Perspectives in Education 2014: 32(3)
ISSN 0258-2236

http://www.perspectives-in-education.com

Reflections on Creemers' Comprehensive Model of Educational Effectiveness for Reading Literacy: South African Evidence from PIRLS 2006

Surette van Staden

Sarah Howie

This study reports on a doctoral investigation (Van Staden, 2010) to identify and explain relationships between some major learner- and school-level factors associated with successful reading in Grade 5. South African classrooms are characterised by large variation, with linguistically and socio-economically heterogeneous groups of learners. However, there is a paucity of theoretical frameworks that could explain reading effectiveness in a developing context. For purposes of this study, the South African Grade 5 data from the Progress in International Reading Literacy Study (PIRLS) 2006 were analysed. Hierarchical Linear Modelling (HLM) was applied to determine the effect of a number of explanatory variables at learner- and school-level on reading achievement as outcome variable, while controlling for language. In the absence of a reading effectiveness framework, Creemers' Comprehensive Model of Educational Effectiveness was used as theoretical point of departure. The framework left the differences in reading scores largely unexplained and could not capture the South African PIRLS 2006 data adequately. The study concludes with reflections on whether Creemers' model could guide an analysis to explain reading performance and on what further modifications to the model might be required to suit a developing South African context more adequately.

Keywords: PIRLS 2006, theoretical framework, reading literacy, Creemers' Comprehensive Model of Educational Effectiveness

Surette van Staden
Department Science,
Mathematics and Technology Education,
University of Pretoria
E-mail: surette.vanstaden@up.ac.za
Telephone: 012 420 5159

Sarah Howie
Department Science,
Mathematics and Technology Education,
University of Pretoria
E-mail: sarah.howie@up.ac.za
Telephone: 012 420 4175

Introduction

This study aimed to identify and explain relationships between some major factors associated with successful reading at Grade 5 level in South African primary schools. In the absence of a reading effectiveness framework to serve as a conceptual guide to the investigation, Creemers' Comprehensive Model of Educational Effectiveness was used as conceptual framework, thereby using school effectiveness as theoretical point of departure. This study took the form of a secondary analysis, and utilised the South African Grade 5 data from the Progress in International Reading Literacy Study (PIRLS) 2006. South Africa's first participation in this international comparative study of reading literacy was during the 2006 cycle, with repeat participation in the 2011 cycle. The current study reports on a secondary analysis of PIRLS 2006 data that formed part of a larger doctoral study which was conducted prior to the availability of South African PIRLS 2011 data.

In South Africa, grave concerns with regard to low levels of learner achievement pervade research initiatives and educational debates. Despite considerable investment in educational input (such as policy and resources) and processes (such as curriculum provision and teacher support), outcomes (in the form of learner achievement) remain disappointingly low. South African classrooms are characterised by large variation, with linguistically and socio-economically heterogeneous groups of learners. In South Africa, official status is given to 11 languages. Mesthrie (2002) clusters the predominant languages around a set of varieties that are closely related along linguistic lines, namely (1) Nguni, consisting of IsiZulu, IsiXhosa, SiSwati, Xitsonga and IsiNdebele; and (2) Sotho, made up of Sepedi (Northern Sotho), Sesotho (South Sotho) and Setswana. Along with these clusters, (3) Afrikaans, (4) English and (5) Tshivenda constitute the set of officially recognised languages in South Africa. Table 1 indicates the achievement by language grouping in PIRLS 2006 and illustrates the severe underperformance of learners from Nguni, Sotho and Tshivenda backgrounds:

Table 1: Average Grade 5 achievement score per language grouping

Language grouping	*N*	*% of the PIRLS 2006 sample*	*Average achievement score*	*SE*
Afrikaans	1 678	11.5	415.7	12.0
English	2 793	19.1	398.0	17.1
Nguni	6 039	41.2	243.3	4.4
Sotho	3 363	22.9	267.1	5.2
Tshivenda	784	5.3	262.1	15.0

Background to PIRLS 2006

A total of 40 countries (including South Africa) and 45 education systems (e.g. Belgium – Flemish and Belgium – French) participated in PIRLS 2006 (Mullis, Martin, Kennedy & Foy, 2007). PIRLS 2006 required the assessment of learners who have had

four years of schooling, and for most countries this requirement translated to Grade 4 learners. PIRLS 2006 aimed to describe trends and international comparison for the reading achievement of Grade 4 learners. It also focused on learners' competencies in relation to goals and standards for reading curricula; the impact of the home environment and how parents foster reading literacy; the organisation, time and reading materials for learning to read in schools; and curriculum and classroom approaches to reading instruction (Mullis, Kennedy, Martin & Sainsbury, 2004). PIRLS 2006 was run under the auspices of the International Association for the Evaluation of Educational Achievement (IEA). As an organisation, the IEA undertakes international studies that benchmark performance of school-going children in mathematics, science, civic education, information, communication, technology and reading, to name several.

In naming its 1991 study, the IEA decided to join the terms "literacy" and "reading" to convey the notion that literacy includes the ability to reflect on what has been read and to use reading as a tool to achieve personal and societal goals. Thus, according to Campbell, Kelly, Mullis, Martin and Sainsbury (2001:3), the framework for literacy that applies to PIRLS is as follows:

> *... the ability to understand and use those written language forms required by society and (or) valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers and for enjoyment.*

With this definition, the PIRLS 2006 framework took the stance that reading literacy is a constructive and interactive process. According to Brinkley and Kelly (2003), the reader is now regarded as actively constructing meaning and as knowing effective reading strategies. Such readers have positive attitudes towards reading and read for the purposes of recreation and information acquisition. Meaning is constructed in the interaction between reader and text in the context of a particular reading experience. Reading implies that readers bring with them a repertoire of knowledge, skills, cognitive and metacognitive strategies.

The South African PIRLS 2006 study not only assessed a first population of Grade 4 learners, but also included a second population of Grade 5 learners as a national option within the study (Howie, Venter, Van Staden, Zimmerman, Long, Scherman & Archer, 2009). Only the Grade 5 learner achievement is reported in the PIRLS 2006 International Report (Mullis *et al.*, 2007). South African Grade 5 learners achieved the lowest score of the 45 participating education systems. Grade 4 learners 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 is well below the fixed international reference average of 500 points.

Conceptual framework

In order to not only understand the reasons for poor reading achievement, but to also identify those factors that could be associated with successful readers and those associated with readers at risk of failure, three contextual levels seem to be of major influence in reading achievement, namely the school, the home and the learners themselves. However, there is a paucity of theoretical frameworks that could explain

reading effectiveness in a developing context. Creemers' Comprehensive Model of Educational Effectiveness (Creemers & Kyriakides, 2008; Kyriakides, Campbell & Gagatsis, 2000) for schools was used as a point of departure for this study, because this model bore relevance to already existing reading achievement literature in international comparative assessments (Leino, Linnakyla & Malin, 2004; Fuchs & Woessmann, 2004; Chapman & Tunmer, 2003; D'Angiulli, Siegel & Maggi, 2004) and those contextual levels that are of major influence in reading achievement, namely the school, the classroom and the learner. Creemers' model provided the framework according to which the South African PIRLS 2006 data were analysed to identify and explain relationships between some major learner- and school-level factors associated with successful reading in Grade 5.

For the study, the original Comprehensive Model of Educational Effectiveness as proposed by Creemers was used, instead of the revised Dynamic Model. The Dynamic Model makes provision for investigation across time with multiple times for data collection, but for the purposes of this study, the available cross-sectional data were collected at one particular time with no follow-up or repeat measures. Creemers' model is well established and has been reviewed critically for its validity in studies of educational effectiveness. Creemers and Kyriakides (2008) state that, although a dynamic model of educational effectiveness is proposed, the original model could provide a starting point for developing a dynamic model of educational effectiveness research. Creemers' original model shows an association with the PIRLS conceptual framework in that the PIRLS conceptualisation of reading literacy also seeks to understand reading performance against learner, teacher, school and community contexts, levels that are all present in Creemers' original work.

Creemers' work provides an extensive analytical model for this study in its attempt to evaluate achievement across language groupings in South Africa. This study, therefore, sought to answer the following research questions:

1. In the absence of identifiable reading effectiveness models, could Creemers' Comprehensive Model of Educational Effectiveness be used to guide an analysis to explain learners' reading performance?
2. To what extent does Creemers' model capture the PIRLS 2006 South African data adequately?
3. In light of unexplained differences in reading achievement using Creemers' model as conceptual framework for this study, what further modifications are required to suit a developing South African landscape more adequately?

Creemers' model aims to explain learner outcomes by alterable educational factors through discerning the contrasting but connected levels of structure for effectiveness in education (Creemers & Reezigt, 1999). Higher levels provide conditions for learner achievement, and educational outcomes are induced by the combined effects of levels. The original model has four levels, namely the learner, classroom, the school and the context (or country). Figure 1 provides an illustration of Creemers' model and the factors at work at context, school, classroom and learner level.

Levels: Characteristics of quality, time and opportunity: Formal criteria:

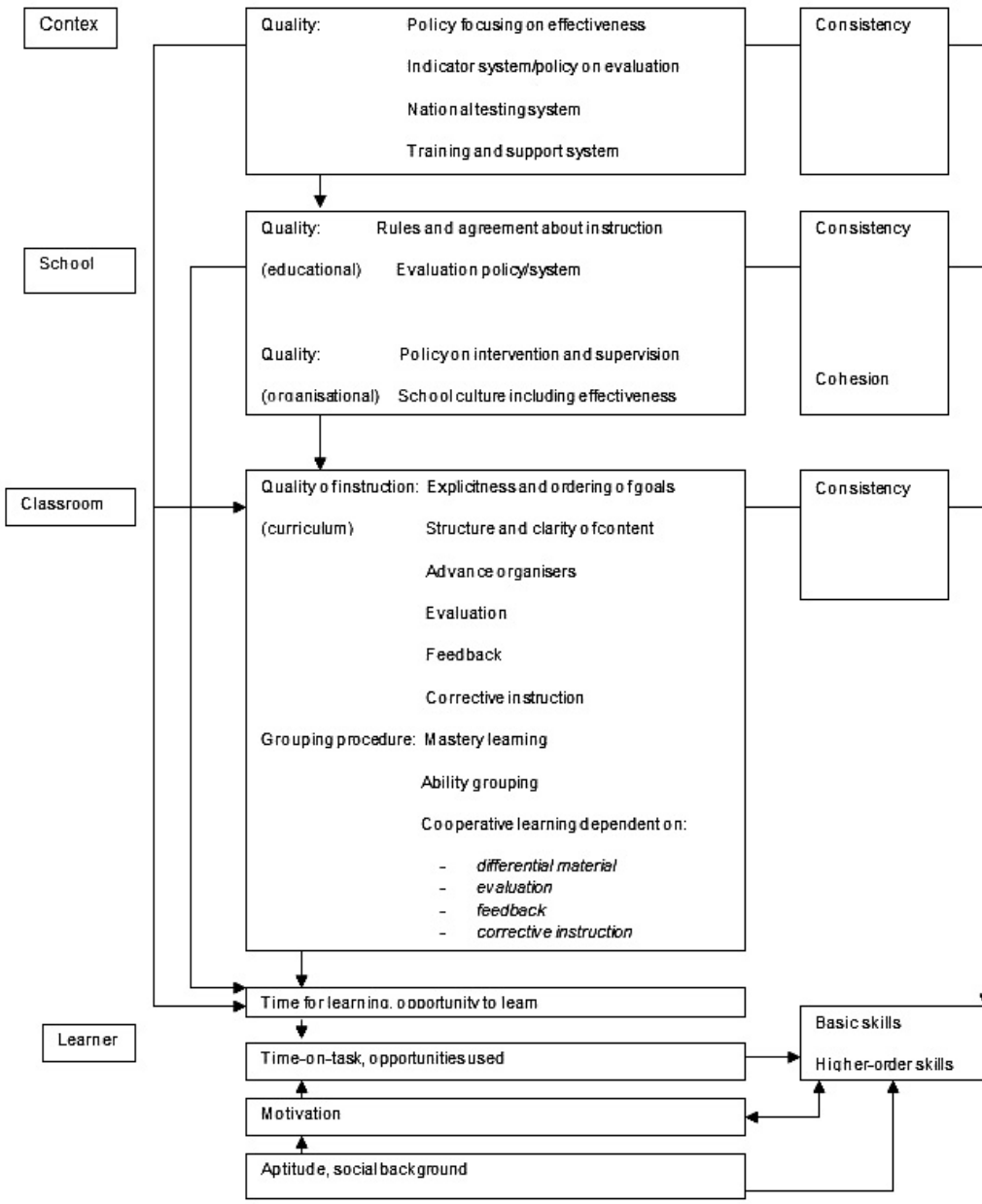

Figure 1: Creemers' Comprehensive Model of Educational Effectiveness

Creemers based his model on four assumptions. First, the time-on-task and the opportunity used at the learner level are related directly to learner achievement. Secondly, the context, school and classroom levels permeate time-on-task and opportunities used at the learner level. Thirdly, the higher-level factors dominate

conditions and have a partial causal effect on the lower levels; thus, factors at the context (or country) level partly determine factors at the school level which, in turn, partly determine what occurs in the classroom, and classroom factors, then, partly affect learner factors. Fourthly, all the factors influence learner achievement (Kyriakides & Creemers, 2006).

Creemers also introduced the formal criteria of consistency, cohesion, constancy and control to the model (Creemers & Reezigt, 1999). Consistency occurs when the factors associated with the effectiveness of classrooms, schools and contexts support one another.. Cohesion requires a suitable constancy of school-level factors from year to year, for example, schools should not regularly change their rules and policies. Lastly, control includes not only the evaluation of learners, but also the practice of teachers who hold themselves and others responsible for effectiveness. These formal criteria emphasise the importance of factors over time and of mechanisms of ensuring effectiveness (Creemers & Reezigt, 1999).

Kyriakides *et al.* (2000) regard Creemers' model as an extension of Carroll's model of school learning (1963) which asserts that the degree of mastery is a function of the ratio of the amount of time learners actually spend on learning tasks to the total amount of time they need. According to the Carroll model, time spent on learning is defined as equal to the minimum value of three variables, namely opportunity or time allowed for learning; perseverance or the time learners are willing to spend actively engaging in reading activities; and aptitude, understood as the amount of time needed to learn under optimal instructional conditions.

According to Kyriakides *et al.* (2000), Creemers added to Carroll's model of learning, specifically in respect to the general concept of "opportunity to learn". Thus, in Creemers' model, time and opportunity are discerned at the classroom and school level and distinguishes between actually-used time and available opportunity. Bos (2002) explains that Creemers, therefore, emphasised the availability of time and opportunity at the classroom level while, at the learner level, he referred to actual time used and opportunity to learn. With regard to quality of instruction, Creemers identified three components at the classroom level, namely curricular materials, grouping procedures and teacher behaviour. According to Bos (2002), by using each of these three components, several combinations of characteristics could constitute an effective scenario. Isolated characteristics are not effective in themselves, because influences on learner achievement are multilevel in nature (Kyriakides & Creemers, 2006.

Kyriakides and Creemers (2006) re-worked the original model of Educational Effectiveness and tested what they refer to as the Dynamic Model of Educational Effectiveness. Creemers' original model is based on the assumptions that the influence of learner achievement is multileveled, thereby referring to factors at different levels, including the context (or country), the school, classroom and the learner (Creemers & Kyriakides, 2006. The original model makes provision for direct and indirect relations between the levels which might not be linear in nature but which are envisaging somewhat static or simultaneous set of relationships. In the dynamic model, however, the same assumptions are still held true, but Creemers added a provision that the classroom, school and context (or country) factors could

also be contrasted or measured across time by taking into account additional five dimensions, namely frequency, focus, stage, quality and differentiation (Creemers & Kyriakides, 2006).

Bos (2002), in his TIMSS (Trends in Mathematics and Science Study) investigation into the benefits and limitations of large-scale international comparative achievement studies, adopted Creemers' model. He employed the same four structural levels suggested by Creemers, but revised the components of quality, time and opportunity to suit the needs of his investigation.

A similar approach was followed for the purposes of the current study, where Creemers' Model of Educational Effectiveness was used as grounds for a model of reading effectiveness based on South African Grade 5 data provided by PIRLS 2006. Creemers' model was adapted to reflect reading effectiveness in contrast with Creemers' original use of the model for school effectiveness. Table 2 shows the adaptation of Creemers' model to serve as a South African model of reading effectiveness, using variables from the PIRLS 2006 school, teacher, learner and parent contextual questionnaires as source:

Table 2: Factors of reading effectiveness as adapted from Creemers' Model of Educational Effectiveness

Levels	Components of quality, time and opportunity	PIRLS 2006 Factors
School	Quality (educational):	Instructional activities and strategies
	Quality: (organisational)	Governance and organisation of educational system
	Time:	Curriculum characteristics and policies
	Opportunities Used:	Home-school connection
Classroom	Quality:	Instructional activities and strategies
		Demographics and resources
	Time:	Instructional activities and strategies
		Classroom environment and structure
	Opportunities used:	Instructional activities and strategies
Learner	Quality:	Activities fostering reading literacy
	Time:	Learners' out-of-school activities
	Opportunities used:	Home-school connection
	Motivation:	Learners' and parents' reading attitudes and self-concept
	Social background:	Demographics and resources
		Home resources
	Basic skills/Higher- order skills:	Language in the home

The objective of this study was, therefore, to establish the extent to which Creemers' Comprehensive Model of Educational Effectiveness could provide a framework for reading performance in a developing context in the absence of established reading education frameworks and their ability to capture the PIRLS 2006 data adequately.

Method

Participants

While the current study took the form of a secondary analysis of South African PIRLS 2006 data, the participants, data collection instruments and procedure as applicable to the primary study are explained in the following sections. The decision to use the South African PIRLS 2006 data set was mainly because of its adherence to strict quality control measures as expected from the IEA. Also, PIRLS 2006 was the first study to make data of these grade levels available in South Africa in all 11 official languages.

The intended South African sample for PIRLS 2006 consisted of 441 schools, all of which offer schooling at least at Grade 4 level. The South African PIRLS 2006 study assessed a population of Grade 4 learners, but also included a second population of Grade 5 learners as a national option within the study (Howie *et al.*, 2009). Reporting of results for purposes of this study was based only on Grade 5 data, since Grade 4 data were neither statistically stable nor included in the international report.

The sample was selected on the basis of probabilities proportional to size, first by province and then by language of teaching within the province. The PIRLS 2006 study resulted in the collection of achievement data from a realised sample of 434 schools comprising 14 657 Grade 5 learners from intact[1] classrooms.

Contextual background information was collected from Grade 5 learners, their parents, teachers and school principals. This information yielded data for 14 657 Grade 5 learners, 14 657 parents, 403 Grade 5 teachers and 397 school principals.

Data collection instruments

Achievement tests: The PIRLS 2006 assessment consisted of a reading literacy test in the form of two types of texts, namely reading for literary experience (or literary texts) and reading to acquire and use information (or informational texts). Reading texts were followed by a range of multiple-choice questions and open-response questions to a maximum of three points. All questions corresponded to any one of the four types of reading comprehension process, namely (1) focusing on and retrieving explicitly stated information, (2) making straightforward inferences, (3) interpreting and integrating ideas and information, and (4) examining and evaluating content, language and textual elements (Mullis et al., 2004). Reporting of reading

achievement results in PIRLS 2006 are presented in terms of achievement above or below the fixed international average of 500 by means of five overall plausible values as derived from item response analyses.

Background questionnaires: Grade 5 learners, their parents, Grade 5 teachers and school principals responded to contextual background questionnaires that addressed a wide range of topics on aspects such as reading behaviour, attitudes, teaching reading and school organisation. Learner and parent questionnaires were administered in all 11 official languages to suit the language preference of learners and parents optimally, while teachers and school questionnaires were administered in English. Questions in the PIRLS questionnaires took the form of Likert-scale items.

For purposes of building the learner-level model, items from the learner and parent questionnaire were used. Table 3 provides information on the variables as taken from these questionnaires and in relation to Creemers' factors of time, opportunity used and social background.

Table 3: Model variables included at the learner level

Factor as measured by Creemers' model	PIRLS 2006 variable name	Variable description	PIRLS 2006 questionnaire source
Time	asbgtoc1-7	Frequency of reading- related activities outside of school	Learner questionnaire
	asbgrto1-10	Frequency of specific reading activities outside of school	Learner questionnaire
	asbgtsp1-5	Time spent engaging in activities outside of school on a normal school day	Learner questionnaire
	asbhtsoh	Time spent on reading homework as reported by parents	Parent questionnaire
	asbhread	Parents' time spent on reading-related activities	Parent questionnaire
Opportunity used	asbgthc1-6	Frequency of reading-related activities in school	Learner questionnaire
	asbgafr1-4	Types of reading activities learners are afforded after reading	Learner questionnaire
	asbhha1-11	Opportunities used by parents/ caregivers to engage the child in preliteracy activities	Parent questionnaire
	asbhdot1-10	Opportunities used by parents/ caregivers to engage the child in reading-related activities	Parent questionnaire
	asbhrre	Opportunities parents use to read for their own enjoyment	Parent questionnaire

Social background	asbgbook	Number of books in the home	Learner questionnaire
	asbgta1-17	Resources in the home e.g. running water, electricity, television	Learner questionnaire
	asbhchbk	Number of children's books in the home	Parent questionnaire
	asbhledf	The highest level of education completed by the child's father	Parent questionnaire
	asbhledm	The highest level of education completed by the child's mother	Parent questionnaire

The school-level model consisted of items taken from the school and teacher questionnaires. Table 4 shows the variables taken from the questionnaires in relation to Creemers' factors of educational quality, time and opportunity used.

Table 4: Model variables included at the school level

Factor as measured by Creemers' model	PIRLS 2006 variable name	Variable description	PIRLS 2006 questionnaire source
Educational quality	acbgacu1-3	Emphasis that the school places on teaching specific language and literacy skills to learners in Grades 1-4	School questionnaire
	acbgme1-12	Grade at which specific reading skills and strategies first receive major emphasis in instruction in the school	School questionnaire
	atbgbhr1-8	Teacher strategies when a learner begins to fall behind in reading	Teacher questionnaire
	atbgmsr1-4	Emphasis that is placed on specific sources to monitor learners' progress in reading	Teacher questionnaire
	atbgasp1-7	Frequency of using specific tools to assess learners' performance in reading	Teacher questionnaire

Time	acbgidy (ACBGZ003)	The number of days per year that the school is open for instruction	School questionnaire
	acbgrii	Informal initiatives to encourage learners to read	School questionnaire
	atbgacth	The amount of time per week spent on English language instruction and/ or activities with the learners	Teacher questionnaire
	atbgfrdh	The amount of time that is explicitly allocated for formal reading instruction	Teacher questionnaire
	atbghwr 2	The amount of time that learners are expected to spend on homework involving reading (for any subject)	Teacher questionnaire
Opportunity used	acbgma1-6	School's use of the specific materials in reading instructional programme for learners in Grades 1-4	School questionnaire
	atbgria1-9	Frequency of using specific resources when doing reading activities/ instruction	Teacher questionnaire
	atbgra1-10	Frequency of doing specific activities when doing reading activities/ instruction	Teacher questionnaire
	atbgdev1-7	Frequency with which teacher requires learners to engage in specific activities to help develop reading comprehension skills or strategies	Teacher questionnaire

Procedure

This study used the PIRLS data to examine the relationship between selected background factors and reading literacy achievement for an overall South African model and per language grouping on two levels, namely the learner level and the school level. Hierarchical Linear Modelling (HLM), also known as Multilevel Modelling (Snijders & Bosker, 1999), was used from observations and measurements obtained from the PIRLS 2006 study. Factors emanating from contextual questionnaires of Grade 5 learners, their home environment, their schools and classrooms were identified by means of factor analyses in conjunction with learners' test scores on the PIRLS 2006 achievement tests. The aim of these analyses was to establish the relationships between one or more explanatory variables (see tables 3 and 4), in this case obtained from items in the contextual questionnaires at learner and school level, and the outcome variables, i.e. reading achievement scores for the different language groupings (namely Afrikaans, English, Nguni, Sotho and Tshivenda). A two-level model was followed, with learner-level variables nested within school-level variables. School- and classroom-level variables were grouped together in one level, and not separated into school level and class level. The PIRLS 2006 sample was drawn so that one intact classroom was chosen from each selected school, thereby making classrooms inextricably part of the school.

The analysis of the PIRLS 2006 achievement and questionnaire data followed a confirmatory approach. Therefore, instead of using all variables from the different questionnaires, only a selection of variables based on Creemers' framework, which were expected to be related to reading literacy achievement, was used for analysis purposes. In this way, the study was not guided by the available data alone, but by existing research into what is known about those factors that are likely to influence learner achievement. In doing so, the theoretical framework in the form of Creemers' model guided the data analysis in a confirmatory, not exploratory, way.

Results

Table 5 illustrates how components of quality, time and opportunity, as taken from Creemers' model, were populated with variables from the PIRLS 2006 contextual questionnaires. Table 5 further summarises the statistically significant effects found in this study for the overall model and per language grouping separately. Entries in the table were characterised by statistical significance at p=0.01 or 1% cut-off.

Table 5: Factors of reading effectiveness and statistically significant effects (adapted from Creemers, 1999)

Levels	*Components of quality, time and opportunity*	*PIRLS 2006 explanatory variables*	*Statistically significant effects*					
			Overall (Intrcpt=524.33)	**Afrikaans (Intrcpt=379.10)**	**English (Intrcpt=405.33)**	**Nguni (Intrcpt=364.29)**	**Sotho (Intrcpt=487.02)**	**Tshivenda (Intrcpt=259.37)**
Context	Quality (educational):	Demographics and resources (School SES)		69.10	87.60	71.05		
	Quality: (organisational)	Governance and organisation of educational system						
	Time:	Curriculum characteristics and policies						
	Opportunity:	Home-school connection						

School	Quality (educational):	School environment and resources						
		Instructional activities and strategies						
	Quality: (organizational)	Governance and organization of educational system						
	Time:	Teacher training and preparation						
	Opportunity:	Home-school connection Curriculum characteristics and policies						
Classroom	Quality:	Demographics and resources Instructional materials and technology						
	Time:	Teacher training and preparation						
	Opportunity:	Classroom environment and structure Instructional strategies and activities Home-school connection	–14.12					

Learner	Quality:	Learners' out-of-school activities	–9.55			–11.40	–8.15	
	Opportunities used:	Home-school connection	10.50			14.50	12.95	16.32
		Activities fostering reading literacy	–8.32	10.05	–11.44		–8.08	
	Motivation:	Demographics: Learner age	–8.76	–31.70	–31.70		–11.37	–26.21
		Demographics: Learner sex	–27.50	–23.53	–23.53	–30.98	–24.52	
	Social background:	Home resources	6.30	11.82	11.82			
	Basic skills/ Higher- order skills:	Language in the home						

Table 5 confirms the statistically significant effects found in the overall Afrikaans and English2 models for school socio-economic status. We could expect reading literacy achievement to be positively affected by as much as 87.60 score points in the Afrikaans language model and as much as 71.05 in the English language model. School socio-economic status had no statistically significant effect for the African language groupings, which might be due to a lack of variation in the sample of African schools. None of the African language schools in the sample could be described as affluent or of high socio-economic status.

As indicated by table 5, a single statistically significant effect was found in the overall model for classroom environment and structure, referred to by Creemers as opportunity used at classroom level. No other factors were, however, found to be of statistical significance in affecting reading literacy scores at school-level for aspects of quality (educational and organisational), time and opportunity in the theoretical framework.

At learner-level, a number of significant factors for the overall model and per language grouping are indicated. With regard to learners' out-of-school reading activities (which were reflected as a quality factor in Creemers' framework), reading achievement scores are predicted to be lower by as much as 9.553 points in the

overall South African model, 11.40 points for the Nguni learners and 8.15 points for the Sotho learners, where out-of-school activities do not involve frequent reading or exposure to reading materials. The presence of a solid home-school connection (as linked to opportunities used in Creemers' framework) positively affect reading achievement scores, with a predicted 10.50 points higher reading achievement score in the overall model, 14.50 points higher in the Nguni model, 12.95 points higher in the Sotho model and 16.32 points higher in the Tshivenda model. Where activities in the home are present that foster reading literacy (e.g. talking about reading, opportunities used by parents or caregivers to engage the child in preliteracy and reading-related activities), reading achievement scores in the Afrikaans model are predicted to be positively affected by 10.05 points. However, in the absence of such activities, reading is lower by 8.32 in the overall model, 11.44 points in the English model and 8.08 points in the Sotho model (see table 5).

Learner demographics (as measured in age and gender, with girls outperforming boys, and poorer achievement as the learners grow older while remaining in Grade 5) showed the strongest prediction of reading literacy achievement scores. All models (with exception of the Nguni model) showed significant decreases in reading achievement by as much as 31.70 points for the English model, 26.21 points for the Tshivenda model, 16.49 points for the Afrikaans model, 11.37 points for the Sotho model and 8.76 for the overall model with every year increase in age for a learner who remains at Grade 5 level. In all the models, higher reading literacy achievement scores were predicted for girls than boys by as much as 30.98 points for the Nguni model and 27.50 points for the overall model. Similarly to patterns found for the effects of school socio-economic status, the presence of home resources (as measured by a number of possessions in the home, parental education and parental employment status) showed statistically significant effects in the overall model (6.30 points predictive increase in reading achievement scores), the Afrikaans model (10.02 points predictive increase in reading achievement scores) and the English model (11.82 points predictive increase in reading achievement scores).

Table 5 indicates that, with most of the statistically significant factors found at learner level, most of the differences at school level in reading achievement scores across five language groupings could not be explained using the conceptual framework for this study. The adapted framework did not fit patterns found for the African language groupings (Nguni, Sotho and Tshivenda) for school socio-economic status specifically and could, therefore, suggest changes to the framework to suit the South African landscape more adequately. While Creemers' model provided an extensive analytical framework, the inability of the model to capture significant factors at work in African language schools might warrant further adaptations to the framework.

The results point to a two-fold situation where adaptations to the framework and more adequate data might still be needed to identify the most prominent factors at work in a developing, multilingual educational system. On the one hand,

Creemers' framework was insufficient in explaining the performance at school level of children using Afrikaans, English and African languages as Language of Learning and Teaching (LoLT). Little evidence could be found for factors where statistically significant effects were expected at school level. The conceptual framework was more appropriate in explaining significant effects of school socio-economic status for the Afrikaans and English groupings, corroborating the literature that infers the influence of socio-economic status on learner achievement. On the other hand, the lack of evidence from the PIRLS 2006 data suggests that the current contextual data for a developing context such as South Africa might be insufficient to provide evidence about associations among variables. Stronger associations and more data might be required for the model to be tested more effectively.

Discussion

The aim of this study was to establish the extent to which Creemers' Comprehensive Model of Educational Effectiveness could provide a framework for reading performance in a developing context in the absence of established reading education frameworks and their ability to capture the PIRLS 2006 data adequately. This study offered a theoretical reflection of an empirical study of learner assessment in South African schools in an attempt to uncover factors that affect reading literacy achievement. In the absence of identifiable reading effectiveness models, a school effectiveness model (in the form of Creemers' model) was adopted for purposes of this study.

In summary, results point to significant socio-economic factors at school level found for the Afrikaans and English groupings. However, little similarity could be found for significant associations between Creemers' components and average reading scores for African language groupings. Based on findings as presented in table 5, some results emanated contrary to expectation. One such outcome was the statistical non-significance of school socio-economic status for the African language groupings. These results, however, should not be interpreted as suggesting that there is no socio-economic association with average reading performances for African language groupings at school level. Instead, there might be a number of direct relationships that could not be found or tested given this study's data source and conceptual framework. For a number of Creemers' factors, no appropriate variables could be identified under the relevant components in the conceptual framework (e.g. basic skills, variables that measure resources rather than opportunity). Although several of the predicted Creemers' components did not exhibit associations for socio-economic status, this outcome does not mean that the associations do not exist. It merely suggests that the predicted components were not directly affecting achievement in the current study.

Similarly, significant factors associated with reading literacy were found mostly at learner level, but this does not mean that the existence of teacher- and school-level

factors is not of importance. While some explanatory factors at learner level could more easily become the target of reading interventions, the higher-level effect of the classroom and school is not diminished by this study.

The PIRLS 2006 data did not necessarily capture educationally and statistically significant factors, as conceptualised by Creemers, which are at play at learner and school level in order to explain reading achievement scores sufficiently in a South African context. While more statistically significant factors were found for the Afrikaans and English language groupings, this significance might be reflective of the European (or predominantly Western) background of these learners who took part in a conceptualised and designed study that is also based on European (or Western) ideals. With regard to an African school context, the Southern and Eastern African Consortium for the Monitoring of Educational Quality (SACMEQ) study makes provision for such a context (e.g. asking teachers to comment on the availability of resources such as mud walls and thatched roofs typically found in many African communities). Multilevel modelling of data could prove useful with the use of a data source which takes these unique contextual aspects into account, thereby improving cross-national and regional validity in studies of this nature. While PIRLS is highly regarded for its methodological rigour and quality assurance procedures in its attempt to assure accurate and reliable estimates, the South African study might benefit from improved indicators in its questionnaires which takes account of the developing nature of many schools and social and linguistic complexities that are different from developed and often highly functional systems.

In the absence of discernible reading effectiveness models that could explain reading achievement in a developing context adequately in relation to associated background factors, an adapted model suited to a South African schooling context is still needed. Such a model should take large variation between schools, as characteristically found in developing contexts, into account by following a holistic systems approach that would allow for complex relationships within and between learner and school levels. A systems theory approach could provide valuable theoretical insights, considering the nested structure of data of this nature. More specifically, at macro (or school) level, individual differences might become discernible when data are not handled at an aggregated (or pooled) level.

Improved indicators of context are perhaps needed for a developing context such as South Africa. It seems as if the current contextual data for African learners are insufficient and the recommendation is made that more variation is required for the model to be tested effectively, specifically because the variation for the African language groupings were limited within and across language groupings. Improved indicators could take the form of additional national-option questions to become part of the contextual questionnaires responded to by learners, parents, teachers and school principals. National-option questions allow for individual countries to pose questions to respondents that are of national interest and the development of contextual questionnaires are included in addition to international questions asked

across all participating countries. Additional indicators of time spent on reading might be needed, where current indicators only provide evidence of reported time spent on reading, but not of how the time is productively spent. Similarly, indicators exist on whether teachers create opportunities for learners to read, but evidence for how these opportunities are used is lacking. Lastly, future national-option questions for the South African PIRLS study might have to include more detailed aspects of the socio-economic state with regard to the rising prevalence of HIV and Aids, child-headed households and dependence on social grants as a means of economic survival, as these not only serve as proxy for socio-economic status, but could also be mediators of learners' educational experiences and exposure to quality education.

Reflections on the conceptual framework used in this study and the study of PIRLS 2006 data to adequately mimic the components as specified by Creemers, invite the following question: How should the model change to suit the South African landscape more adequately? Perhaps modifications should be explored rather than confirmed, since use of the South African PIRLS 2006 data source to capture the essence of Creemers' components has often resulted in the elimination of or adaptation to factors that did not show high factor loadings. Therefore, an exploratory approach might be warranted when dealing with contextual data and South Africa's 11 official languages. Such an approach might be more appropriate when working with African languages. African languages might have to be treated separately in future research, since aggregation could lead to the identification and significance of some factors becoming hidden from the framework.

The conceptual reflections in this study are made against a stark reality that has since been confirmed by the results of the South African PIRLS 2011 study. Grade 5 learners in South African primary schools who participated in PIRLS 2006 were not able to achieve satisfactory levels of reading competence. The gravity of this finding was exacerbated by the fact that these learners were tested in the language in which they had been receiving instruction during the Foundation Phase of schooling.

The cultivation of a passion for reading, a culture of reading in South African households, classrooms and schools, and the continual monitoring of reading achievement remain imperatives for the South African schooling system in years to come. The importance of a reading literate country is emphasised by Mullis *et al.* (2007:15) in the introduction of the PIRLS 2006 International Report:

> *In today's information society, the ability to read is essential for maximizing success in the endeavours of daily life, continuing intellectual growth, and realizing personal potential. Similarly, a literate citizen is vital to a nation's social growth and economic prosperity.*

The ultimate cost of an illiterate population for whom reading is inaccessible and unvalued includes dire life-long economic and social consequences, both for the individual and communities.

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