshiVenda fall outside of these language groups and make up the Other group (Botha, Zimu, & Barnard, 2007; Kamwangamalu, 2001).

1.7. Outline of the Research Report

The introduction outlined the importance of fair and non-prejudicial assessments whilst highlighting the inequalities of the past and the negative manner in which assessment results were utilised.

The second chapter consists of an in-depth discussion of a literature review that forms the basis of this research study. The literature review will include a detailed discussion of the relevant literature for this research study.

The third chapter will discuss the methods around the research collection, which will include research design, sampling and instruments used in this study. The procedure to collect the research material will be outlined, which will be followed with the methods of analysis and possible threats to validity. The chapter will conclude with a discussion around the ethical considerations that were taken into account for this research study.

Chapter 4 will begin with pre-analyses and the various statistical analyses utilised to address the research questions. The instrument reliability will first be analysed followed by the suitability of the data for parametric analyses to determine which statistical tests will be utilised. Finally, a detailed overview of the results will be presented in the order of the research questions posed.

Chapter 5 will discuss the findings of this research study. The findings will be located within a body of literature, which aims to provide a critical view of the findings in relation to relevant research studies.

The final chapter will discuss the limitations of this research study, in order to explore alternatives to improve the overall research study. The recommendations for future research are important to consider, which may ignite further research in this field. The conclusion will complete this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

The purpose of the literature review is to situate and contextualise this research study within a conceptual framework (Athanasou et al., 2012). This will lay the foundation for key theories and concepts that are pertinent to this research study. The key issues that underpin this research study will be explored to place the intended research within a framework. The chapter will begin with an overview of the language policy in South African schools to situate the broad framework of this research study. This will be followed by an overview of a bilingual theory, which is conceptually important. This will be followed by a discussion on the psychological assessment landscape of South Africa, which will lay down the historical facts and pertinent issues in this area. A look at the concept of intelligence will follow, in order to understand the key issues that this research study is interested in studying, which will be followed by a brief discussion on the various measures of intelligence. This will link directly to academic performance, which will link to the next section, which will discuss the importance of reading comprehension and auditory vocabulary. A conclusion will finalise this chapter.

2.2. Language Policy in South Africa's Schools

The first democratically elected education ministry had been left with one of the most disproportionate sectors in South Africa (Jansen & Taylor, 2003). Education in South Africa carries historical baggage; zoning in on the reality of schooling in 2016 will not adequately explain how today's realities are shaped by events more than two decades old. The accomplishments of the post-apartheid government within education, at ground level, are

numerous and vast, especially weighed up against the inequity that was inherited from the apartheid government. South Africa has achieved almost 100 percent enrolment for children aged 7 to 14 years (Frempong, Reddy, & Mackay, 2013) and is a significant achievement especially when combined with South Africa achieving one of the highest rates of enrolment in Africa for female learners (Jansen & Taylor, 2003). These strides in education should be credited to the government's initiative to transform education and should serve as motivation for further educational reform.

The structure of education seems robust; there is adequate legislation, policy and enrolment rates are very high, compared to other African countries (Jansen & Taylor, 2003). Practically, the reality of the classroom situation and educational achievement is of concern as indicated in the study conducted by Frempong et al. (2013) as part of the Human Sciences Research Council (hereafter HSRC). This study assessed the national average performance, according to the Annual National Assessment (hereafter ANA) reports of 2011 and 2012, which looks at national mathematics performance and home language scores. The study revealed that learners in Grades 3 to 6 and Grade 9 achieved below 50 percent in Mathematics and Home Language scores (Department of Basic Education, 2011, 2012, as cited in Frempong et al., 2013). These scores show the enormity of the issue that the basic education sector faces, yet ironically demonstrates the usefulness of large-scale measures such as the ANA due to the valuable understanding of the issue at national level.

South Africa's education context is incomplete without reviewing and discussing South Africa's diverse language landscape. Alexander (2000) categorically situates this issue by stating that there are not many topics that cause fervour as a discussion that is centred around language of instruction within schools. This is due to language being used as a tool historically for social inequity. *Census 2011* notes that a meagre 9.6 percent of the total

population speak English as a first language (Statistics South Africa, 2012). This statistic is unsurprising and indicates that the majority of South Africans have an African language as a home language. Interestingly, over 97 percent of African adults (aged 15 years and older) note that their home language is one of the nine African languages, as noted by Posel and Zeller (2011). Thus, the majority of learners entering school would not have been exposed to English as a home language. Recently, the contention around utilising English as a reconciliatory language to mend race relations have been discussed in great detail in both the press (SAPA, 2013) as well as in academic literature (Obondo, 2008; Posel & Zeller, 2011; Van Staden & Howie, 2012) indicating the drawn out debate that seems to have no definite answer, adding further confusion to a divisive topic.

The *Language in Education Policy* (National Department of Education, 1997) was a framework specifically designed for the education sector that Pluddemann (1999) refers to as the single policy that eradicated all the language policies of the apartheid education system. This policy identifies and acknowledges South Africa's linguistic diversity and promotes an additive multilingual approach within education and may be an attempt to address the issue of language diversity in education. Heugh (2008) nostalgically posits that the *Language in Education Policy* placed South Africa as one of the international leaders of advancement in education. After the Mandela presidency, this progressive trend was unexpectedly halted. The education sector post-1999 seemed to assume English-only education as a default and assumed separate development of all 11 official languages, which was impossible in a cohesive education sector (Heugh, 2008).

The failure of the Department of Education was that African languages were not valued in education policy and was not adequately integrated into curriculum development (Kamwangamalu, 2001). This explains why additive bilingualism is encouraged in theory,

but is actually an early transition to a first additional language (Heugh, 2008). An additive multilingual approach is accepted as common bilingual practice within education internationally as the benchmark of academic success (Cummins, 2014); however, this practice seems to be lacking within South African education, due to the non-prescriptive nature of policies put into practice. Instead schools in consultation with parents have the power to choose the language of teaching and learning (Posel & Zeller, 2011). This has resulted in many schools adopting English as the sole medium of instruction, with devastating unforeseen consequences. This is due to many parents believing that English is a superior choice, which results in English being the medium of instruction during the formative school years (Pretorius & Mampuru, 2007).

One of the reasons why an English-only option manifested was due to student and parent pressure in retaliation to apartheid Bantu Education policies, which forced black people to be taught in their home language (Heugh, 1999). This had dire consequences for education and as a result, the democratically elected government directed its wrath at older language policies, therefore causing African languages to suffer the consequences of not being taught, promoted and appreciated in South African schools (Heugh, 1999). There is another very sound reason why African languages are undervalued in South Africa. Research conducted in this area indicates that people, who read, write and speak English very well, earn more on average and have better projected future income earnings compared to people who are fluent in an African language (Posel & Zeller, 2011). This has had a direct negative result on future academic outcomes for L2 learners, based on extensive research in this area, discussed in the following section.

This research study would therefore require a bilingual theoretical framework as an essential pillar of this study, especially considering the diverse language landscape and language choices made in South Africa's schools, with long-lasting implications.

2.3. Cummins' Bilingual Theory

Language policy in South African education is governed by the Constitution of the Republic of South Africa: section 29; subsection two of the Constitution states: "[E]veryone has the right to receive education in the official language or languages of their choice in public educational institutions where the education is reasonably practicable" (Republic of South Africa, 1996). The far-reach and practical implications for constitutionally allowing all citizens the right to choose their language of instruction in schools seems to pose many challenges. As previously noted, a scanty 9.6 percent of the population speak English as a home language (Statistics South Africa, 2012). This would imply that the majority of South Africans speak an African home language and in reality when added to the constitutional right, mentioned above, shows that this could potentially cause major issues to an already pressured education system; therefore this constitutional right may be unfulfilled. Therefore, this system would require a measured approach, where home language rights may be fulfilled when resources are available, but would also require a consideration of bilingual education as a standard practice.

Bilingualism can be defined as having the ability to speak two (or more) languages but it is important to note that proficiency in each language could range along a continuum (Manyike, 2013). This could range from basic communication to native-like proficiency. The ability to communicate in two (or more) languages in either written or spoken form has been the accepted term for bilingualism (Manyike, 2013). The benefits of being bilingual has been debated for decades and initial research concluded that bilinguals were disadvantaged due to

a language conflict or confusion. The metaphor explained very often in research is that monolinguals have one large language filled balloon whereas bilinguals have two (or more) half-filled language balloons with no interchange and is therefore inadequate (Manyike, 2013). This stance altered dramatically in later research studies showing that appropriate proficiency in two (or more) languages is associated with cognitive advantages (Collier & Thomas, 1989; Cummins, 1984, 2008; Manyike, 2013). Bilingualism in education is widely practised in many African countries (Obondo, 2008) and re-emphasises the importance of a bilingual theory to account for the conceptual distinction of bilingualism in South African education.

Cummins' bilingual theory will be explored as the theory has been developed and revised over a number of years. Cummins' postulated that every single human with some cognitive function would acquire basic interpersonal communicative skills (hereafter BICS), whilst the acquisition of cognitive academic language proficiency (hereafter CALP) would be strongly related to literacy skills (Cummins, 1980). This BICS/CALP distinction is crucial in understanding the different levels of proficiency required to meet the criteria for acquiring BICS and CALP. The levels of proficiency occupy a continuum with BICS occupying one end and CALP occupying the opposite end, therefore they are not discrete or separate (Cummins, 2008). BICS and CALP develop from birth, but CALP is differentiated from BICS once early schooling has begun. This implies that BICS may still be used in school, for communication, but CALP would need to be accessed for formal tasks. An iceberg metaphor explains the shared similarities and the unique differences that make up BICS and CALP. The visible section of an iceberg would include vocabulary, pronunciation and grammar which would broadly encompass BICS, whilst semantic meaning and academic language proficiency lie below the surface and constitute CALP (Cummins, 1980).

Cummins (1989) elaborates and further distinguished two separate related models of bilingual language attainment; namely the Separate Underlying Proficiency (hereafter SUP) and the Common Underlying Proficiency (hereafter CUP). The SUP model viewed the development of the L1 as being completely independent of the L2, whilst the CUP model assumes some similarities that could be transferred from the L1 to the L2 (Cummins, 1980). The shared CUP model has been proven and there is evidence that shows shared elements of different languages exist and these principles could be transferred from an L1 to an L2. This theory was later revised, further explored and culminated into the Thresholds Theory.

The Thresholds Theory explored the relationship between L1 and L2 in a formal educational context. This implied that the interdependence of the L1 on the L2 was more clearly defined. The theory shows that proficiency in one's home language has a direct influence on the projected L2 proficiency (Cummins, 1984). This was further explored where L2 learners were able to communicate in English, therefore utilising BICS but lacked CALP, almost as a facade, therefore lacking the more challenging aspects of English in an academic setting.

Heugh (2008) explains that the additive bilingual model, as proposed by the now dormant *Language in Education Policy* (1997) is often confused with the practise of transitioning to an L2. This means that L2 learners are encouraged to transition to English before being fully competent in their home language, which infers that the CUP skills cannot be transferred to English. This premature transition according to Heugh (2008) is the primary reason why the educational gap has widened so drastically between L1 and L2 learners. Ideally, researchers maintain that L2 learners need to maintain their home language for between five to eight years before transitioning to English as a language of learning and teaching (hereafter LoLT) (Heugh, 1999). This would ensure that L1 mastery is acquired, which has been proven to have a lasting positive impact on future academic performance. This shows that an early

transition model is not ideal whereas an additive complementary model would have far greater benefit and positive implications during the long-term.

Cummins does clarify that the BICS/CALP framework is not a theory detailing language proficiency and since its inception some have misconstrued its purpose (Cummins, 2008).

The BICS/CALP model was meant to substantiate and inform policy and practice as a broad framework (Cummins, 2008). This is explained further that the BICS/CALP distinction is not only based on the differences between communicative ability and cognitive ability, but rather has deeper social constructs as previously explained (Cummins, 1984).

Based on all the above, ideally, learners should then have adequate exposure to their L1 and these common principles would be transferred to the L2. Therefore, L1 mastery is critical in gaining adequate L2 proficiency. This differentiation is critical in understanding the position that stakeholders assume in education. The historical handicap of learners not afforded a fair chance to fully learn and be proficient in their L1, before being immersed in an L2, could have devastating consequences. Research has shown that L2 learners who have access to their L1 and are more proficient compared to their peers always exceed grade level performance on standardised tests compared to learners who were exclusively L1 (Collier & Thomas, 1989; Posel & Zeller, 2011). It is critical to note that L2 learners who appear to be English proficient, therefore having acquired BICS and not CALP will struggle academically due to the wide gap of knowledge that is embedded in language. Cummins (1984) highlights this clearly noting that educators would then assume that L2 learners lack intelligence instead of making the language link, therefore displaying poor academic performance.

Cummins (1994) explains that the construct of language proficiency and its relationship to intelligence has been debated by philosophers and psychologists since antiquity. Cummins (1984) also importantly questions how the areas of language proficiency mars intelligence

and academic performance, due to the common social aspect in which these three constructs exist. Intelligence for a school-going learner may be loosely translated as being clever smart, therefore having a superior level of ability (Adey, Csapó, Demetriou, Hautamäki, & Shayer, 2007). In light of the above theoretical framework, Cummins (1994) encourages a closer look at assessment practices and its meaning for the L2 learner on a daily basis. Historically, assessment practices worldwide has unintentionally played a role in the justifiable marginalisation of L2 speakers (Cummins, 1994). This has led to the locating of the issue within the person due to a supposed bilingual handicap, instead of reviewing and revising the education system. This directs the proposed research onto the next section, which will explore psychological assessment practices within the broader South African context.

2.4. Psychological Assessment in South Africa

The diverse population of South Africa makes psychological testing and assessment research in this area invaluable (Laher & Cockcroft, 2013). Kriegler and Skuy (1996) considered, almost two decades ago, that the main aim of assessment needs to benefit the majority of the population yet there are glaring inconsistencies that are still pervasive. This means that even though assessment was considered a major hurdle twenty-one years ago, it seems like there are still issues that exist. These inconsistencies brought about change in South Africa's legislation with the Employment Equity Act 55 of 1998, Section 8 (Department of Labour, 1998) which stipulates that: "Psychometric testing and other similar assessments are prohibited unless the test or assessment being used - (a) has been scientifically shown to be valid and reliable, (b) can be applied fairly to all employees; and (c) is not biased against any employee or group" (p. 7). This change in the legal framework within South Africa shows the gravitas that psychological testing and assessment has in our country.

Van der Vijver and Rothmann (2004) explain that this change in legislation differs in two ways from common practice in other countries. Firstly, policy-makers assume the opposite stance by clearly stating that any form of unfair practice is not allowed. This implies that tests are fairly used unless proven otherwise, whereas South African law requires psychologists to be actively involved in ensuring that psychological tests are valid, reliable, fair and unbiased. This approach does question the far-reach of the Equity Act and how this unfolds on a daily basis must be explored. Therefore, directed research about the equity and fairness of psychological assessments are invaluable. Secondly, most countries do not entrench laws of fairness and equitable practice into law, but rather draws up codes of practice through professional bodies that govern all belonging members (Van der Vijver & Rothmann, 2004). This adoption internationally differs from South Africa and does place added pressure on psychologists to ensure fair and equal practice. The Equity Act should not be assumed to inhibit psychological assessment practices, but should instead provide lateral thinking space for psychologists in South Africa to explore multicultural assessment processes and to develop more culture-fair testing methods.

Debates have continued on the justification of assessment in education (Foxcroft, 2004, 2011; Foxcroft & Davies, 2008) and many have said that any justification for assessment should be over-shadowed by a common feeling that there should be less assessment (Kriegler & Skuy, 1996). Yet, others have said that psychological testing and assessment may provide a valuable key in assisting the transformation process of South Africa (Laher & Cockcroft, 2013). This juxtaposition in thoughts and ideas stem from the historically unfair assessment practices that contributed to the apartheid ideology and instituted policies that disadvantaged one race against another based on assessment scores. The manipulation and abuse of assessment scores are no longer used and have been replaced with more appropriate culture-

fair testing practices, but the question of the appropriateness of psychological tests remain, especially in education.

South Africa's Bill of Rights, as included in the Constitution (Republic of South Africa, 1996), entrenches the right that every citizen can claim to basic education. This is a mammoth task for all stakeholders in South Africa's education arena. Psychologists, specifically educational psychologists meet educators at the threshold of education and assessment. This critical role needs to be carefully explored to ensure that fair assessment practices are being implemented.

Historically, almost two decades ago it would be easier to say that fewer assessments needed to be conducted due to its emotional link to apartheid that was raw and unhealed. Today, almost 23 years into democracy a fair stance would be to re-assess the value that assessment can add to South Africa and re-evaluate the tests, assessments and procedures utilised. It is crucial to ensure that history does not repeat itself and therefore testing and assessments need to be carefully scrutinised, evaluated and adapted for the South African population. Kriegler and Skuy (1996) gauged that assessment issues that plagued South Africa have mirrored international trends and therefore make the applicability of research in this area important. It is also emphasised that intelligence tests should be researched to establish their fairness and equity for the diverse South African population Therefore, this does require a careful look at the concept of intelligence.

Intelligence is an abstract concept that is at the core of the assessment process, as there is much emphasis placed on what a learner is able to achieve, based on their intelligence, which directly influences their academic performance. Understanding the ubiquitous and often misinterpreted concept of intelligence is pivotal in understanding how intelligence

assessments are constructed and developed. The concept of intelligence will be explored in the next section to unpack the core issues of what constitutes intelligence.

2.5. What is intelligence?

Intelligence testing and research has been in focus for over a century (Bovaird & Ivie, 2010) and the variety of definitions that span the time period is extensive and have withstood the test of time. Intelligence is an important concept since it has been proven to have an impact on quality of life, longevity, mate selection, socioeconomic status, psychological development, educational-vocational choices as well as creativity (Lubinski, 2004), therefore making it a widely studied concept across different research areas. The large wealth of knowledge amassed over the last century paints and weaves a very interesting portrait of the concept of intelligence, which was formally and hierarchically, organised by Spearman initially in 1904, with agreed consensus (Lubinski, 2004; Spearman, 1904).

A group of 52 experts developed a consensus of general intelligence (hereafter *g*), which stated that,

“[I]ntelligence is a very general mental capability that among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill, or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings – ‘catching on’, ‘making sense’ of things or ‘figuring out’ what to do” (Gottfredson, 1997, p. 13)

Some theorists view intelligence as comprised of one common factor, *g*, whilst others view intelligence comprising of multiple factors, which vary vastly (Bovaird & Ivie, 2010). The

common factor, *g*, as well as multiple factors theories will both be discussed, as there is value in understanding both areas of thinking.

Intelligence as a common factor, was conceptualised by Galton and Spearman (Bovaird & Ivie, 2010; Sternberg, 2014), although there were individual differences in each of their respective models. Galton proposed a theory of hereditary intelligence, which was posited on concepts postulated by his famous uncle, Charles Darwin, the evolutionary scientist, who developed the groundbreaking theory of evolution (Sternberg, 2000). Galton's intelligence assessments were run in a laboratory in London from 1884-1890 where visitors voluntarily had their intelligence measured through psychophysiological testing, which assessed their ability to discriminate between various concepts such as weight, taste and touch (Bovaird & Ivie, 2010; Sternberg, 2000). Galton theorised that a person with a higher perceptive ability seemed to have access to larger stores of information, thereby dramatically improving their intelligence (Bovaird & Ivie, 2010). Galton's concept of intelligence was dismissed very quickly by researchers who thought that assessing weight discrimination and musical pitch was not directly related to measuring an individual's intelligence (Sternberg, 2000). Galton's views being dismissed scientifically was not futile as it had mapped out the important initial stages of developing future intelligence assessments, which focused on a person's unique ability.

Spearman's (1904) research seems to be the earliest most comprehensive study that explored how *g* could be objectively determined and measured whilst providing a review of the literature and prominent figures of the late nineteenth and early twentieth century's. His groundbreaking 1904 research paper concluded that all areas of intelligence have one common underlying area of function, which seems to be accessed under different circumstances (Spearman, 1904). This directly influences the areas that is defined by the

common underlying function, which may be different or similar in function or purpose (Spearman, 1904). This does imply that the contention of how to measure g accurately is extensively well documented. Measures of g are diverse with models which postulate general factors of intelligence whilst others seem to ignore the general intellectual factor and focus on all dimensions being equal (Gustafsson, 1984). Spearman's Two Factor theory of intelligence proposes that a general factor (g) and a specific task-oriented factor (s) are responsible for intelligence only (Bovaird & Ivie, 2010; Gustafsson, 1984; Sternberg, 2014). This does mean that Spearman seemed to be aware that there were some limitations to his statistical analyses, as he had hinted through his famous 1904 research paper, assuming that the concept of intelligence is far more complex than he could account for through his factorial analyses.

Theories of intelligence, comprising of multiple factors gained popularity due to the lack of definite and decisive research proving that that intelligence could be explained by only one common factor. During the 1920s and 1930s, the Thurstone model gained popularity, which encompasses multiple factors to account for intelligence called Primary Mental Abilities, which comprised of seven primary abilities. The abilities include; word fluency, verbal comprehension, number facility, spatial visualisation, perceptual speed, associative memory and reasoning (Bovaird & Ivie, 2010; Gustafsson, 1984; Sternberg, 2014). Thurstone seemed to initially postulate that an individual could have varied abilities across the seven abilities and later seemed to accept a more hierarchical view of intelligence which seemed to be more widely accepted (Bovaird & Ivie, 2010). Sternberg seemed to adopt a similar stance as Thurstone except he subsumes g and divides g into three facets; analytical, creative and practical intelligence (Bovaird & Ivie, 2010).

During the 1960s, three intelligence models gained popularity. These theories have their roots in earlier intelligence models, which they elaborated and furthered with their respective view, although their individual theories hold merit, therefore they will be discussed.

Firstly, the Guilford model known as the Structure of Intellect was theorised and encompassed a multitude of factors within three facets; operation, content and product (Gustafsson, 1984), although the model did not seem to gain any popularity due to the 120 possibilities that the three facets could potentially yield, which was tedious and time consuming to interpret (Gustafsson, 1984). It was later narrowed down to 98 factors, which did not seem to improve its applicability and popularity (Gustafsson, 1984).

Secondly, the Burt and Vernon models relies on Multiple Factor analysis which forms a matrix of correlations to extract the *g* factor and then proceeds to draw out various other factors on a hierarchical model (Gustafsson, 1984). The Burt and Vernon premised on a hierarchical structure with the *g* factor at the top, being split one level down into the verbal-educational and practical-mechanical factors (Gustafsson, 1984). These two further subdivided to include linguistic, number and scholastic abilities in the verbal-educational factor whilst the practical-mechanical factor comprised of mechanical, spatial and perceptual factors (Gustafsson, 1984). This theory did not gain any traction due to the very stringent classification systems, which were binary in nature (Gustafsson, 1984).

Thirdly, the current Cattell-Horn-Carroll model was based on the initial work of Thurstone's research during the 1930s (Alfonso, Flanagan, & Radwan, 2005). The theory was theorised in the 1940s but it was only during the 1960s that the model was empirically tested. The theory during its infancy was theorised according to Cattell, who initially postulated that intelligence was comprised of fluid intelligence (hereafter *G_f*), which included both inductive and deductive ability as well as crystallised intelligence (hereafter *G_c*), which was considered to

be acquired knowledge through acculturation (Alfonso et al., 2005). Horn later expanded Cattell's dichotomous theory to include four additional factors, which included visual perception or processing (*Gv*), short-term memory (*Gsm*), long term storage and retrieval (*Glr*) and speed processing (*Gs*). Auditory processing (*Ga*) was later added whilst the *Gv*, *Gs* and *Glr* were revised (Alfonso et al., 2005). During the 1990s, Horn added the reaction time (*Gt*), quantitative ability (*Gq*) and broad reading/writing ability (*Gw*) (Alfonso et al., 2005). The first two factors, *Gf* and *Gc* are closely linked to *g* and has gained popularity due to the robustness and empirically sound evidence in large-scale research studies (Alfonso et al., 2005; Evans, Floyd, McGrew, & Leforgee, 2001; Kvist & Gustafsson, 2008; Schweizer & Koch, 2001) having had the greatest impact and superlative research support. The CHC theory has recently been updated as the Cattell-Horn *Gf-Gc* (fluid and crystallised intelligence respectively) theory and Carroll's three-stratum theory of cognitive abilities (Evans et al., 2001). Recently, the similarities between the Horn-Cattell *Gf-Gc* model together with John Carroll's three stratum theory, which has resulted in the Cattell-Horn-Carroll (hereafter CHC) theory (Bovaird & Ivie, 2010; McGrew, 2009), as it is known today. The majority of researchers recently seemed to acknowledge the comprehensive and wide scope of the CHC theory, as it has been regarded as the agreed upon psychometric theory that defines intelligence (McGrew, 2009).

Gardner proposed a theory of Multiple Intelligences (hereafter MI) during the 1980s and also utilised a seven, sometimes an eight factor model, which has gained popularity in the education field but does not seem to be well-accepted within the scientific community (Bovaird & Ivie, 2010; Visser, Ashton, & Vernon, 2006a). The seven or eight factors have been debated in literature by many esteemed researchers, who all argue that Gardner's MI theory has some merit but does seem to mirror the CHC theory's second stratum abilities, to some extent (Visser et al., 2006a). Gardner's strong focus on school-like tasks seem to

contradict literature which accepts that *g* cannot only be seen from an academic lens, because there is strong research that proves that non-verbal tasks are as important to intelligence, as verbal tasks (Visser et al., 2006a; Visser, Ashton, & Vernon, 2006b). Gardner's lack of generalisability to other fields is hypothesised to be the reason why this theory has not been widely accepted (Raven, 1988; Visser et al., 2006a).

Eysenck's scientific approach has had mixed reviews as he viewed *g* as a theoretical construct, which consisted of three distinct classes (Bovaird & Ivie, 2010). This meant that each of these classes seemed to have a causal effect on each other, therefore accounting for differences in intelligence. Jensen, who was a student of Eysenck seemed to define intelligence through a dual method, naming the first level associative learning, the second, a conceptual level, which he regarded as biologically innate, therefore accounting for differences in intelligence (Bovaird & Ivie, 2010). Jensen's research has been contentious, as his research has been focused largely on the differences in intelligence amongst different racial groups, which has largely been criticised by the scientific community, which he himself has also acknowledged (Dolan, Roorda, & Wicherts, 2004; Jensen, 1992). There have been various attempts to try to explain differences in intelligence, according to racial classification, as a means of explaining inherited biological superiority, which would be supposedly, provide a clearer understanding of intelligence as a concept (Rushton & Skuy, 2001; Jensen, 1992). The biological basis of attempting to explain intelligence is unfounded and obscure with very little scientific evidence which has resulted in many papers written addressing this very contentious area, where there are clear disparities (Helms-Lorenz, Van de Vijver, & Poortinga, 2003; Lynn & Meisenberg, 2010; Wicherts, Borsboom, & Dolan, 2010; Wicherts & Dolan, 2010, 2010; Wicherts, Dolan, Carlson, & van der Maas, 2010; Wicherts, Dolan, & van der Maas, 2010). The methods of arriving at the conclusion that black populations performance on intelligence tests are generally 18 points lower on average

compared to white populations (Jensen, 1992) is not scientifically accurate (Dolan et al., 2004). There seems to be a lack of agreed upon scientific evidence in this area, where it has been noted that some researchers utilise statistical analyses that suit their intended outcome of finding preconceived intended results (Dolan et al., 2004). Therefore, there is no scientific traction for these obscure views and will not be detailed.

The concept of intelligence has consumed the last one hundred years of research in diverse fields and has ignited many test developers' zeal to produce a concise and definite measure of human intelligence. There are various different measures of intelligence, all differing in their approach of defining and measuring intelligence, which will be discussed in the following section.

2.6. Measures of Intelligence

Modern intelligence measures has its roots in the work of Galton, Binet, and Yerkes (Sternberg, 2000). Galton and Binet furthered their individual differing concept of intelligence testing whilst Yerkes conceptualised group testing and the various parameters that influenced this process (Bovaird & Ivie, 2010).

Alfred Binet and Theodore Simon are considered to be the founders of modern intelligence measurement as they developed the first-known intelligence test in 1904 (Binét & Simon, 1916; Sternberg, 2000) with revisions in 1908 and 1911 (Robinson, 1999). The original Simon-Binet test was designed to cover a wide range of cognitive functioning, which included judgement, comprehension, reasoning, in addition to some sensory and perceptual tests in order to assist children who may have academic difficulties (Sternberg, 2000). This test, today, would be considered an aptitude test instead of a cognitive or intelligence test. The Binét-Simon scale was commissioned by the Parisian government to identify children in the school system who required special assistance, in order to keep up with their peers'

academic performance (Petrill & Wilkerson, 2000). Terman with the assistance of Stanford University revised the Binet-Simon test in 1916 (Robinson, 1999) renaming it the Stanford-Binet test. Terman redefined the scoring mechanism from mental level to a ratio of mental age to chronological age, known as an intelligence quotient (hereafter IQ) (Bovaird & Ivie, 2010). Terman first introduced the term IQ in 1911, which was a representation of a child's intellectual standing in relation to their peers (Bovaird & Ivie, 2010).

Wechsler's development of the Wechsler-Bellevue Test in 1939 was probably the most influential test developed, that still has influence today (Bovaird & Ivie, 2010; Shuttleworth-Edwards et al., 2013). The Wechsler tests are proclaimed to be the gold standard of intelligence assessments, as they are regarded as the most widely used intelligence tests that cover the adult lifespan, from two and half years to 89 years (Shuttleworth-Edwards et al., 2013). Wechsler's theory underlining the development of the test is the most informative guide on the use of test scores, rather than the actual concept of intelligence. The reason why Wechsler's tests are so informative and well received is in his understanding of the impact of the issue that multiple ratios can have on the IQ, due to the statistical analyses undertaken to reach that score (Bovaird & Ivie, 2010). Therefore, he assigned a score, which compares the individual's score to the mean of their age group, thereby eliminating the need to work on a ratio score (Robinson, 1999). This seems to have become the standard practice for comparing most IQ scores, which is regarded as a fairer measurement of IQ (Bovaird & Ivie, 2010).

Spearman's stance on intelligence testing and measurement has been one that has been misconstrued over a number of years, where *g* has been equated to intelligence, which has been made interchangeable, even though this was not Spearman's intention (Raven, 2011; Spearman, 1904). It is acknowledged that this current research report falls into the same trap of semantic use, as it is the general term used to describe intelligence in current literature.

Spearman did intend to imply that *g* is a hypothetical construct of a set of complex factorial statistical analyses that describes a person's current functioning depending on the tests and assessments utilised (Raven, 2011). This does directly imply that the type of test or measure used to measure *g* has a direct impact on the outcome of the person's intelligence factor and could often be misinterpreted.

The generality of *g* has been proven where the *g* factor was extracted from various measures of intelligence, which has proven that the *g* factor could be generalised across various measures of intelligence (Vernon, 1989). This proves Spearman's early twentieth century hypothesis that the *g* loadings on dissimilar tests are almost the same, pointing to the similarity of the *g* loadings across different assessment measures (Vernon, 1989). This meant that psychological intelligence tests were critiqued in their ability to provide reliable and accurate measures (Raven, 2011).

There are two broad categories of intelligence testing, non-verbal and verbal, both of which are important in their own right to understand the very complex concept of intelligence. One measure is no more superior to the other, which needs to be emphasised. This does mean that understanding the importance of both is critical, as highlighted by the two specific measures of intelligence, as discussed below.

One of the best non-verbal tests of intelligence that has stood the test of time, is the Raven's Standard Progressive Matrices developed by John C. Raven, a former student of Spearman, who designed the test based on Spearman's theories of intelligence (Raven, 2011). The matrices were initially developed to assess the mental ability of military personnel and have undergone a few revisions, although the initial test is still in use today (Raven, Raven, & Court, 2004). The non-verbal nature of the assessment is thought to be more culture fair and

less biased (Cockcroft & Israel, 2011), which explain its international appeal and extensive use across a variety of contexts.

It is important to note that there have been group differences reported on the RSPM in both local and international studies, due to the highly *g*-loaded nature of the test (Fagan & Holland, 2002), which makes it important to assess the results of the RSPM with caution. A study conducted in South Africa showed that learners in a school in Soweto, Johannesburg scored one to two deviations below the American norm group (Skuy, Schutte, Fridjhon, & O'Carroll, 2001). This means that the RSPM could be used dynamically, as a tool to assess a learner's learning potential instead of their static intelligence, at a given point in time (Amod & Seabi, 2013). This has far-reaching implications for intelligence testing, which needs to be borne in mind when analysing the results of the RSPM, as the learner's context is important.

The RSPM was designed to measure a person's eductive ability, based on Spearman's extensive research (Raven et al., 2004). Eductive ability is one's skill in drawing out and making meaning out of new material that may be unclear, using problem-solving and perceptual skills (Raven, 2011). Eductive ability mainly engages with non-verbal processes, which facilitate the problem solving processes (Raven, 2011). Conversely, reproductive ability is one's ability to bring information, which has been made clear in the past, using verbal skills, which involve recollection and reproducing previously learnt concepts (Raven, 2011), which will be tapped into via the SDRT subtests, discussed below.

The relationship between the above two concepts has been misinterpreted and misapplied due to many over-generalisations and lack of engagement with these two very complex concepts, which require careful analysis and interpretation (Raven, 2011). Eductive ability is often conceptualised as general ability, when in fact it is a series of cognitive processes that are built up in a complex fashion, therefore the simplification is ineffective (Raven, 2011).

Reproductive ability on the other hand is much more elusive, since there is sparse research concerning this process (Raven, 2011). The difficulty in measuring these two fundamental constructs, which are interrelated and rely so heavily on the success of the other, has filled the last century's literature (Raven, 2011). These two concepts are the foundational pillars of what is considered to constitute intelligence as a whole (Raven, 2011), and should be considered when discussing specific theories of intelligence, as discussed previously. It must be noted that the RSPM was never intended to measure *g*, although extensive research has shown that it is one of the purest and best single measures available (Lubinski, 2004; Raven et al., 2004), due to the commonalities between educative ability and *g* (Gottfredson, 1997).

A popular verbal measure, which assesses reading English ability is the SDRT and is the second psychological measure that is discussed. The SDRT was first published in 1966 and was intended for use in high schools and colleges in the United States of America. The latest and final edition was published in 1996 and although it is dated, there is still value in its application because of the rich detail that is provided. The SDRT is favoured due to its diagnostic nature and is often utilised as it places more emphasis on learners who have lowered reading levels (Karlsen et al., 1986b). L2 learners would not be biased, based on the above evidence, which makes it a fairer and more appropriate reading assessment.

The high language demand placed on learners in the South African curriculum make it essential to assess the reading and vocabulary levels of the learners (Pretorius & Mampuru, 2007). Even though there are inclusive language policies in South African schools, the majority of teaching and learning is delivered through English. Therefore, the SDRT is an important tool that allows the learner's current reading level to be determined, in order to ascertain if there is meaningful understanding of the curriculum and to understand the relationship between language ability and academic performance.

The underlying motivation for using the RSPM as well as the SDRT reading comprehension and auditory vocabulary subtests were partly motivated by Spearman's theory as well as the need to use both a non-verbal and verbal measure of assessment. Raven had developed the Raven's Progressive Matrices and the Mill Hill Vocabulary Tests, which could be used independently of each other, to provide both a non-verbal and verbal measure (Raven, 2011). The Mill Hill Vocabulary Tests did not seem applicable, since it is only a vocabulary test and did not include a reading component. It was felt that a reading component would add more depth to the research study, therefore the SDRT auditory vocabulary and reading comprehension subsets were utilised (Raven et al., 2004).

The importance of measuring intelligence shows huge strides in unpacking the complexities of what defines intelligence. It has also demonstrated that it is a work in progress, because there is research that vehemently states that the current approach to intelligence testing and measurement is flawed (Raven, 2011). This is due to the lack of understanding related to human abilities and competencies, which is directly motivated by personal interest, at times (Raven, 2011). Therefore, there has been suggestion that a two-stage model of intelligence testing needs to be developed instead of a two-factor framework (Raven, 2011). This seems to address the core issue of intelligence testing being appropriate, both culturally and linguistically, added with the crucial ingredient, of the testee being suitably motivated (Raven, 2011). Therefore, researchers require a paradigm shift to reconceptualise how intelligence is viewed, measured and interpreted (Raven, 2011). This does require further research, as there is sparse mention of the re-conceptualisation of intelligence as a factor.

The most interesting stance that Spearman adopted very early in the twentieth century, with regard to intelligence, was that ability tests were inappropriate for school use, since it directly negated the principle of educating and drawing out the genius in every child (Raven, 2011).

In light of the above sentiment, it is critical that the use of intelligence testing in the school environment needs to be carefully considered, to encourage that all learners are provided an equal and fair opportunity to discover their true potential.

Even though the forefather of the *g* factor deemed that intelligence testing was not meant for the education system there has been an innumerate amount of research in this area (Baumert, Lüdtke, Trautwein, & Brunner, 2009; Deary, Strand, Smith, & Fernandes, 2007; Dodonova & Dodonov, 2012; Petrill & Wilkerson, 2000; Spinath, Spinath, Harlaar, & Plomin, 2006; Vock, Preckel, & Holling, 2011). The links between *g* and academic performance seem well-established and is supposedly one of the best predictors of academic achievement (Binét & Simon, 1916; Frey & Detterman, 2004; Spearman, 1904), even though intelligence testing within the school context is such a contentious and often misinterpreted subject, as noted above, it is important to discuss and consider, which follows in the next section.

Assessment measures, both formal and informal have a huge impact on the academic performance of learners, due to the emphasis placed on the end result of a school leaving certificate, with dramatic implications for future vocational and career opportunities.

Therefore, it is important to understand the links between academic performance and intelligence on a deeper more meaningful level, which the next section addresses. The next section will explore critical factors within academic performance, as it is important to place intelligence within the context of this research study's specific areas of interest.

2.7. Academic Performance

The link between academic performance and intelligence is uncertain, as previously mentioned, since measures of intelligence and intelligence testing were originally meant to identify children who were having difficulties at school (Binét & Simon, 1916; Frey & Detterman, 2004; Spearman, 1904). Therefore, there is an association between academic

performance and intelligence, but the exact relationship is uncertain. Some researchers theorise that the correlation is very weak (Brunner, 2008), whilst others have determined that the relationship to be well established and accepted in literature (Deary et al., 2007; Dodonova & Dodonov, 2012; Spinath et al., 2006 ; Vock et al., 2011).

Academic performance is sometimes referred to in literature as cognitive ability. The term academic performance will be utilised, in this research report, for ease of discriminating between intelligence and cognitive ability, which are sometimes used interchangeably in literature.

Questions have been raised with regard to the *g* factor being present within school-specific subjects and found that in many cases the material lacked specific relevance (Brunner, 2008). Therefore, the assumption that a higher intelligence automatically results in superior academic performance needs to be avoided. Research has been conducted in this area which proves that intelligence does not always relate directly to academic performance, although there are common factors, which do have an influence on academic performance (Baumert et al., 2009), which is where this research report interests are focused.

The relationship between intelligence and academic performance is moderate to strong, at about the 0.50 level (Dodonova & Dodonov, 2012; Spinath et al., 2006). Broader abilities tend to be better predicted by *g* compared to narrower abilities, although there is contention on the strength of the association at the broader level (Spinath et al., 2006). Interestingly, there is a difference in underlying processes between the sciences and languages, when comparing the different intelligence indexes, according to various theorists (Dodonova & Dodonov, 2012).

There are still major gaps in the research of intelligence about the interplay between general and specific abilities, which could also be better defined as broad or narrower abilities (Vock

et al., 2011). Some research has focused on this area, to try to understand the interplay between broad and narrower abilities on academic tasks (Dodonova & Dodonov, 2012; Vock et al., 2011).

A research paper compared four specific abilities (reasoning, divergent thinking, mental speed and short-term memory) impact on academic performance to understand if one or all of these factors have a role to play in academic performance (Vock et al., 2011). The results found that the more complex abilities of reasoning and divergent thinking seemed to have a greater impact on academic performance compared to the lower level more 'automatic' skills of mental speed and short-term memory (Vock et al., 2011). This does imply that there are some cognitive processes, which are critical for superior academic performance compared to lower-level processes. Interestingly, the *g*-factor seems to have only a 25-30% influence on overall academic performance, which does mean that there are other important factors, which play a critical part (Demetriou & Andreou, 2006, as cited in Adey, Csapó, Demetriou, Hautamäki, & Shayer, 2007). Therefore, it is difficult to pinpoint which cognitive process is responsible for each academic demand and output, unless there is information about each specific cognitive process. Carroll's work, which has resulted in the CHC theory, as discussed previously, is testament to the specialised processes that underlie specific skills and demands. His analysis of over 450 datasets showed many similarities that underlie cognitive processes but also showed many differences (Adey et al., 2007). There has been substantial research conducted on the possibility of the delineation of a hierarchical system which dynamically and simultaneous accesses different systems to process information and undertake cognitive tasks, which does mean that there may never be a clear unambiguous match for each cognitive process (Adey et al., 2007).

Dodonova et al.'s (2012) research focused on the importance of processing speed as a predictor of academic performance, since it is one of the most important components of an intelligence test. The results found that processing speed does not have a positive impact on academic performance (Dodonova & Dodonov, 2012). This means that superior processing speed may mean a higher intelligence level but does not translate to increased academic performance in real-life, which does question the importance and value of one of main components of most well-known intelligence tests.

A large national assessment in the United Kingdom with 70 000- school learners showed that there was a 0.81 correlation between intelligence tests administered at age 11 with the learners' school leaving results at age 16 (Deary et al., 2007). This study depicted that there is a large correlation and a strong positive relationship between academic performance and intelligence. Interestingly, the study showed that girls performed better compared to boys in school assessments, even though they were matched on intelligence (Deary et al., 2007). The study showed that girls tended to outperform boys due to their superior verbal skills. It was acknowledged that there were many non-g factors, such as parental support, teaching quality, motivation, learning materials, school ethos as well as school attendance (Deary et al., 2007). These could all influence academic achievement, which needs to be accounted for when interpreting research results.

Two of the most widely discussed concepts that have infiltrated some of academic performance's nomenclature, centre around the distinction between fluid and crystallised intelligence (Bui & Birney, 2014; Kan, Kievit, Dolan, & van der Maas, 2011; Schweizer & Koch, 2001). The contention around the parameters of fluid intelligence and crystallised intelligence are important to consider, since it has been theorised that they are essential ingredients in mediating learning and academic performance (Schweizer & Koch, 2001). This

implies that in order to understand the concept academic performance, one has to unpack the meaning of these two concepts, as discussed below. Recently, there has been a zoomed in focus on the actual concepts of both crystallised and fluid intelligence, due to its very close and important links to academic performance (Bui & Birney, 2014; Flores-Mendoza et al., 2015; Kan et al., 2011; Kvist & Gustafsson, 2008; Salthouse, Pink, & Tucker-Drob, 2008; Schipolowski, Wilhelm, & Schroeders, 2014; Schweizer & Koch, 2001).

Crystallised intelligence, also known as *G_c*, is a construct that still seems to add confusion to current research, as there is no consensus as to the exact nature and contents of the construct (Schipolowski et al., 2014). The elusive nature of this construct requires some elaboration, which follows. There has been some consensus that *G_c* is associated with culture-specific knowledge and information that is learnt and built from childhood to adulthood (Kan et al., 2011; Schipolowski et al., 2014). Cattell's original definition of crystallised intelligence shows that it is domain specific with an emphasis on knowledge, which includes but is not limited to various aspects of verbal ability and factual knowledge (Evans et al., 2001; Kan et al., 2011).

Fluid intelligence, known as *G_f*, is responsible for higher mental processes that are the main underlying drivers, which are involved in problem solving, abstract thinking and reasoning (Kvist & Gustafsson, 2008; Salthouse et al., 2008). It has been difficult to pin down an exact agreed upon definition but key figures in this research area agree that it is certainly responsible for the aforementioned three processes. The key to understanding the concept is the choice of the word, fluid, which was purposefully chosen by Cattell. This was to indicate that this underlying process is able to flow everywhere and reach every crevice, indicating its dynamic and multi-purpose nature, (Schweizer & Koch, 2001) unlike *G_c*. Research has shown that *G_f* cannot be learnt or improved upon, like *G_c*, which does mean that it may

remain relatively unchanged throughout the lifespan (Flores-Mendoza et al., 2015). During learning, *Gf* is thought to be the main processor of newly learnt concepts that are then converted to the *Gc* domain, which implies that it has crystallised (Kvist & Gustafsson, 2008). Therefore, *Gf* and *Gc* act as buffers during learning, which are key components in understanding how new information is processed and stored. This highlights the value of these concepts, which are essential for academic success.

Overall, academic achievement depends on different cognitive processes, which many theorists have not been able to agree on as universal, given the specific requirements for different educational systems internationally. Some of the most agreed upon concepts include: reasoning, divergent thinking, mental speed and short-term memory (Vock et al., 2011). These concepts, depending on the intelligence model utilised are made up of both complex and simple tasks, where each cognitive process is accessed, depending on the academic demand.

One of the most demanding and important aspects for academic success is reading, which has been shown to be the key for learners to access the curriculum (Pretorius, 2002). The reading-heavy curriculum used in South Africa, which does mirror international trends and curriculum benchmarks means that reading is a fundamental skill for academic success (Pretorius & Mampuru, 2007). The next section outlines and highlights the importance of reading comprehension and auditory vocabulary as essential foundational skills for academic success.

2.8. The Importance of Reading Comprehension and Auditory Vocabulary

Learning to read and reading to learn are two very different concepts, which highlights a key difference in the complex reading comprehension process, which seems to be the cusp of South Africa's reading dilemma (Goldman, 2012; Pretorius, 2002). The lack of meaningful

engagement with academic material means that parts of the curriculum are not accessed due to limited reading comprehension understanding, which is a vital component of reading to learn (Goldman, 2012). This means that some learners may never learn to their full potential, due to gaps in their understanding of reading to learn.

The link between language, academic performance and intelligence is contested (Cummins, 1984). Research has shown that four general areas of language; listening, speaking, reading and writing, are related to academic performance (Cummins, 1984). The areas of speaking and writing are difficult to measure due to the subjective nature of the wide interpretation margins that are possible (Andor, 2006), therefore, the importance of reading comprehension and auditory vocabulary (listening) are only considered in this research study due to the more accurate nature of these constructs (Cummins, 1984).

Reading is a cognitive-linguistic activity that is made up of different underlying skills (Pretorius, 2002), allowing meaningful interaction with the world. There are two broad components of reading; decoding and comprehension. Decoding refers to the perceptual process of reading, where symbolic text is translated into language (Pretorius, 2002). Comprehension is the process of understanding these symbols meaningfully (Pretorius, 2002). Reading comprehension is the result of successful decoding and comprehension, which happen simultaneously and is due to a series of complex-processing information outcomes that allows the reader to understand, interpret and make meaning of the text (Baumert et al., 2009).

Theories of reading comprehension have been developed to understand this complex process, which identifies three key stages. Retrieving information is the first step followed by understanding and interpreting the text and finally evaluating and reflecting on the text (Kirsch, 1995; Kirsch, Jungeblut, & Mosenthal, 1998, as cited in Baumert et al., 2009). These

three distinct processes involve many underlying processes which are required to begin the process of reading comprehension, which include, speed of lexical/word access, content and organisation of the lexicon (vocabulary), working memory capacity, word recognition, prior knowledge and reasoning ability (Baumert et al., 2009).

There are various types of reading, each with their own function and purpose. The three types of reading are text based (view), interactive reading and critical socio-cultural reading (Granville, 2001). This shows that teaching needs to adopt more forthright and direct methods to teach reading, which does not happen, as reading is the task that is completed once formal school work is completed. Therefore, it is imperative that learners are taught to read critically, to utilise the different reading methods for purposes when interacting and accessing the curriculum to gain maximum benefit.

The classroom reality for most South African learners shows that second language learning is taking place simultaneously to learning to read (Howie, Venter, & Van Staden, 2008), which is a disastrous process, as there is lack of mastery in their L1. Code switching between English and the learners' L1 is often used to try to explain concepts meaningfully to bridge learning gaps. L2 learners face two unique hurdles, inter-lingual learning problems, caused by their L1 and intra-lingual issues caused by the different language structure of the L2 (Verhoeven, 1990, as cited in Howie et al., 2008).

Reading comprehension for L2 learners would require intricate processes to unfold, especially since reading to learn requires multiples cognitive process to synchronise together. Oral reading fluency is a strong predictor of reading comprehension, which shows that word recognition as well as fluency contributes to the overall meaning and understanding (Kim, 2012). There is limited research that has covered the underlying processes of reading

comprehension in L2 learners (Kim, 2012), but there is evidence that shows that L1 reading comprehension proficiency improves overall understanding when using English as an L2.

There is an important consequence of poor reading, which needs to be highlighted, the Matthew Effect, which hypothesises that learners who have a successful start in reading will always be ahead of their peers (Pretorius & Currin, 2010). This biblical term comes from the book of Matthew in the New Testament, 25:29: For unto everyone that hath shall be given, and he shall have in abundance, but from him that hath not shall be taken away even that which he hath (Pretorius & Currin, 2010).

The auditory vocabulary process is a similar process to reading comprehension, because individual letters and sounds needs to be understood to make meaning of the word, in context (Nagy et al., 2000). The non-verbal nature of auditory vocabulary emphasises the importance of the auditory pathways being switched on to make real meaning of the word in context (Nagy et al., 2000). Vocabulary is the building blocks for meaningful sentences, therefore understanding each word in context is valuable and important. Auditory vocabulary has been shown to influence reading comprehension, since making sense of a word individually will have an impact on one's ability to make meaning of a word in context (Nagy et al., 2000), therefore, this is an important aspect of reading comprehension that cannot be ignored.

The largest national reading studies that were conducted in South Africa took place in 2006 and 2011(Howie et al., 2012), which was undertaken by the IEA called PIRLS, as discussed in Chapter 1. The PIRLS studies indicated that South Africa has a national reading crisis, which needs urgent attention and intervention, if learners are to succeed academically. The Department of Education is aware of the reading crisis, where there has been acknowledgment in the curriculum statement that learners cannot read with comprehension and meaning, therefore learning is not taking place (Department of Basic Education, 2011,

2013). There has also been mention of specific tasks within the curriculum that need to be taught to learners in order to become proficient readers, these tasks include scanning, comparing, predicting, inferring, summarising and skimming (Department of Basic Education, 2013).

Pretorius (2002) unequivocally states that reading is the fundamental skill from Grade 4 onwards that will determine future academic success, which highlights the importance of all of the above factors to improve overall reading. There are various factors, which influence reading effectiveness and they include school environment, parent education, school and home resources as well as a general love and motivation to read (Van Staden & Howie, 2012). There are definite benefits to creating positive reading environments for young children who enjoy reading for pleasure, which will create a life-long ripple effect to use reading as a tool to interact with their world (Pretorius, 2002).

Worldwide, reading has been used a benchmark to assess education systems, which indicates that South Africa's education system requires a major overhaul. There are various factors which need to synchronise and be developed to see an overall improvement and benefit, which so far not been realised. Therefore, there is the annual outcry of the poor matriculation results and the dismal PIRLS performance, which shows that South Africa falls towards the bottom when compared to other countries, based on international standards. This means that education in South Africa is robbing its youth of a fair chance of being educated to their full potential, which is as a direct result of poor reading performance.

2.9. Conclusion

The literature review has discussed various concepts that are inter-related to this research study. This provides a framework to understand the key areas of focus that this research study has highlighted.

The language policy in South Africa's schools were discussed, which has been linked to unjust historical policies in the past, showing that South Africa still needs to make decisive choices about language in schools, which has a direct result on future academic performance. Cummins' Bilingual theory framed the debate about whether being bilingual or multilingual is an advantage, which showed some evidence and benefit of being bilingual. Psychological assessment in South Africa was discussed to highlight how assessments were utilised inappropriately and unethically, which needs to be borne in mind when conducting psychological testing and assessments. The ubiquitous concept of intelligence was next discussed and showed that there is a large body of research, which needs to be refined to understand the quintessence of intelligence. The measures of intelligence showed variability within the two broad categories, with the main issues related to this research study being highlighted. The link between intelligence and academic performance was discussed next and indicated that there are some links in certain areas but this relationship needs to be cautiously interpreted. Finally, the importance of reading comprehension and vocabulary was situated within the above framework, which highlighted the importance of reading comprehension and auditory vocabulary in relation to academic performance.

Chapter 3 follows with an in-depth discussion on the methods utilised in this research study. The methods will include detailed discussion about the research process from inception to conclusion.

CHAPTER 3

METHODS

3.1. Introduction

This chapter will begin with a discussion around research design, sampling and an in-depth analysis of the research instruments used in this study. The research procedure that was utilised in collecting the data for this research will be explored, followed by a discussion of the methods of analysis and threats to validity. Finally, the ethical considerations pertinent to this study will be discussed.

3.2. Research Design

The study utilised a non-experimental design that is quantitative in nature with no random assignment due to the researcher's interest in examining the variables of interest as they naturally occur (Howitt & Cramer, 2007). The data utilised was archival data that was collected by the researcher during a previous study (Gangat, 2014). A single cross-sectional set of measurements was collected and there was no manipulation of any of the variables within the research study. The research design involved a comparison between groups, also known as a between-subjects research design (Gravetter & Wallnau, 2013). The study consisted of a quasi-independent variable, due to the lack of manipulation, whereby all research participants would fit into either the L1 or L2 language group, based on their home language (Gravetter & Wallnau, 2013). This was operationalised by means of a biographical questionnaire (Appendix A). The L2 group was further split into two groups, the Nguni and Sotho/Other groups due to the languages that comprised these two broad language family groups (Botha et al., 2007; Kamwangamalu, 2001). The dependent variables, reading comprehension and auditory vocabulary, were measured using the SDRT whilst the general

intelligence was measured using the RSPM. The participants' academic performance was measured by their year-end promotional results that were provided by the school. Each dependent variable was only measured once.

The inherent weakness associated with a non-experimental design (Gravetter & Wallnau, 2013) due to the lack of manipulation and control is worth considering, especially because of the low impact that it would have on this study as its specific aim is to relate the academic performance of L1 and L2 learners to the SDRT and the RSPM.

The research design has been explained and the sampling utilised in the research study will be discussed.

3.3. Sampling

The sample was a non-probability based sample which consisted of a cluster sample, meaning a naturally occurring group of individuals (Mertens, 2010). There were 210 learners in Grade 8 with the final sample consisting of 155 learners, who had both provided assent and consent. There were 71 L1 learners and 84 L2 learners, all of whom did fulfil the requirement of being taught for at least a minimum of five years in English in a formal learning environment. The learners were from an ex-model C high school in Johannesburg. The school is situated in a middle-income suburb, with many learners attending the school from the local community. The school is a well-resourced school especially in light of its ex-model C status, meaning that there are above average resources available at the school. The learners were an independent sample and did not have any previous affiliation to the researcher. The choice of Grade 8 learners from an ex-model C high school was motivated by several factors.

Firstly, it could be assumed that these learners would have had sufficient exposure to English in the first seven years of schooling in a formal academic setting. This means that L2 learners

would ideally have had at least five years of CALP English exposure in a school setting and would therefore not be disadvantaged. Cummins notes that it takes at least five years to achieve academic language proficiency or CALP, therefore learners who did not fit this criterion were excluded (Cummins, 1984). It must be noted that L2 learners who did not meet this criteria were excluded from the sample before testing had begun and this information was obtained through a biographical questionnaire. Two learners who did not meet the criteria were separately informed that this research study was interested in learners who used an African language as a home language, and were therefore not assessed. Secondly, Grade 8 learners should have test experience, after being exposed to testing conditions for the first seven years of schooling, therefore having the adequate ability and knowledge to complete a standardised test appropriately (Glewwe, 2002). Thirdly, the school's demographic profile is diverse with a variety of language, race and religious groups attending the school, therefore ensuring that a highly diverse and representative sample was utilised in this study.

The sampling utilised in this research study has been explored in detail. A comprehensive discussion around each instrument will follow.

3.4. Instruments

The instruments utilised are listed and discussed below:

The Biographical Questionnaire (Refer to Appendix A)

The biographical questionnaire was designed by the researcher specifically for the purpose of this study and focussed on collecting vital information regarding the participants, i.e. age, gender, home language and prior English exposure in a formal school setting. As language exposure was vital in analysing the quasi-independent variable, it was important to ascertain L2 participants' prior English language exposure in an academic school setting from Grades 1

to 7. L2 learners who did not have at least five years of English language instruction as a LoLT during these grades were excluded from the sample due to the disadvantage of not having adequate English proficiency. The questionnaire took between five to eight minutes to complete.

The Stanford Diagnostic Reading Test (SDRT) (Brown Level)

The SDRT (Brown Level) is a group-administered reading test that is usually utilised as a diagnostic test to identify particular strengths and weaknesses with regards to specifically reading ability (Karlsen, Madden, & Gardner, 1986a). The test items are ordered in a manner that intersperses the easier and difficult items, therefore reducing the level of frustration (Karlsen et al., 1986b). The SDRT consists of four parts: Auditory Vocabulary and Reading Comprehension, Phonetic Analysis, Structural Analysis and Reading Rate (Karlsen et al., 1986b). The only two subtests that were used for this research study are the Auditory Vocabulary and the Reading Comprehension subtests. The reason for not utilising the Phonetic Analysis, Structural Analysis and Reading Rate subtests was due to the researcher's interest in only the vocabulary and reading levels of the learners. It is noted that one or more subtests of the SDRT may be administered as individual tests and they may be interpreted in isolation as they are independent of each other (Karlsen et al., 1986b). Although the SDRT (Brown Level) is normed in the United States and is intended for use as a diagnostic tool for high school learners in Grades 5 to 8 who are poor readers (Karlsen et al., 1986a). This means that this assessment is a fair tool to be used in the South African context, as learners will not be unfairly disadvantaged because it is an American normed reading test. This does mean that the results need to be interpreted cautiously as this may skew results positively.

The reliability of the SDRT is high with an internal consistency co-efficient that exceeds .80 and the validity is well established with high criterion-related validity reported across all

subtests (Karlsen et al., 1986b). Cockcroft and Israel (2011) report internal consistency reliability estimates for a study conducted in South Africa within an acceptable range for the SDRT; therefore validating the use of the subtests within South Africa.

The SDRT Brown Level: Auditory Vocabulary subtest

The Auditory Vocabulary subtest is administered orally to the learners and thus reading abilities are eliminated (Karlsen et al., 1986a). The subtest consists of 40 multiple-choice items that require participants to select the word that best fits the meaning of the sentence, although the visual back up of the answer choices is provided. Participants' listening skills may adversely affect the subtest; therefore, the visual back up is an important feature for participants whose listening skills are affected by difficulties in sustained attention. The subtest provides information about language competence without requiring reading. The subtest takes about 30 minutes to administer and is suitable for group administration. The subtest consists of words from three broad areas; mathematics and science, arts and social studies, as well as literature and reading (Karlsen et al., 1986b). Participants' vocabulary knowledge is assessed by classifying words into categories, as well as identifying synonyms (Karlsen et al., 1986b).

The SDRT Brown Level: Reading Comprehension subtest

The Reading Comprehension subtest measures literal and inferential comprehension through a variety of textual, functional and recreational reading materials. There are 60 multiple-choice items in total with 30 items for each of the literal and inferential questions. The subtest has a maximum time limit of 40 minutes. There are four types of comprehension that are assessed, which include; initial understanding, interpretation, critical analysis and reading strategies (Karlsen et al., 1986b). The initial understanding of the text may be the learner's initial understanding with very little analysis. Interpretation is the act of making meaning and

sense of the text. Critical analysis requires that the learner delves deeper into the text's meaning and makes connections that are not very obvious. Reading strategies are the different methods that learners use to interact with the texts provided, as some students would highlight key words or read the passage aloud to make sense of the passage.

The subtest consists of nine passages with a variety of questions that test both literal and inferential understanding. The literal component measures the participants' ability to grasp and understand basic facts and the general content of the passage whilst the inferential questions test the participants' ability to use higher order functioning to make meaning of the passage. The inferential section may exhibit higher levels of *g* whilst one would expect lower levels from the literal component of the subtest.

The Raven's Standard Progressive Matrices (RSPM)

The RSPM is a non-verbal test that was designed to measure the eductive component of *g*. The test consists of 60 visual puzzles that are grouped into five sets, which increase in difficulty with each set containing 12 puzzles. Each puzzle has a part missing that needs to be completed with a range of between six to eight options provided. Each set builds on the first question and allows a progressive build-up of each puzzle's argument, therefore allowing five opportunities to grasp the method of thought (Raven et al., 2004). The matrix follows the principle of utilising two separate principles to complete the puzzle with one principle going from left to right and the other going from top to bottom within each matrix (Gustafsson, 1984). The test can be utilised in a group setting as each participant will work independently to complete the test at their own pace (Raven et al., 2004). The test does attempt to ensure that the puzzles have visual appeal to sustain interest and are bold and clearly laid out so as to eliminate any possibility of confusion. The test takes about 40 minutes to complete, although learners were not limited by any time constraint.

The reliability and internal consistency of the RSPM has been well-established for all ethnic groups in South Africa ranging from .97 to .99 (Raven et al., 2004), therefore indicating that the test is robust on a wide range of cultural, socio-economic and ethnic groups. The RSPM has been utilised widely in South African research studies, which showed that it is a valuable assessment tool (Cockcroft & Israel, 2011; Owen, 1992; Rushton & Skuy, 2001; Rushton, Skuy, & Fridjhon, 2003).

Academic Performance Achievement Average

The school had agreed to provide the learners' academic marks at the end of 2014, when this data was collected as part of the researcher's previous study (Gangat, 2014). The school was informed that the data was to be used as part of this research study and consent was granted.

The academic marks provided consisted of the following nine subjects; Art, Additional Language (Afrikaans), Economic and Management Sciences, English, Life Orientation, Mathematics, Natural Science, Social Sciences and Technology.

The learners' academic marks were provided in both percentage and level descriptor form.

The percentage was calculated out of a 100 whilst the achievement levels consisted of seven categories as outlined in Table 3.1 (Department of Basic Education, 2013).

Table 3.1*Academic Achievement Level Descriptors*

Achievement	Achievement	Marks
Level	Description	%
7	Outstanding Achievement	80 - 100
6	Meritorious Achievement	70 -79
5	Substantial Achievement	60 -69
4	Adequate Achievement	50-59
3	Moderate Achievement	40-49
2	Elementary Achievement	30-39
1	Not Achieved	0-29

The average achievement level, which was an overall average of the learner's nine subjects, as previously discussed, was utilised as a measure in order to enrich the data analyses and discussion with more detail compared to the overall percentage, which would have far more room for variation.

The instruments utilised in this research study have been detailed. The procedure in collecting the research data will be follow.

3.5. Procedure

The procedure outlined below was utilised for the data collection during a previous study conducted by the researcher (Gangat, 2014). The procedure is still pertinent; hence, it is outlined below even though the data is archival.

Clearance was received from both the Human Research Ethics Committee (Non-Medical), (Protocol Number: H14/04/25 - see Appendix B) as well as the Gauteng Department of Basic Education (Reference Number: D2015 / 016 - see Appendix C). The researcher sought consent from the Headmistress of the school. Information was provided to the school (see Appendix D) which detailed the aims, rationale and research procedure. Consent was requested from the school to proceed with the research (see Appendix E) and consent was received. Thereafter the researcher began organising the logistics for the collection of data. Information forms were prepared for the educators involved in the study (see Appendix F) as well as consent forms for the educators involved in the research process (see Appendix G). Consent needed to be sought from both the participants and their legal guardian/s since the learners are minors (Howitt & Cramer, 2007). Information letters were prepared for the legal guardian/s (see Appendix H) as well as consent forms (see Appendix I). Information letters were also prepared for the participants (see Appendix J) as well as assent forms (see Appendix K).

The school together with the relevant Grade 8 educators had agreed that the week before examinations was due to commence was a suitable time for the testing process as this would not interfere with any formal academic activities. The Grade 8 learners needed to be present at school but had completed the academic programme for the year. Therefore, there was no disruption of formal teaching time as this was a major concern due to the length of each of the tests and the biographical questionnaire.

All learners were tested in their homeroom classes and consisted of between 18 to 30 learners in each class. This ensured that the testing process ran smoothly and was a manageable number for each test.

According to Howitt and Cramer (2007) some learners might agree to be part of a research study if undue pressure, fear or coercion is present in some form. To avoid this and ensure that the study adhere to the ethical treatment of participants, they were briefed during the stated meeting, assured that participation is entirely voluntary and that they might withdraw from the study at any time without consequence. They were also given assent forms to sign should they wish to partake and allowed an opportunity to ask questions and raise potential concerns.

Learners were also requested to forward the legal guardian/parent information and consent forms to allow adequate time for their parents to make an informed decision. The assent and consent forms were collected a week later, before testing would commence. The primary determiner to be included in the research study was legal guardian/parent consent coupled with assent from the learner.

The biographical questionnaire was first completed followed by the SDRT Auditory Vocabulary and Reading Comprehension subtest. The RSPM was the final test to be administered. There was a 15-minute break between the two SDRT subtests as well as the RSPM to allow learners adequate time to be refreshed.

The researcher is not part of the teaching staff of the school, thereby ensuring that there was familiarity and bias in the testing process. Educators were present during the testing process as non-active participants who were not allowed to assist any learners. The test papers were independently collected, scored and coded by the researcher.

The procedure above outlined how the data collection was managed. The methods of analysis utilised to answer the research questions will now be discussed.

3.6. Methods of Analysis

The data gathered was described statistically and analysed quantitatively. Prior to analysing the data collected, it was necessary to establish the reliability of the tests utilised to ensure that the inferences drawn are accurate. The internal consistency tests are important to ensure that the inferences drawn are both consistent and reliable (Ary, Jacobs, Sorensen, & Walker, 2014). Cronbach Coefficient Alphas were therefore calculated to determine internal consistency reliability estimates for each of three test scores used, namely; the SDRT, RSPM and the Academic Performance Averages. This was particularly important in the case of the former two tests as there is very little psychometric information available for these two standardised tests in the South African context. The latter's reliability needed to be tested to determine whether the Academic Average Performance was suitable for analyses as this was not collected by the researcher and its internal consistency and reliability needed to be established.

Descriptive statistics were provided to explore the detail of the sample utilised and included the age, gender and language diversity of the research sample. This is important to locate the research findings within the sample and to allow for extrapolation of results.

Prior to the inferential analyses being conducted, it was necessary to establish whether the data collected was suitable for parametric analysis. The assumptions necessary to fulfil a parametric analysis were first tested to ensure that the data could be analysed using parametric analyses. These assumptions included independence of observations, adequate sample size, lack of univariate outliers for each dependent variable, multivariate normality, linearity of data, homogeneity of variance and a lack of multicollinearity (Howell, 2014).

In order to investigate if there was a significant difference between L1 and L2 learners' scores on the SDRT and the RSPM and their individual academic performance a two-factor

Multivariate Analysis of Variance (hereafter MANOVA) was calculated. A MANOVA allows for dependent variables that are conceptually related like the SDRT and Academic Performance and the RSPM and Academic Performance (Howell, 2014). The MANOVA allows for multiple dependent variables means' to be compared and allows for a clearer interpretation of the interaction between the variables. Post-hoc analyses are important to test all possible comparisons in order to ensure that all possibilities are accounted for to explain the difference of a significant result (Howell, 2014). The interpretation of effect size for the SDRT and Academic Average Achievement Level was interpreted using Wilks' Lambda due to the homogeneity of the variance-covariance being met whilst the RSPM and Academic Average Achievement Level was violated, therefore Pillai's Trace was utilised instead (Howell, 2014).

A correlation exists whenever two variables are related to each other (Goodwin, 2009), therefore in order to ascertain whether the SDRT or the RSPM is a better predictor of academic performance a Pearson correlation was conducted. Pearson correlations indicate the degree of the relationship and this will provide the degree of which test is a better predictor of academic performance (Howell, 2010). This is important to understand and will ascertain which test has a stronger relationship to academic performance.

These analyses were utilised in addressing the four research questions posed in this research study. The possible threats to validity that may affect this research study will now be discussed.

3.7. Threats to Validity

A number of uncontrollable potential threats to validity could have affected the research study. The impact of these threats to validity is uncertain, although they need to be discussed in order to shed light on the results obtained.

Due to the logistical constraints of both space and time at the school that the research was carried out, it was felt that the classes needed to be tested within their class allocations. This meant that the researcher administered the tests under seven different testing conditions. Although every effort was made to standardise the testing process, it is possible that some classes received slightly different test conditions. This should be borne in mind when interpreting the results. Secondly, the language exposure to academic language is a subjective assumption that cannot be confirmed as a standard. Different levels of proficiency in different schools with a variety of educators are possible. Therefore, a learner having at least five years of English instruction at the academic level is extremely subjective and it is difficult to determine if all learners have the same level of proficiency. This could have affected both the interpretation of the test conditions where verbal instructions were provided to the learners by the researcher as well as the final test result.

Finally, the Grade 8 group was chosen due to their familiarity with testing conditions. Some learners may have misunderstood the testing process due to the unique features of some parts of the tests. The SDRT Auditory Vocabulary required learners to listen to the questions prior to making a selection. The RSPM required learners to choose the final piece of the puzzle and these unique features of these tests could have disadvantaged certain learners and needs to be considered.

Therefore, it is imperative to interpret the test results with caution, bearing all of the above threats to validity in mind. The significant ethical considerations pertinent to this study will follow and will conclude this chapter.

3.8. Ethical Considerations

The ethical considerations involved in this study were approached cautiously as the participants in this research study are considered a vulnerable group, younger than 18-years

of age. The American Psychological Association's ethical general principles were adhered to and underpinned the ethical considerations for this research study (Howitt & Cramer, 2007).

As discussed previously in the Procedure section, appropriate ethical clearance was obtained, as well as consent and assent from the relevant parties. Participants were briefed a week before the research process was due to commence so as to ensure that adequate time and thought was given to make an informed decision of whether to participate in the study.

Voluntary non-discriminatory participation and confidentiality was assured to all participants. Participants who chose to refuse were not discriminated against, advantaged or disadvantaged, or subjected to harmful consequences for choosing not to participate or withdraw from the study at any point. These learners were allowed to engage in another formal learning activity with an educator in a separate venue.

Participants' confidentiality was guaranteed as all data is stored and safeguarded from unauthorised access. In order to ensure anonymity the use of a numbering system was utilised for each participant, to ensure that the tests and biographical questionnaires belonged to the same learner, thereby eliminating all identifying data from the tests. The testing process was conducted in a familiar non-threatening environment and was an important factor to ensure that learners were not overly anxious during the testing process as well as to ensure that their academic routine was minimally disrupted. Support in the form of counselling services and extra English assistance were provided to all learners after the testing process, especially learners who felt like they had not performed well. There were no direct risks to the learners, although there is general benefit to the school, which will receive general feedback to ensure that this information is integrated and considered to improve overall educational practices at the school. Educators were also briefed after the testing process, explaining the importance of

why each test was conducted to ensure transparency and to ensure that the general feedback report would have a greater depth of meaning and understanding.

The results from this research study were presented at the 21st South African Psychology Congress organised by the Psychological Society of South Africa held in Johannesburg, South Africa during September 2015. The audience feedback and input was integrated into this research report.

A general feedback report will be prepared for the school once the research report is finalised to assist the school in using the information to appropriately support all learners and provide an optimal learning environment. This general feedback report will not highlight any particular learner but will highlight the general overall trends observed.

3.9. Conclusion

This chapter outlined the methods utilised in carrying out this research study. The research design, sampling and research instruments were explored and analysed. A detailed research procedure followed and included the logistical details carried out during the research process. The methods of analysis were discussed followed by an explanation of the results. A detailed discussion on the possible threats to validity as well as the ethical considerations concluded this chapter. It included a detailed discussion around all the important ethical issues within this research study. The results chapter follows with detailed research results outlined.

CHAPTER 4

RESULTS

4.1. Introduction

In order to address the research questions, pre-analyses and statistical analyses were carried out. The pre-analyses consisted of an overview of the instrument reliability, descriptive statistics and the suitability of the data for parametric analyses. These pre-analyses were followed by a series of statistical techniques designed to address the two broad research questions. As a reminder, these are the research questions that were investigated:

1. Is there a significant difference between L1 and L2 learners' scores on the SDRT and their academic performance?
2. Is there a significant difference between L1 and L2 learners' scores on the RSPM and their academic performance?
3. Is the SDRT or RSPM a better predictor of academic performance for L1 learners?
4. Is the SDRT or RSPM a better predictor of academic performance for L2 learners?

The results obtained for the analyses follow.

4.2. Instrument Reliability

Instrument reliability is essential in establishing the reliability of the tests utilised within the research study (Gravetter & Forzano, 2012). Therefore, reliability estimates of the tests used in this research, namely the SDRT, RSPM as well as the Academic Average Achievement Level were measured. The Cronbach's Alpha coefficient is used to measure this reliability

and internal consistency and a value that is closer to 1.00 has a higher degree of internal consistency and reliability (Gravetter & Forzano, 2012).

Table 4.1 indicates that within the study there were high levels of internal consistency reliability for all three data collection instruments; The SDRT ($\alpha = 0.92$), RSPM ($\alpha = 0.85$) and the Academic Average Achievement Level ($\alpha = 0.96$). This suggests that internal consistency reliability estimates are acceptably consistent measures within this study (Ary et al., 2014).

Table 4.1

Reliability Estimates for SDRT, RSPM and Academic Average Achievement Level

<i>Cronbach's Alpha Based</i>			
	<i>Cronbach's Alpha</i>	<i>on Standardized Items</i>	<i>No. of Items</i>
SDRT	.928	.928	100
RSPM	.868	.853	60
Academic Average Achievement Level	.959	.963	9

4.3. Descriptive Statistics

Descriptive statistics "describe the state of affairs at the time of the study" (Haslam & McGarty, 2003, p. 131). The descriptive statistics for this study include age, gender, home language and the L1 and L2 profiles of the participants. These descriptive statistics are important to contextualise the inferential statistics, which will be discussed later.

The learners' age profile ranges from 12 years to 16 years as depicted in Table 4.2. There is a significant portion of learners falling between 13 (53.5%) and 14 years (40%). The large portion of 13 to 14-year olds who make up this sample is age appropriate for South African

school standards (Jansen & Taylor, 2003). These ages may seem like an uneven spread, but is age-appropriate, as there are only 6 participants who fall within the 15 to 16 year group. The majority of participants fall within the 13 to 14 year age range, which is age-appropriate. The 12-year age range seems to be made up of learners who have birthdays later in the academic year.

Table 4.2

Descriptive Statistics of Age of Participants

<i>Age</i>	<i>Frequency</i>	<i>Percent</i>
12	4	2.6
13	83	53.5
14	62	40.0
15	5	3.2
16	1	.6
Total	155	100.0

Table 4.3 describes the sample's gender profile, which is slightly skewed in favour of female learners (56.1%). This is a positive sign and shows that South Africa's education has made significant progress since the advent of democracy, given that female enrolment rates in South Africa are one of the highest on the African continent (Jansen & Taylor, 2003).

Table 4.3*Descriptive Statistics of Gender of Participants*

<i>Gender</i>	<i>Frequency</i>	<i>Percent</i>
Female	87	56.1
Male	68	43.9
Total	155	100.0

The learner's Home Language profile is diverse and consists of many African languages as shown in Table 4.4. The majority of learners spoke an African language (54.2%) whilst English speakers made up the slightly smaller group (45.8%). The Nguni language group is made up isiZulu, isiXhosa, isiNdebele and xiTsonga whilst the Sotho/Other group is made up of SeSotho, Sepedi, Setswana (the Sotho group) and Shona and tshiVenda. The latter two languages fall outside of the mentioned language groups and thus make up the other group. The spread of African language speakers being slightly higher is unsurprising, given the high number of South Africans who speak an African language, as shown in Census 2011 (Statistics South Africa, 2012). The school's location may be attributed to the higher number of English home language speakers, which does not match the national statistics, since the school is situated in a middle-income residential area. This could also be attributed that the school was an ex-model C school, which historically was a school attended by a mostly white population with a smaller ratio of black people.

Table 4.4*Descriptive Statistics of Home Language Profile of Learners*

<i>Home Language</i>	<i>Frequency</i>	<i>Percent</i>
English	71	45.8
isiZulu*	44	28.4
SeSotho	10	6.5
Sepedi	8	5.2
Setswana	8	5.2
isiXhosa*	6	3.9
Shona	5	3.2
isiNdebele*	1	.6
xiTsonga*	1	.6
tshiVenda	1	.6
Total	155	100.0

*** Nguni language group**

Table 4.5 depicts and clearly shows that the learners' language group profile (L1 and L2) is slightly skewed in favour of L2 speakers (54.2%).

Table 4.5*Descriptive Statistics of L1 and L2 profile of Participants*

<i>L1/L2</i>	<i>Frequency</i>	<i>Percent</i>
L1	71	45.8
L2	84	54.2
Total	155	100.0

The language spread of Table 4.6 shows a more detailed breakdown of the language spread between the L2 language groups. The L1 English learners comprise the largest group (45.8%) followed by the L2 Nguni learners (32.9%) and the Sotho/Other learners (21.3%).

Table 4.6

Descriptive Statistics of Language Group profile of Participants

<i>Language Group</i>		<i>Frequency</i>	<i>Percent</i>
L1	English	71	45.8
L2	Nguni	51	32.9
	Sotho/Other	33	21.3
Total		155	100.0

The descriptive statistics are important to describe the sample and elaborate on details before the inferential statistics are analysed. In order to decide on which inferential statistics are appropriate, the normality of the data needs to be tested. The normality of the data will be discussed next, followed by the inferential statistics.

4.4. Normality of the Data

The use of parametric statistical analyses requires that the normality of the data has been established (Howell, 2014). There are seven underlying assumptions that need to be met in order to run a MANOVA (Howell, 2014). The assumptions underlying the normality of the data are outlined below.

Firstly, the sample should have independence of observations (Howell, 2014) meaning that there are different participants in each group. The data does fulfil this assumption due to the use of the quasi-independent variable, L1 and L2, therefore ensuring that there is

independence of observations in the sample, with each participant belonging to a specific group with no overlap between L1 and L2 groups.

The second assumption requires an adequate sample size and although a larger sample size would suit a MANOVA better, the basic requirement is to have more cases in each group compared to the dependent variables being analysed (Howell, 2014).

Table 4.7 shows that the second assumption is fulfilled with 71 participants in the L1 group and 84 participants in the L2 group, which consists of the Nguni and Sotho/Other subgroups with 51 and 33 participants respectively. There are three dependent variables being analysed, therefore fulfilling the second assumption.

Table 4.7

Sample Size of L1 and L2 Home Language Groups

<i>Language Group</i>		<i>N</i>
L1	English	71
L 2	Nguni	51
	Sotho/Other	33
	L2 Subtotal	84
Total		155

Thirdly, there should be no univariate outliers in each group of the quasi-independent variable (Howell, 2014). Therefore, there should be no univariate outliers in each group of the quasi-independent variable for each dependent variable of the MANOVA. Thus, there needs to be a lack of unusual combinations of scores for each dependent variable.

Table 4.8 shows that the assumption of normality for SDRT, RSPM and Academic Average Achievement Level scores are satisfied for all group combinations of English, Nguni and

Sotho/Other language groups, as assessed by Shapiro-Wilk's test ($p > .05$). This satisfies the assumption of univariate normality for each of the dependent variables.

Table 4.8

Shapiro-Wilk Test of Normality for SDRT, RSPM and Academic Average Achievement Level Scores

		<i>Shapiro-Wilk</i>		
<i>Language Group</i>		<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
SDRT	English	.979	71	.267
	Nguni	.981	51	.564
	Sotho/Other	.964	33	.324
RSPM	English	.986	71	.603
	Nguni	.945	51	.019
	Sotho/Other	.972	33	.540
Academic Average	English	.963	71	.037
Achievement Level	Nguni	.978	51	.448
	Sotho/Other	.987	33	.959

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Fourthly, the assumption of multivariate normality needs to be met (Howell, 2014). Although this assumption cannot be directly tested in SPSS, instead the normality in each group of the independent variable together with each dependent variable is assessed. There were no multivariate outliers in the data, as assessed by Mahalanobis distance ($p > .001$).

Fifthly, the assumption of linearity needs to be satisfied between each dependent variable for each group of the quasi-independent variable. If the relationship is not linear, there can be a loss of power to detect differences (Howell, 2014). There was a linear relationship between the SDRT, RSPM and Academic Average Achievement Level scores in each language grouping; English, Nguni and Sotho/Other, as assessed by a scatter plot (see Figures M1, M2 and M3 in Appendix M and Figures N1, N2 and N3 in Appendix N).

The second-last assumption to test for homogeneity of variance-covariance matrices and is tested by using Box's M test of equality covariance (Howell, 2014).

Table 4.9 shows that there was homogeneity of the variance-covariance matrices of the SDRT and Academic Average Achievement Level, as assessed by Box's test of equality of covariance matrices ($p = .008$) due to a non-significant result ($p > .001$).

Table 4.9

Box's Test of Equality of Covariance Matrices^a for SDRT and Academic Average Achievement Level

Box's M	17.770
F	2.899
df1	6
df2	135153.028
Sig.	.008

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Home Language

As can be seen in Table 4.10, the assumption of homogeneity of variance-covariance matrices for RSPM and Academic Average Achievement Level, as assessed by Box's test of equality of covariance matrices ($p = .000$) was not satisfied and was violated due to a significant result ($p < .001$). However, many statisticians agree that a MANOVA is robust to violations of homogeneity variances-covariance matrices and does not affect the result of the MANOVA, although the interpretation will be affected (Gavin, 2008; Gravetter & Wallnau, 2013; Howell, 2014, 2010). There are various reasons why the homogeneity of variance-covariance was violated and could be due to a large sample size or unequal samples for each of the variables (Gavin, 2008; Gravetter & Wallnau, 2013; Howell, 2014, 2010). The discussion of results will consider this in more detail, in Chapter 5.

Table 4.10

Box's Test of Equality of Covariance Matrices^a for RSPM and Academic Average Achievement Level

Box's M	24.917
F	4.064
df1	6
df2	135153.028
Sig.	.000
Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.	
a. Design: Intercept + Home Language	

Table 4.11 depicts that there was homogeneity of variances, as assessed by Levene's Test of Homogeneity of Variance ($p > .05$) for all dependent variables; SDRT, RSPM and Academic Achievement Level.

Table 4.11***Levene's Test of Equality of Error Variances for SDRT, RSPM and Academic Average Achievement Level***

	<i>Sig.</i>
SDRT	.733
RSPM	.009
Academic Average Achievement Level	.006

The final assumption that needs to be checked is a lack of multicollinearity. There are various methods to test for multicollinearity but the most straightforward is a correlation between the dependent variables to assess if there are any relationships that are too strongly correlated.

The correlation matrix in Table 3.12 indicates a lack of correlation that exceeds .80. This indicates that is a lack of very strong correlations between the variables. There was no multicollinearity between the SDRT and RSPM as assessed by Pearson correlation ($r = .507$, $p = .000$). The second set of variable also shows that there was no multicollinearity between the RSPM and Academic Average Achievement Level as assessed by Pearson correlation ($r = .496$, $p = .000$).

Finally, there was no multicollinearity between the SDRT and Academic Average Achievement Level as assessed by Pearson correlation ($r = .745$, $p = .000$), although this figure is in the upper limits of being acceptable and needs to be borne in mind when interpreting and discussing the results.

Table 4.12

Correlations of SDRT, RSPM and Academic Average Achievement Level

		SDRT	RSPM	Academic Average Achievement Level
SDRT	Pearson	1	.507**	.745**
	Correlation			
	Sig. (2-tailed)		.000	.000
	N	155	155	155
RSPM	Pearson	.507**	1	.496**
	Correlation			
	Sig. (2-tailed)	.000		.000
	N	155	155	155
Academic Average Achievement Level	Pearson	.745**	.496**	1
	Correlation			
	Sig. (2-tailed)	.000	.000	
	N	155	155	155

** . Correlation is significant at the 0.01 level (2-tailed).

The normality of the data has been detailed above indicating that parametric analyses are suitable to answer the research questions. The inferential results will be detailed below.

4.5. Inferential Results

The inferential results will now be presented and a summary of results will conclude the chapter.

The inferential results section is laid out according to the order of the research questions.

Relationship between L1 and L2 learners on the SDRT and Academic Average

Performance

Table 4.13 shows that there was a statistically significant difference between Home Language on the combined dependent variables, $F(4, 302) = 14.508, p < .0005$; Wilks' $\Lambda = .704$; partial $\eta^2 = .161$.

This implies that a difference was observed between the SDRT and Academic Achievement Levels for both L1 and L2 learners.

Table: 4:13

Multivariate Tests^a for SDRT and Academic Average Achievement Level

<i>Effect</i>	<i>Value</i>	<i>Hypothesis</i>			<i>Partial Eta</i>		
		<i>F</i>	<i>df</i>	<i>Error df</i>	<i>Sig.</i>	<i>Squared</i>	
Home	Wilks' Lambda	.704	14.508 ^b	4.000	302.000	.000	.161
Language							

a. Design: Intercept + Home Language

b. Exact statistic

There was a statistically significant difference in both SDRT and Academic Average Achievement Level scores between the L1 and L2 learners as seen in Table 4.14, with the SDRT result being $F(2, 152) = 25.073, p < .0005$; partial $\eta^2 = .248$ and the Academic Average Achievement Level result $F(2, 152) = 27.820, p < .0005$; partial $\eta^2 = .268$. This means that the effect of Language on both the SDRT and the Academic Average Achievement Level are both significant results.

Table 4.14

Tests of Between-Subjects Effects for the SDRT and Academic Average Achievement Level

		<i>Type III</i>					
<i>Source</i>	<i>Dependent Variable</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared</i>
	SDRT	9596.773	2	4798.386	25.073	.000	.248
Home							
Language	Academic Average Achievement Level	54.075	2	27.038	27.820	.000	.268
	SDRT	29089.382	152	191.378			
Error	Academic Average Achievement Level	147.724	152	.972			

The descriptives of the SDRT and the Academic Achievement Levels in Table 4.15 shows that the differences mean differences between L1 and L2 learners require careful interpretation due to the large difference.

Table 4.15*Descriptive Statistics of the SDRT and Academic Average Achievement Level*

	<i>Home Language</i>	<i>Mean</i>	<i>Std. Deviation</i>
SDRT	English	68.77	13.260
	Nguni	52.16	14.482
	Sotho/Other	54.48	14.025
Academic Average	English	5.01	1.174
Achievement Level	Nguni	3.77	.804
	Sotho/Other	3.94	.768

Tables 4.15 and 4.16 will be interpreted simultaneously as the former shows the descriptive statistics whilst the latter indicates the multiple comparisons. Table 4.16 highlights the differences between the SDRT and Academic Average Achievement Levels and only the most pertinent and significant differences will be highlighted.

There was an increase in English L1 scores ($M = 68.8$, $SD = 13.3$) compared to Nguni L2 scores ($M = 52.2$, $SD = 14.5$) on the SDRT, a mean increase of 16.6, $SE = 2.5$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 68.8$, $SD = 13.3$) compared to Sotho/Other L2 scores ($M = 55.5$, $SD = 14.0$) on the SDRT, a mean increase of 14.3, $SE = 2.9$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 5.0$, $SD = 1.2$) compared to Nguni L2 scores ($M = 3.8$, $SD = .80$) on the Academic Average Achievement Level, a mean increase of 1.3, $SE = .18$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 5.0$, $SD = 1.2$) compared to Sotho/Other L2 scores ($M = 3.9$, $SD = .77$) on the Academic Average Achievement Level, a mean increase of 1.1, $SE = .21$, which was statistically significant ($p = .000$).

It is important to note that there was no significant difference between the Nguni L2 or Sotho/Other L2 scores in both the SDRT and the Academic Average Achievement Levels.

Table 4.16

Tukey post-hoc Multiple Comparisons for SDRT and Academic Average Achievement Level

						<i>95% Confidence</i>		
				<i>Mean</i>				
<i>Dependent</i>	<i>(I) Home</i>	<i>(J) Home</i>	<i>Difference</i>	<i>Std.</i>				
<i>Variable</i>	<i>Language</i>	<i>Language</i>	<i>(I-J)</i>	<i>Error</i>	<i>Sig.</i>	<i>Lower</i>	<i>Upper</i>	
						<i>Bound</i>	<i>Bound</i>	
SDRT	English	Nguni	16.62*	2.539	.000	10.61	22.63	
		Sotho/Other	14.29*	2.915	.000	7.39	21.19	
	Nguni	English	-16.62*	2.539	.000	-22.63	-10.61	
		Sotho/Other	-2.33	3.091	.732	-9.64	4.99	
	Sotho/Other	English	-14.29*	2.915	.000	-21.19	-7.39	
		Nguni	2.33	3.091	.732	-4.99	9.64	
	Academic	English	Nguni	1.25*	.181	.000	.82	1.67
			Sotho/Other	1.08*	.208	.000	.58	1.57
Average	Nguni	English	-1.25*	.181	.000	-1.67	-.82	
		Sotho/Other	-.17	.220	.723	-.69	.35	
Achievement	Sotho/Other	English	-1.08*	.208	.000	-1.57	-.58	
		Nguni	.17	.220	.723	-.35	.69	

Based on observed means.

The error term is Mean Square (Error) = .972.

*. The mean difference is significant at the .05 level.

Relationship between L1 and L2 learners on the RSPM and Academic Average

Performance

Table 4.17 shows that there was a statistically significant difference between Home Language on the combined dependent variables, $F(4, 304) = 14.771, p < .0005$; Pillai's $\Lambda = .325$; partial $\eta^2 = .163$. Due to the violation of the homogeneity of the variance-covariance under the assumptions, Pillai's Trace is utilised as the interpretation of the effect size due to this earlier violation. However, many statisticians agree that it does not affect the result (Frederick & Forzano, 2003; Gravetter & Forzano, 2012).

Table 4.17

Multivariate Tests^a for RSPM and Academic Average Achievement Level

<i>Effect</i>		<i>Value</i>	<i>Hypothesis</i>			<i>Partial Eta</i>	
			<i>F</i>	<i>df</i>	<i>Error df</i>	<i>Sig.</i>	<i>Squared</i>
Home	Pillai's Trace	.325	14.771	4.000	304.000	.000	.163

Language

a. Design: Intercept + Home Language

b. Exact statistic

Table 4.18 shows that there was a statistically significant difference in both RSPM and Academic Average Achievement Level scores between the L1 and L2 learners with the RSPM result being $F(2, 152) = 20.111, p < .0005$; partial $\eta^2 = .209$ and the Academic Average Achievement Level result $F(2, 152) = 27.820, p < .0005$; partial $\eta^2 = .268$. This

means that the effect of Language on both the RSPM and the Academic Average Achievement Level are both significant results.

Table 4.18

Tests of Between-Subjects Effects for the RSPM and Academic Average Achievement Level

		<i>Type III</i>					
<i>Source</i>	<i>Dependent Variable</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared</i>
	RSPM	1653.363	2	826.681	20.111	.000	.209
Home							
Language	Academic Average Achievement Level	54.075	2	27.038	27.820	.000	.268
	RSPM	6248.225	152	41.107			
Error							
	Academic Average Achievement Level	147.724	152	.972			

The descriptives of the RSPM and the Academic Achievement Levels in Table 4.19 shows that the differences mean differences between L1 and L2 learners require careful interpretation due to the large difference.

Table 4.19

Descriptive Statistics of the RSPM and Academic Average Achievement Level

	<i>Home Language</i>	<i>Mean</i>	<i>Std. Deviation</i>
RSPM	English	43.48	5.629
	Nguni	36.22	7.829
	Sotho/Other	38.61	5.494
Academic Average	English	5.01	1.174
Achievement Level	Nguni	3.77	.804
	Sotho/Other	3.94	.768

The descriptives of the RSPM and the Academic Achievement Levels in Table 4.19 will be interpreted in conjunction with Table 4.20. Tables 4.19 and 4.20 show the descriptive statistics and the multiple comparisons respectively. Table 4.20 highlights the differences between the RSPM and Academic Average Achievement Levels and only the most pertinent and significant differences will be highlighted.

There was an increase in English L1 scores ($M = 43.5$, $SD = 5.6$) compared to Nguni L2 scores ($M = 36.2$, $SD = 7.8$) on the RSPM, a mean increase of 7.3, $SE = 1.2$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 43.5$, $SD = 5.6$) compared to Sotho/Other L2 scores ($M = 38.6$, $SD = 5.5$) on the RSPM, a mean increase of 4.9, $SE = 1.4$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 5.0$, $SD = 1.2$) compared to Nguni L2 scores ($M = 3.8$, $SD = .80$) on the Academic Average Achievement Level, a mean increase of 1.3, $SE = .18$, which was statistically significant ($p = .000$).

There was an increase in English L1 scores ($M = 5.0$, $SD = 1.2$) compared to Sotho/Other L2 scores ($M = 3.9$, $SD = .77$) on the Academic Average Achievement Level, a mean increase of 1.1, $SE = .21$, which was statistically significant ($p = .000$).

It is important to note that there was no significant difference between the Nguni L2 or Sotho/Other L2 scores in both the RSPM and the Academic Average Achievement Levels.

Table 4.20

Tukey post-hoc Multiple Comparisons for RSPM and Academic Average Achievement Level

<i>Dependent Variable</i>	<i>(I) Home Language</i>	<i>(J) Home Language</i>	<i>Mean Difference (I-J)</i>	<i>Std. Error</i>	<i>Sig.</i>	<i>95% Confidence Interval</i>	
						<i>Lower Bound</i>	<i>Upper Bound</i>
RSPM	English	Nguni	7.26*	1.177	.000	4.48	10.05
		Sotho/Other	4.87*	1.351	.001	1.68	8.07
	Nguni	English	-7.26*	1.177	.000	-10.05	-4.48
		Sotho/Other	-2.39	1.432	.221	-5.78	1.00
	Sotho/Other	English	-4.87*	1.351	.001	-8.07	-1.68
		Nguni	2.39	1.432	.221	-1.00	5.78
Academic Average Achievement Level	English	Nguni	1.25*	.181	.000	.82	1.67
		Sotho/Other	1.08*	.208	.000	.58	1.57
Nguni	English	Sotho/Other	-1.25*	.181	.000	-1.67	-.82
		Sotho/Other	-.17	.220	.723	-.69	.35
Sotho/Other	English	Nguni	-1.08*	.208	.000	-1.57	-.58
		Nguni	.17	.220	.723	-.35	.69

Based on observed means.

The error term is Mean Square(Error) = .972.

*. The mean difference is significant at the .05 level.

Suitability of SDRT or RSPM as a predictor of Academic Average Performance for L1 learners

In order to ascertain the suitability of the SDRT and the RSPM as a predictor of Academic Average Performance for L1 learners a Pearson correlation was conducted and the results are below:

Table 4.21 shows the correlation matrix between the dependent variables for L1 learners.

There were moderate positive correlations between the following variable combinations;

SDRT and RSPM scores, $r = .370$ with an effect size of $r^2 = 0.14$ whilst the RSPM and Academic Average Achievement Level scores, $r = .391$, with an effect size of $r^2 = 0.15$.

There was a strong positive correlation between SDRT and Academic Average Achievement Level in L1 learners, $r = .704$ with an effect size of $r^2 = 0.50$.

Table 4.21

Correlations of SDRT, RSPM and Academic Average Achievement Level for L1 Learners

		SDRT	RSPM	Academic Average Achievement Level
SDRT	Pearson	1	.370**	.704**
	Correlation			
	Sig. (2-tailed)		.001	.000
	N	71	71	71
RSPM	Pearson	.370**	1	.391**
	Correlation			
	Sig. (2-tailed)	.001		.001
	N	71	71	71
Academic Average Achievement Level	Pearson	.704**	.391**	1
	Correlation			
	Sig. (2-tailed)	.000	.001	
	N	71	71	71

** . Correlation is significant at the 0.01 level (2-tailed).

Suitability of SDRT or RSPM as a predictor of Academic Average Performance for L2 learners

In order to ascertain the suitability of the SDRT and the RSPM as a predictor of Academic Average Performance for L2 learners a Pearson correlation was conducted and the results are below:

The correlation matrix above in Table 4.22 shows the correlation matrix between the dependent variables for L2 learners. There were moderate positive correlations between the following variable combinations; SDRT and RSPM scores, $r = .372$, with an effect size of $r^2 = 0.14$, whilst RSPM and Academic Average Achievement Level scores, $r = .343$, with an effect size of $r^2 = 0.12$. There was a strong positive correlation between SDRT and Academic Average Achievement Level in L2 learners, $r = .645$ with an effect size of $r^2 = 0.42$.

Table 4.22

Correlations of SDRT, RSPM and Academic Average Achievement Level for L2 Learners

		SDRT	RSPM	Academic Average Achievement Level
SDRT	Pearson	1	.372**	.645**
	Correlation			
	Sig. (2-tailed)		.000	.000
	N	84	84	84
RSPM	Pearson	.372**	1	.343**
	Correlation			
	Sig. (2-tailed)	.000		.001
	N	84	84	84
Academic Average Achievement Level	Pearson	.645**	.343**	1
	Correlation			
	Sig. (2-tailed)	.000	.001	
	N	84	84	84

** . Correlation is significant at the 0.01 level (2-tailed).

4.6. Summary of Results

A summary of results for each research question follows:

Relationship between L1 and L2 learners on the SDRT and Academic Average Performance

A one-way multivariate analysis of variance was run to determine if there was a significant difference between L1 and L2 learners' scores on the SDRT and their academic performance. One measure was assessed; the SDRT scores whilst the learner's academic achievement levels were provided by the school. Learners were divided into L1 and L2 groups based on their home language. Preliminary assumption checking revealed that data was normally distributed, as assessed by Shapiro-Wilk test ($p > .05$); there were no multivariate outliers, as assessed by Mahalanobis distance ($p > .001$), there were linear relationships as assessed by scatter plots; no multicollinearity ($r = .745, p = .000$); and there was homogeneity of variance-covariance matrices, as assessed by Box's M test ($p = .008$). English L1 learners scored higher on the SDRT ($M = 68.8, SD = 13.3$) compared to L2 Nguni ($M = 52.2, SD = 14.5$) and L2 Sotho/Other ($M = 54.5, SD = 14.0$) learners' scores. English L1 learners scored higher on their Academic Average Achievement Level ($M = 5.0, SD = 1.2$) compared to L2 Nguni ($M = 3.8, SD = .80$) and L2 Sotho/Other ($M = 3.9, SD = .77$) learners' scores. The differences between the scores on the combined dependent variables was statistically significant, $F(4, 302) = 14.508, p < .0005$; Wilks' $\Lambda = .704$; partial $\eta^2 = .161$. Follow-up univariate ANOVAs showed that both SDRT scores $F(2, 152) = 25.073, p < .0005$; partial $\eta^2 = .248$ and Average Achievement Levels $F(2, 152) = 27.820, p < .0005$; partial $\eta^2 = .268$ were statistically significantly different, using a Bonferroni adjusted α level of .025. Tukey post-hoc tests showed that for SDRT scores, English L1 learners had statistically significantly higher mean scores than L2 Nguni ($p < .0005$) and Sotho/Other ($p < .0005$), learners but not

between L2 Nguni and Sotho/Other learners ($p = .732$). Tukey post-hoc tests showed that for Academic Average Achievement Levels, English L1 learners had statistically significantly higher mean scores than L2 Nguni ($p < .0005$) and Sotho/Other ($p < .0005$), learners but not between L2 Nguni and Sotho/Other learners ($p = .723$).

Relationship between L1 and L2 learners on the RSPM and Academic Average

Performance

A one-way multivariate analysis of variance was run to determine if there was a significant difference between L1 and L2 learners' scores on the RSPM and their academic performance. One measure was assessed; the RSPM scores whilst the learners' academic achievement levels were provided by the school. Learners were divided into L1 and L2 groups based on their home language. Preliminary assumption checking revealed that data was normally distributed, as assessed by Shapiro-Wilk test ($p > .05$); there were no multivariate outliers, as assessed by Mahalanobis distance ($p > .001$), there were linear relationships as assessed by scatter plots; no multicollinearity ($r = .496, p = .000$); and there was no homogeneity of variance-covariance matrices, as assessed by Box's M test ($p = .000$). English L1 learners scored higher on the RSPM ($M = 43.5, SD = 5.6$) compared to L2 Nguni ($M = 36.2, SD = 7.8$) and L2 Sotho/Other ($M = 38.6, SD = 5.5$) learners' scores. English L1 learners scored higher on their Academic Average Achievement Level ($M = 5.0, SD = 1.2$) compared to L2 Nguni ($M = 3.8, SD = .80$) and L2 Sotho/Other ($M = 3.9, SD = .77$) learners' scores. The differences between the scores on the combined dependent variables was statistically significant, $F(4, 304) = 14.771, p < .0005$; Pillai's $\Lambda = .325$; partial $\eta^2 = .163$. Follow-up univariate ANOVAs showed that both RSPM scores $F(2, 152) = 20.111, p < .0005$; partial $\eta^2 = .209$ and Average Achievement Levels $F(2, 152) = 27.820, p < .0005$; partial $\eta^2 = .268$ were statistically significantly different, using a Bonferroni adjusted α level of .025. Tukey post-hoc tests

showed that for RSPM scores, English L1 learners had statistically significantly higher mean scores than L2 Nguni ($p < .0005$) and Sotho/Other ($p < .0005$), learners but not between L2 Nguni and Sotho/Other learners ($p = .221$). Tukey post-hoc tests showed that for Academic Average Achievement Levels, English L1 learners had statistically significantly higher mean scores than L2 Nguni ($p < .0005$) and Sotho/Other ($p < .0005$), learners but not between L2 Nguni and Sotho/Other learners ($p = .723$).

Suitability of SDRT or RSPM as a predictor of Academic Average Performance for L1 learners

A Pearson's product-moment correlation was run to assess the relationships between the dependent variables; SDRT and RSPM, RSPM and Academic Average Achievement Level and SDRT and Academic Average Achievement Level for L1 learners. Preliminary analyses showed the relationship to be linear with all variables being normally distributed, as assessed by Shapiro-Wilk test ($p > .05$), and there were no outliers. There were moderate positive correlations between the following variable combinations; SDRT and RSPM scores, $r(98) = .370, p < .0005$, with an effect size of $r^2 = 0.14$, whilst the RSPM and Academic Average Achievement Level scores, $r(98) = .391, p < .0005$, with an effect size of $r^2 = 0.15$. There was a strong positive correlation between SDRT and Academic Average Achievement Level in L1 learners, $r(98) = .704, p < .0005$, with an effect size of $r^2 = 0.50$.

Suitability of SDRT or RSPM as a predictor of Academic Average Performance for L2 learners

A Pearson's product-moment correlation was run to assess the relationships between the dependent variables; SDRT and RSPM, RSPM and Academic Average Achievement Level and SDRT and Academic Average Achievement Level for L2 learners. Preliminary analyses showed the relationship to be linear with all variables being normally distributed, as assessed

by Shapiro-Wilk test ($p > .05$), and there were no outliers. There were moderate positive correlations between the following variable combinations; SDRT and RSPM scores, $r(98) = .372, p < .0005$, with an effect size of $r^2 = 0.14$, whilst RSPM and Academic Average Achievement Level scores, $r(98) = .343, p < .0005$, with an effect size of $r^2 = 0.12$. There was a strong positive correlation between SDRT and Academic Average Achievement Level in L2 learners, $r(98) = .645, p < .0005$ with an effect size of $r^2 = 0.42$.

4.7. Conclusion

The final chapter will discuss the results whilst simultaneously locating the implications within a social context. This ensures that this research results' practical application can be understood and may be useful for future use in a real world context.

CHAPTER 5

DISCUSSION OF FINDINGS

5.1. Introduction

This chapter will centre on the discussion of the research results and will simultaneously locate the findings within relevant literature. This is important to consider to understand where this study is placed within current literature.

5.2. Discussion of Results

The discussion will be structured according to the research questions, as outlined in Chapter 4. For ease of discussion, the first two research questions will be combined and the last two questions will be discussed together.

The relationship between L1 and L2 learners on the SDRT and RSPM compared to their Average Academic Performance showed that there was a significant difference between L1 and L2 learners' scores on the SDRT and the RSPM compared to their academic performance. The study utilised a two-factor Multivariate Analysis of Variance (hereafter MANOVA) to investigate whether there was a significant relationship between L1 and L2 learners' scores on the SDRT and the RSPM in relation to their academic performance, which allowed conceptually related variables to be linked and compared (Howell, 2014). There was a violation to the homogeneity of variance-covariance that could have been as a result of unequal sample sizes in L1 and L2 learners, with 71 and 85 respectively. Although this was an important factor to consider for the normality of the data, it will not affect the overall interpretation of the MANOVA, hence the results are valid and reliable (Gavin, 2008; Gravetter & Wallnau, 2013; Howell, 2014, 2010).

The L1 learners showed an overall increase in their SDRT scores compared to the Nguni and Sotho/Other group. This showed that L1 learners performed better than L2 learners did overall, although the Sotho/Other group performed slightly better compared to the Nguni group. The Sotho/Other group's difference compared to the Nguni group were not significant. The relationship between L1 and L2 learners on the RSPM in relation to their academic performance was also assessed which showed that the L1 learners performed better on the RSPM compared to the L2 learners in both the Nguni and Sotho/Other language groupings. The Sotho/Other L2 learners performed slightly better compared to the Nguni L2 group on the RSPM, although the result was not significant. When comparing the L1 and L2 learners' academic performance scores, the L1 learners performed better compared to their peers in the Nguni and Sotho/Other groups. Interestingly, the Nguni group performed better overall compared to the Sotho/Other group, which is surprising since the Sotho/Other L2 learners performed slightly better than the Nguni group in the SDRT, overall. It is important to note that there was no significant or large difference between the Nguni L2 and Sotho/Other L2 scores in the SDRT, RSPM and the Academic Average Achievement Levels.

The relationship between the SDRT, RSPM and overall academic performance was important to consider due to the canon of theoretical knowledge that validates the use of these assessments, yet there is such limited research with regard to the applicability of these tests within the South African context. The historical impact of psychological assessment needs to be carefully considered in South Africa, which is part of the responsibility of being a psychologist in South Africa. The use of psychological assessments in South African classrooms is limited but there are implications for learning and for determining future academic potential for learners, if used ethically and appropriately (Laher & Cockcroft, 2014, 2013). This study was also interested in determining whether the RSPM or the SDRT is a

better predictor of academic performance, discussed further in this discussion, since it is sometimes used in psycho-educational assessments, which will inform best practice.

The results of this research study indicates that educational language policies in South Africa need to be revised in order to begin the process of addressing the language issues within the classroom. The Department of Education's best intentions to rid democratic South Africa of older language policies, which was divisive, racist and unfair, may have been premature, as this was a catastrophe for the promotion of African languages, in particular (Kamwangamalu, 2001). The aggressive stance meant that all language policies with regard to the promotion and advancement of African languages lagged behind (Kamwangamalu, 2001). This meant that there were limited resources to publishing reading material in African languages, promoting multilingualism in schools and encouraging learners to have an appreciation for their cultural and linguistic heritage (Kamwangamalu, 2001). The lack of published educational material in African languages exacerbates the problem even further, due to the lack of proficient language acquisition by L2 learners, which negatively influences their ability to succeed in a predominantly English environment. These practices will re-instil pride and positivity in South Africans' toward African languages, which is such an important step to improving education nationally.

The impact of language policy revision is a powerful step in the right direction as research has shown that L2 learners will thrive in school settings which promote and affirm L2 students' home languages within the school environment (Coetzee-Van Rooy, 2010). L2 learners should be encouraged to use language to formulate knowledge, question classroom material and be allowed to voice opinions to improve their English (Coetzee-Van Rooy, 2010). Furthermore, educators should be familiar with the benefits of using L2 learner's home language as a stepping stone for formulating thoughts and ideas, especially during

assessments (Coetzee-Van Rooy, 2010). The promotion of overall additive bilingualism in the school setting has numerous benefits (Coetzee-Van Rooy, 2010). Some shared language commonalities between educators and learners to promote pride in L2 learner's home languages (Coetzee-Van Rooy, 2010). Allowing and encouraging a diverse school environment to allow learners to feel accepted and part of the greater school community (Coetzee-Van Rooy, 2010).

The language policies, pressured education system and lack of direction from the Department of Education seem to be part of the reason for the results revealed in this research study. The mismatch of South Africa's scant language policies and the language practices in the school sector are problematic, as this mismatch highlights how school environments are not conducive to additive multilingualism (Kamwangamalu, 2001). This is primarily caused the ambivalent Constitution's clauses, which do in theory advocate for education in one's home language, but this has not been followed up with any real political will power to alter and change educational practices (Webb, 1999).

This lack of political willpower with uninformed best practice policies means that South Africa's children will never have equal education opportunities, which directly goes against one of the basic Constitution's principles that promises the right to basic education (Republic of South Africa, 1996). There is a lack of structural resources that has negatively impacted the acceptance of African languages, which shows that many black people would 'trade in' their African language, which would not empower or improve their lives in both the vocational and educational settings (Kamwangamalu, 2001). Added to this lack of language direction in policies, there is a lack of harmonisation between African language activists due to the threat of losing valuable cultural and linguistic identity (Kamwangamalu, 2001).

The relevance of Cummins' theory shows that South Africa's basic education policies need to be revised in line with research that shows that there is value in an additive bilingualism model. This will add value to the current standings of African languages whilst promoting an additive bilingualism model to improve L2 learners' overall perceptions of their home language. The results relate directly to Cummins' Thresholds Theory which is a valuable lens into the infinite possibilities that L2 learners could achieve with the correct language immersion (Cummins, 1984). The research in this area proves the value of an additive bilingual model, which has been shown to be most effective. This has directly affected school-leaving results, because there is a substantial body of research, which indicates that L2 learners need to be proficient in their L1 before they are able to engage with academic material successfully (Kamwangamalu, 2001). This ideal transition is not as simple, when contextualised in South Africa's history, due to the negative connotations associating African mother tongue language instruction with inferior education (Alexander, 2000). This is based on Bantu education, which utilised African languages as a tool to disempower black people, which resulted in African languages being stigmatised (Alexander, 2000; Pluddemann, 1999). This complex notion cannot be easily altered, to ensure that black learners are using an African language as a LoLT. These historical apartheid practices are very important to consider when recommending that L2 learners be taught in their home language during their earlier school grades. The way forward is not simple and there is no template but there is a common understanding that African languages need to be re-packaged to South African as a way to re-instil pride and positivity toward African languages, as previously discussed, which does require an intense overhaul to alter these historical associations.

One of the potential reasons why the L2 learners may not have performed as well as their peers may be due to a direct result of a lack of CALP in their L1 before transitioning to L2, which requires at least five years to develop fully (Cummins, 1989), depending on the level

of language development and interaction the learner receives. The reality is that many households in South Africa lack a rich reading background, which means that many L2 learners are hardly exposed to reading material in their home language. This lack of engagement coupled with the early transition to L2 when entering formal schooling results in poorer academic performance compared to their L1 peers. The development of the L2 also requires constant language engagement to develop fully, which means that learners have to engage verbally in all social situations in their L2 to gain mastery. This may not always be possible for L2 learners since many of their communities may not be proficient in English to engage meaningfully, which means that English is mostly spoken in the school environment. This means that learners will be in the process of learning English whilst simultaneously be expected to deliver academic tasks, which may not be a fair indicators of their optimal ability. This unfair practice seems pervasive across many South African classrooms, which questions the importance of assessment in the South African context.

The suitability of the SDRT or RSPM as a predictor of Academic Average Performance for L1 and L2 learners was also investigated. Pearson product moment correlations were also utilised to assess the degree of the relationship between the SDRT and RSPM to ascertain which test was a better predictor of academic performance. This was important to understand and was used to ascertain which test had a stronger relationship to academic performance. The suitability of either the SDRT or RSPM as a predictor of academic performance in L1 learners was analysed using a Pearson correlation and showed that the SDRT was a better predictor of academic performance for L1 learners. Similarly, the suitability of either the SDRT or RSPM as a predictor of academic performance in L2 learners' was also analysed using a Pearson correlation and showed that the SDRT was also a better predictor of academic performance for L2 learners. The results indicated that the relationship between

both the L1 and L2 learners on the SDRT compared to their academic performance were significant, with effect sizes of 0.50 and 0.42 respectively.

Research has shown that there are definite links between academic performance and intelligence. The RSPM has strong correlations to the *g*-factor (Raven et al., 2004), which does mean that it should have been a better predictor of academic performance, considering that there is a strong relationship between academic performance and intelligence. The results showed that the SDRT was a better predictor of both L1 and L2 learner's overall academic performance compared to the RSPM, which was surprising. The lowered RSPM correlation could be explained by research which has shown that the RSPM may be a better predictor of academic potential instead of academic performance, which sheds new light and possibilities for the future potential use of this very important test (Spren & Strauss, 1998). Research around the RSPM's standardisation, use and applicability for the South African population as revealed mixed results, where some research has shown that its applicability is fair and unbiased (Raven et al., 2004) whilst others have questioned its cultural appropriateness (Cockcroft & Israel, 2011). The definitive answer around the question about the influence of language on the RSPM is scant and obscure (Knowles, 2010), leaving many unanswered questions around the overall suitability of the RSPM as a suitably fair measure of intelligence for the South African population. The RSPM being a non-verbal assessment measure does question the cognitive processes involved in solving this test, especially since there was no relationship found in predictability of academic performance. This implies that learning at school may not involve many higher order executive functions, which the RSPM requires.

Another viewpoint which is important to consider, is the concept of intelligence, which has a long history spanning the last decade, as discussed in Chapter 2 in the literature review. This overarching theme is important to consider, as there are links between intelligence and

academic performance, which are critical skills for success at school. The contention of equating academic performance to intelligence as being one and the same is premature and incorrect (Brunner, 2008), although there has been some research noting that educational researchers would benefit from revisiting the concept of intelligence, altogether (Baumert et al., 2009; Brunner, 2008). This means that a deeper look into the relationship between intelligence and academic performance is definitely required, especially in light of this debate.

A potential reason why the SDRT was an overall better predictor of academic achievement in both L1 and L2 learners was possibly due to the volume of reading in the South African school curriculum, meaning that learners who are poor readers will generally have poor academic performance (Pretorius & Mampuru, 2007). Some of the reasons provided for the poor reading levels in South Africa include, poor teaching practices, under resourced school environments, lack of reading material in African languages, the oral traditions of African languages, lack of motivation and a generally poor reading culture (Howie et al., 2008). The nature of the SDRT assessment needs to be considered, as it was developed as a diagnostic tool for weaker readers, which may skew results positively, as previously mentioned. The high correlation linked to academic performance, may mean two things. Firstly, the learners' real reading ability may be underdeveloped which shows that they have not yet achieved their true reading potential. Secondly, the SDRT could be linked directly to their overall academic performance, therefore being a better predictor of their academic performance. This ubiquitous link has not been analysed and is a very pertinent point to consider in possible future research studies.

The impact of biased and unfair psychological assessments have scarred and damaged many South Africans' views about the value of psychological assessments. The tarnished image of

psychological assessments needs to be repaired with the general South African population, as there is some mistrust, based on unfair historical practices (Laher & Cockcroft, 2014). The lack of South African developed psychological measures means that international tests are used, which does mean and imply that the psychologist needs to be extra mindful when interpreting results due to the lack of South African norms in certain instances, together with the unique language and cultural issues which form the landscape of assessment in South Africa. The manner in which psychological assessments are interpreted is important to consider, even if there is research to validate the test's use in the South African context. Tests that may have been previously used need to be re-assessed periodically to ensure applicability and fair use in the South African context. It has been acknowledged that there is value in psychological assessment in South Africa, as it can assist and further the transformation process, inform policy change, alter education standards, therefore improving education as well as enhancing the general psychological wellbeing of South Africans (Laher & Cockcroft, 2014).

This research study began the dialogue of test appropriateness and fairness within the multilingual South African population, which has important implications for psychological application in the South African context. The SDRT and RSPM's suitability for use in South Africa was not the primary interest of this research study, although the value of the information that both these assessments have shown as by-products reveal important information. The value of the SDRT has shown to be a good predictor of academic performance, which is related to the reading requirements of the South African curriculum. The RSPM is a valuable tool, but its use may not be the best tool for predicting academic performance due to its non-verbal nature, which was surprising when considering the suitability for L2 learners. The RSPM on face value seems to be a more suitable measure,

since there is a lack of language and reading, but showed to have limited applicability in this area.

The unambiguous and unclear nature of how to deal with the diverse language landscape is definitely cause for concern, as the results have shown that L2 learners seem to underperform academically, due to a reading crisis. The Department of Basic Education's latest curriculum policies show that there is a general interest to further reading at school level, as there is mention of this important skill in national policies (Department of Basic Education, 2013).

The document shows an interest but there are no separate or direct policies regarding reading at national level. This means that educators may understand the importance of reading but a critical and important issue that transposes across all subject areas needs a more vigorous national drive to improve reading levels across all school grades.

The results revealed that there are major gaps in learning and knowledge transfer between L1 and L2 learners in South Africa. This needs to be accounted for, as it shows that the education system is failing L2 learners, who are not achieving their full potential. This research study has shown that L2 learners face huge hurdles to bridge the language gap, with their peers. This reality translates to poor academic grades, high failure and dropout rates and lack of tertiary education opportunities due to poor academic performance.

The future directions of multilingual education in Africa is outlined by Obondo (2008) which mirrors and pertains to South Africa shows that firstly, decision makers to be aware of the real needs of the education system through community engagement in order to ensure that role players directly involved in the community have their opinions and voices heard. The lack of involvement by key players in the educational arena may have led to the lack of input from educators due to the top-down policies implemented by policy-makers (Obondo, 2008). This could explain why there is no improvement in educational practices due to this top-down

approach, which does not ensure that educators understand the process nor have an interest in the rationale behind new policies being implemented. This links to the second suggestion, which states that governments should not hold exclusive rights to educational language policies; rather it should be informed through collaboration between local organisations knowledgeable in national and international best practice (Obondo, 2008). Finally, economic resources need to be prioritised so that adequate resources are developed to ensure that the language policies and practice is changed to benefit learners in the education system. It was also highlighted that economic resources be set aside to research best practice nationally (Obondo, 2008).

5.3. Conclusion

This chapter has provided a thorough overview of a discussion of the results in relation to current literature and theory. There were many pertinent points raised, which could improve overall educational practices and therefore increase overall academic performance. The results, which have showed important findings, also reveal many gaps and limitations in our understanding of the links between a verbal and non-verbal assessment as well as academic performance.

CHAPTER 6

LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

6.1. Introduction

This chapter will discuss the limitations of this research study and its implications.

Recommendations for further research will also be outlined to highlight key areas to further research in this critically under researched area. Finally, a conclusion will complete this chapter finalise this research report.

6.2. Limitations of the Research Study

There were a number of limitations in this study, which were difficult to control, as it is not always possible to account for all variables in a research study (Gavin, 2008).

There were some methodological limitations to this research study, which need to be acknowledged. The sampling was drawn from a single school, which limits the wider applicability of this research to the general South African population. Schools from different provinces, socio-economic classes and language diversity, would have added more depth and value to the research study. The type of statistical analyses chosen together with the data collected could have greater value to allow for a closer look at the links between the SDRT and the RSPM to specific school subjects.

Another limitation of this study was the lack of information with regard to the type of primary school attended by the learners. This could have been added to the biographical questionnaire but was not included due to the likelihood that learners may not have understood the various school categories. Historically, different category schools would offer different levels of formal English education and engagement (Shuttleworth-Edwards et al.,

2013), which means that some learners may have had an advantage, depending on the type of primary school they attended. For example, private funded schools during apartheid enjoyed 75% of educational resources, which meant that learners achieved academic competency, which resulted in postgraduate and tertiary education opportunities (Shuttleworth-Edwards et al., 2013). The lack of accurate data concerning the L2 learners' English engagement in a formal setting is uncertain, which does imply that the results need to be interpreted cautiously. The prior education of the children is difficult to determine, which could have a major impact on the research results, although there is research that emphasises the importance of reading to be a better predictor of academic achievement compared to years of education (Shuttleworth-Edwards et al., 2013).

The learners' unequal access to English reading material may have influenced the results of this research study, due to the direct link between a print rich environment and increased reading competency (Pretorius & Currin, 2010). It is not always possible to control these variables, which means that this may have skewed the findings, which needs to be taken into consideration when interpreting the results.

The inherent connectedness of reading to 'connect' the dots within the curriculum was underestimated, as it was not an initial factor considered at the beginning of the research, which is hindsight seems very naive. This seems to have shown that due to the L2 learner's poor reading levels, their ability to perform well academically was directly compromised, which is such an important point to consider. This lack of insight on the part of the researcher was something that was not considered fully and has now been revealed as a blind spot. There are still many questions as to the real impact of under developed reading literacy versus a subtractive language issue.

6.3. Recommendations for Further Research

The recommendations for further research include being able to conduct larger studies on the greater South African population with different psychological measures to make the results more generalisable. This will enable wider application of the results to deduce and determine which psychological tests are most suitable for the South African population. It is recommended that further research be undertaken in South Africa on various test instruments to ascertain their suitability and fairness for the wider South African public.

It would be valuable to delve further into the relationships between school-specific subjects with various psychological tests to determine how accurate they predict school performance, as many tests are used as diagnostic tools to recommend interventions at school level. For example, the link between academic performance and academic potential could be investigated in relation to a reading assessment such as the SDRT. This slight difference could reveal what is truly being measured in relation to reading assessments, academic performance or academic potential.

The lingering questions about the impact of language versus reading require further exploration to understand whether African languages are actually used as a LoLT, due to the importance of additive bilingualism. This very critical language immersion technique requires extensive development within both practice and policy, which could be further investigated at classroom level in South Africa. Furthermore, the teaching practices of reading in earlier grades require careful investigation to ascertain the detail around this vital school skill. This is an under researched area, which is so important to consider in order to have an impact on education in South Africa.

6.4. Conclusion

This research study should be utilised as a catalyst to investigate other educational areas within South Africa. There are many under researched areas, which include various reading facets, language use, learner's perceptions about language and classroom language use. The relevance, fairness and equity of psychological testing within the unique South African context require extensive probing, which needs to be critically evaluated. This does open up many opportunities for future researchers to delve deeply into this very under researched area, which could have major implications for countries such as South Africa that have a lack of appropriate tests and psychological assessments. The educational implications that reading has should be prioritised by all stakeholders to ensure that South Africa's reading levels are improved. This will have a direct long-term effect on academic performance levels, which will directly improve future learning outcomes for the general population.

REFERENCES

- Adey, P., Csapó, B., Demetriou, A., Hautamäki, J., & Shayer, M. (2007). Can we be intelligent about intelligence?: Why education needs the concept of plastic general ability. *Educational Research Review*, 2(2), 75–97.
- Alexander, N. (2000). English unassailable but unattainable. *PRAESA Occasional Paper*, (3). Retrieved from <http://marxists.anu.edu.au/archive/alexander/1999-english-unassailable.pdf>
- Alfonso, V. C., Flanagan, D. P., & Radwan, S. (2005). The impact of the Cattell-Horn-Carroll theory on test development and interpretation of cognitive and academic abilities. *Contemporary Intellectual Assessment: Theories, Tests, And*, (2nd), 185–202.
- Amod, Z., & Seabi, J. (2013). Dynamic assessment in South Africa. In S. Laher & K. Cockcroft (Eds.), *Psychological Assessment in South Africa: Research and Applications* (pp. 120–136). Johannesburg, South Africa: Wits University Press. Retrieved from <http://psychologicalassessmentinsouthafrica.com/>
- Andor, K. E. (2006). *First and Second Language English Students in Tertiary Education: Reading and Academic Performance* (Unpublished Honours Research Report). University of the Witwatersrand, Johannesburg, South Africa.
- Ary, D., Jacobs, L., Sorensen, C., & Walker, D. (2014). *Introduction to research in education* (9th, International Edition ed.). United Kingdom: Wadsworth Cengage Learning.

- Athanasou, J. A., Di Fabio, A., Elias, M. J., Ferreira, R., Gitchel, W. D., Jansen, J. D., & Mpfu, E. (2012). Chapter 5: Theoretical-conceptual and structural aspects of thesis writing. In J. K. Maree (Ed.), *Complete your thesis or dissertation successfully: practical guidelines*. Cape Town, South Africa: Juta & Company Limited.
- Baumert, J., Lüdtke, O., Trautwein, U., & Brunner, M. (2009). Large-scale student assessment studies measure the results of processes of knowledge acquisition: Evidence in support of the distinction between intelligence and student achievement. *Educational Research Review*, 4(3), 165–176.
- Binét, A., & Simon, T. (1916). *The development of intelligence in children: The Binét-Simon Scale*. Baltimore, United States of America: Williams & Wilkins Company.
- Botha, G. R., Zimu, V., & Barnard, E. (2007). Factors that affect the accuracy of text-based language identification. Presented at the 18th Annual Symposium of the Pattern Recognition Association of South Africa (PRASA), Pretoria, South Africa: Meraka Institute.
- Bovaird, J. A., & Ivie, J. L. (2010). Intelligence/Intelligence Quotient (IQ). In *Encyclopedia of Cross-Cultural School Psychology* (pp. 545–547). New York, United States of America: Springer.
- Brunner, M. (2008). No g in education? *Learning and Individual Differences*, 18(2), 152–165.
- Bui, M., & Birney, D. P. (2014). Learning and individual differences in Gf processes and Raven's. *Learning and Individual Differences*, 32, 104–113.

- Cockcroft, K., & Israel, N. (2011). The Raven's Advanced Progressive Matrices: a comparison of relationships with verbal ability tests. *South African Journal of Psychology, 41*(3), 363–372.
- Coetzee-Van Rooy, S. (2010). Evaluation of the Cummins theoretical framework for higher education in South Africa. *Southern African Linguistics and Applied Language Studies, 28*(1), 25–38.
- Collier, V. P., & Thomas, W. P. (1989). How quickly can immigrants become proficient in school English. *Journal of Educational Issues of Language Minority Students, 5*(1), 26–38.
- Constitution of the Republic of South Africa Act. (1996). Statutes of the Republic of South Africa - Constitutional Law. Retrieved from http://inkomaticma.co.za/images/Constitution_of_the_Republic_of_South_Africa_1996.pdf
- Cummins, J. (1980). The Construct of Language Proficiency in Bilingual Education. In J. E. Alatis (Ed.), *Current issues in bilingual education Georgetown University Round Table on Languages and Linguistics* (pp. 81–103). Washington, DC: Georgetown Univ. Press.
- Cummins, J. (1984). Wanted: A theoretical framework for relating language proficiency to academic achievement among bilingual students. *Language Proficiency and Academic Achievement, 10*, 2–19.
- Cummins, J. (1989). A theoretical framework for bilingual special education. *Exceptional Children, 56*(2), 111–119.

- Cummins, J. (1994). Primary language instruction and the education of language minority students. *Schooling and Language Minority Students: A Theoretical Framework*, 2, 3–46.
- Cummins, J. (2008). BICS and CALP: Empirical and theoretical status of the distinction. In *Encyclopedia of language and education* (pp. 487–499). New York, United States of America: Springer. Retrieved from http://link.springer.com/10.1007%2F978-0-387-30424-3_36
- Cummins, J. (2014). Beyond language: Academic communication and student success. *Linguistics and Education*, 26, 145–154.
- Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. *Intelligence*, 35, 13–21.
- Department of Basic Education. (2011). *Action Plan to 2014: Towards the Realisation of Schooling 2025*. Pretoria, South Africa. Retrieved from <http://www.education.gov.za/LinkClick.aspx?fileticket=XZGwrpV9gek%3D&tabid=418&mid=1211>
- Department of Basic Education. (2013). *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement: Grades R - 12* (No. Government Notices as 499 and 500, Government Gazette No. 36465 of 17 May 2013) (p. 59). Retrieved from <http://sajcd.org.za/index.php/sajcd/article/view/27>
- Department of Labour. (1998). *Employment Equity Act 55 of 1998*. Republic of South Africa: Department of Labour. Retrieved from <http://bee.b1sa.co.za/docs/The%20Employment%20Equity%20Act%201998.pdf>

- Dodonova, Y. A., & Dodonov, Y. S. (2012). Processing speed and intelligence as predictors of school achievement: Mediation or unique contribution? *Intelligence*, *40*(2), 163–171.
- Dolan, C. V., Roorda, W., & Wicherts, J. M. (2004). Two failures of Spearman's hypothesis: The GATB in Holland and the JAT in South Africa. *Intelligence*, *32*(2), 155–173.
- Evans, J. J., Floyd, R. G., McGrew, K. S., & Leforgee, M. H. (2001). The relations between measures of Cattell-Horn-Carroll (CHC) cognitive abilities and reading achievement during childhood and adolescence. *School Psychology Review*, *31*(2), 246–262.
- Fagan, J. F., & Holland, C. R. (2002). Equal opportunity and racial differences in IQ. *Intelligence*, *30*(4), 361–387.
- Flores-Mendoza, C., Mansur-Alves, M., Ardila, R., Rosas, R. D., Guerrero-Leiva, M. K., Maqueo, M. E. L.-G., ... León, A. B. (2015). Fluid intelligence and school performance and its relationship with social variables in Latin American samples. *Intelligence*, *49*, 66–83.
- Foxcroft, C. D. (2004). Planning a psychological test in the multicultural South African context. *SA Journal of Industrial Psychology*, *30*(4), p–8.
- Foxcroft, C. D. (2011). Ethical issues related to psychological testing in Africa: What I have learned (so far). *Online Readings in Psychology and Culture*, *2*(2), 7.
- Foxcroft, C. D., & Davies, C. (2008). Historical perspectives on psychometric testing in South Africa. In *Interiors: A history of psychology in South Africa* (pp. 152–181). Pretoria, South Africa: UNISA Press: University of Pretoria.

Frederick, J., & Forzano, L.-A. B. (2003). *Research methods for the behavioral sciences*.

Connecticut, United States of America: Thomson.

Frempong, G., Reddy, V., & Mackay, K. (2013). Improving teaching and learning through the South African Annual National Assessment: Challenges, possibilities and solutions. Human Sciences Research Council. Retrieved from

http://www.hsrc.ac.za/uploads/pageContent/3324/04%20Teaching%20and%20Learn

ng.pdf

Frey, M. C., & Detterman, D. K. (2004). Scholastic assessment or g? The relationship

between the scholastic assessment test and general cognitive ability. *Psychological Science*, 15(6), 373–378.

Gangat, N. (2014). *Exploring Reading Comprehension and Auditory Vocabulary levels in L1*

and L2 learners at an ex-model C High School in Johannesburg (Unpublished

Honours Research Report). University of the Witwatersrand, Johannesburg, South Africa.

Gavin, H. (2008). *Understanding Research Methods and Statistics in Psychology*. Los

Angeles, United States of America: SAGE.

Glewwe, P. (2002). Schools and skills in developing countries: Education policies and

socioeconomic outcomes. *Journal of Economic Literature*, 436–482.

Goldman, S. R. (2012). Adolescent literacy: Learning and understanding content. *The Future*

of Children, 22(2), 89–116.

Goodwin, C. J. (2009). *Research in psychology: Methods and design* (6th ed.). New Jersey,

United States of America: John Wiley & Sons.

- Gottfredson, L. S. (1997). Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography. *Intelligence*, 24(1), 13–23.
- Granville, S. (2001). Comprehension or comprehending? Using Critical Language Awareness and interactive reading theory to teach learners to interact with texts. *Southern African Linguistics and Applied Language Studies*, 19(1–2), 13–21.
- Gravetter, F. J., & Forzano, L.-A. B. (2012). *Research methods for the behavioral sciences* (4th ed.). California, United States of America: Wadsworth Cengage Learning.
- Gravetter, F. J., & Wallnau, L. (2013). *Statistics for the behavioral sciences* (9th ed.). California, United States of America: Wadsworth Cengage Learning.
- Gustafsson, J.-E. (1984). A unifying model for the structure of intellectual abilities. *Intelligence*, 8(3), 179–203.
- Helms-Lorenz, M., Van de Vijver, F. J., & Poortinga, Y. H. (2003). Cross-cultural differences in cognitive performance and Spearman's hypothesis: g or c? *Intelligence*, 31(1), 9–29.
- Heugh, K. (1999). Languages, development and reconstructing education in South Africa. *International Journal of Educational Development*, 19(4), 301–313.
- Heugh, K. (2008). Encyclopedia of Language in Education. In S. May & N. H. Hornberger (Eds.), *Language policy and education in Southern Africa* (2nd ed., Vol. I: Language Policy and Political Issues in Education, pp. 355–367). New York, United States of America: Springer Science + Business Media LLC.

- Howell, D. C. (2010). *Statistical methods for psychology* (7th ed.). California, United States of America: Wadsworth Cengage Learning. Retrieved from https://books.google.com/books?hl=en&lr=&id=CRYKAAAQBAJ&oi=fnd&pg=PR5&dq=Howell+-+Statistical+Methods+For+Psychology+-+7th+Edition&ots=au8JM5G1sW&sig=UaaLGV47Uv9bU5yrHd9_P267C1o
- Howell, D. C. (2014). *Fundamental statistics for the behavioral sciences* (8th ed.). California, United States of America: Wadsworth Cengage Learning.
- Howie, S., Van Staden, S., Tshele, M., Dowse, C., & Zimmerman, L. (2012). PIRLS 2011: South African children's reading literacy achievement summary report. *Pretoria: University of Pretoria.*
- Howie, S., Venter, E., & Van Staden, S. (2008). The effect of multilingual policies on performance and progression in reading literacy in South African primary schools. *Educational Research and Evaluation, 14*(6), 551–560.
- Howitt, D., & Cramer, D. (2007). *Introduction to research methods in psychology* (3rd ed.). Essex, England: Pearson Education Limited.
- Jansen, J., & Taylor, N. (2003). *Educational change in South Africa 1994-2003: Case studies in large-scale education reform.*
- Jensen, A. R. (1992). Understanding g in terms of information processing. *Educational Psychology Review, 4*(3), 271–308.
- Kamwangamalu, N. M. (2001). The language planning situation in South Africa. *Current Issues in Language Planning, 2*(4), 361–445.

Kan, K.-J., Kievit, R. A., Dolan, C., & van der Maas, H. (2011). On the interpretation of the CHC factor Gc. *Intelligence*, 39(5), 292–302.

Kanjee, A., & Sayed, Y. (2013). Assessment policy in post-apartheid South Africa: challenges for improving education quality and learning. *Assessment in Education: Principles, Policy & Practice*, 20(4), 442–469.
<https://doi.org/10.1080/0969594X.2013.838541>

Karlsen, B., Madden, R., & Gardner, E. F. (1986a). *Stanford Diagnostic Reading Test: Directions for administering* (3rd ed.). New York, United States of America: Psychological Corporation.

Karlsen, B., Madden, R., & Gardner, E. F. (1986b). *Stanford Diagnostic Reading Test: Manual for interpreting* (3rd ed.). New York, United States of America: Psychological Corporation.

Kim, Y.-S. (2012). The relations among L1 (Spanish) literacy skills, L2 (English) language, L2 text reading fluency, and L2 reading comprehension for Spanish-speaking ELL first grade students. *Learning and Individual Differences*, 22(6), 690–700.

Knowles, J. (2010). *Assessment of non-verbal intelligence in South African schools: do language and gender bias performance on the Raven's Standard Progressive Matrices?* Retrieved from <http://wiredspace.wits.ac.za/handle/10539/8238>

Kriegler, S. M., & Skuy, M. (1996). Perspectives on psychological assessment in South African schools. In P. Engelbrecht, S. M. Kriegler, & M. I. Booysen (Eds.), *Perspectives on Learning Difficulties: International Concerns and South African realities* (pp. 109–122). Pretoria, South Africa: Van Schaik.

- Kvist, A. V., & Gustafsson, J.-E. (2008). The relation between fluid intelligence and the general factor as a function of cultural background: A test of Cattell's investment theory. *Intelligence*, 36(5), 422–436.
- Laher, S., & Cockcroft, K. (2013). Contextualising psychological assessment in South Africa. In S. Laher & K. Cockcroft (Eds.), *Psychological Assessment in South Africa: Research and Applications* (pp. 1–14). Johannesburg, South Africa: Wits University Press. Retrieved from <http://psychologicalassessmentinsouthafrica.com/>
- Laher, S., & Cockcroft, K. (2014). Psychological assessment in post-apartheid South Africa: the way forward. *South African Journal of Psychology*, 44(3), 303–314.
- Lubinski, D. (2004). Introduction to the special section on cognitive abilities: 100 years after Spearman's (1904)"General intelligence, 'objectively determined and measured". *Journal of Personality and Social Psychology*, 86(1), 96.
- Lynn, R., & Meisenberg, G. (2010). The average IQ of sub-Saharan Africans: Comments on Wicherts, Dolan, and van der Maas. *Intelligence*, 38(1), 21–29.
- Manyike, T. V. (2013). Bilingual literacy or substantive bilingualism? L1 and L2 reading and writing performance among Grade 7 learners in three township schools Gauteng Province, South Africa. *Africa Education Review*, 10(2), 187–203.
- Mbatha, T. (2012). IsiZulu teachers' perceptions of the foundations for learning literacy programme in four township primary schools. *Per Linguam: A Journal of Language Learning = Per Linguam: Tydskrif Vir Taalaanleer*, 28(1), 59–72.

- McGrew, K. S. (2009). CHC theory and the human cognitive abilities project: Standing on the shoulders of the giants of psychometric intelligence research. *Intelligence*, 37(1), 1–10.
- Mertens, D. M. (2010). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (3rd ed.). California, United States of America: Sage Publications. Retrieved from <https://books.google.com/books?hl=en&lr=&id=VEkXBAAAQBAJ&oi=fnd&pg=PR1&dq=Mertens+-+Research+and+Evaluation+in+Education+and+Psychology+-+3rd+Edition&ots=4ZfxJeaene&sig=HkNCTm9hq76dZtPQ9uuXtEjWZtw>
- Nagy, W. E., Scott, J. A., Kamil, M. L., Mosenthal, P. B., Pearson, P. D., & Barr, R. (2000). Vocabulary processes. *Handbook of Reading Research*, 3, 269–284.
- National Department of Education. (1997). Language in Education Policy. Retrieved from <http://www.education.gov.za/LinkClick.aspx?fileticket=XpJ7gz4rPT0%3D&tabid=390&mid=1125>
- Obondo, M. A. (2008). Bilingual education in Africa: An overview. In *Encyclopaedia of language and education* (pp. 1606–1616). New York, United States of America: Springer.
- Owen, K. (1992). The suitability of Raven's Standard Progressive Matrices for various groups in South Africa. *Personality and Individual Differences*, 13(2), 149–159.
- Petrill, S. A., & Wilkerson, B. (2000). Intelligence and achievement: A behavioral genetic perspective. *Educational Psychology Review*, 12(2), 185–199.

Pluddemann, P. (1999). Multilingualism and education in South Africa: one year on.

International Journal of Educational Research, 31(4), 327–340.

Posel, D., & Zeller, J. (2011). Home language and English language ability in South Africa:

Insights from new data. *Southern African Linguistics and Applied Language Studies*, 29(2), 115–126.

Pretorius, E. J. (2002). Reading ability and academic performance in South Africa: Are we fiddling while Rome is burning? *Language Matters*, 33(1), 169–196.

<https://doi.org/10.1080/10228190208566183>

Pretorius, E. J. (2002). Reading and applied linguistics—a deafening silence? *Southern African Linguistics and Applied Language Studies*, 20(1–2), 91–103.

Pretorius, E. J., & Currin, S. (2010). Do the rich get richer and the poor poorer?: The effects of an intervention programme on reading in the home and school language in a high poverty multilingual context. *International Journal of Educational Development*, 30(1), 67–76.

Pretorius, E. J., & Mampuru, D. M. (2007). Playing football without a ball: language, reading and academic performance in a high-poverty school. *Journal of Research in Reading*, 30(1), 38–58.

Raven, J. (1988, December 29). A critique of Sternberg's and Gardner's concept of multiple intelligences. Retrieved from

<http://www.eyeesociety.co.uk/resources/acritiqueofsternbergs.pdf>

Raven, J. (2011, May 14). Spearman on Intelligence. WebPsychEmpiricist. Retrieved from

<http://wpe.info/vault/raven11a/raven11a.pdf>

- Raven, J., Raven, J. C., & Court, J. H. (2004). *Raven's Standard Progressive Matrices (SPM) Manual*. Pearson. Retrieved from http://us.talentlens.com/wp-content/uploads/SPM_Manual.pdf
- Robinson, D. L. (1999). The IQ factor: implications for intelligence theory and measurement. *Personality and Individual Differences, 27*(4), 715–735.
- Rushton, J. P., & Skuy, M. (2001). Performance on Raven's Matrices by African and White university students in South Africa. *Intelligence, 28*(4), 251–265.
- Rushton, J. P., Skuy, M., & Fridjhon, P. (2003). Performance on Raven's advanced progressive matrices by African, East Indian, and White engineering students in South Africa. *Intelligence, 31*(2), 123–137.
- Salthouse, T. A., Pink, J. E., & Tucker-Drob, E. M. (2008). Contextual analysis of fluid intelligence. *Intelligence, 36*(5), 464–486.
- SAPA. (2013, October 2). Jansen is wrong about English as a primary tuition language, says FF Plus. Retrieved from <http://mg.co.za/article/2013-10-02-jansen-speech-on-language-in-education-was-distorted>
- Schipolowski, S., Wilhelm, O., & Schroeders, U. (2014). On the nature of crystallized intelligence: the relationship between verbal ability and factual knowledge. *Intelligence, 46*, 156–168.
- Schweizer, K., & Koch, W. (2001). A revision of Cattell's investment theory: Cognitive properties influencing learning. *Learning and Individual Differences, 13*(1), 57–82.

- Shuttleworth-Edwards, A. B., Van der Merwe, A. S., Van Tonder, P., Radloff, S. E., Cockcroft, K., & Laher, S. (2013). WISC-IV test performance in the South African context: A collation of cross-cultural norms. *Psychological Assessment in South Africa: Research and Applications*, 33–47.
- Skuy, M., Schutte, E., Fridjhon, P., & O'Carroll, S. (2001). Suitability of published neuropsychological test norms for urban African secondary school students in South Africa. *Personality and Individual Differences*, 30(8), 1413–1425.
- Spearman, C. (1904). 'General Intelligence,' objectively determined and measured. *The American Journal of Psychology*, 15(2), 201–292.
- Spinath, B., Spinath, F. M., Harlaar, N., & Plomin, R. (2006). Predicting school achievement from general cognitive ability, self-perceived ability, and intrinsic value. *Intelligence*, 34(4), 363–374.
- Spreen, O., & Strauss, E. (1998). *A compendium of neurological tests*. New York, United States of America: Oxford University Press Inc.
- Statistics South Africa. (2012). *Census 2011: Census in Brief*. Pretoria, South Africa.
- Sternberg, R. J. (2000). *Handbook of intelligence*. New York, United States of America: Cambridge University Press.
- Sternberg, R. J. (2014). Teaching about the nature of intelligence. *Intelligence*, 42(0), 176–179. <https://doi.org/10.1016/j.intell.2013.08.010>
- Van der Vijver, A. J. R., & Rothmann, S. (2004). Assessment in multicultural groups: The South African case. *SA Journal of Industrial Psychology*, 30(4), p–1.

- Van Staden, S., & Howie, S. (2012). Reading between the lines: contributing factors that affect Grade 5 student reading performance as measured across South Africa's 11 languages. *Educational Research and Evaluation, 18*(1), 85–98.
<https://doi.org/10.1080/13803611.2011.641270>
- Vernon, P. A. (1989). The generality of g. *Personality and Individual Differences, 10*(7), 803–804.
- Visser, B. A., Ashton, M. C., & Vernon, P. A. (2006a). Beyond g: Putting multiple intelligences theory to the test. *Intelligence, 34*(5), 487–502.
- Visser, B. A., Ashton, M. C., & Vernon, P. A. (2006b). G and the measurement of multiple intelligences: A response to Gardner. *Intelligence, 34*(5), 507–510.
- Vock, M., Preckel, F., & Holling, H. (2011). Mental abilities and school achievement: A test of a mediation hypothesis. *Intelligence, 39*(5), 357–369.
- Webb, V. (1999). Multilingualism in democratic South Africa: the over-estimation of language policy. *International Journal of Educational Development, 19*(4), 351–366.
- Wicherts, J. M., Borsboom, D., & Dolan, C. V. (2010). Why national IQs do not support evolutionary theories of intelligence. *Personality and Individual Differences, 48*(2), 91–96.
- Wicherts, J. M., & Dolan, C. V. (2010). Measurement invariance in confirmatory factor analysis: An illustration using IQ test performance of minorities. *Educational Measurement: Issues and Practice, 29*(3), 39–47.

Wicherts, J. M., Dolan, C. V., Carlson, J. S., & van der Maas, H. L. (2010). Another failure to replicate Lynn's estimate of the average IQ of sub-Saharan Africans. *Learning and Individual Differences*, *20*(3), 155–157.

Wicherts, J. M., Dolan, C. V., & van der Maas, H. L. (2010). A systematic literature review of the average IQ of sub-Saharan Africans. *Intelligence*, *38*(1), 1–20.

APPENDICES

APPENDIX A

BIOGRAPHICAL QUESTIONNAIRE



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Biographical Questionnaire

Age: _____ years _____ months

Gender: Male Female

Home Language: _____

Second Language: _____

Third Language: _____

Other Languages: _____

Please fill in the necessary information in the table.

Grade	School	Language of Instruction
Grade One		
Grade Two		
Grade Three		
Grade Four		
Grade Five		
Grade Six		
Grade Seven		

Do you speak in English to? (Please tick the appropriate box)

	Sometimes	Often	Never
Your Family			
Your Friends			

Thank you for taking the time to fill in this questionnaire. Your help is much appreciated.

APPENDIX B

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL) CLEARANCE CERTIFICATE



Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Gangat

CLEARANCE CERTIFICATE

PROTOCOL NUMBER H14/04/25

PROJECT TITLE

The effect of curriculum change on the reading comprehension ability of Grade 8 first and second language English learners

INVESTIGATOR(S)

Ms N Gangat

SCHOOL/DEPARTMENT

Human & Community Development/Psychology

DATE CONSIDERED

25 April 2014

DECISION OF THE COMMITTEE

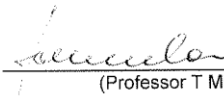
Approved Unconditionally

EXPIRY DATE

27/05/2016

DATE 28/05/2014

CHAIRPERSON


(Professor T Milani)

cc: Supervisor : Dr D Alexander

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10000, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

APPENDIX C

**GAUTENG DEPARTMENT OF EDUCATION (GDE) RESEARCH APPROVAL
LETTER**

**GAUTENG PROVINCE**

Department: Education
REPUBLIC OF SOUTH AFRICA

For administrative use:
Reference no: D2015 / 016

GDE RESEARCH APPROVAL LETTER

Date:	22 April 2014
Validity of Research Approval:	22 April to 3 October 2014
Name of Researcher:	Gangat N.
Address of Researcher:	P.O. Box 42728
	Fordsburg
	2033
Telephone Number:	011 837 0506 / 074 606 3009
Email address:	nabeeagangat@gmail.com
Research Topic:	The effect of curriculum change on the reading comprehension ability of Grade 8 first and second language English learners
Number and type of schools:	ONE Secondary School
District/s/HO	Ekurhuleni North

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

1

Making education a societal priority

Office of the Director: Knowledge Management and Research

9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

APPENDIX D

SCHOOL INFORMATION FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

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School Information Form

Dear Principal

My name is Nabeela Gangat. I am currently studying towards obtaining my Honours degree in Educational Psychology at the University of the Witwatersrand. In partial fulfilment of this degree, I am conducting research. The research area of focus is measuring the effect of curriculum changes on reading levels of Grade 8 learners. The research is a follow-up study after a 7-year period in order to measure the changes, if any, against archival data on reading levels that was collected at your school. I hope that my study will serve to contribute to a greater body of research in education policies in South Africa.

I would like to invite your learners to participate in this study. Participation in this study will require learners to fill out a biographical questionnaire, which will ask questions regarding learners' age, gender and language use as well as completing two assessments; the Stanford Diagnostic Reading Test (70 minutes) and the Raven's Standard Progressive Matrices test (40 minutes). The assessments and questionnaire will take approximately two hours to complete in total, and the sessions will take place on the school premises during school hours so as not to disrupt the routine school-time of any participants. There are three parts of the testing process and will be split up over a 2-week period in order to minimise disruption of teaching time. As a trained researcher, I will ensure fair administration and scoring of the tests. The questionnaire and tests will not be seen by any person at the school at any time and will only be processed by my supervisor and myself. Learners' responses will only be looked at in relation to all other responses. They may choose to refuse to answer any questions they would prefer not to and they may choose to withdraw from the study at any time. All information

collected will be treated confidentially. There are no direct risks or benefits attached to participating in this study.

If you consent for the learners to participate in the study, they will be asked to complete the questionnaire and tests as carefully and honestly as possible. The administration of the questionnaire and tests will be administered at a time that is most convenient for you, the staff and learners in order not to jeopardise any academic time. A feedback letter will be provided to the school once I have analysed the results. Please note that because participation is anonymous and confidential no information about the learners' individual performance scores will be disclosed.

Your consent for the learners to participate in this study would be greatly appreciated. Please do not hesitate to contact me should you require further information. Should any learner experience any distress after participating in the study, free helpful contact numbers of counselling organisations and English tutors will be provided to them.

The research will be conducted under the auspices of the University of the Witwatersrand and the Ethics Committee, in order to ensure that the rights of the participants are protected. If you choose to grant permission for the requested study to take place at your school please fill in your details on the form below. Please do not hesitate to contact me should you require more information. I can be contacted telephonically at 074 606 3009 or via email at nabeelagangat@gmail.com.

Kindest Regards

Nabeela Gangat

Nabeela Gangat: _____

nabeelagangat@gmail.com

074 606 3009

Dr Dinah Alexander: _____

Dinah.Alexander@wits.ac.za

011717 4526

APPENDIX E

SCHOOL CONSENT FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



School Consent Form

I _____ (full name) hereby grant permission for Ms Nabeela Gangat to:

- Make use of _____ (name of school) as the site for the study.
- Assess the vocabulary and comprehension ability of the learners.

I understand that:

- Participation in this study is voluntary for learners
- That the learners may refuse to answer any questions they would prefer not to
- Learners can withdraw from the study at any time
- No information that may identify learners will be included in the research report and learners' responses will remain confidential
- There are no direct risks or benefits for participation in this study

Signed: _____

Date: _____

APPENDIX F

EDUCATOR INFORMATION FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Educator Information Form

Dear Sir/Madam

My name is Nabeela Gangat. I am currently studying towards obtaining my Honours degree in Educational Psychology at the University of the Witwatersrand. In partial fulfilment of this degree, I am conducting research. The research area of focus is measuring the effect of curriculum changes on reading levels of Grade 8 learners. My research is a follow-up study after a 7-year period in order to measure the changes, if any, against archival data on reading levels that was collected at your school. I hope that my study will serve to contribute to a greater body of research in education policies in South Africa.

I would like to invite your class learners to participate in this study. Participation in this study will require learners to fill out a biographical questionnaire, which will ask questions regarding learners' age, gender and language use as well as completing two assessments; the Stanford Diagnostic Reading Test (70 minutes) and the Raven's Standard Progressive Matrices test (40 minutes). The assessments and questionnaire will take approximately two hours to complete in total, and the sessions will take place on the school premises during school hours so as not to disrupt the routine school-time of any participants. There are three parts of the testing process and will be split up over a 2-week period in order to minimise disruption of teaching time. As a trained researcher, I will ensure fair administration and scoring of the tests. The questionnaire and tests will not be seen by any person at the school at any time and will only be processed by my supervisor and myself. Learners' responses will only be looked at in relation to all other responses. They may choose to refuse to answer any questions they would prefer not to and they may choose to withdraw from the study at any

time. All information collected will be treated confidentially. There are no direct risks or benefits attached to participating in this study.

If you consent to allow your class learners to participate in the study, they will be asked to complete the questionnaire and tests as carefully and honestly as possible. The administration of the questionnaire and tests will be administered by the researcher at a time that is most convenient for you and the learners in order not to jeopardise any academic time. Educators must be present in class during the testing process as non-active participants. Educators will not be allowed to intervene during the testing process. Please note that educators will not be able to discuss observations with any individual after the testing process. A feedback letter will be provided to the school once I have analysed my results. Please note that because participation is anonymous and confidential no information about the learners' individual performance scores will be disclosed.

Your consent would be greatly appreciated. Please do not hesitate to contact me should you require further information. Should any learner experience any distress after participating in the study, free helpful contact numbers of counselling organisations and English tutors will be provided to them.

The research will be conducted under the auspices of the University of the Witwatersrand and the Ethics Committee, in order to ensure that the rights of the participants are protected. If you choose to grant permission for the requested study to take place in your class please fill in your details on the form below. Please do not hesitate to contact me should you require more information. I can be contacted telephonically at 074 606 3009 or via email at nabeelagangat@gmail.com.

Kindest Regards

Nabeela Gangat

Nabeela Gangat: _____

nabeelagangat@gmail.com

074 606 3009

Dr Dinah Alexander: _____

Dinah.Alexander@wits.ac.za

011717 4526

APPENDIX G

EDUCATOR CONSENT FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Educator Consent Form

I _____ (full name) hereby grant permission for Ms Nabeela Gangat to:

- Make use of _____ (class) as the site for the study.
- Assess the vocabulary and comprehension ability of the learners.

I understand that:

- I will be present in class during the testing process
- I am unable to assist learners during the testing process or intervene during the testing process
- I will be a non-active participant during the testing process
- I will have no access to the data or to learner's individual scores
- I will not be able to discuss my observations with any individual after the testing process
- I understand that a feedback letter will be provided to the school providing general indications about performance and no specific identifying information will be provided

Signed: _____

Date: _____

APPENDIX H

LEGAL GUARDIAN INFORMATION FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Legal Guardian Information Form

Dear Sir/Madam

My name is Nabeela Gangat. I am currently studying towards obtaining my Honours degree in Educational Psychology at the University of the Witwatersrand. In partial fulfilment of this degree, I am conducting research. The research area of focus is measuring the effect of curriculum changes on reading levels of Grade 8 learners. My research is a follow-up study after a 7-year period in order to measure the changes, if any, against archival data on reading levels that was collected at your child's school. I hope that my study will serve to contribute to a greater body of research in education policies in South Africa.

Participation in this study will require your child to fill out a biographical questionnaire, which will ask questions regarding learners' age, gender and language use as well as completing two assessments; the Stanford Diagnostic Reading Test (70 minutes) and the Raven's Standard Progressive Matrices test (40 minutes). The assessments and questionnaire will take approximately two hours to complete in total, and the sessions will take place on the school premises during school hours so as not to disrupt the routine school-time of any participants. As a trained researcher, I will ensure fair administration and scoring of the tests. The questionnaire and tests will not be seen by any person at the school at any time and will only be processed by my supervisor and myself. Learners' responses will only be looked at in relation to all other responses. Learners may choose to refuse to answer any questions they would prefer not to and they may choose to withdraw from the study at any time. All information collected will be treated confidentially. There are no direct risks or benefits attached to participating in this study.

If you consent for your child to participate in the study, they will be asked to complete the questionnaire and tests as carefully and honestly as possible. The administration of the questionnaire and tests will be administered at a time that is most convenient for the school and learners in order not to jeopardise any academic time. Please note that because participation is anonymous and confidential no information about the learners' individual performance scores will be disclosed. A general feedback report will be provided to highlight strengths and weaknesses in reading ability across the participant group.

Your consent for your child to participate in this study would be greatly appreciated. Please do not hesitate to contact me should you require further information. Should your child experience any distress after participating in the study, free helpful contact numbers of counselling organisations and English tutors will be provided to your child.

The research will be conducted under the auspices of the University of the Witwatersrand and the Ethics Committee, in order to ensure that the rights of your child are protected. If you choose to grant permission for your child to participate in the study, please fill in your details on the form below. Please do not hesitate to contact me should you require more information. I can be contacted telephonically at 074 606 3009 or via email at nabeelagangat@gmail.com.

Kindest Regards

Nabeela Gangat

Nabeela Gangat: _____

nabeelagangat@gmail.com

074 606 3009

Dr Dinah Alexander: _____

Dinah.Alexander@wits.ac.za

011717 4526

APPENDIX I

LEGAL GUARDIAN CONSENT FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Legal Guardian Consent Form

I, _____, consent for _____ to be involved in the study where vocabulary and reading comprehension will be assessed by Ms Nabeela Gangat for the study as explained above.

I understand that:

- The nature and purpose of the study has been explained to me
- Participation in this study is completely voluntary
- No negative consequences will result if the participant decides to withdraw or if any participant chooses to decline their participation
- That the participant may refuse to answer any questions he/she would prefer not to
- The participant may withdraw from the study at any time
- No information that may identify the participant will be included in the research report and the participant's responses will remain confidential
- There are no direct risks or benefits for participation in this study

Signed: _____

Date: _____

APPENDIX J

PARTICIPANT INFORMATION FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Participant Information Form

Dear Learner

My name is Nabeela Gangat. I am currently studying towards obtaining my Honours degree in Educational Psychology at the University of the Witwatersrand. In partial fulfilment of this degree, I am conducting research. The research area of focus is measuring the effect of curriculum changes on reading levels of Grade 8 learners. My research is a follow-up study after a 7-year period in order to measure the changes, if any, against stored data on reading levels. I hope that my study will serve to contribute to a greater body of research in education policies in South Africa.

I would like to invite you to participate in this study. Participation in this study will require you to fill out a biographical questionnaire, which will ask you questions regarding your age, gender and language use, as well as completing two assessments, the Stanford Diagnostic Reading Test (70 minutes) and the Raven's Standard Progressive Matrices test (40 minutes). The assessments and questionnaire will take approximately two hours to complete in total, and the sessions will take place at your school, during school hours so as not to disrupt your school routine. As a trained researcher, I will ensure fair administration and scoring of the tests. The questionnaire and tests will not be seen by any person at the school at any time and will only be processed by my supervisor and myself. Your responses will only be looked at in relation to all other responses. You may choose to refuse to answer any questions you would prefer not to and you may choose to withdraw from the study at any time. All information

collected will be treated confidentially. There are no direct risks or benefits attached to participating in this study.

If you choose to participate in this study, you will be asked to complete the questionnaire and tests as honestly and carefully as possible, and your participation would be greatly appreciated. Should you experience any concern after participating in the study free helpful contact numbers will be provided to you. Please note that because participation is confidential I will not be able to tell you any information about your individual scores.

The research will be conducted under the auspices of the University of the Witwatersrand and the Ethics Committee, in order to ensure that your rights as participants are protected. If you choose to take part in the study at your school please fill in your details on the form below. Please do not hesitate to contact me should you require more information. I can be contacted telephonically at 074 606 3009 or via email at nabeelagangat@gmail.com.

Kindest Regards

Nabeela Gangat

Nabeela Gangat: _____

nabeelagangat@gmail.com

074 606 3009

Dr Dinah Alexander: _____

Dinah.Alexander@wits.ac.za

011 717 4526

APPENDIX K

PARTICIPANT ASSENT FORM



Department of Psychology

School of Human and Community Development

Private Bag 3, WITS, 2050

Tel: (011) 717 4500 Fax: (011) 717 4559



Participant Assent Form

I _____ (full name)

hereby consent to my participation in the study with Ms Nabeela Gangat.

I understand that:

- Participation in this study is voluntary
- I may refuse to answer any questions I would prefer not to
- I can withdraw from the study at any time
- No information that may identify me will be included in the research report and my responses will remain private (confidential)
- There are no direct risks or benefits for participation in this study

Signed: _____

Date: _____

APPENDIX L

STATEMENT OF PRINCIPLES FOR POSTGRADUATE SUPERVISION

16. STATEMENT OF PRINCIPLES FOR POSTGRADUATE SUPERVISION

IN A CONTEXT OF ACADEMIC FREEDOM AND WITHIN A FRAMEWORK OF INDIVIDUAL AUTONOMY AND THE PURSUIT OF KNOWLEDGE THIS AGREEMENT IS WRITTEN IN THE BELIEF THAT THERE IS A RECIPROCAL RELATIONSHIP AND MUTUAL ACCOUNTABILITY BETWEEN SUPERVISOR AND STUDENT.

THE SUPERVISOR AND THE STUDENT:	
<p>THE SUPERVISOR:</p> <ol style="list-style-type: none"> 1. Undertakes to provide guidance for the student's research project in relation to the design and scope of the project, the relevant literature and information sources, research methods and techniques and methods of data analysis. 2. Has a responsibility to be accessible to the student. 3. Will be prepared for meetings with the student. 4. This includes being up-to-date on the latest work in his/her area of expertise. 5. Will expect written work as jointly agreed and will return that work with constructive criticism within a timeframe (a suggestion of 2-4 weeks) jointly agreed at the outset of the research. 6. Will provide advice that can help the student to improve his/her writing. This may include referrals for language training and academic writing. The supervisor will provide guidance on technical aspects of writing such as referencing as well as on discipline specific requirements. Detailed correction of drafts and instruction in aspects of language and style are not the responsibility of the supervisor. 7. Will support the student in the production of a research report, dissertation or thesis. Provision should be allowed for adequate, mutually respectful, discussion around recommendations made. 8. Will assist with the construction of a written time schedule which outlines the expected completion dates of successive stages of the work. 9. Will ensure the student has the opportunity to present work at postgraduate/staff seminars/conferences as appropriate. 10. Will assist with the publication of research articles as appropriate with the University guidelines and rules on intellectual property, co-authorship and copyright. 11. Will ensure that the research is conducted in accordance with the University's policy on plagiarism. 12. Will ensure that the student is made aware in writing of the inadequacy of progress and/or of any work where the standard is below par. Acceptability will be according to criteria previously supplied to the student. 13. Has a duty to refuse to allow the submission of sub-standard work for examination, regardless of the circumstances, if the student chooses to submit without the consent of the supervisor, then this should be clearly recorded and the appropriate procedures followed. 	<p>THE STUDENT:</p> <ol style="list-style-type: none"> 1. Undertakes to work independently under the guidance of the supervisor. This includes reading widely to ensure that the literature pertinent to his/her chosen topic has been identified and consulted. 2. Is obliged to make appointments to see the supervisor and will arrange meeting times well in advance. 3. Will think carefully about how to derive maximum benefit from these sessions by planning what he/she wants in these sessions. 4. Should submit written work for discussion with the supervisor well in advance of a scheduled meeting. The kind and frequency of written work should be agreed with the supervisor at the outset of the research. 5. Undertakes to submit written work that is relatively free of basic spelling mistakes, incorrect punctuation and grammatical errors. Responsibility for the accuracy of language, the overall structure and coherence of the final research report, dissertation or thesis rests with the student. 6. Undertakes to heed the advice given by the supervisor and to engage in discussion around suggestions made. Ultimately, the student has to take responsibility for the quality and presentation of the work. 7. Should strive, within reasonable bounds, to maintain a focus on his/her research area and to work within the agreed time schedule. 8. Will prepare material for presentations at seminars and conferences. 9. Undertakes to submit papers for publication. 10. Agrees to honour agreements about ownership of the research and in accordance with the University's guidelines and rules in relation to co-authorship, copyright and intellectual property. 11. Will ensure that the work contains no instances of plagiarism and that all citations are properly referenced and that the list of references is accurate, complete and consistent. 12. Agrees to work in accordance with the criteria of acceptability as supplied by the supervisor. 13. Undertakes not to place the supervisor under undue pressure to submit work for examination until the supervisor is satisfied that it has reached an acceptable level of quality.
<p>I confirm that I have read and understood this statement and agree to be guided by its principles</p> <p>Name of student: <u>Nabela Gangat</u></p> <p>Student's signature: <u>AP, Gangat</u></p> <p>Name of Supervisor: <u>Adn Vosker</u></p> <p>Supervisor's signature: <u>[Signature]</u></p> <p>Name of Co-Supervisor: <u>N/A</u></p> <p>Co-Supervisor's signature: <u>N/A</u></p> <p>The broad area of study is: <u>Academic Performance</u></p> <p><u>H0 L1 and L2 1st/2nd/3rd.</u></p> <p>Provisional submission date is: <u>November 2015</u></p> <p>Degree: <u>MEI Regynology</u></p> <p>School: <u>SHCD</u></p> <p>Faculty: <u>Humanities</u></p> <p>Date: <u>2015/03/09</u></p> <p>Specific agreements pertaining to: ownership and joint publication, funding, etc. may be attached and signed.</p>	

GRIVANCE PROCEDURES. It should be acknowledged that during the course of the research, both students and supervisor can feel aggrieved. In this event, matters should be dealt with as swiftly as possible by the parties involved and, if necessary, the appropriate Postgraduate Coordinators and Committees. There is, in addition, a University Grievance Policy to help guide deliberations. It is available on www.wits.ac.za/prospectivestudent/postgraduate.

APPENDIX M

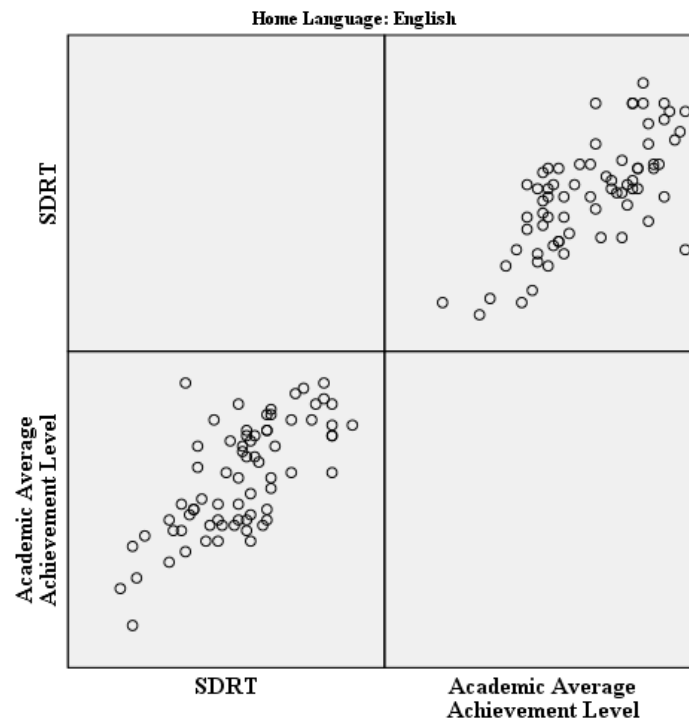
SCATTER PLOT MATRICES FOR SDRT AND ACADEMIC AVERAGE
ACHIEVEMENT LEVEL

Figure M.1: Scatter plot Matrices for English learners comparing SDRT and Academic Average Achievement Levels

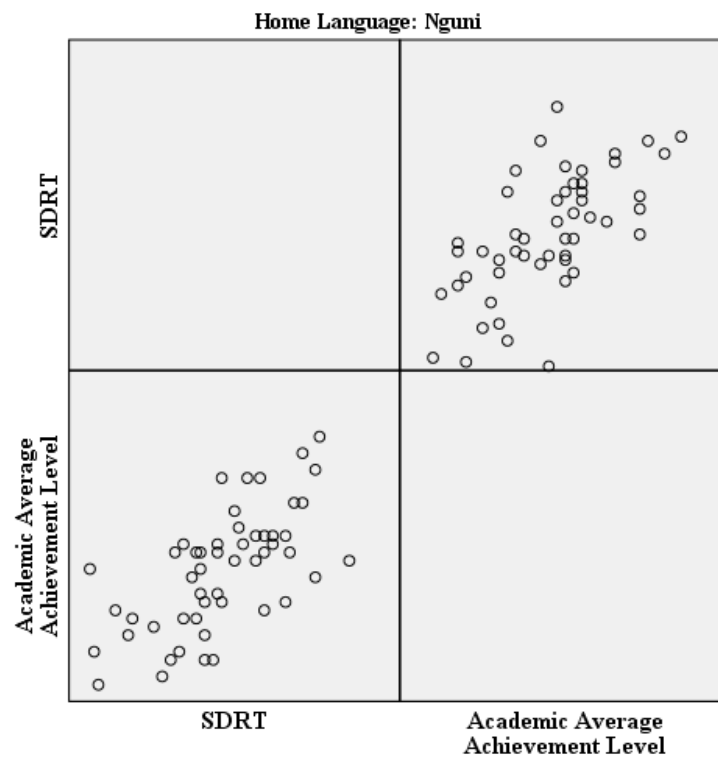


Figure M.2: Scatter plot Matrices for Nguni learners comparing SDRT and Academic Average Achievement Levels

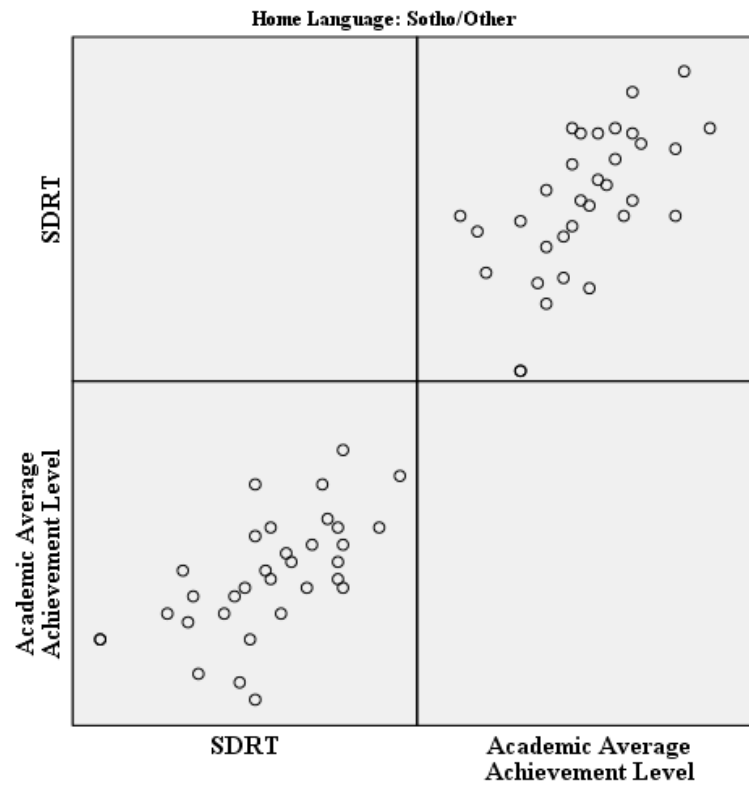


Figure M.3: Scatter plot Matrices for Sotho/Other learners comparing SDRT and Academic Average Achievement Levels

APPENDIX N

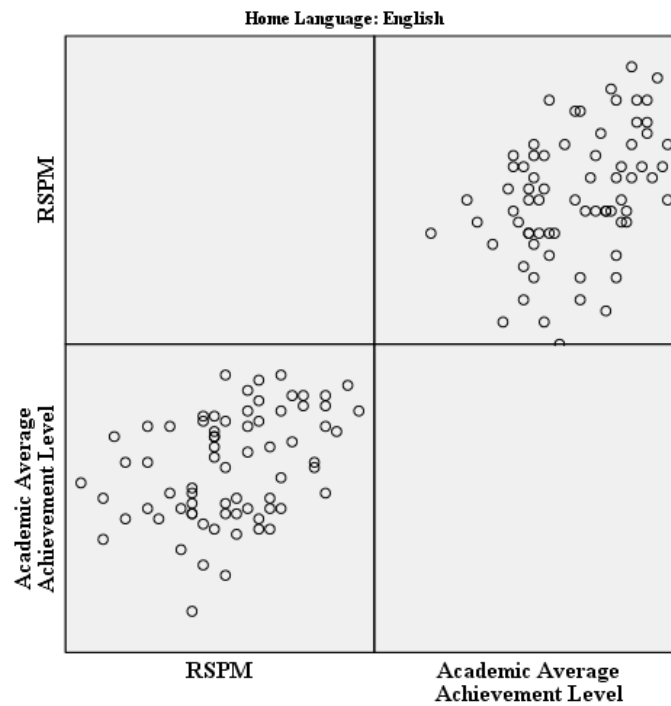
SCATTER PLOT MATRICES FOR RSPM AND ACADEMIC AVERAGE
ACHIEVEMENT LEVEL

Figure N.1: Scatter plot Matrices for English learners comparing RSPM and Academic Average Achievement Levels

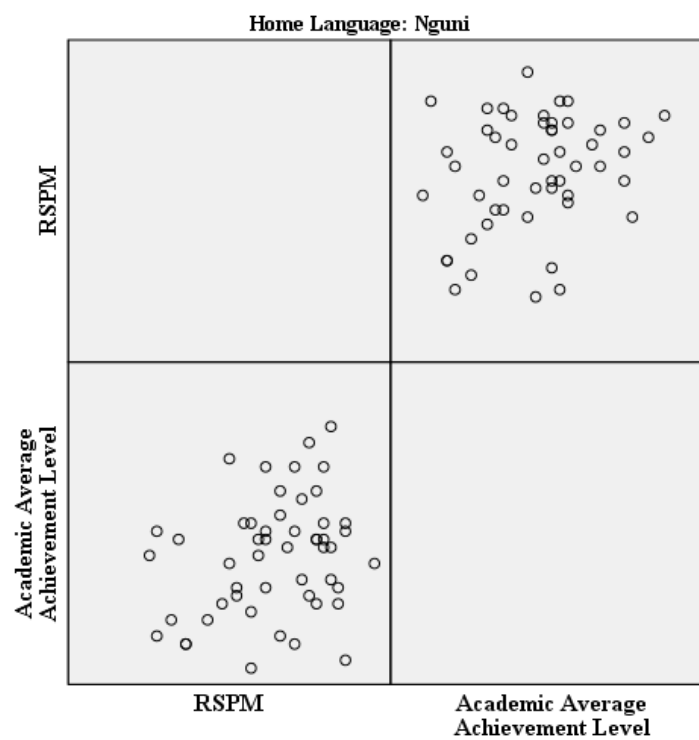


Figure N.2: Scatter plot Matrices for Nguni learners comparing RSPM and Academic Average Achievement Levels

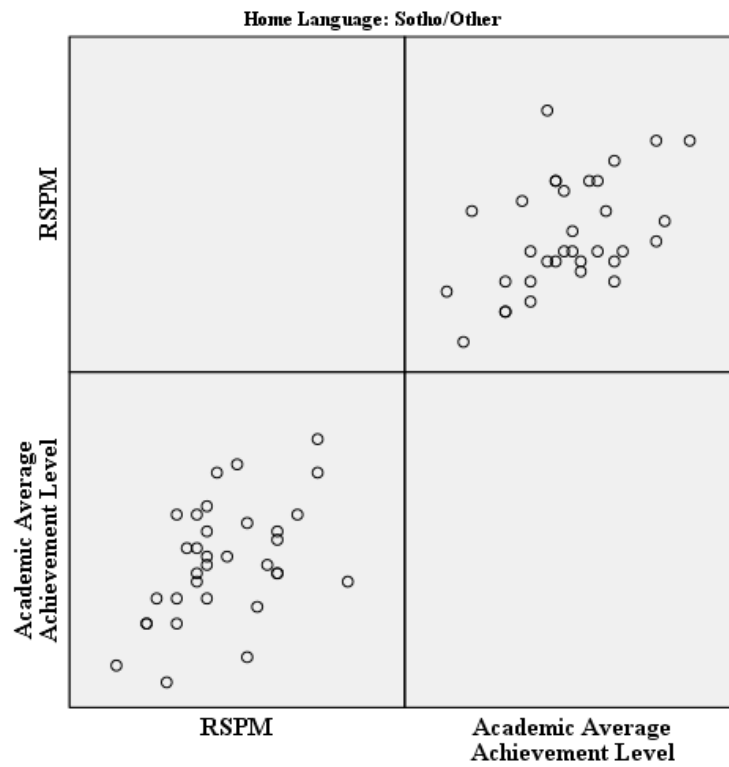


Figure N.3: Scatter plot Matrices for Sotho/Other learners comparing RSPM and Academic Average Achievement Levels