

## **Reading between the Lines: Contributing Factors that Affect Grade 4 Student Reading Performance as Measured Across South Africa's 11 Languages.**

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### **Abstract**

This paper reports on the conceptualization of a study to identify, illuminate and explain relationships between some major factors associated with successful reading at Grade 4 level in South African primary schools. The South African population is characterized by great diversity and variation. With 11 official languages, current educational policy in South Africa advocates an additive bilingualism model and therefore students in Grade 1 to 3 are taught in their mother tongue. Thereafter, these students progress to Grade 4, the language of learning and teaching changes to a second language, which in most cases is English. At this key developmental stage students are also expected to advance from learning to read, to a stage where they can use reading in order to learn. The study intends to use Structural Equation Modeling techniques to analyse the South African PIRLS 2006 data. However, as this is work in progress and the study is still in its preparatory data analysis phase, this paper will focus on the conceptual and preparatory stages of developing a model for one of three models, namely the student-level model.

**Keywords:** *secondary analysis, educational policies, reading literacy*

### **Introduction**

This research proposes to identify, illuminate and explain relationships between some major factors associated with successful reading at Grade 4 level in South African primary schools. In an attempt to understand students' difficulties with reading and writing, Rhodes and Dudley-Marling (1996) stated the following, "*Working with struggling students inevitably means working with disproportionate numbers of poor White, Black, Hispanic, Aboriginal and bilingual students – students whose struggles in school have less to do with their capabilities than the abilities of schools to recognize the range of individual, social and cultural differences students bring with them to school. The standardized, one-size-fits-all curricula found in so many schools today imagine students to be pretty much the same, but they're not.*" The authors of this paper concur with Rhodes and Dudley-Marling: the causal elements and reasons for struggling to read are not the same for all students. Therefore the attempt to investigate South African students' reading performance (in 11 languages) when given reading tasks in

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the language of learning and teaching is a complex task. Just as one-size-fits-all curricula are inappropriate, a singular or a one-dimensional explanation for students' poor reading performance is equally inappropriate and inadequate in addressing a vastly varying and diverse student population in South Africa. In understanding the reasons for poor reading performance and identifying those factors that can be associated with successful readers, and those factors associated with readers at risk of failure, three systems namely the home (Martin, Mullis and Gonzalez, 2004) and students' background (Leino, Linnakyla and Malin, 2004), the school and the classroom (Howie, 2006) have been shown to be of major influence in reading performance internationally.

International research has revealed that a number of factors at home are important as the process of becoming literate begins long before a child enters a formal educational system. Factors include parents emphasizing reading for meaning, (Fiala and Sheridan, 2003); parents' education, parents' occupation and the number of books at home, learners who live with both their parents, resources in the home, specifically where students have more than 500 books in the home, performance has been proved to be better than those without any books at home (Fuchs and Woessmann, 2004).

Factors related to students themselves include reading motivation and reading related self-perception, learners who spend a lot of time reading on their own (Leino et al, 2004); initial experiences with learning to read (Chapman and Tunmer, 2003); and interest and engagement in reading on their own (Linnakyla, Malin & Taube, 2004). Children master the rudimentary aspects of their native languages during the first years of life. By age three, they should have reached a large and varied lexicon and by age five, their command of a language is relatively sophisticated. This sophistication should increase and progress as the child enters school and learns to read (Ely, 2005). Both English learners and English second language learners seem to take similar paths of development in specifically pre-reading skills such as phonological awareness (D'Angiulli, Siegel, & Maggi, 2004; Gersten and Geva, 2003).

Second language learners face two types of difficulties, namely interlingual learning problems caused by mother tongue interference and intralingual learning problems, caused by the structure of the second language (Verhoeven, 1990). Agreement exists that word recognition is a critical part of reading and in learning to recognize words, students use three representational systems, namely: phonemic mapping, recognition of orthographic patterns and direct recognition of words already represented in memory. Children acquiring reading in a second language may experience difficulty with all three of these recognition processes (Verhoeven, 1990). Furthermore there is a strong expectation that culture will emerge prominently with regard to many of the factors on these three levels and therefore the decision was made to explore the factors across the five major language groupings (combining the 11 languages into language groupings). These are discussed in the next section. Factors pertaining to Grade 4

students, through their home environment, the classroom and the school, that could impact on reading performance will be identified in this study and used to describe and understand the student profiles within each of the five language groupings (Afrikaans, English, Nguni, Sotho and Tshivenda) in South Africa. It is the first time that South Africa has data on reading literacy for all languages with international comparable data that can be analysed on a number of levels.

### **The Language Profile of South Africa**

The language profile of South Africa paints a very complex and dense picture. During the Apartheid era South Africa had two official languages, namely English and Afrikaans. The end of the Apartheid era brought about a new constitution that gave official status to 11 local languages. Table 1 provides an indication (as taken from Mesthrie, 2002) from the 1996 Census, of numbers and percentages of people speaking each of the official languages in South Africa, the relative percentage of the sample tested in each language in PIRLS is presented and the mean score for each language. The pupils writing in English (347 points) and Afrikaans (352 points) achieved consequentially higher results than all the African languages that varied between 255 down to 177 points.

[Take in Table 1 about here]

A distinction needs to be made, amongst the complexity of languages in South Africa, between ‘mother-tongue’, ‘language of instruction’ and ‘language of the test’. While South African children start their learning at school from Grade 1 to 3 in their home language (mother tongue), many schools are faced with teaching students in these grades in a language of instruction that is different from what the children speak at home. For the majority of students entering Grade 4, the language of instruction changes (again), resulting in more than 80% of students being taught in a second language (mostly English, a language spoken by less than 10% of the population). For Grade 1 to 3 students, ‘home language’ does not necessarily coincide with ‘language of instruction’ (or the ‘language of the test’). For example, a Xitsonga-speaking student may attend a school that teaches in IsiZulu, only to switch to English as language of instruction by Grade 4. For the purposes of data analysis in this study, language groupings will therefore be defined by means of ‘language of instruction’ (in Grades 1 to 3), which was also the “language of the test” in PIRLS since the term ‘home language’ is not an accurate indication of whether or not a student does in fact receive instruction in his or her home language.

### **Conceptualization of the study**

Three levels of the system are influential in analyzing reading achievement, namely the school, the

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classroom, and the home and students' background in order to identify those factors that can be associated with successful readers and those factors associated with readers at risk of failure. Creemers' Comprehensive Model of Educational Effectiveness for schools (Creemers and Reezigt, 1999; Kyriakides, Campbell & Gagatsis, 2000; Kyriakides and Creemers, 2003) is used as point of departure for this research, providing an extensive analytical model to analyse achievement across the five language groupings.

Creemers' model focuses on the explanation of student outcomes by alterable educational factors by discerning contrasting, but connected levels of structure, for effectiveness in education (Creemers and Reezigt, 1999). Higher levels provide conditions for lower levels and educational outcomes are induced by the combined effects of levels. Creemers' model has four levels, namely the student level, classroom level, the school level and the context (or country) level. For the purposes of this study, a similar route will be followed as was used by Bos (2002). In his TIMSS<sup>1</sup> investigation into the benefits and limitations of large-scale international comparative achievement studies, he adopted Creemers' model for the purposes of the study. Bos (2002) employed the same levels as suggested by Creemers, but revised the components of quality, time and opportunity to suit the needs of his investigation. Creemers' Model of Educational Effectiveness will be adapted to data provided by PIRLS 2006. Table 2 illustrates how Creemers' Model has been adapted and links each of Creemers components with variables from the PIRLS 2006 student questionnaire in order to develop the student model.

[Take in Table 2 about here]

## Methodology

This study is a secondary analysis of the PIRLS 2006 South African Grade 4 data. Two grades were tested in South Africa, Grades 4 and 5. The main research question that will guide the project is, What are the factors that could be associated with Grade 4 student performance in reading literacy?

Factors emanating from contextual questionnaires of Grade 4 students, their home environment, their schools and classrooms will be analysed in relation to students' achievement scores on the PIRLS 2006 achievement tests. The main research question comprises the following sub-questions:

1. What factors related to the students' background (for example motivation to read, language skills and home environment) affect performance in reading literacy for each language group?

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<sup>1</sup> Third International Mathematics and Science Study of 1995, now the Trends in International Mathematics and Science Study

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2. To what extent do the school and classroom environments affect reading literacy performance for each language group?

For the purposes of answering these questions, Structural Equation Modeling (SEM) will be used for level of the data. The aim of these analyses would be to establish the relationships between one or more explanatory variables (in this case obtained from items in the contextual questionnaires) and one or more outcome variables (reading achievement scores for the different language groupings).

Prior to the SEM, a number of preparatory steps need to be undertaken and this includes exploratory analysis to establish the relationships (if any) among some of the student level variables for each of the language groupings. While previous sections described the intention of the study to employ SEM methods to answer the main research questions, the methods discussed for the purposes of this paper will mainly relate to the preparatory process of reviewing and selecting student-level variables for purposes of developing a student-level model.

### **Developing a student- level model for reading**

Since 1994, South Africa has been undergoing considerable social, political, economic and cultural changes. Changes on the education front included a new curriculum (that has already been revised) and the introduction of an outcomes-based system of education.

Despite national efforts, inordinate numbers of South African school students are repeatedly failing grades or leaving school. Almost half of students who drop out of the system do so due to a lack of basic learning skills, more specifically, a lack of adequate language skills (Howie, 2003, Howie, 2008). South Africa achieved the lowest score of the 45 participating PIRLS 2006 education systems with Grade 4 learners having achieved on average 253 points (SE=4.6), while Grade 5 learners achieved on average 302 (SE=5.6). Average achievement for both these grades was about 200 points and more below the fixed international mean score of 500 points.

The student level variables have been shown in previous large-scale secondary analyses to have the most significant and direct impact on student achievement than any other level variables (Howie, 2002). The further one moves away from the student-level factors, the lesser the effect. Bearing this in mind, this research has opted to start with developing a student-level model.

Table 2 indicated the specific variables, as selected from the PIRLS 2006 student questionnaire, on the basis of the Creemers model for purposes of developing a student- level model. These variables

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will be analysed in future for each of the language groupings. Table 3 provides the student model with overall frequencies for these variables linked to each component of the Creemers' model.

[Take in Table 3 about here]

Based on the Creemers' model, the variables are grouped per component of *time*, *opportunities used*, *motivation (of students)*, *social background*, and *basic skills/higher order skills*. The frequencies of the South Africa national data are presented per variable under each component. It has to be kept in mind that the data still has to be analysed for each language grouping. In terms of *time*, less than half (47%) of South African children read outside of school on a daily basis. Almost a quarter of the children report spending no time on reading outside class. With regard to the *opportunities* provided in school that are used, almost half of the children read at school and 25% receive reading homework daily. However, more than one in 10 children never get the opportunity to read at school and almost a third (29%) never receives reading homework. One out of five children spend more than an hour on reading homework with 23% spending no time on homework. About a third of the students (32%) take books out of the library weekly. In particular, the variables related to *opportunities* are expected to vary greatly across the language groupings given the political history of the country.

*Motivation* comprises two variables, self concept and attitude to reading. These were combined in the analysis and more than half of the children were strongly motivated to read while 14% were not motivated to read. The social background of the students is a well-known influential component on students learning. More than a third of the children in South Africa had no access to computers or internet at home and a similar proportion had no books in the home in the language of the test they wrote. Worse still, 50% of Grade students had no books in the home (less than 10). In general, the students had few resources at home with 10% or less having their own desk, own books, and own room at home. About one in 10 had access to electricity and running water in the home. Under the *basic skills* component, the language of the test spoken at home was included and just over half (59%) of the students were found to speak the language of the test at home.

### **Conclusion and Implications**

This research is in its initial stages. Already the national data reveal the potential to explain South African students' poor performance in reading. This paper described the basis for the conceptualization of the study and the methods to identify the factors for developing a student-level model. The factors described in the previous section will now be subjected to rigorous further analysis to ascertain their

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relationship with reading achievement overall and per each of the language groupings outlined earlier.

The potential significance of this study is that factors associated with reading literacy achievement can be illuminated and understood against objective measures of achievement in each of the 11 official languages. The magnitude of the PIRLS 2006 study for South Africa has to be taken into account, since 11 official languages in essence implies that the study had to be replicated 11 times over to provide assessment measures for all language groups in the country. Also of significance is that data is available for almost 17 000 Grade 4 learners taken from a nationally representative sample. The available data not only pertains to achievement data, but also contextual data on student, home, classroom and school level. Such a rich source of data would allow for multi-level analyses.

Ultimately, the implications of this study will be fed back to policy reforms. Of importance would be to inform policy through the identification of those factors per language grouping with an inherent manipulability that could be adjusted (e.g. the supply of resources) in order to ensure optimal performance and highest achievement possible for students within these language groupings.

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*Table 1: Percentage of the population speaking the 11 official Languages in South Africa, percentage of the PIRLS sample and mean score for reading literacy*

Languages per group	Percentage of the population	Percentage of the PIRLS sample	PIRLS 2006 Mean score	
				SE
<b>Nguni</b>				
IsiNdebele	1.5	.66	176.8	9.0
SiSwati	2.5	2.4	211.6	6.5
IsiXhosa	17.9	14.6	189.9	6.5
IsiZulu	22.9	26.5	229.0	7.9
Xitsonga	4.4	2.4	221.7	
<b>Sotho</b>				
Sepedi	9.2	8.7	203.9	8.6
Sesotho	7.7	3.9	214.2	5.6
Setswana	8.2	7.2	255.0	6.3
<b>Other</b>				
Tshivenda	2.2	2.5	214.1	10.4
Afrikaans	14.4	8.7	351.7	12.0
English	8.6	22.1	346.8	17.5

*Table 2: Student Model Variable Selection*

Level	Creemers' Components of Quality, Time and Opportunity	PIRLS 2006 Explanatory Student Variables (as taken from the PIRLS 2006 Student Questionnaire)
Student	Time:	Students' out-of-school activities as measured by Items 3, 4 and 5
	Opportunities used:	Activities fostering reading literacy as measured by Items 6, 7, 8, 10 and 13a
	Motivation:	Student Self Concept and Reading Attitude as measured by Items 14 and 15
	Social background:	Demographics and resources as measured by Items 11, 12 and 13b Home resources as measured by Items 20 and 21
	Basic skills/Higher order skills:	Language in the home as indicated by Item 19

*Table 3: Components for the student level model and frequencies*

<b>Creemers' Components</b>	<b>PIRLS 2006 Student Variables</b>	<b>% of Learners</b>				
<b>Time</b>	Students' out-of-school activities					
	Out of school activities	<b>Every day</b>	<b>1 or 2x week</b>	<b>1x month</b>	<b>Never</b>	
	Frequency of reading outside school (SQ3&4)	47	26	13	14	
		<b>5 hrs</b>	<b>3-5 hrs</b>	<b>1-3 hrs</b>	<b>Up to 1 hr</b>	<b>never</b>
	Time spent reading daily (SQ 5)	29	21	15	12	23

<b>Creemers' Components</b>	<b>PIRLS 2006 Student Variables</b>	<b>% of Learners</b>				
<b>Opportunities used</b>	Opportunities to engage in activities fostering reading literacy	<b>Every day</b>	<b>1 or 2x week</b>	<b>1 or 2 month</b>	<b>Never</b>	
	Time spent on reading at school (SQ 6 & 7)	47	27	13	13	
		<b>Daily</b>	<b>3-4 x week</b>	<b>1-2 x week</b>	<b>&lt; 1 x week</b>	<b>Never</b>
	Frequency of reading for homework (SQ 8)	25	14	21	12	29
		<b>More than 1 hr</b>	<b>30 mins to 1 hr</b>	<b>30 mins or less</b>	<b>Never</b>	
	Time spent on reading homework (SQ 10)	20	25	32	23	
		<b>1 x week</b>	<b>1-2 x month</b>	<b>Few times a year</b>	<b>Never</b>	
	Take out books from library (SQ 13 a)	32	23	21	24	

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