Exploring Ways to Enhance Reporting TIMSS and PIRLS Background Data by Developing an Indicator of Effective School Environments for Learning to Read

Corinna Preuschoff, preuscho@bc.edu
Michael O. Martin, martinas@bc.edu
Ina V.S. Mullis, mullis@bc.edu
TIMSS & PIRLS International Study Center, Boston College

Abstract

As an extension of the effort devoted to expanding and updating the questionnaires for TIMSS and PIRLS 2011, this research uses data from PIRLS 2006 to explore a new reporting strategy for contextual questionnaire data for the 2011 international reports. This research delves into the possibility of capitalizing on the extensive student, parent, teacher, and school information in the *PIRLS 2006 International Database* to develop a robust international indicator of *Effective School Environments for Learning to Read*. Briefly, the *PIRLS 2011 Contextual Framework* describes the attributes of effective schools; these descriptions were used to identify variables from the 2006 questionnaires that address these attributes. These questionnaire data were recoded into a series of items suitable for creating a scale for the construct, *Effective School Environments for Learning to Read*. The items were scaled using 1-Parameter IRT (Rasch) scaling, and three regions of the scale described in terms of the content of the original questions. Finally, country performance on the indicator of *Effective School Environments for Learning to Read* was reported, providing the opportunity to compare learning environments against international standards on a global level.

Keywords: *International Indicators, Rasch scaling, Effective School Environments*

Introduction

IEA's Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS) are ambitious international large-scale assessment studies designed to provide information to education policy makers and practitioners by linking student achievement in mathematics and science (TIMSS) and reading (PIRLS) to the contexts in which learning takes place. For this purpose, TIMSS and PIRLS collect an extensive array of contextual background information from students, their parents, teachers, and school principals via questionnaires. Over the years, contextual background data

from TIMSS and PIRLS have had an impact on educational reform and development efforts worldwide. Given this important role in informing education policy and practice, TIMSS and PIRLS constantly seek to provide high-quality measures of background contexts for learning, and report these in a way that is easy to access and interpret.

TIMSS has been conducted on a four-year cycle since 1995, and PIRLS every five years since 2001. In 2011, TIMSS and PIRLS will be assessed together for the first time, with more than 40 countries planning to test the same students at the fourth grade. Conducting IEA's international trend assessments of reading, mathematics, and science achievement together in 2011 provided an impetus for updating and expanding the contextual frameworks and background questionnaires in a joint effort involving both studies. The updating effort focused on improving the relevance of the TIMSS and PIRLS contextual background data by collecting information about factors shown in the literature to be related to effective schooling and student achievement.

With the TIMSS 2011 and PIRLS 2011 assessment frameworks (Mullis, Martin, Ruddock, O'Sullivan, & Preuschoff, 2009; Mullis, Martin, Kennedy, Trong, & Sainsbury, 2009) published and the questionnaires soon to be finalized for the main data collection in 2011, the focus of this research is on exploring a new reporting strategy for contextual background data in TIMSS and PIRLS. The intention is to take as an example the construct, *Effective School Environments for Learning to Read*, and bring to bear all possible information in the *PIRLS 2006 International Database* (Foy & Kennedy, 2007) to develop a comprehensive indicator that can be used to compare across countries. This indicator will summarize large amounts of contextual information on a single scale, while describing regions of the scale in terms of questionnaire responses that map into these regions.

Reporting Contextual Questionnaire Data in TIMSS and PIRLS

Since the inception of TIMSS and PIRLS, data on the educational contexts for learning have been routinely published in the international reports (Mullis, Martin, & Foy, 2008; Martin, Mullis, & Foy, 2008). The many exhibits in the international reports have summarized how responses to questions in questionnaires were distributed within and across countries and how these contextual variables were related to achievement. Typically, either the response categories to the questions were reported directly, or they were combined in some logical way and the percentage of students responding in each category was reported, together with mean achievement.

The international reports also included indices that combined information on sets of questions to measure various constructs, such as school climate or attitudes toward mathematics, with a strong focus on effective contexts for learning. As presented in the international reports, these indices were composite variables that assigned students to one of three levels—high, medium, and low—on the basis of responses to a series of component variables. For each index, the high category was defined in terms of the student responses (or the responses of teachers or school principals) expected to be most characteristic of a supportive learning environment, whereas the low category was defined in terms of the responses expected to characterize the least supportive learning environment. The scales underlying the TIMSS and PIRLS indices are constructed by simply averaging the responses to sets of questionnaire items, an approach with the advantage over more complex scaling models of having a straightforward interpretation so long as the number of component questions is relatively small and homogeneous.

Though the indices have proven very useful in summarizing background questionnaire data in TIMSS and PIRLS, they focus on quite specific areas of the framework. A more global perspective could be gained by combining diverse sets of items into a single indicator, providing a comprehensive view of the contexts in which students learn. This would also enable a large amount of information to be summarized concisely.

Using Rasch Models to Scale Questionnaire Data

Two other ongoing international assessments share important objectives with TIMSS and PIRLS: IEA's International Civics and Citizenship Education Study (ICCS) and OECD's Program for International Student Assessment (PISA). Both assessments collect a considerable amount of information via questionnaires, in addition to administering achievement tests. Both studies have also developed reporting strategies for background questionnaire data using Rasch scaling. These approaches offer a starting point for developing a new approach to reporting TIMSS and PIRLS background questionnaire data, capitalizing on the strengths of Rasch measurement. PISA, and the ICCS predecessor CIVED, both use the 1-Parameter IRT (Rasch) measurement model to scale dichotomous questionnaire items and its generalization the Partial Credit Model to scale polytomous questionnaire items. In addition to reporting average scale scores, both studies provide information on how these scales could be interpreted in reference to the original component questions, supported by graphical displays (Schulz & Sibberns, 2004; OECD, 2008).

One strength of Rasch scaling for questionnaire data is that both item responses to questions on the questionnaires and respondents can be mapped onto the same unidimensional scale, enabling a detailed content-referenced description of the scale. The scales can then be presented graphically as student/item distribution maps, often referred to as a Wright Maps in the literature. If the scaled item thresholds shown on the Wright Map are paired with item content, a substantive content-referenced interpretation of the scales can then be derived (see Wilson, 2005).

Dichotomously scored questionnaire items are mapped on the scale by their scaled threshold parameters, which are the points on the scale where choosing the higher (more desirable) category becomes more likely than choosing the lower category (less desirable). Levels of polytomous items are mapped to the same scale by their cumulative threshold parameters (Masters & Wright, 1997), which provide an estimate of the point on the underlying scale where it becomes more likely ($p>.05$) to respond to a particular category, or higher, than to respond in a lower category. Cumulative thresholds are parallel in interpretation to scaled threshold parameters for dichotomously scored items and have shown to be useful for developing descriptions of Rasch scales (for example, Fraillon, 2008).

Developing an Indicator of Effective School Environments for Learning to Read Based on the PIRLS 2011 Framework

The *PIRLS 2011 Contextual Framework* summarizes factors expected to be useful in characterizing the construct, *Effective School Environments for Learning to Read*, based on findings from previous cycles of PIRLS and extensive literature reviews. From the most recently completed PIRLS assessment, the *PIRLS 2006 International Database* provides responses of students, their parents, teachers, and school principals to approximately 400 questions that address many of the aspects of effective contexts for learning documented in the 2011 framework. The 2006 data do not perfectly address all aspects of effective contexts for learning specified in the 2011 framework. However, the Background Questionnaires for 2006 measure the Contextual Framework for 2011 quite well.

Developing a Construct Map from PIRLS 2011 Contextual Framework

Figure 1 displays the construct map[1] for *Effective School Environments for Learning to Read* developed through a detailed content analysis of the *PIRLS 2011 Contextual Framework*. The purpose of this construct map is to structure the indicator development by providing a

[1] See Wilson (2005) for a detailed description of construct maps.

graphical representation of the conceptual definition of the construct. The construct map focuses on two extremes of the continuum underlying the construct—most supportive school environment and least supportive school environment. The construct map displays two aspects of the construct: expected characteristics of respondents and their learning environments displayed on the left and statements that respondents with these characteristics would be expected to endorse on the right.

-Insert Figure 1 here-

According to the *PIRLS 2011 Contextual Framework*, as displayed in Figure 1, students in the most effective school environment for learning to read are expected to be in schools that contain a student population ready to learn, are organized effectively for instruction, have a positive school climate, have high quality resources available, and encourage parental engagement. Conversely, students in the least supportive school environment are expected to be in schools with a student population not ready to learn, that are not organized effectively for instruction, that do not have a positive school climate, have few resources, and do not encourage parental engagement. These characteristics are made more explicit through the series of statements that respondents with the characteristics would be expected to endorse. For example, principals of students in the most effective schools are expected to agree that these schools are located in neighborhoods that do well economically, with many students from families that are well off economically, and their students have good learning prerequisites, in terms of early literacy skills. On the contrary, principals of the least effective schools are expected to disagree with these statements.

Identifying Items from the PIRLS 2006 International Database

Based on a detailed review of the questions in the PIRLS 2006 questionnaires, items were identified that addressed as many of the statements on the right side of the construct map as possible. Overall, there were 85 items that addressed aspects of the construct, *Effective School Environments for Learning to Read*, including a number of existing PIRLS 2006 indices. Most of these items were from the School Questionnaire, but there were also items from the Student, Home, and Teacher Questionnaires. In addition, a number of new composite variables were constructed.

The construct map provides a directional representation of the construct, with more effective learning environments and higher student achievement at one extreme, and less effective learning environments and lower student achievement at the other. To ensure that the direction of the items was consistent with the direction of the construct map, the following steps were

undertaken:

1) Items were reverse coded if necessary;

2) Open-response items (e.g., number of computers) were condensed to a small number of ordered categories. The categories were chosen based on the relationship with achievement and judgments as to which attributes could be expected to most effectively describe different qualitative levels of the construct;

3) Adjacent categories were sometimes collapsed based on the relationship with achievement and judgments as to which categories could be expected to most effectively describe different qualitative levels of the construct;

4) Items not related to achievement were eliminated unless they addressed content that was unique and important for measuring the construct.

The item development effort resulted in 25 scalable items to be summarized in the indicator of *Effective School Environments for Learning to Read*. These included 17 items reported by school principals, 3 by parents, 2 by students, and 3 by teachers. Of the total 25 items, 8 were individual questions that had been recoded or had categories collapsed; 8 were composite variables already available in the *PIRLS 2006 International Database* (some of these with modifications), and 9 were new composite variables constructed specifically for this analysis.

Constructing a Scale for Effective School Environments for Learning to Read

This research used the 1-Parameter IRT (Rasch) scaling model, and its generalization for polytomous items, the Partial Credit Model (Masters, 1982), to create a scale for *Effective School Environments for Learning to Read*. Before attempting to construct a scale, a factor analysis was conducted to investigate the dimensionality of the items. This analysis revealed that most of the items, 17 of 25, loaded on a single factor. Upon inspection, the items with low loadings were considered not to be essential to the construct and so were not included in the scaling.

The remaining 17 items accounted for 18% of the variance of the underlying factor, with content spanning across the range of the construct map. Of the 17 items, 2 addressed the aspect of a student population ready to learn, 2 addressed effective organization for instruction, 8 school climate, 2 availability of resources, and 3 parental engagement. A complete list of all the questionnaire items included in the scaling analysis and their associated response categories is provided in Table A.1.

The Rasch scaling analysis was conducted using the ConQuest 2.0 Generalized Item Response Modeling software (Wu, Adams, Wilson, & Haldane, 2007). The scaling was implemented using data from the 40 countries that participated in PIRLS 2006, providing a sample of approximately 200,000 students. Students were weighted so that each country contributed equally to the estimation of item parameters. Individual student scores on the scale were derived using the maximum likelihood procedure implemented in ConQuest. To facilitate interpretation, the logit scores produced by ConQuest, which have a mean of approximately zero and a standard deviation close to 1, were transformed into an international metric with a mean of 10 and a standard deviation of 2.

Figure 2 shows the calibrated student/item distribution map (Wright Map) for the scale, *Effective School Environments for Learning to Read*. Students and items are displayed on the same scale, with the distribution of students shown on the left, and the location of items on the right. The location of each item number corresponds to its cumulative threshold parameter. For dichotomous items, the item number is shown. For polytomous items, the item numbers have suffixes ".1" and ".2", corresponding to specific categories. For example, item 2 ("Principals' Reports on Percentage of Students with Early Literacy Skills") has 3 categories (0 = Less than 25%; 1 = 25-50%; 2 = More than 50%). Item 2.2 on the map is the threshold for the students whose principals reported that more than 50% of students in a school had early literacy skills when they first started school, a response likely to be given only by principals of highly effective schools. Item 2.1 is the threshold for the response that that 25-50% of students in a school had early literacy skills. Although not as high as item 2.2., this response is still high on the scale. The "0" category of each item serves as reference category and does not appear on the Wright Map. The full list of items with item numbers, and suffixes is provided in Appendix A.1.

-Insert Figure 2 here-

Table 1 provides the average score and standard deviation for each country on the scale for *Effective School Environments for Learning to Read*. Standard errors also are shown. As might be expected, countries varied widely in their average location on the scale, from Iceland, the United States, Denmark, New Zealand, and Singapore, with average scale scores more than one standard deviation above the international mean, to South Africa and Morocco, with average scale scores more than one standard deviation below.

-Insert Table 1 here-

Describing the Scale for Effective School Environments for Learning to Read

To facilitate reporting, the scale for *Effective School Environments for Learning to Read* was divided into three regions: High Region = Top Quarter (75% percentile or above); Medium Region = between 25th and 75th percentiles; and Low Region = Bottom Quarter (25th percentile or below).

Table 2 describes the three regions of the scale in terms of aspects of the construct map addressed and where each questionnaire response is located. In summary:

High Region: Students are likely to be in schools where most students are from homes that are well-off economically and begin primary school well prepared with respect to their literacy skills. Principals report that students in this region have teachers with very high expectations of their students and teachers are very satisfied with their jobs. Principals also report that students have a very strong desire to do well in school. Schools are well equipped with libraries, books and other resources, and parents are strong supporters of their children's achievement.

Medium Region: Students are likely to be taught complex reading skills (integrating and interpreting) by 2nd grade. Their teachers are generally satisfied with their careers, though not with their job. Students have high regard for school property and are unlikely to show violent behavior, although classroom behaviors (e.g., noise, disruption, cheating) may present problems. Shortages of resources for instruction are rare, and parents are likely to engage in school activities if the opportunity is provided.

Low Region: Students are likely to attend schools where relatively few students well off economically. Basic reading skills are taught by the first grade, but complex reading skills relatively later. Teachers do not have very high job satisfaction, do not have very high expectations of their students, and report that students do not have a strong desire to do well in school. Students do not show much regard for school property, and absenteeism and violent behavior may be a problem. The school may have a small library, but generally resources are sparse. Though schools may provide the opportunity for parents to get involved in school activities, only few parents actually participate. Parents do not strongly support their children's achievement.

-Insert Table 2 here-

Reporting Differences across Countries on the Scale for Effective School Environments for Learning to Read

Table 3 provides the percentage of students in the high, medium, and low regions of the scale for each country, together with average reading achievement. There was considerable variation in the distribution of students across the three regions from country to country. Five countries had more than half of the students in the high region of the scale—Iceland (72%), United States (61%), Singapore (60%), Denmark (57%), and New Zealand (56%). At the other extreme, there were five countries with more than half of the students in the low region of the scale. These were South Africa (71%), Morocco (63%), Moldova (56%), Trinidad and Tobago (53%), and the Slovak Republic (53%).

-Insert Table 3 here-

Overall, the scale constructed for *Effective School Environments for Learning to Read* has a strong relationship with achievement. On average across countries, students in the high region of the scale scored 524 points on the PIRLS reading test, compared to an average of 500 for students in the medium region, and an average of 477 for students in the low region. The difference in average reading achievement between students at the high region and low region of the scale was largest in South Africa (239 points) and smallest in Slovenia and Georgia, where there was almost no difference in the achievement of students in more effective and less effective learning environments

To demonstrate the relationship across countries between reading achievement and school environments, Figure 3 plots average reading achievement in each country against the country average on the scale. Although it is possible to fit a linear regression line to these data (which explains 34% of the variance), the relationship is not strictly linear, and many countries deviate substantially from this best-fit line. Figure 3 shows that countries with higher average scores on the *Effective School Environment* scale (above the international scale average of 10 points) also had higher average reading achievement on PIRLS 2006 (at or above the PIRLS scale average of 500 points). However, countries with average scores below the international average on the *Effective School Environment* scale had a much wider range of average reading achievement.

-Insert Figure 3 here-

Conclusions

This study has shown that it is possible to combine large amounts of contextual questionnaire data into a broad summary scale that provides useful, policy relevant information. This indicator allows countries to benchmark the state of their schools against an international standard for effective school environments and identify areas for further research. It shows that good school environments have many characteristics expected to be supportive for learning, and also are associated with high reading achievement.

From a measurement perspective, the scale worked quite well. That is, it was sufficiently unidimensional and the items conformed relatively well to the Rasch model. Also, the scale was strongly related to students' reading achievement, an aspect of validity, and the items conformed to the direction of the construct map as expected—positive attributes (e.g., early literacy skills) were found to be high on the scale and negative attributes (e.g., violent behaviors) to be low on the scale.

References

Foy, P., & Kennedy, A.M. (2007). *PIRLS 2006 user guide for the international database*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Fraillon, J. (2008). Constructing a described achievement scale for the International Civic and Citizenship Education Study. Paper prepared for IEA International Research Conference in Taipei, Chinese Taipei, September 16-20, 2008.

Masters, G.N. (1982). A Rasch model for partial credit scoring. *Psychometrik*a, 47(2), 149-174.

Masters, G.N., & Wright, B.D. (1997). The Partial Credit Model. In: M.J. van de Linden & R.K. Hambleton (Eds.). *Handbook of modern item response theory*. Berlin: Springer.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report: IEA's Progress in International Reading Literacy Study in primary school in 40 countries.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., Trong, K., & Sainsbury, M. (2009). *PIRLS 2011 assessment framework*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O'Sullivan, C.Y., Preuschoff, C. (2009). TIMSS *2011 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

OECD (2008): *PISA 2006 technical report*. Paris: Author.

Schulz, W. & Sibberns, H. (2004). *IEA Civic Education Study-Technical Report*. Amsterdam: IEA.

Wilson, M. (2005). Constructing measures – An item response modeling approach. New York: Psychology Press.

-Insert Table A.1 here-

Figure 1 Construct Map for Effective School Environments for Learning to Read—PIRLS 2011 Frameworks

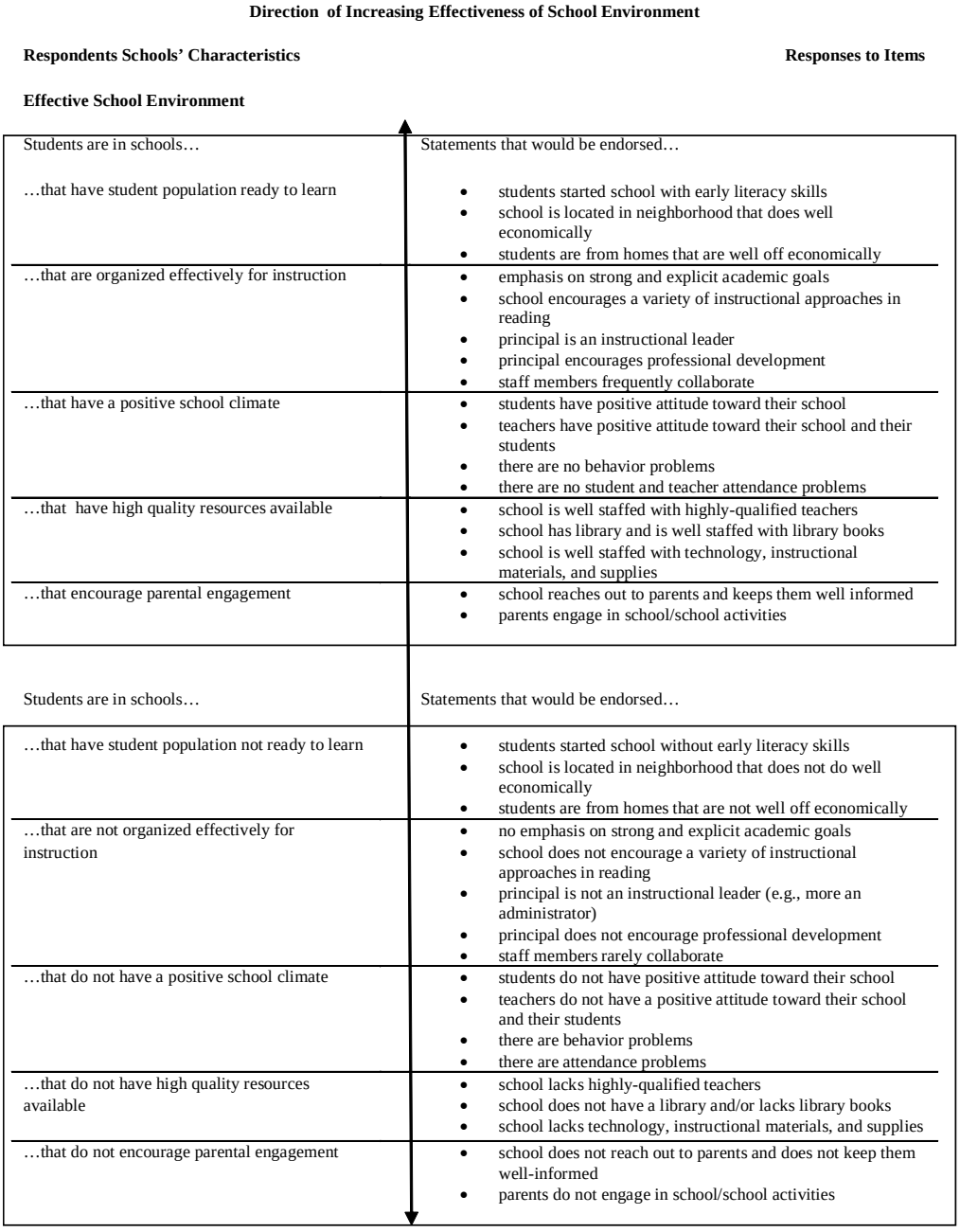

Figure 2 Effective School Environments for Learning to Read, PIRLS 2006 (Fourth Grade)

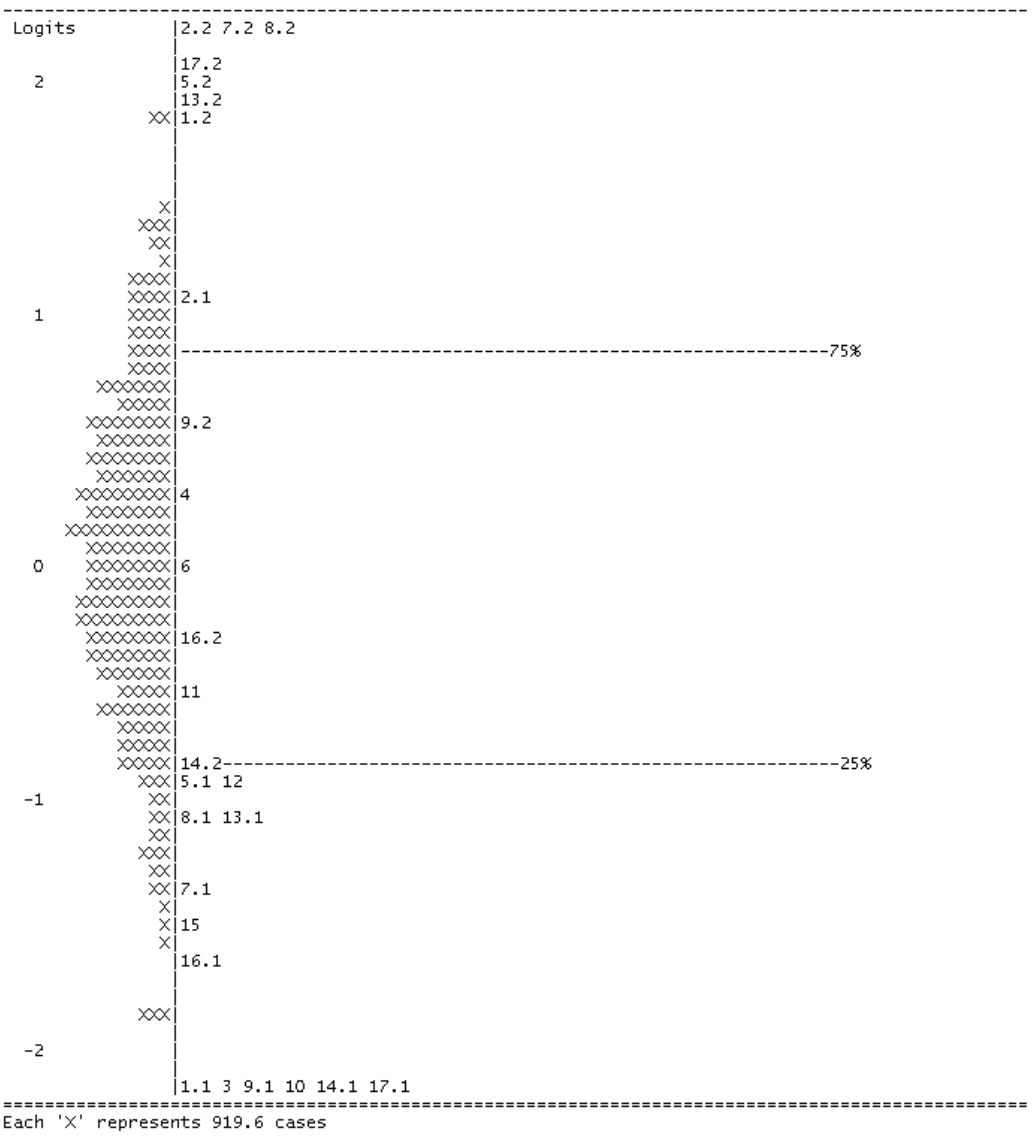

Table 1 Effective School Environments for Learning to Read - Scale Scores

PIRLS 2006
4th Grade

Countries	International Metric Average Score		International Metric Standard Deviation	
Iceland	13.1	(0.01)	2.08	(0.01)
United States	12.5	(0.23)	2.65	(0.12)
Denmark	12.0	(0.17)	2.11	(0.16)
New Zealand	12.0	(0.17)	2.37	(0.12)
Singapore	12.0	(0.02)	1.81	(0.02)
England	11.8	(0.18)	2.73	(0.14)
Scotland	11.4	(0.17)	1.96	(0.11)
Chinese Taipei	11.1	(0.13)	1.47	(0.09)
Sweden	11.0	(0.17)	1.82	(0.12)
Belgium (French)	11.0	(0.21)	2.35	(0.12)
Norway	11.0	(0.17)	1.80	(0.11)
Spain	10.8	(0.17)	2.18	(0.12)
Israel	10.8	(0.18)	2.34	(0.14)
Hong Kong	10.7	(0.15)	1.93	(0.12)
Russian Federation	10.3	(0.10)	1.58	(0.08)
Belgium (Flemish)	10.2	(0.12)	1.47	(0.09)
Austria	10.2	(0.15)	1.84	(0.14)
France	10.0	(0.17)	2.20	(0.14)
International Average	10.0	(0.03)	2.00	(0.02)
Netherlands	10.0	(0.14)	1.64	(0.11)
Slovenia	9.8	(0.14)	1.55	(0.09)
Italy	9.8	(0.15)	1.85	(0.12)
Germany	9.8	(0.11)	1.98	(0.10)
Georgia	9.6	(0.16)	1.84	(0.10)
Latvia	9.5	(0.14)	1.87	(0.10)
Macedonia, Rep. of	9.4	(0.15)	1.83	(0.11)
Poland	9.4	(0.14)	1.61	(0.11)
Hungary	9.2	(0.14)	1.73	(0.13)
Lithuania	9.1	(0.15)	1.81	(0.11)
Indonesia	9.0	(0.14)	1.75	(0.15)
Iran, Islamic Rep. of	9.0	(0.13)	1.96	(0.12)
Qatar	8.9	(0.01)	1.92	(0.00)
Kuwait	8.9	(0.16)	2.07	(0.10)
Romania	8.9	(0.19)	2.11	(0.15)
Bulgaria	8.5	(0.19)	2.30	(0.13)
Trinidad and Tobago	8.4	(0.18)	2.26	(0.17)
Slovak Republic	8.3	(0.15)	1.80	(0.10)
Moldova, Rep. of	8.3	(0.16)	1.74	(0.10)
South Africa	7.5	(0.18)	2.78	(0.19)
Morocco	6.8	(0.24)	2.86	(0.16)
Luxembourg[1]	-	-	-	-

() Standard errors appear in parentheses

A dash (-) indicates comparable data are not available.

[1]Insufficient data to report because school questionnaire was not administered.

Table 2 Effective School Environments for Learning to Read—Description of the Scale PIRLS 2006 , 4th Grade

Aspect of the Construct Map	Region of the Scale High Region (75th Percentile and Above)	Medium Region (Between 25th and 75th Percentile)	Low Region (25th Percentile and Below)
Students are in schools that have a student population ready to learn	Most students are from homes that are well-off economically (1.2) Many students enter school with early literacy skills (2.1,2.2)		Only some students are from homes that are well-off economically (1.1)
Students are in schools that are organized effectively for instruction		Inferencing and interpreting texts is emphasis in second grade (at least two grades below target grade) (4)	Basic reading skills are emphasis in first grade (three grades below target grade) (3)
Students are in schools that have a positive school climate	Teachers have very high job satisfaction (5.2) Teachers have very high expectations of student achievement (7.2) Students do have a very strong desire to do well in school (8.2)	Teachers are satisfied with their career in general (6) Students have high regard for school property (9.2) Classroom behaviors may become a problem (11)	Teachers do not have very high job satisfaction (5.1) Teachers do not have very high expectations of student achievement (7.1) Students do not have strong desire to do well in school (8.1) Students do not have much regard for school property (9.1) Violent behaviors may become a problem (12) Absenteeism may become a problem (10)
Students are schools that have high quality resources	School has library with more than 2,000 books (13.2)	No shortages (14.2)	School may have library, but with 2,0000 books or less (13.1) Shortage of resources may become a problem (14.1)
Students are in schools that encourage parental engagement	Parents have strong support for student achievement (17.2)	Most parents engage in school (16.2)	School provides events/information (15) Some parents are engaged in school (16.1) Parents do not have strong support for student achievement (17.1)

Table 3 Distribution of Effective School Environments for Learning to Read									PIRLS 2006 4th Grade			
	High Region				Medium Region				Low Region			
Countries	2006 Percent of Students		Average Achievement		2006 Percent of Students		Average Achievement		2006 Percent of Students		Average Achievement	
Iceland	72	(0.4)	513	(1.5)	28	(0.4)	505	(1.9)	-	-	-	-
United States	61	(4.3)	554	(3.3)	34	(3.7)	522	(4.3)	5	(1.6)	491	(9.8)
Singapore	60	(1.3)	564	(3.5)	38	(1.3)	551	(5.7)	2	(0.4)	523	(23.7)
Denmark	57	(4.4)	555	(2.8)	39	(4.4)	537	(4.3)	4	(1.6)	524	(8.5)
New Zealand	56	(3.3)	545	(3.0)	39	(3.2)	521	(4.6)	5	(1.6)	480	(12.1)
England	47	(3.5)	563	(4.0)	46	(3.9)	524	(4.7)	7	(2.0)	498	(9.5)
Belgium (French)	43	(4.7)	509	(4.5)	43	(4.7)	502	(3.4)	14	(3.1)	465	(6.1)
Scotland	43	(4.2)	538	(4.6)	53	(4.2)	519	(4.0)	4	(1.7)	522	(16.4)
Chinese Taipei	38	(4.3)	538	(3.3)	59	(4.5)	535	(2.4)	3	(1.5)	517	(8.4)
Spain	37	(3.5)	526	(3.2)	49	(3.7)	512	(3.3)	14	(2.7)	480	(9.4)
Israel	37	(3.9)	541	(7.1)	50	(4.2)	509	(6.5)	14	(2.9)	448	(17.4)
Sweden	36	(3.9)	555	(3.4)	59	(3.9)	548	(2.7)	5	(1.8)	526	(6.5)
Norway	34	(4.6)	500	(4.8)	61	(4.9)	497	(3.2)	5	(1.8)	494	(3.3)
Russian Federation	24	(3.4)	585	(5.8)	66	(3.0)	563	(3.7)	9	(1.9)	525	(9.2)
International Average	24	(0.5)	524	(1.5)	51	(0.6)	500	(0.8)	25	(0.5)	477	(1.4)
France	24	(3.5)	539	(2.8)	53	(4.2)	528	(3.0)	23	(3.5)	492	(3.7)
Hong Kong	24	(3.3)	574	(4.0)	67	(3.8)	563	(3.1)	9	(2.6)	548	(6.8)
Austria	23	(3.1)	552	(3.5)	62	(4.0)	538	(3.2)	15	(3.1)	520	(5.1)
Germany	19	(2.4)	559	(4.3)	58	(3.3)	553	(2.9)	23	(2.7)	524	(4.6)
Italy	18	(2.7)	561	(6.4)	58	(3.9)	555	(3.7)	24	(3.7)	537	(6.3)
Belgium (Flemish)	18	(3.4)	555	(3.3)	70	(4.0)	549	(2.1)	12	(2.9)	524	(5.6)
Georgia	17	(3.0)	477	(5.9)	54	(4.2)	468	(4.7)	29	(4.6)	472	(7.5)
Slovenia	15	(3.1)	521	(6.3)	66	(3.9)	522	(2.5)	19	(3.1)	521	(4.4)
Netherlands	14	(2.9)	550	(4.4)	71	(3.9)	550	(1.8)	15	(2.7)	529	(5.6)
Latvia	14	(2.0)	561	(6.5)	55	(3.9)	543	(2.6)	31	(3.6)	529	(5.0)
Bulgaria	11	(2.5)	577	(8.1)	38	(4.0)	559	(5.9)	51	(4.4)	532	(6.7)
Qatar	10	(0.1)	386	(3.5)	46	(0.2)	357	(1.6)	43	(0.2)	342	(1.9)
Lithuania	10	(2.6)	555	(6.1)	50	(3.9)	535	(2.2)	40	(4.0)	535	(3.1)
Poland	9	(2.4)	524	(7.6)	65	(3.9)	522	(3.4)	26	(3.6)	511	(3.8)
Kuwait	8	(2.2)	326	(19.3)	51	(4.1)	343	(6.0)	41	(4.0)	314	(6.8)
Hungary	8	(2.3)	570	(14.2)	66	(4.2)	557	(3.2)	26	(3.7)	529	(7.1)
Romania	8	(2.7)	538	(7.1)	47	(4.2)	503	(5.4)	45	(4.2)	467	(7.0)
South Africa	8	(1.5)	519	(23.8)	22	(2.7)	294	(15.1)	71	(3.1)	280	(5.0)
Trinidad and Tobago	8	(2.2)	524	(14.3)	39	(4.6)	455	(6.6)	53	(4.3)	408	(6.8)
Indonesia	7	(2.2)	423	(19.3)	54	(4.0)	407	(5.8)	39	(4.1)	398	(6.3)
Macedonia, Rep. of	7	(2.1)	496	(16.8)	62	(4.6)	452	(6.7)	30	(4.3)	410	(9.0)
Iran, Islamic Rep. of	7	(1.6)	492	(9.4)	56	(3.8)	432	(4.6)	37	(3.6)	391	(6.2)
Slovak Republic	4	(1.6)	557	(9.2)	43	(3.8)	543	(3.1)	53	(4.0)	519	(4.4)
Moldova, Rep. of	4	(1.6)	491	(12.1)	40	(4.3)	506	(5.0)	56	(4.4)	496	(4.0)
Morocco	1	(0.9)	421	(15.6)	35	(4.2)	330	(10.3)	63	(4.0)	316	(8.2)
Luxembourg[1]	-	-	-	-	-	-	-	-	-	-	-	-

() Standard errors appear in parentheses. A dash (-) indicates comparable data are not available.

[1]Insufficient data to report because school questionnaire was not administered.

Figure 3 Average Reading Achievement and Effective School Environments for Learning to Read, PIRLS 2006 (Fourth Grade)

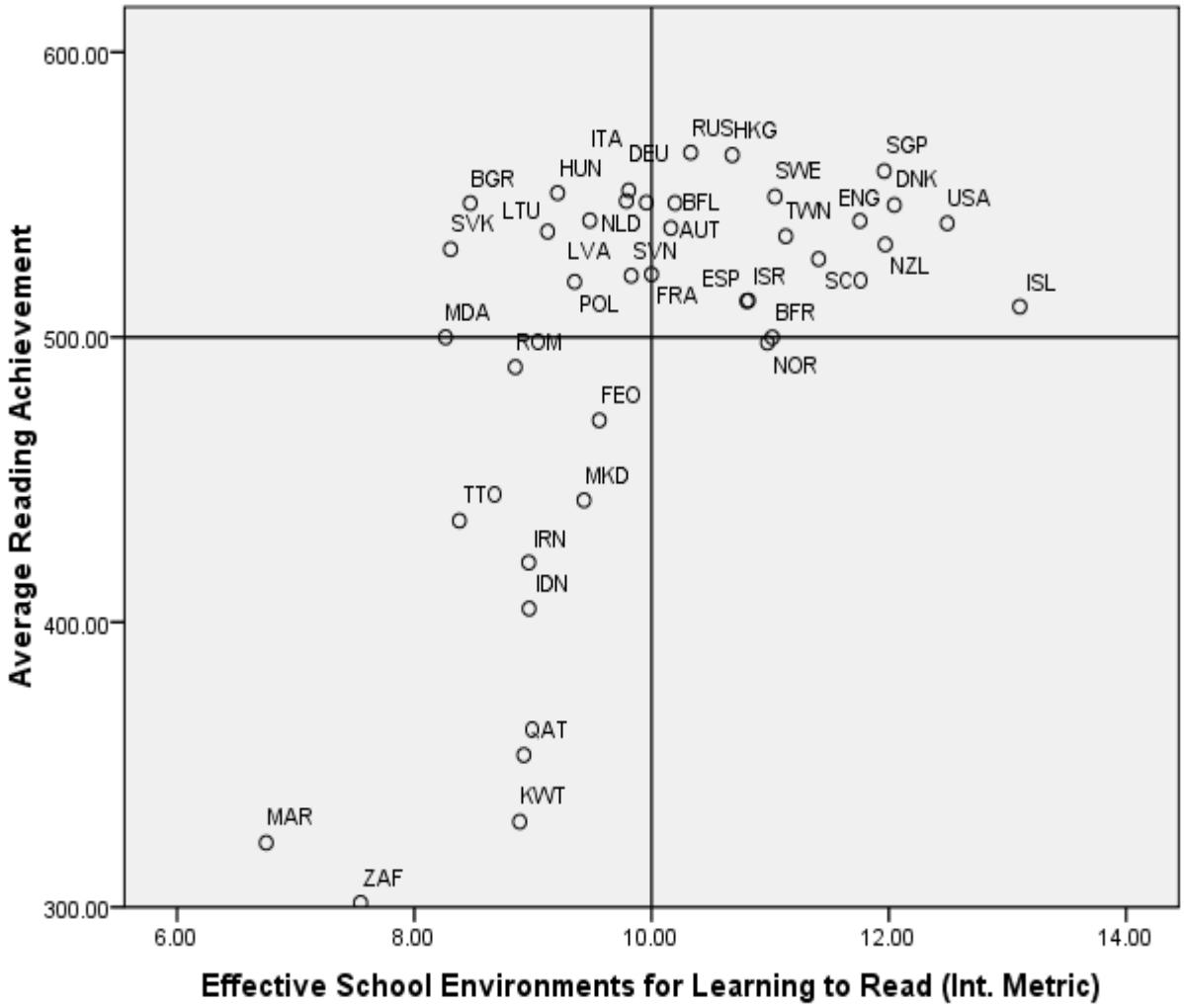

Table A.1 Effective School Environments for Learning to Read—Scale Items		PIRLS 2006 , 4th Grade
ASPECT OF THE CONSTRUCT MAP	**ITEM**	**SCORES**
Students are in Schools that have a Student Population Ready to Learn	1. Index of Economic Well-being of Student Population	0 = All or Some Students Receive Free or Reduced Price Lunch; More than 25% from Disadvantaged Homes; Less than 25% from Advantaged Homes 1 = All other combinations 2 = No Students Receive Free or Reduced Price Lunch; More than 25% from Disadvantaged Homes; Less than 25% from Advantaged Homes
	2. Principals' Reports on Percentage of Students Entering School with Early Literacy Skills	0 = Less than 25%; 1 = 25-50%; 2 = More than 50%
Students are in Schools that are Organized Effectively for Instruction	3. Principals' Reports on Basic Reading Skills being Major Emphasis	0 = Skills Emphasis Two Grades Below Target Grade or Later; 1 = Skills Emphasis Three Grades Below Target Grade or Earlier
	4. Principals' Reports on Inferencing and Interpreting Texts being Major Emphasis	0 = Skills Emphasis One Grade Below Target Grade or Later; 1 = Skills Emphasis Two Grades Below Target Grade or Earlier
Students are in Schools that have a Positive School Climate	5. Principals' Reports on Teachers' Job Satisfaction	0 = Medium, Low, or Very Low; 1 = High; 2 = Very High
	6. Teacher Career Satisfaction	0 = Disagrees a lot or a little on average; 1 = Agrees a lot or a little on average
	7. Principals' Reports of Teachers' Expectations for Student Achievement	0 = Medium, Low, or Very Low; 1 = High; 2 = Very High
	8. Principals' Perception of Students' Desire to Do Well in School	0 = Medium, Low, or Very Low; 1 = High; 2 = Very High
	9. Principals' Perception of Students' Regard for School Property	0 = Low or Very Low; 1 = Medium; 2 = Very High or High
	10. Principals' Reports on Student Tardiness and Absenteeism	0 = Moderate Problem or Serious Problem; 1 = Minor Problem or Not a Problem
	11. Principals' Reports on Classroom Behaviors	0 = Moderate Problem or Serious Problem; 1 = Minor Problem or Not a Problem
	12. Principals' Reports on Violent Student Behaviors	0 = Moderate Problem or Serious Problem; 1 = Minor Problem or Not a Problem
Students are in Schools that Have High Quality Resources	13. Principals' Reports on Availability of School Library	0 = No School Library; 1 = School Library with 2,000 Books or Less; 2 = School Library with More than 2,000 Books
	14. Index of Availability of School Resources	0 = Some or A Lot of Shortages; 1 = A Little Shortages; 2 = No Shortages
Students are in Schools that Encourage Parental Engagement	15. Principals' Reports on Frequency of School's Outreach to Parents	0 = Events/Information Provided 2-3 Times a Year or Less 1 = Events/Information Provided 4 or More Times a Year
	16. Principals' Reports on Parental Engagement	0 = 0=10% of Parents are Engaged in School; 1 = 11-50% of Parents are Engaged in School; 2 = More than 50% of Parents are Engaged in School
	17. Principals' Reports on Parental Support for Student Achievement	0 = Low or Very Low; 1 = Medium; 2 = Very High or High