DETERMINANTS OF READING LITERACY IN INDUSTRIALIZED SOCIETIES

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Abstract

This study focuses on factors that cause differences in reading literacy skills in eleven industrialized societies with high economic status. An attempt is made to explain individual differences in the development of reading literacy skills in young children. For this study, data from the IEA Progress in International Reading Literacy Study (PIRLS 2001) are used. The countries included in the study are Germany, England, France, Iceland, Italy, The Netherlands, Norway, Scotland, Singapore, Sweden, and the United States. At the student level, context factors as well as intrinsic factors were studied. The purpose of the study is to advise policy makers, school principals, teachers and parents how to create a context in which the development of children's reading literacy skills can be optimized. The results show that the differences in reading literacy scores can be accounted for by various variables with respect to the child, the child's home, and the child's school. A more detailed paper including results of a multilevel analysis will be distributed during the conference.

INTRODUCTION

Reading literacy can be seen as one of the most important skills that children develop during primary school. In the IEA Progress in International Reading Literacy Study (PIRLS 2001), reading literacy was defined as "the ability to understand and use those written language forms required by society and/ or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers, and for enjoyment" (Campbell et al., 2001, p.3). With PIRLS, the IEA assessed how well students in thirty-five countries read and which factors were related to reading achievement. In the present study an attempt has been made to explain individual differences between students in industrialized societies on the basis of the PIRLS data. Three types of factors were

distinguished: Characteristics related to the child, the child's home and the child's school.

With respect to the child, earlier studies show that both cognitive and motivational factors affect the development of reading literacy skills. Guthrie et al., (1995) explored social, cognitive, and instructional connections between reading instruction and the amount and breadth of reading by students aged 9, 13 and 17. For 9-year-olds, amount and breadth of reading were associated with levels of social interaction surrounding reading (talking about reading and writing with friends and parents), cognitive strategies for reading (using a variety of approaches to comprehension), and teacher-directed instruction (for comprehending texts, learning new words, and studying efficiently). Guthrie and Anderson (1999) are convinced that reading is not merely a skill limited to an achievement in the cognitive domain. Reading is better understood as an engagement of the person in a conceptual and social world. This engagement perspective has consequences for education and people who have a stake in education as well as for researchers who mostly work in a decontextualized nature. The question arises whether schools and teachers can contribute to students' reading self-concept and attitudes towards reading. Verhoeven and Snow (2001) also demonstrated that literacy is influenced by the motivation of children to read. In seeking answers to the question of how a world of engaged readers can be created, the authors in this book focus on the affective side of literacy, the enjoyment that readers derive from reading, the motivations that impel them to learn to read and that impel them to spend time reading, the wide variety of social and cultural factors that influence motivation to read, and the array of forms that literacy can take and roles that it can play.

With respect to the child's home, socio-economic status (SES) together with access to reading materials are conducive to the development of children's reading literacy skills. Rowe (1991) concluded that regardless of family socio-economic status, age and gender, 'reading activity at home' had significant positive influences on measures of students' reading achievement, attitudes towards reading and even attentiveness in the classroom. This indicates that the opportunity to develop and practice attentiveness-demanding skills at home results in positive transference of similar skills to the classroom and that parents can contribute to the educational development of their children. Baker et al. (1997) reviewed literature on home and family influences on children's motivations for reading. Children's early experience with literacy has to be enjoyable and interactive. Parents' attitudes influence the point of view of their children. Older children who have more positive motivations toward reading have higher levels of reading achievement. For this reason, parents need to do all they can to ensure that children's early home lives afford opportunities to develop such motivations. Bergin (2001) focused on the quality of parent-child relationships during beginning reading, as a reaction to researchers who only focus on frequency. She found a significant difference in the affective quality of the parent-child relationship related to both the child's attitude toward reading and the child's reading fluency.

Finally, development of reading comprehension is influenced by school factors.

Many researchers are convinced that explicit strategy instruction is essential for children to discover strategies that are vital to their learning and development (e.g., Pressley, 1998). Nevertheless, some researchers are convinced that direct instruction of strategies has considerable limitations for reading comprehension development. Van Elsacker (2002) found that not many of the school variables she studied appeared to influence reading achievement. The amount of time spent on reading comprehension lessons and taking turns reading aloud was even a consistently negative predictor of reading comprehension. Most of the time of reading comprehension lessons was devoted to the teaching of skills rather than the teaching of meaning, while reading motivation as well as reading comprehension require active participation and engagement (Allington & Johnston, 2000). Van Elsacker (2002) did find indications that silent reading provided opportunities to improve students' reading comprehension and that the teaching of vocabulary was extremely important to the reading comprehension of minority students. The results showed significant, direct or indirect effects of strategy use, reading motivation, and leisure time reading on reading development. Van Elsacker (2002) concluded that promotion of engagement was of vital importance to create good readers. According to Verhoeven and Snow (2001), to promote engagement, teachers have to arrange tasks and activities in such a way that they are easily accessible and create settings in which children's engagement is maintained. The access to books is critical, but as Verhoeven and Snow (2001) conclude, the crucial contribution comes not from having the books but from reading the books, which is the end result of instruction.

In the present study, factors within the child, the child's home and the child's school have been explored to explain individual differences in the IEA Progress in International Reading Literacy Study in the year 2001. Several attempts have been made so far to explain individual differences in reading literacy development within the context of the IEA Reading Literacy Study in the year 1991. This Reading Literacy Study described the reading achievement levels of nine-year-olds in twenty-seven countries and their systems of education. Elley (2001) searched for differences between countries. Most countries with high means (like Finland, France and Sweden) had high indices on gross national product (GNP). The causal link between wealth and achievement was contentious: Did better literacy contribute to greater national wealth or did greater wealth allow more money to be spent on schools? Apart from wealth, the variance between countries also lay in the society's attitudes toward reading, in the strength of their literacy traditions. Several factors that were often considered important gained little or no support from the IEA survey, like length of school year, multi-grade classes, age for starting formal instruction, and number of textbooks. Factors that did influence reading achievement were grouped in four categories: access to reading materials, captioned television, pupils' views, and home language. De Glopper and Otter (1993) found that countries with high mean scores were characterized by several factors. In these countries, schools were larger, classes were smaller, there were more teachers per student, and more teachers were female. Further, the education to become a teacher was longer, school days and weeks were shorter, reading education started with older children, children read silently more often, children were less often evaluated, libraries at

school and in classes were bigger, children had more books at home, and children visited a library more frequently.

In the studies conducted so far, individual differences have been examined in all countries without taking into account differences in national economic contexts. In the present study, an attempt will be made to explore the individual differences in reading literacy in a selective group of industrialized countries with a high level of economic development. Countries with a minimum Gross National Product of 20,000 US Dollars are included in the present study[1]. These countries are Italy, England, Scotland, Singapore, France, Germany, Sweden, Iceland, United States, and Norway (see Table 1).

Table 1: Mean Scores of Eleven Industrialized Countries

	Mean eleven countries	*Sweden*	*Netherlands*	*England*	*United States*	*Italy*	*Germany*	*Scotland*	*Singapore*	*France*	*Iceland*	*Norway*
PIRLS	541	561	554	553	542	541	539	528	528	525	512	499
SD	*75*	*62*	*53*	*83*	*79*	*67*	*64*	*80*	*89*	*67*	*71*	*78*

METHOD

Materials. The PIRLS assessment of reading literacy focuses on two purposes that account for most of the reading done by young students: Reading for literary experience or enjoyment and reading to acquire and use information. To provide a valid and reliable measure of these two purposes of reading, the PIRLS Reading Development Group found that at least four hours of assessment materials were necessary. This amounted to eight passages with accompanying items (questions about the texts). Since it was not possible to administer the entire test to each child, a matrix sampling technique was used to distribute the assessment material among students. The items systematically address four processes of comprehension necessary for reading comprehension (Barr et al., 1990). Students had to focus on and retrieve explicitly stated information, make straightforward inferences, interpret and integrate ideas and information, and examine and evaluate content, language, and textual elements. Two main types of items were used, namely multiple-choice questions and constructed-response questions. The multiple-choice questions offered students four plausible response options, only one of which was correct or clearly the best response to the question. Each of these carried one score point. Constructed-response items could yield one, two or three score points. They were used to allow students to explain their interpretations and evaluations of the text, to show their reasoning, and to give them the chance to formulate their own views and reasons. A scoring guide was used to credit the responses. This guide yielded explicit directions for the scorers and was based on actual responses from students in small-scale trials.

Participants. In IEA studies, the target population for all countries is referred to as the international desired target population. For PIRLS, this population consists of all

students enrolled in the upper of the two adjacent grades that contains the largest proportion of 9-year-olds at the time of testing (Campbell et al., 2001). Students who were unable to take the PIRLS tests because of some disability were excluded within schools. All countries were asked to estimate the size of the population such that the national defined population included at least 95% of the national desired population. The international project team provided manuals and expert advice to guide the countries through the phases of sampling (Foy & Joncas, 2003). Countries were permitted to adapt the sample design for their national educational system where the local situation required it. However, these solutions had to be approved by the International Study Center (ISC) and by Statistics Canada.

Design and Procedure. According to the international sample design for PIRLS, in each country a sample was drawn from a database containing all primary schools. Although countries were expected to make great efforts to secure the participation of sampled schools, it was anticipated that a 100% participation rate would not be possible in each of the participating countries. To minimize sample-size losses, an algorithm was used to identify two replacement schools for each sampled school a priori (see Appendix A in Mullis et al., 2003 for sampling information in individual countries). After the schools had agreed to participate, lists of classes, teachers, and students were entered in Within-School Sampling Software (W3S), provided by the IEA Data Processing Center (DPC). Directions for the preparation of the test session and the administration script with detailed instructions were described in a test administrator manual. Scorers valued the answers of the students on the constructed-response items. They were trained to be conscientious and attentive to detail, knowledgeable in reading, and willing to apply the scoring guides as stated, even if they disagreed with a particular definition or category. The data were entered in special software for keying, checking, and verifying the data (WinDEM, provided by the DPC). Then the data files were sent to the DPC, which conducted another thorough data check and prepared the international data analysis. The ISC performed international analysis and reported the results in an international report (Mullis et al., 2003).

For the present study, data from the international database from the eleven selected countries were merged (Gonzalez & Kennedy, 2003). This resulted in four databases containing information from the four questionnaires completed by students, parents, teachers and principals together with information about children's performance on the PIRLS reading literacy test and students' weights. According to the IEA, the PIRLS sample design has to be taken into account in all analyses to make appropriate estimation of population characteristics. This was accomplished by assigning a weight to each respondent. The sampling weight properly accounts for the sample design, takes into account any stratification or disproportional sampling of subgroups, and includes adjustments for non-response (Gonzalez & Kennedy, 2003). In the present study, these weights were used in all analyses.

First, the variables in the four databases that contributed the most to the PIRLS reading literacy score in the eleven countries were selected. On the level of the student, information from PIRLS Student Questionnaire and PIRLS Learning to Read Survey (completed by their parents) was screened. Based on Linear Regression

Analysis (method enter), a selection was made of the available variables. By assigning PIRLS weights to the students, the number of students was artificially increased as if all students in the national desired population were tested. This resulted in significant results in the regression analysis of almost each variable. To be selected for the present study, the Beta-coefficient in the regression analysis had to be higher than 0.1. After the remaining variables were screened based on theory and overlap, sixteen variables turned out to contribute largely to individual differences in reading literacy scores in terms of student and school.

With respect to the child, these variables were sex of student, frequency of watching television outside school, frequency of using a computer at home, students' attitude towards reading (SATR), and students' reading self-concept (SRSC). With respect to the child's home these factors were home language, number of people living at home, presence of a daily newspaper and children's books at home, number of books at home, and annual household income. With respect to the child's school, the following variables were included: school location size, the principal's perception of school climate, percentage of students with parents attending school events, and teachers working individually with students who fall behind in reading.

These sixteen variables with most predicting power were merged in a final database containing almost fifty thousand students. The variables were explored one by one. In the following section, a description is given of all these variables in the selected countries.

RESULTS

To find factors that cause individual differences in reading literacy in the eleven selected countries, the sixteen variables mentioned above are explored one by one. Table 1 shows the countries in order of their mean scores on the PIRLS Reading Literacy Test. For each country, the mean score on the PIRLS test and the standard deviation are presented. In all tables in the present article, the abbreviation "Exh." refers to related Exhibits in the international report (Mullis et al., 2003). Figures 1 to 3 visualize the information in the corresponding Tables 2 to 4.

First, child characteristics were explored (see Table 2 and Figure 1). As has been found in earlier studies, girls had significantly higher achievement than boys. This was found for each country.

In the student questionnaire children answered how often they watched television or videos on a normal school day outside school. On average, 66% reported watching daily, 19% reported watching once or twice a week, 5% once or twice a month, and 10% never or almost never. The relationship between watching television and average achievement in the eleven selected countries was strong. Children who watched television weekly or monthly performed best on the reading literacy test. They performed better than children who did it (almost) every day. Children who never or hardly ever watched television performed the lowest.

In the eleven countries, 40.5% of the students, on average, reported daily using a computer at home, 33.5% reported using it weekly, 11% monthly, and 15% never or

almost never. There was a clear relationship with the PIRLS reading assessment. Children using a pc at home monthly or weekly had the highest mean reading score and those using it daily had median performance. Children never using a computer performed the lowest (*p*=. 000). This pattern was found in each of the eleven countries.

Table 2: Factors related to Reading Literacy within the child

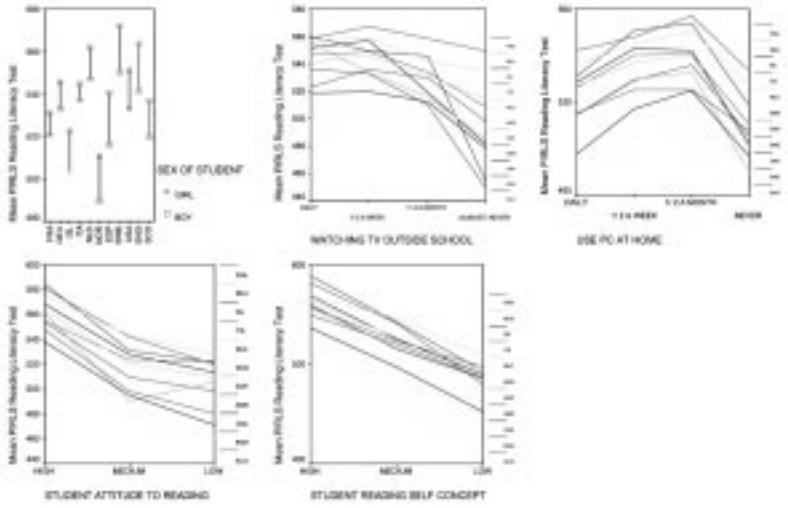
		Mean	*Swe*	*Nld*	*Eng*	*USA*	*Ita*	*Ger*	*Sco*	*Sgp*	*Fra*	*Isl*	*Nor*
Sex	Girls	549	572	562	564	551	545	546	537	541	531	523	511
Exh.	*SD*	*72*	*59*	*51*	*80*	*75*	*67*	*63*	*80*	*84*	*65*	*68*	*74*
1.3	Boys	533	550	547	541	533	537	533	516	516	521	503	489
	SD	*77*	*62*	*54*	*84*	*82*	*67*	*63*	*80*	*91*	*67*	*73*	*79*
	Daily	548	559	557	560	552	546	541	536	556	523	519	496
	SD	*72*	*62*	*52*	*79*	*73*	*65*	*62*	*76*	*81*	*66*	*70*	*78*
Watch TV at home	1 or 2 x a week	550	567	559	549	557	549	546	533	534	536	520	508
	SD	*73*	*59*	*53*	*80*	*80*	*65*	*62*	*76*	*86*	*63*	*67*	*76*
	1 or 2 x a week	528	559	542	546	519	534	532	510	516	530	513	507
	SD	*75*	*63*	*54*	*85*	*86*	*67*	*62*	*87*	*86*	*67*	*76*	*70*
Exh.	(Almost Never)	488	549	535	454	481	509	515	449	485	498	478	494
8.12	*SD*	*76*	*72*	*55*	*79*	*77*	*69*	*66*	*79*	*84*	*72*	*69*	*78*
Use PC at home	Daily	539	558	550	544	541	538	539	523	523	524	502	496
	SD	*76*	*62*	*53*	*83*	*80*	*67*	*63*	*80*	*93*	*67*	*71*	*77*
	1 or 2 x a week	556	565	561	569	559	555	551	542	542	537	526	507
	SD	*71*	*59*	*52*	*78*	*73*	*63*	*59*	*78*	*82*	*66*	*68*	*73*
	1 or 2 x a week	556	576	568	573	558	556	555	550	546	536	536	514
	SD	*71*	*59*	*53*	*81*	*74*	*68*	*61*	*81*	*82*	*64*	*66*	*77*
Exh.	(Almost) Never	511	547	539	528	507	518	505	512	492	514	501	482
4.10	*SD*	*78*	*66*	*57*	*86*	*83*	*71*	*67*	*80*	*94*	*63*	*76*	*86*
Students' attitudes toward reading	High	565	581	575	584	569	555	563	554	561	548	538	529
	SD	*69*	*57*	*48*	*75*	*73*	*64*	*56*	*74*	*75*	*61*	*66*	*70*
	Medium	524	542	543	531	528	524	520	510	490	499	495	481
	SD	*76*	*58*	*51*	*82*	*80*	*68*	*62*	*81*	*89*	*62*	*68*	*75*
	Low	513	520	528	521	513	523	510	498	506	480	471	460
Exh. 8.1	*SD*	*68*	*60*	*47*	*73*	*70*	*61*	*54*	*69*	*73*	*54*	*62*	*74*
Students' reading self concept	High	567	581	568	588	569	558	564	560	556	549	536	531
	SD	*68*	*55*	*50*	*73*	*71*	*61*	*56*	*72*	*79*	*64*	*65*	*66*
	Medium	526	541	546	542	525	523	526	515	516	521	497	477
	SD	*74*	*59*	*51*	*80*	*78*	*68*	*61*	*79*	*89*	*64*	*69*	*73*
	Low	490	480	508	493	490	498	494	486	487	486	452	412
Exh. 8.3	*SD*	*72*	*63*	*53*	*80*	*76*	*64*	*56*	*75*	*84*	*60*	*73*	*75*

To examine fourth-graders' views on reading for enjoyment and appreciating books, PIRLS created an Index of Students' Attitudes Toward Reading (SATR). The index was based on students' agreement with the following five statements related to reading: I read only if I have to (reverse coded), I like talking about books with other people, I would be happy if someone gave me a book as a present, I think reading

is boring (reverse coded), and I enjoy reading. Responses to each statement, ranging from disagree a lot to agree a lot on a 4-point scale, were averaged across each student. Students in the high category agreed or agreed a lot with all of the statements about reading. Students in the low category disagreed or disagreed a lot with all of the statements. The medium level of the index indicates all other combinations of responses. Student attitudes were generally positive (47% in high category). Within all countries, students with the most positive attitudes had the highest reading achievement. Between countries, high scoring countries did not have more students in the first category (high SATR). In the Netherlands, only 43% of the students were categorized in the high category. The correlation between attitude and reading score was significant at the .001 level: the higher the attitude, the lower the performance (Pearson r=.3).

To examine students' conceptions of their reading ability, PIRLS asked students to respond to the following statements about how well they read: reading is very easy for me, I do not read as well as other students in my class (reverse coded), and reading aloud is very hard for me (reverse coded). Again, response options ranged from disagree a lot to agree a lot on a 4-point scale and PIRLS combined the responses to form an Index of Students' Reading Self-Concept (SRSC) in the same way as the SATR-index described above. On average across countries, the majority of students were in the medium category (50%), while only six percent were in the low category. Students with a positive reading self-concept (44%) had higher achievement in each of the PIRLS countries (Pearson correlation r= .3, p= .000).

Figure 1: Information in Table 1 visualized



Then, characteristics related to the child's home were explored (see Table 3 and Figure 2). Students reported how often they spoke the language of the PIRLS test at home. On average, across countries, there was a strong relationship between frequency of speaking the language of the PIRLS test at home and performance on

the PIRLS test. The average score on the PIRLS Reading Literacy Test was 548 points for those always speaking the PIRLS language at home (*SD* = 72), 503 points (*SD* = 75,5) for those speaking it only sometimes, and 457 points (*SD* = 94) for those never speaking it at home. In all eleven countries, children who always spoke the language of the test at home performed better than children who sometimes or never spoke this language at home. In five countries (Iceland, Norway, Singapore, USA, and Scotland), children who sometimes spoke the language of the test at home scored significantly higher than children who never did (p = .000). In five countries (France, Germany, Italy, Sweden, and England) the difference between children who sometimes and children who never spoke the language of the test at home was not significant (p = 1.000). In the Netherlands, children who never spoke Dutch at home scored higher (3 percent) than children who sometimes spoke Dutch at home (11 percent) (p = .000).

In all countries, most children lived in families with four or five people. In general, children from families with three, four or five people performed best on the reading literacy test, they performed above the mean score of the eleven countries (541 points). Students in families with two people (just one parent and the child) and those from larger families performed less well. The relationship between reading literacy and the number of people at home shows the same pattern in the eleven countries.

To provide information on the educational resources in the home, children were asked whether they had a daily newspaper at home. On average, 61 percent of the students reported having one. In all countries except France, most students reported having one and these students had higher average reading achievement than those reporting not having one. In France, most students reported not having a daily newspaper; the difference between the reading score of children having or not having a daily newspaper in France was negligible.

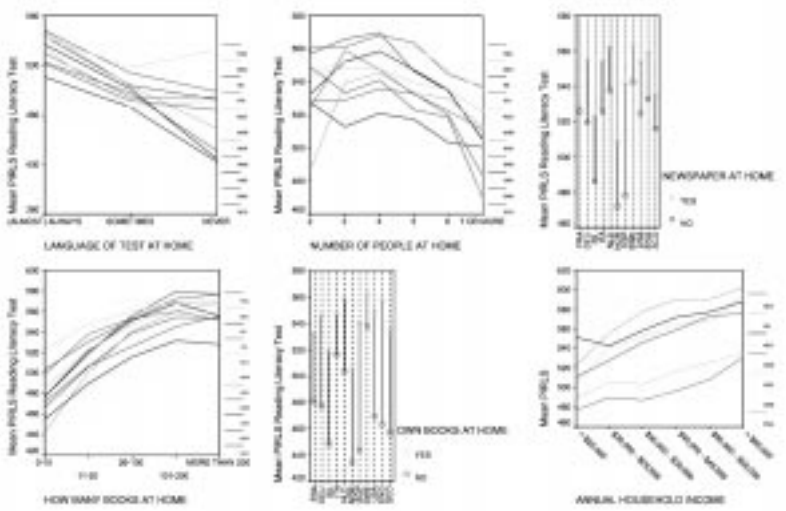
Because books are probably the most important literacy resource, PIRLS asked students as well as parents to report the number of books and children books in the home. Parents reported a somewhat higher level of book ownership (Mullis et al., 2003). In the present study students' reports were used, because they included data from more countries and from more students within countries. On average, across countries, and in most countries individually, children reporting more books in the home had higher reading achievement. According to Mullis et al. (2003), having children's books in the home may be even more important for fostering literacy among young children. Students reporting having books of their own had higher reading achievement than those reporting not having them.

Information about annual household income was submitted in seven of the eleven selected countries: England, Germany, Iceland, the Netherlands, Norway, Singapore, and Sweden. In general, children from parents with high income scored higher on the Reading Literacy Test. In Singapore, more than half of the children (54%) had parents whose income was less than 20,000 US Dollars. Iceland, Norway and the Netherlands had most parents with more than 60,000 US Dollars (22 to 26%).

Table 3: Factors related to Reading Literacy within the child's home

		Mean	*Swe*	*Nld*	*Eng*	*USA*	*Ita*	*Ger*	*Sco*	*Sgp*	*Fra*	*Isl*	*Nor*
Language of test at home	Always	548	568	558	559	551	543	547	533	564	531	519	505
	SD	*72*	*59*	*51*	*81*	*75*	*66*	*59*	*79*	*77.5*	*64*	*69*	*75*
	Sometimes	503	522	528	510	506	498	487	502	509	494	488	459
	SD	*75.5*	*68*	*58*	*80*	*78*	*70*	*64*	*76*	*84*	*66*	*68*	*81*
	Never	457	504	546	496	435	498	495	444	466	485	433	394
	SD	*94*	*74*	*51*	*77*	*96*	*78*	*70*	*78*	*93*	*69*	*70*	*87*
Exh. 4.4	2	536	561	546	557	533	524	544	549	487	529	528	496
Number of people at home	*SD*	*71*	*64*	*42*	*91*	*74*	*72*	*52*	*63*	*102*	*56*	*67*	*84*
	3	551	561	552	566	552	559	548	533	539	529	513	503
	SD	*72*	*64*	*53*	*82*	*77*	*62*	*55*	*76*	*80*	*61*	*69*	*76*
	4	554	568	557	570	559	547	548	541	545	536	521	504
	SD	*71*	*58*	*50*	*77*	*75*	*65*	*60.5*	*75*	*77*	*62*	*70*	*75*
	5	544	564	562	547	548	533	539	523	533	533	517	505
	SD	*72*	*59*	*53*	*79*	*74*	*66*	*63*	*82*	*81*	*64*	*70*	*73*
	6	533	545	547	535	535	522	535	518	530	520	503	489
	SD	*74*	*64*	*59*	*83*	*76*	*66*	*66*	*82*	*86.5*	*70*	*69*	*79*
	≥ 7	506	537	535	505	505	511	522	470	513	483	501	475
No exhibit	*SD*	*79*	*71.5*	*57*	*85*	*80*	*71*	*70*	*84*	*95.7*	*67*	*70*	*90*
Newspaper at home?	Yes	553	564	562	559	554	554	555	535	541	528	523	509
	SD	*73*	*60*	*52*	*81*	*77*	*65*	*60*	*79*	*82*	*67*	*68*	*76*
	No	524	542	538	533	524	526	520	516	478	526	486	472
Exh. 4.10	*SD*	*74*	*68*	*52*	*85*	*79*	*65*	*61*	*81*	*94*	*65*	*68*	*72*
Number of books at home	0-10	481	503	523	477	477	499	486	466	442	472	455	435
	SD	*69*	*63*	*54*	*77*	*71*	*66*	*54*	*79*	*91*	*58*	*67*	*73*
	11-25	522	530	547	518	522	538	523	506	500	506	490	463
	SD	*69*	*55*	*49*	*74*	*74*	*63*	*57*	*70*	*79*	*62*	*64*	*77*
	26-100	548	552	560	555	551	553	546	539	540	526	515	495
	SD	*68*	*59*	*51*	*77*	*70*	*61*	*56*	*70*	*72*	*61*	*66*	*74*
	101-200	566	572	569	579	568	560	568	554	560	545	532	517
	SD	*69*	*58*	*49*	*74*	*72*	*64*	*57*	*75*	*77*	*61*	*65*	*72*
	> 200	559	577	570	577	556	551	570	553	569	555	528	518
Exh. 4.8	*SD*	*77*	*59*	*51*	*81*	*82*	*69*	*57*	*81*	*81*	*63*	*72*	*73*
Own books of child?	Yes	548	563	559	557	549	547	545	535	540	533	519	505
	SD	*72*	*61*	*51*	*81*	*75*	*66*	*60*	*77*	*80*	*64*	*68*	*75*
	No	480	537	503	463	469	516	477	457	444	480	449	434
Exh. 4.10	*SD*	*75*	*68*	*51*	*72*	*79*	*64*	*60*	*77*	*98*	*63*	*64*	*68*
Parents' income	< 20.000	515	544	552	522	xxx	xxx	511	xxx	503	xxx	489	477
	SD	*73*	*66*	*52*	*85*	*xx*	*xx*	*64*	*xx*	*87*	*xx*	*73*	*88*
	20-29999	536	555	543	555	xxx	xxx	528	xxx	541	xxx	505	490
	SD	*67*	*61*	*57.5*	*78*	*xx*	*xx*	*59*	*xx*	*76*	*xx*	*73*	*78*
	30-39999	554	560	558	578	xxx	xxx	546	xxx	552	xxx	504	487
	SD	*66*	*61*	*50*	*70*	*xx*	*xx*	*60*	*xx*	*73*	*xx*	*72*	*82*
	40-49999	564	562	572	590	xxx	xxx	559	xxx	565	xxx	516	496
	SD	*66*	*58*	*49*	*79*	*xx*	*xx*	*56*	*xx*	*62*	*xx*	*67*	*73*
	50-59999	572	569	577	590	xxx	xxx	573	xxx	569	xxx	526	508
	SD	*63*	*59*	*45*	*74*	*xx*	*xx*	*53*	*xx*	*56*	*xx*	*68*	*72*
	≥ 60000	582	590	588	602	xxx	xxx	576	xxx	594	xxx	535	531
No Exh.	*SD*	*60*	*55*	*50*	*66*	*xx*	*xx*	*51*	*xx*	*60*	*xx*	*65*	*68*

Figure 2: Information in Table 3 visualized



Finally, factors on the school level have been explored (see Table 4 and Figure 3). The first factor contains the principals' characterization of the school as urban, suburban, or rural. According to the international report, in most countries, reading achievement is highest for students in urban schools, lower in suburban schools, and even lower in rural schools. This is true for most PIRLS-countries with low GNP. In the eleven selected countries, the relationship with reading literacy is not straightforward. Nevertheless, regression analysis showed that this variable is an important predictor of reading literacy in the selected countries (*Beta* = -.104). In these countries 14% of the children go to schools that are located in an area where less than 3000 people live, 55% go to schools where more than 3000 to 100000 people live and 31% go to schools in larger places. Correlations varied from -.151 in the United States to only .077 in Iceland. In Germany, England, the Netherlands, Scotland, Sweden, and the United States a negative correlation was found: the less people lived in the location of the school, the higher the mean score on the PIRLS Reading Literacy Test. The opposite was found for France, Iceland, Italy, and Norway, where children in big cities performed better than children in little villages.

The school environment establishes the climate for learning. To measure the extent to which schools offer a positive school climate, PIRLS created an Index of Principals' Perceptions of School Climate (PPSC). On a scale from very high to very low, the Index was based on principals' characterizations of the following: teachers' job satisfaction, teachers' expectations for student achievement, parental support for student achievement, students' regard for school property, and students' desire to do well in school. On average, half of the students attended schools in the high category and half in the medium category. Less than one percent was at the low level. In all countries except Italy, students in the high category had the highest reading achievement.

To measure the extent to which communication was emphasized between schools and parents, PIRLS created an Index of Home-School Involvement. The index was based on schools' average response to six questions about the opportunities for parental involvement provided by the school and about parental attendance at school-sponsored meetings or other events. In the present study, only one answer of the principal was taken into account: The percentage of students with parents participating in school events. The Regression Analysis showed that this variable had more predicting power than the Index created by PIRLS.

Table 4: Factors related to Reading Literacy within the child's school

		Mean	*Swe*	*Nld*	*Eng*	*USA*	*Ita*	*Ger*	*Sco*	*Sgp*	*Fra*	*Isl*	*Nor*
School location size (x 1,000 people)	<3	540	562	551	559	541	515	531	557	xxx	531	503	502
	SD	*77*	*58*	*52*	*77*	*78*	*72*	*68*	*83*	*xx*	*60*	*77*	*74*
	3-100	546	562	557	546	554	541	540	521	xxx	522	512	494
	SD	*72*	*61*	*53*	*87*	*74*	*67*	*62*	*81*	*xx*	*66*	*69*	*78*
	100-500	542	548	547	562	541	550	536	530	xxx	533	518	520
	SD	*76*	*65*	*56*	*83*	*80*	*62*	*64*	*77*	*xx*	*61*	*69*	*75*
	> 500	515	563	551	5432	504	541	516	521	528	526	xxx	506
Exh.7.1	*SD*	*83*	*68*	*51*	*83*	*84*	*71*	*73*	*83*	*89*	*57*	*xx*	*88*
School climate	High	554	566	566	xxx	557	544	555	537	536	536	514	505
	SD	*72*	*61*	*51*	*xx*	*74*	*67*	*59*	*80*	*87*	*64*	*69*	*76*
	Medium	529	554	550	xxx	523	540	534	509	517	519	504	486
	SD	*75*	*61*	*53*	*xx*	*84*	*67*	*63*	*78*	*90*	*67*	*75*	*80*
	Low	509	xxx	xxx	xxx	509	548	xxx	xxx	xxx	494	xxx	xxx
Exh.7.14	*SD*	*76*	*xx*	*xx*	*xx*	*80*	*58*	*xx*	*xx*	*xx*	*54*	*xx*	*xx*
Parents partici-pating in school events	0-10%	523	557	548	538	514	538	535	484	499	508	521	484
	SD	*73*	*63*	*55*	*83*	*80*	*69*	*64*	*57*	*102*	*67*	*72*	*87*
	11-25%	530	566	551	558	503	556	532	540	529	539	518	507
	SD	*77*	*61*	*54*	*74*	*86*	*67*	*64*	*83*	*92*	*63*	*78*	*7*
	26-50%	539	559	562	550	540	535	533	533	535	532	512	503
	SD	*74*	*63*	*52*	*86*	*76*	*68*	*63*	*79*	*82*	*65*	*69*	*77*
Exh. 7.9	> 50%	546	559	498	527	564	561	511	555	565	546	545	526
	SD	*61*	*74*	*78*	*81*	*80*	*52*	*70*	*73*	*59*	*61*	*60*	*90*
Indiv. help reading problems Exh. 5.23	Yes	544	561	555	554	548	540	540	527	524	525	513	500
	SD	*75*	*62*	*53*	*83*	*78*	*68*	*63*	*81*	*88*	*67*	*71*	*77*
	No	522	563	534	558	506	555	539	552	536	528	512	490
	SD	*76*	*59*	*61*	*78*	*79*	*57*	*64*	*70*	*92*	*65*	*69*	*77*
Instruction hours per year (Exh. 5.11)		987	860	1082	958	1041	1038	812	962	940	910	749	682

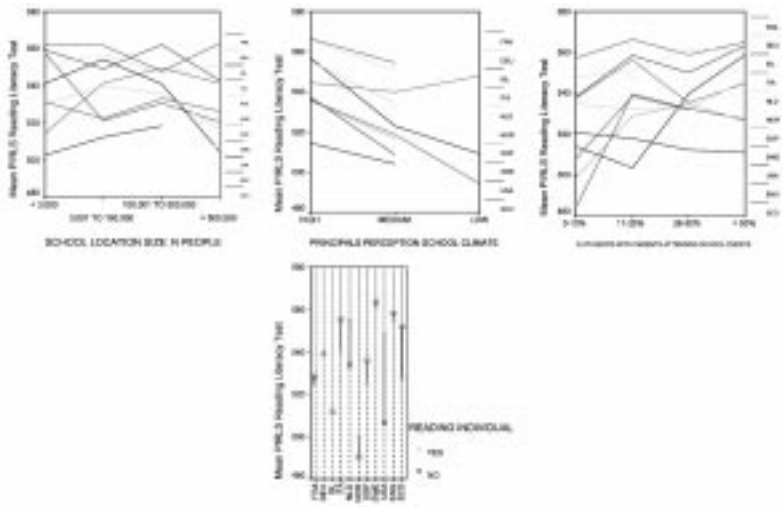
In general, children in schools where parents participate in school events, score higher on the PIRLS reading literacy test.

Teachers reported their intervention methods for children falling behind in reading. In the eleven selected countries on average 86 percent reported working with students individually when they fell behind in reading. In nearly every country this was the most common way of dealing with these students. In Singapore, most

teachers had other students work with the student and in Iceland, working with a remedial or reading specialist was the most common intervention. In Germany, the Netherlands, Norway and the USA, children with teachers using this approach performed much better on the reading literacy test than those with teachers who did not read individually with students falling behind in reading. In Italy, Singapore, and Scotland, the opposite was found; students with teachers reporting they did not read individually with children scored higher.

Total time for instruction in school was the last important factor that appeared to be of great importance in reading literacy development. The more hours children received instruction, the better their performance on the PIRLS Reading Literacy Test. School principals reported the total number of hours, which ranged from 682 hours in Norway to 1082 hours in the Netherlands, with an average of 987 (the international average of the 35 countries was 837 hours). Total hours of instruction per year was based on principals' reports of the number of hours spent on instruction per day multiplied by the number of days per year the school is open for instruction. The overall correlation between instruction hours per school year and mean score was significant at 0.01 level (r = .08). This correlation was significant in most individual countries. In Iceland and England the correlation was not significant, in France the Ministry provided the mean number of hours of instruction. In Singapore, no data about instruction hours were available.

Figure 3: Information in Table 4 visualized



CONCLUSION AND DISCUSSION

The present study shows that the sixteen factors described above highly predict the literacy achievement of children in industrialized societies. The factors that influenced reading achievement in all participating countries in the IEA Reading Literacy Study in the year 1991 (Elley, 1993) were grouped in four categories: access

to reading materials, captioned television, pupils' views, and home language. Seven of the sixteen variables in the present study can be classified under these groups. Further, the gender variable, three factors closely related to SES (number of people at home, pc use at home, and parents' income), and some variables at the school level appeared to add greatly to reading development of young children. The characteristics of countries with high mean scores (de Glopper & Otter, 1993) were again studied in PIRLS 2001 but they did not meet the criteria to be included in the present study since they did not predict reading literacy achievement to a large extent.

In the domain of the child, five variables predicted PIRLS reading literacy scores. First, girls performed better on the PIRLS test than boys. Second, children who never watched television or used a computer performed lower than children who did so on a daily basis, who in their turn performed lower than children watching television or using a computer at home weekly or monthly. The fact that children who did these things on a daily basis performed lower than children who did them weekly or monthly may be due to the fact that the latter children made a more conscious and active choice. Elley (1992) specifically mentioned captioned television as one of the factors that influenced reading achievement. In PIRLS, students reported how often they read subtitles on TV. In the eleven selected countries, most children reported reading subtitles on the television every day or almost every day (37%). Children who did so monthly scored the highest (M = 547, SD = 72), followed by children reading subtitles weekly (M = 545, SD = 70), daily (M = 541, SD = 69), and never (M = 545, SD = 72). The mean difference between all these groups was significant at .000 level (Anova, Bonferroni, Posthoc). In the Netherlands, Iceland, Norway, Singapore, and Sweden, children who read subtitles weekly scored the highest, followed by children reading subtitles daily, monthly, and never. In Germany, Italy, England and Scotland, children who read subtitles daily or weekly performed the lowest. In France and the United States, no data were available about reading subtitles. In the latter six countries, in general subtitles are used less often than in the other five countries because more movies and series are broadcast in their own languages.

Finally, students with a positive attitude towards reading and a positive self-concept of their reading skills performed best on the Reading Literacy Test. This relationship is reciprocal, since students who have positive experiences with reading comprehension develop positive attitudes and self-concept and therefore read more often and develop better reading literacy skills.

With regard to the child's home, six variables were explored in the present study. Children who always spoke the PIRLS language at home performed best on the PIRLS Reading Literacy Test, followed by students who sometimes or never did. The difference between children who sometimes or never did was not significant in all countries. Further, children in families with a medium number of people (three, four or five) performed better on the reading literacy test than those in families with only two or more than five people. On average, across countries, and in most countries individually, children reporting more books in the home had higher

reading achievement, just like children reporting having books of their own or a daily newspaper. In general, children of parents with high income scored higher on the Reading Literacy Test. This information was only collected in seven of the eleven countries. The five variables last mentioned show a clear relationship with social economic status (SES). All countries in the analyses had high economic status. Within countries, children in families with three to five people, a high income, lots of (children's) books and a daily newspaper at home performed best on the PIRLS Reading Literacy Test. Two factors with respect to the child also come together with SES; children who regularly (but not daily) used a computer or watched television at home, performed well. Because probably all children in the selected countries had access to a television, it is not self-evident to relate TV-watching to SES.

Finally, school factors appeared to contribute highly to reading literacy development of young children. The first important intermediate variable was the number of instruction hours per school year. Children who received more instruction per year performed better on the PIRLS Reading Literacy Test. The second important variable was urbanization. The international report concluded that in most countries, reading achievement was highest for students in urban schools, lower in suburban schools, and the lowest in rural schools. However, most countries in the present study exhibit different patterns in achievement. In Germany, England, the Netherlands, Scotland, Sweden, and the United States children in smaller places scored higher whereas children in France, Iceland, Italy, and Norway had better performance when their school was located in a large place. Further, children in schools where the principal's perception of school climate was positive performed best on the PIRLS Reading Literacy Test. Also, commitment of parents to schools seems to contribute to the development of students' reading literacy skills. Students in schools where parents participate in school events score higher on the PIRLS Reading Literacy Test. Finally, the action taken by teachers when children fall behind in reading seems to contribute substantially to the reading literacy achievement of children. Most teachers reported working individually with students who fell behind in reading. In some countries, this approach seems to have positive influence on reading literacy development though this was not found in all countries. The quality of the intervention is not studied in PIRLS 2001. In future research, more detailed information about the form and the quality of the intervention has to be collected.

Of course, the present study has some limitations. For three school factors (instruction hours per year, school location size, and reading individually with children with reading problems), their contribution to the reading literacy score was not clear in several countries. Nevertheless, these factors did pass the selection procedure based on the Regression Analysis. The USA contributed relatively substantially to the Beta coefficient in the Regression Analysis because weighted scores were used. The American sample represented almost four million students, which was more than half of the students in all eleven countries (54%). If the USA were excluded from the regression analysis, the three factors mentioned above would not have passed the selection procedure. Beta coefficients for these three variables in the ten remaining countries would all have been smaller than 0.1.

Further, the children were not equally spread in the four categories of the variable school location size. More than half of the children in all countries belonged to the second category. If the United States were excluded, even 67.5% belong to this category. More precise information about urbanization in the Netherlands showed significant differences between students in three categories; students in big cities performed the lowest on the PIRLS reading literacy test[2]. This categorization appeared to produce a better distribution for densely populated countries like the Netherlands. Attention should be paid to this limitation in PIRLS 2006.

In the Netherlands in future research (PIRLS 2006) special attention must also be given to the question in the student questionnaire about home language. The deviating pattern in the Netherlands may be due to the way the question is formulated. Maybe children who never spoke Dutch at home were not merely immigrants but children who spoke a certain dialect or Frisian at home. Support for this assumption was found in the stratification information that was used to draw the Dutch sample. In the Netherlands, two stratification variables for school sampling were used for implicit stratification (level of urbanization and mean student weight)[3]. A relatively large group of students never speaking Dutch at home came from little villages and did not attend schools with a high percentage of low educated foreign parents. For this reason, this group did not seem to represent the second language speakers. Students who answered sometimes speaking Dutch at home did seem to largely represent the second language speakers in the Netherlands because a lot of them came from big cities and schools with a high percentage of low educated foreign parents. Another support for this assumption was found in Exhibit 4.5 in the International Report. This Exhibit shows that ten percent of the students have neither parent born in the Netherlands. They scored 516 points. Children with a father or mother born in the Netherlands scored 552 points (11%). Children from parents both born in the Netherlands scored 560 points (79%). So children answering never speaking Dutch at home were not the same students as the students with parents born in other countries (so called non-native language speakers).

The present study has several practical implications. Teachers, parents, and researchers in industrialized societies should pay special attention to the described factors related to the child, the child's home and the school. Teachers have to keep paying special attention to children in families with low SES, though of course they should not demand less of these children in advance. Children who don't speak the language of instruction at home also need an adjusted approach. These children have more difficulty in developing reading literacy skills. Also, action can be taken to improve students' attitudes to reading, their reading self-concept, school climate, and commitment of parents with school. Maybe even instruction time can be increased to improve children's reading literacy skills.

Parents can also contribute to their children's reading literacy development. They can encourage children who never watch television or use a computer to do it more often. Parents with children who watch television or use a computer daily should encourage them to choose other activities. Parents can contribute to an atmosphere that invites children to read, and make sure children have access to reading

materials. This way, they also attribute to their children's attitudes toward reading and their reading self-concept.

Girls performed better on the PIRLS reading literacy test than boys. Based on the data of the reading literacy study of nine-year-olds in 1991, Wagemaker (1996) found that significant differences favoring girls were observed in all 27 countries for narrative passages, in 24 countries for expository passages, and in seven countries for documents. The early and almost universal advantage regarding reading performance displayed by girls across domains and across countries at age 9 was fairly systematically absent by age 14. Maybe, in developing reading literacy tests for young children, special attention should be paid to boys' perception of their environment.

In a follow-up study, a Multilevel analysis will be conducted to make a more precise distinction between the relative contributions of the three types of factors. Based on these results, even more substantiated advice can be given to teachers, parents, and researchers. A description of the results of the multilevel analysis will be distributed during the conference.

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NOTES

1. The Gross National Product (GNP) is the total dollar value of all final goods and services produced for consumption in society during a particular time period. Its rise or fall measures economic activity based on the labor and production output within a country.

2. Students in the first category (less than 1500 addresses per square kilometer) performed best (*M* = 559, *SD* = 51), followed by students in the median category (1500 to less than 2500 addresses, *M* = 551, *SD* = 53) and students in the last category (more than or equal to 2500 addresses, *M* = 532, *SD* = 63)

3. This type of stratification is a simple way of ensuring proportional sample allocation without the complexity of explicit stratification. It can also improve the reliability of the survey (Martin et al., 2003).
   Urbanisation:
   1 = >= 2500 addresses per km^2
   2 = 1500 tot < 2500 addresses per km^2
   3 = 1000 tot <1500 addresses per km^2
   4 = 500 tot <1000 addresses per km^2
   5 = <500 addresses per km^2
   hildren in schools with mean student weight 1 and mean student weight 2 performed higher than children in schools with mean student weight 3 (*p*= .000).
   Mean student weight (MSW):
   1 = "normal" students
   2 = high percentage of students with low educated Dutch parents
   3 = high percentage of students with low educated foreign parents