



Reading literacy in PIRLS 2006: What explains achievement in 20 EU countries?

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EXECUTIVE SUMMARY

Mullis et al. (2006) claim that "PIRLS will provide a wealth of information that can be used not only to improve the reading curriculum and instruction for younger students, but also help in interpreting the results for 15-year-olds in PISA" (p. 102). However, there is no evidence that students' achievement in PIRLS is related to literacy instruction (Shiel & Eivers, 2009). In addition, although the relationship between students' reading scores and some background variables at the student, household, school and class within school levels have been investigated, more research is needed to identify the effects of the factors associated with reading achievement. Thus, and in order to contribute to evidence-based policy implications, we ran a secondary analysis of the PIRLS 2006 dataset for 20 EU countries to measure the effects of specific variables identified in previous investigations using PIRLS data as well as variables identified in psycholinguistic research as predictors of reading attainment. Specifically, this study addresses the following questions: 1) what is the relationship between students' scores on the purposes and processes of reading and related curriculum and instructional coverage in the Program for International Reading Literacy Study (PIRLS) 2006 participating countries? And 2) which variables explain reading achievement in the PIRLS 2006 study? First, we ran correlations that indicate that the relationships between achievement and curriculum and instructional emphasis are very weak. The results show that the curriculum information on the PIRLS Encyclopaedia regarding curriculum emphasis as well as that reported by national representatives contributes very little to explain reading achievement. Second, we used multilevel analysis including three levels pertaining to: i) Student background characteristics, ii) Class characteristics and iii) School characteristics. Findings indicate that our model, controlled for country effects, explains 43% of the variance in students' achievement and that the variables with the highest impact on students' overall reading score relate to home resources and practices, students' pre-reading knowledge and their attitudes and to school compositional effects. Country-level analysis confirms that the variables identified for the model with the 20 countries as having a strong influence on students' reading achievement are also statistically significant in all countries, except one. These findings have important policy implications as they show which factors can be addressed by policy measures to improve students' performance. For example, measures related to curriculum and instruction and to social equity can be implemented by national governments to reduce educational inequality. In sum, this report offers a detailed account of the reading research related to the assessment of reading literacy, explains the methodological procedures used in the analysis to answer the research questions and, after the presentation of the results, it discusses policy implications.

INTRODUCTION

International large-scale assessments of student achievement are increasingly regarded as an effective way to evaluate school systems and to measure progress over time. PISA, the Program for International Student Assessment, launched by OECD in 2000 and implemented since then on a three-year cycle is perhaps the best known program. Covering Mathematics, Science and Reading, PISA seeks to collect information on how prepared students are at the end of compulsory education to make the transition from school to work. Another organization, the *International Association for the Evaluation of School Achievement* (IEA) also runs large-scale international assessments in mathematics and reading at an earlier stage in students' school careers. Specifically, it evaluates students' achievement in these subjects in fourth and eighth grades and adopts a curriculum-based framework, whereby the content covered is intended to represent a sample of what is taught in different countries. The first PIRLS – the Program for International Reading Literacy Study – was launched in 2001 and runs on a five-year cycle. Thus, the last assessment was implemented in 2011 but data will only be released at the end of 2012.

The number of participating countries attests to the growing world-wide adherence to international evaluations of student achievement as a means to compare attainment among countries. In the last 2006 PIRLS study, 45 countries participated and in 2011 55 countries participate in PIRLS. Participation in PISA has grown even higher, registering 43 participating countries in 2000, 41 in 2003, 57 in 2006, and 66 in 2009. This trend accompanies national and international accountability movements in education that focus on monitoring progress through the establishment of performance benchmarks (Ravitch, 2010). It also fits well with current perspectives linking educational achievement to economic development. The same entity that develops and implements the PISA study, the Organization for Economic Cooperation and Development, has recently published a study on the high cost of low educational performance showing that increasing students' performance in PISA would yield a considerable increase in a country's economic growth (OECD, 2010).

Even if such a clear link between achievement and economic development still lacks consistent validation, research has unequivocally shown that failing to learn to read fluently with good comprehension before the third or fourth year of schooling may result in life-long problems in learning new skills. In the words of Keith Stanovich, “This is because children who fall behind in reading, read less, increasing the gap between them and their peers. Later, when students need to “read to learn” (where before they were learning to read) their reading difficulty creates difficulty in most other subjects. In this way they fall further and further behind in school, dropping out at a much higher rate than their peers” (Adams, 1990, p. 59).

The fact that the fourth grade constitutes the first moment for international performance monitoring in reading literacy parallels the research results in this area as it is in tune with the notion that by grade four students should have acquired the basic skills needed to comprehend what they read. PIRLS, in particular, follows closely the reading stages proposed by Jeanne Chall (1996). It seeks to capture students` progress in moving from the first stage of learning to read to the subsequent reading to learn stage. In this way, PIRLS is supposed to “... provide a wealth of information that can be used not only to improve the reading curriculum and instruction for younger students, but also help in interpreting the results for 15-year-olds” (Mullis, Kennedy, Martin & Sainsbury, 2006, p. 102).

In addition to measuring reading achievement, both PIRLS and PISA seek to capture relationships between reading skills, attitudes, and habits by collecting data on school and home literacy environments and practices. For example, PIRLS 2001 and 2006 found “a positive relationship between students` reading achievement in fourth grade and parents having engaged their children in early literacy activities before starting school” (Mullis, Martin, Kennedy & Foy, 2007, p. 5). Thus, a multilevel analysis of the PIRLS 2006 dataset comprising cognitive performance, school, home and student questionnaire responses enables us to understand the relative performance of students in different European countries and to examine the interplay between cognitive and social factors that may influence achievement.

READING ABILITY

Decoding ability has long been recognized as the basis for successful reading acquisition in alphabetic languages, regardless of the specificities of different orthographic systems. In deep or opaque orthographies like English there are many multi-letter graphemes (letter combinations that represent one phoneme or speech sound as in *boat*). In transparent writing systems such as the Finnish there is an almost perfect one to one correspondence between graphemes and phonemes and a simple syllable structure or a predominance of open CV syllables with few initial or final clusters (Seymour, Aro, & Erskine, 2003). In the early stages of learning to read these written code differences seem to result in differing rates of reading development. Specifically, children learning to read in English seem to take longer to achieve the same level of decoding ability of the majority of their European counterparts. French, Portuguese, and Danish first graders seem to take a little longer than German or Spanish ones to acquire basic decoding skills because they have to learn slightly more irregular languages (Seymour et al., 2003). Research studies with other orthographic codes also suggests that “orthographies that represent pronunciation encourage faster learning for reading aloud and the more transparently they do this, the faster the learning rate and the more they encourage lexical access via phonology” (Ellis, Natsume, Stavropoulou, Hoxhallari, Van Daal, Polyzoe, Tsipa, & Petalas, 2004, p. 458).

Indeed, comparative international research has recently shown that, although there are weaker correlations between phonological awareness (PA) and reading ability in transparent orthographies, the predicting power of phonological awareness is universal (Ziegler, Bertrand, Tóth, Csépe, Reis, Faísca, Saine, Lyytinen, Vaessen, & Blomert, 2010). Specifically, transparent orthographies produce a facilitating effect in learning to read by “boosting basic phonological – awareness skills and helping to trigger the development of phoneme-size representations” (Ziegler et al., 2010). This, in turn, facilitates rapid and accurate decoding with basis on phonological processing. Children learning more opaque systems take longer to achieve the same kind of efficient decoding and their performance is more modulated by their ability to process phonological information. Thus, phonological awareness is

more predictive of reading ability in opaque languages, but it remains the main factor associated with reading performance in all the alphabetic systems studied to date.

Knowledge of the alphabet alone, understood as children's ability to name letters of the alphabet before formal reading instruction begins, is one of the strongest predictors of children's reading ability (Bond & Dykstra, 1967; Riley, 1996, Piasta & Wagner, 2010). Together with phonological awareness, this knowledge is a component of emergent literacy or of early reading skills. Such skills include the ability to distinguish letters from numbers, to understand that one reads from left to right and to read and write some words (Clay, 1991). Studies have shown that parents often engage their children in home activities that focus on these literacy aspects. However, research indicates that children need to learn letter names and letter sounds to learn how to read words (Ehri, 1983). Alphabet knowledge shares a reciprocal relation with phonological awareness (PA) because some letter names also include their sounds.

Good decoding skills, based on phonological processing, enable readers to form stable orthographic representations which make word identification automatic and effortless. In turn, this automaticity makes it easier for readers to comprehend what they read. Indeed, several decades of research have confirmed LaBerge and Samuels' (1974) model of reading and showed that "slow reading of words consumes the limited consciousness available for processing text, with the result that no consciousness is left over for understanding what is read" (Pressley, Gaskins, & Fingeret, 2006, p. 54). In a similar vein, Perfetti's (1992) verbal-efficiency account of reading ability postulates that fast word-identification skills serve as the foundation for text comprehension. Evidence from research with students with reading difficulties, in particular, confirms that the great majority of those students have not developed adequate decoding and efficient word recognition abilities (Stanovich, 2000).

Assessing Reading Comprehension

Reading comprehension can be defined as ... "an active and complex process that involves understanding written text; developing and interpreting meaning; and using meaning as appropriate to

type of text; purpose and situation” (National Assessment Governing Board, 2007, p. 2). As the definition suggests, in order to construct meaning from text, readers must develop interpretations according to specific reading tasks. Furthermore, reading comprehension is a complex process encompassing different and complementary reading skills that intervene in the construction of meaning by readers.

Indeed, as reading ability develops factors other than efficient decoding, such as vocabulary knowledge, explain reading comprehension. For example, Sénéchal, Ouellette, and Rodney (2006) found that young children’s vocabulary knowledge, acquired from parental book reading, positively impacts their future reading in grade three. In contrast, Chall and Jacobs (2003) research shows that low achieving fourth graders begin to exhibit a vocabulary lag, namely difficulty in defining less common words, and that their reading comprehension scores begin to decline significantly in grade six. Consistent with these findings, PISA results indicate that socially disadvantaged youngsters who read frequently equal or surpass their more advantaged peers who read less in reading performance (OECD, 2007). Conclusions from the National Reading Panel meta-analysis further corroborate this indicating that recreational reading is a privileged way to learn reading skills implicitly. Students with strong reading habits consolidate orthographic representations of words they repeatedly encounter in print and constantly learn new vocabulary (Nagy & Scott, 2000; Kamil, 2004).

As a result of repeated recreational and teacher-guided reading experiences, students also gain world knowledge and develop inference skills (Guthrie, Wigfield, & VonSecker, 2000). Research suggests that poor comprehenders may have difficulty at the level of inferences and in integration of information (Cain, Oakhill, Barnes, & Bryant, 2001; Yuill & Oakhill, 1991). Stanovich’s (1980) interactive-compensatory model, for example, predicts that context can compensate for inefficient word processing skills. More specifically, it “compensates for poor readers’ slow print processing when it delivers top-down information about a word’s identity before bottom-up processing has concluded” (Jenkins, Fuchs, Van Den Broek, Espin, & Deno, 2003, p. 720). Nevertheless, as Adams points out “...research has taught us that written text is accessible, and thus permits learning, only if

the reader or listener already knows the vast majority of words from which it is constructed. Indeed, research indicates that reading with comprehension depends on understanding at least 95% of the words of the text” (Adams, 2009, p.172).

This understanding involves vocabulary knowledge as well as knowledge of the world in general. Research suggests that some poor comprehenders may have reached appropriate fluency and accuracy levels for their respective age/grade and have adequate word and world knowledge, but exhibit a specific difficulty in answering questions that require inference skills (Cain & Oakhill, 1999; Perfetti, Landi, & Oakhill, 2005). For example, in understanding text-level inferences that require attending to referential links as in *John took the drink out of his bag. The milk was very refreshing*, we can logically infer that the drink was milk.

Other types of textual information require pragmatic inferences, which involve the consideration of a situation model based on knowledge of the world. This happens, for example, when a reader needs to gather information from different parts of a text to infer the setting of a story or when knowledge of a particular word makes an inference possible. For instance, when we read a statement such as “dressed in silk”, depending on the overall tone of the passage, we can infer that the person is financially well off (Giasson, 1990).

International studies suggest that low achieving students evidence more weaknesses in integrating world knowledge with text-based information and in critically evaluating text content than in retrieving explicitly stated text information. In the PIRLS 2001 study “... it was discovered that, for the passages in the assessment, students at the lower quarter benchmark demonstrated the most success on items requiring retrieval of explicitly stated details from the various literary and informational texts” (Mullis, Martin, & Gonzalez, 2004, p. 24). However, in the subsequent PIRLS 2006 assessment the same pattern of achievement was not observed.

Similarly, PISA 2003 and 2006 results show that most students are better at responding to micro than to macro textual aspects. Specifically, they are good at retrieving explicit information and at developing text-based interpretations, but have difficulties connecting information in the text to

knowledge from other sources and reflecting on the content and form of a given text (OECD, 2007; OECD, 2004).

In sum, higher-order comprehension processes seem to be better mastered by students who have developed good inference skills. Moreover, there is empirical evidence supporting the idea that reading is constrained by bottom-up processing, but that other factors also explain reading comprehension.

The PIRLS Reading Literacy Framework

PIRLS defines reading literacy 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 in school and everyday life, and for enjoyment” (Mullis et al., 2006, p. 103). With respect to literacy purposes, PISA’s definition of literacy refers comparable goals: “the ability to understand, reflect on and use written texts, in order to achieve one’s goals and to participate effectively in society” (OECD, 2000, p. 21).

In addition to considering two reading purposes – reading for literary experience and for information - both assessments use similar frameworks concerning reading comprehension processes. In PIRLS, the reading framework posits that readers can construct meaning in different ways and that the knowledge and experiences that readers bring to reading equip them with an understanding of language, texts, and the world through which they filter their comprehension of the material” (Alexander & Jetton, 2000; Beach & Hynds, 1996; Clay, 1991).

Readers can focus on and retrieve specific ideas, make inferences, interpret and integrate information and ideas, and examine and evaluate text features. Thus, the PRILS framework establishes “... four specific processes of reading comprehension, which vary in the degree of inference or interpretation required and in the focus on text content or structural features of the text” (Sainsbury & Campbell, 2003, p. 16). They are 1) *Focus on and Retrieve Explicitly Stated Information*, which requires students to locate and understand relevant information or ideas that are explicitly stated in

text, 2) *Make Straightforward Inferences*, or move beyond surface meaning to make straightforward, text-based inferences, 3) *Interpret and Integrate Ideas and Information*, whereby students have to draw on their understanding of the world, experience, or other knowledge to find connections between ideas and information in the text, and 4) *Examine and Evaluate Content, Language, and Textual Elements*, which requires critical consideration of the text in terms of reflecting on and evaluating text structure and content, language use, literary devices, and the author's perspective and craft (Mullis et al., 2006).

Although PIRLS distinguishes four different levels of text processing, for score reporting purposes the two first levels are grouped together and the same with the last two. This is because essentially the first two have to do with text-based retrieval of information whereas the last ones deal with a critical reading of text. Thus, PIRLS achievement scores are reported according to: 1) the total score combining reading for literary and informational purposes and including all levels of the processes of comprehension, 2) the reading for literary purpose score including all levels of the processes of comprehension, 3) the reading for information purpose score including all levels of the processes of comprehension, 4) the straightforward comprehension process, irrespective of reading purpose and 5) the interpretation comprehension process, irrespective of reading purpose.

PISA's reading proficiency levels are also related to reading comprehension processes similar to those of PIRLS. As summarized in the PIRLS framework, "Both frameworks describe ways of understanding or responding to texts that provide specifications for the type of comprehension questions posed to students. For PIRLS, these are described as four "processes of comprehension". The PISA framework distinguishes between "macro and micro aspects of understanding text" (Mullis et al., 2006, p. 104). The first Table shows how the reading purposes are tested in PIRLS while the second one describes how the comprehension process specifications are similar in the PIRLS and PISA frameworks. For additional information on the literary and informational test questions used in PIRLS 2006, please refer to Annex II to view the proportion of questions pertaining to each comprehension process.

Table 1 – Purposes for Reading

Purposes for Reading	Block
<i>Literary Experience</i>	<p>5 Literary booklets with 5 texts: L1 L2 L3 L4 L5</p> <p>With an average of 12 questions per reading text in a combination of <i>Multiple Choice (MC)</i> and <i>Constructed Response (CR)</i> formats</p>
<i>Acquire and Use Information</i>	<p>5 Informational booklets with 5 texts: I1 I2 I3 I4 I5</p> <p>With an average of 13 questions per reading text in a combination of <i>Multiple Choice (MC)</i> and <i>Constructed Response (CR)</i> formats</p>

Comparison of PIRLS Processes of Comprehension and PISA Macro Aspects of Understanding Text

PIRLS

Processes of Comprehension

Focus on and Retrieve

Explicitly Stated Information – locate and understand relevant information or ideas that are explicitly stated in text.

Make Straightforward

Inferences – move beyond surface meaning to make straightforward, text-based inferences.

Interpret and Integrate Ideas and Information – draw on understanding of the world, experience, or other knowledge to find connections between ideas and information in the text.

Examine and Evaluate Content, Language, and Textual Elements

– critical consideration of the text; reflect on and evaluate text content; consider and evaluate text structure, language use, literary devices, or author’s perspective and craft.

PISA

Macro Aspects of Understanding Text

Forming a Broad General

Understanding – initial reading to determine whether text suits intended goals; consider texts as a whole, make predictions about text.

Retrieving Information – scan, search, locate, and select relevant information.

Developing an Interpretation – develop a more specific or complete understanding; understand interaction between local and global cohesion within text; use information and ideas activated during reading yet not explicitly stated in the text.

Reflecting on the Content of a Text – connect information found in text to knowledge from other sources; assess claims made in text against own knowledge.

Reflecting on the Form of a Text – stand apart from the text and consider it objectively; evaluate text’s quality and appropriateness; understand text structure, genre, and register.

Source: Appendix C of the PIRLS 2006 Assessment Framework and Specifications

As previously stated, for reporting purposes, PIRLS created an overall reading scale and two scales specific to the reading processes. The first “combines retrieval and straightforward inferencing processes (...) and the second “combines the interpreting and integrating processes with the examining and evaluating processes” (p. 17). Nonetheless, it is visible that there is a good match between the comprehension levels in the PIRLS and PISA frameworks, these progress from a basic understanding of text information to a more complex interpretation of text and ultimately to a critical reflection and evaluation of text. The only divergent aspect is that the fourth level in the PIRLS processes of comprehension corresponds to a combination of levels four and five in the PISA framework. Transcending these processes are the metacognitive processes and strategies that allow readers to examine their understanding and adjust their reading approach (Paris, Wasik, & Turner, 1996; VanDijk & Kintsch, 1983). Proficient readers are known to do this and in assessments such as PIRLS or PISA one can infer that if students are able to critically evaluate text information they are also using metacognitive strategies.

Clearly, international reading literacy assessments adopt a framework for assessing reading comprehension processes that incorporates a view of reading literacy as an interactive process requiring different skills in processing text information. In addition, we know that the frameworks for reading assessment have been developed by international teams of researchers who agreed on how to assess the reading achievement of international students following sound reliability and validity criteria (Sainsbury & Campbell, 2003).

Findings from PIRLS 2006 and 2001

The PIRLS 2006 study reports findings in a trend like fashion. That is, by comparing, when possible, the results from 2006 with the ones from 2001 and by summarizing main findings according to the specific categories below:

- 1. School Curriculum and Organization for Teaching Reading**
- 2. Teachers and Reading Instruction**
- 3. Home Activities Fostering Literacy**
- 4. Students' Attitudes and Reading Habits**

For example, at the internationally level, we know from PIRLS 2006 results that 78% of students were taught reading as a whole class activity, that 4/5 of students were in schools that had initiatives to encourage students to read and that almost ¾ of students were in schools that placed more emphasis on reading than in any other subject. PIRLS results have consistently shown that the main resource for teaching reading is the textbook (Mullis et al. 2007) and that the majority of teachers are female (83% of students are taught by female teachers). Moreover, we know that teachers reported asking students a variety of reading skills and strategies (90% for identifying main idea, 72% relating reading with own experiences, and 71% making generalizations and drawing inferences) (Mulins et al, 2006).

With respect to instructional effects, “PIRLS 2001 results suggest that curriculum or instructional approaches may influence students' relative achievement in the processes of reading comprehension” (p.24). The PIRLS 2006 international report refers that PIRLS data “can be used to monitor the impact of structural and curricular changes in education systems” (p. 43). In particular, the report links the improved achievement from PIRLS 2001 to PIRLS 2006 of students from Hong Kong and Singapore to specific curricular and instructional reforms. Such reforms seem to be more in line with the PIRLS reading *Purposes and Processes*, namely by including curricula guidelines that focus on teaching students to read for information and for literary response.

Similarly, in PIRLS 2001 most of the participating English-speaking countries – New Zealand, Canada, the United States, and England – had higher performance on the interpreting, integrating and evaluating processes of reading comprehension, and so did a number of Eastern European countries – Romania, Macedonia, Hungary and Moldova. As the report states, “This result suggests that curriculum or instructional approaches may also influence students' relative achievement in these

processes (Mullis, Martin, & Gonzalez, 2004, p. 24).” However, as Shiel and Eivers (2009) state it is difficult to establish associations between the frequency of teaching various skills to students’ performance: “many of the associations between frequency of instruction and achievement in PIRLS are weak, not statically significant, or counter-intuitive (p. 355). For example, analysis of the PIRLS 2001 results have also shown non-existing relationships between teachers’ reported organization of reading instruction (whole group or individualized) and the frequency with which various reading strategies are used and students’ performance (Haahr, Nielsen, Hansen, & Jacobsen, 2005; Shiel & Eivers, 2009).

Furthermore, it is difficult to determine how PIRLS can be used to improve reading instruction and to interpret PISA results. For instance, “In PIRLS 2006, the highest achieving country was the Russian Federation. Yet, its performance in PISA 2006 (440 points) was well below the average of 492 for OECD countries” (Shiel & Eivers, 2009, p. 346).

From the PIRLS 2006 *Home Questionnaire* directed at parents or main caregivers, we learned that 81% of students had attended more than 1 year of ISCED0, or pre-school education, and that nearly 1/3 of students entered school able to perform early literacy activities very well (recognize most of the alphabet, read some words, read sentences, write letters and words). In addition, both in PIRLS 2001 and PIRLS 2006 there was a positive relationship between students’ reading achievement at the fourth grade and parents having engaged their children in early literacy activities before starting school (e.g., reading books, telling stories, singing songs, playing with alphabet toys, and playing word games). The positive trend is that 14 countries reported increases in the level of engagement in these activities in PIRLS 2006 vis a vis PIRLS 2001. Also, resources in the home such as “The presence of children’s books in the home showed a strong relationship with reading achievement. The average reading achievement difference between students from homes with many children’s books (>100) and those from homes with few books (10 or fewer) was almost one standard deviation (91 points)”. Although in PIRLS 2006 parents reported having fewer children’s books at home than they did in 2001, this may be related to the increase in digital supported reading materials.

With respect to students' reading attitudes and behaviours, self-reported student data obtained through questionnaires shows that the students who enjoy reading and have a high concept of themselves as competent readers had the highest achievement in both PIRLS 2001 and 2006. As the international report states, "In PIRLS 2006, on average across countries, 40 percent of the students reported reading for fun on a daily basis, and 28 percent at least weekly. However, almost one third of students (32%) internationally reported reading for fun only twice a month or less. Although there were decreases for four participants, unfortunately, seven countries had increases in the percentages of students who reported reading for fun only twice a month or less" (Mullis et al., 2007, p. 7).

In PIRLS 2006, on average across countries, students reported spending less time reading outside of school than in 2001 but the tendency to read more frequently daily stories and novels than informational materials (e.g., magazines and instructions) was maintained. Again, as the international report reveals, in the last assessment, "...students reported spending more time in a typical day reading stories and articles in books or magazines than on the Internet (1.4 hours vs. 1.0 hours). On average, girls reported more time than boys reading from books or magazines (1.5 hours vs. 1.3 hours) and this difference was found for almost every participant. In comparison, on average, boys reported more time than girls reading on the Internet (1.0 hours vs. 0.9 hours), a pattern found for approximately half the participants" (Mullis et al., 2007, p.).

Unlike other large-scale assessments such as PISA, for the PIRLS study the IEA does not include in its international report multivariate statistical analysis that control for the influence of different variables in students' achievement. Mainly, it presents descriptive statistics and percentages associated with different levels of engagement in activities like reading. The positive or negative relationships found between independent variables and achievement involve correlations. Accordingly, we have information on how students with a parent in a professional occupation, have higher achievement. Similarly, children of employed parents tend to score higher and children with both parents born in the country of assessment score higher than those that have one or both parents born abroad. When both students and parents always speak the language of the test at home students also

score higher. Conversely, "...students who had not attended pre-primary education had an international reading score of 455, compared to 510 for those students receiving 3 years or more of pre-primary education (p. 158).

The technical report, however, presents additional information regarding the percentage of variance explained by individual variables and by constructed *Indexes*. For example, this technical publication indicates that, at the international level, the positive correlation between the number of children's books in the home and reading achievement is 0.30 and that this possession associated with human capital explains 9% of the variance in students' scores.

As for the Index of *Early Home Literacy Activities*, a composite measure including reading books, telling stories, singing songs, playing with alphabet toys and playing word games, a correlation of 0.28 was found and parental engagement in these activities accounts for 8% of variance in students' achievement. Similarly, the Index of *Students' Attitudes toward Reading* showed a correlation of 0.39 and accounts for 15% of variance in student achievement. The highest reported correlation was in the Index of *Home Educational Resources*, including the possession of books and parents' highest level of education, with a coefficient of 0.44 and 9% of variance in student achievement explained.

Thus, the influences on students' reading achievement seem to be more linked to student-level variables related to individual student characteristics and their home family background than to the classroom and school environments. Nonetheless, research also suggests that school compositional effects play a role in achievement. For instance, Cortina, Carlisle and Jeng (2008) found that in schools with a large percentage of students from economically disadvantaged backgrounds the students' attainment was lower than at schools with a low percentage of students with few economic resources. More recently, an analysis of the 2006 PIRLS dataset for German indicates that class membership also explains the variance in students' achievement (Bellin, Dunge and Gunzenhauser, 2010). More specifically, a high percentage of students in the same class that do not speak the language of the test at home is negatively related to reading achievement and "in a class where 60% of the students have low educational resources, the reading achievement would be about 79 points lower than the average

reading achievement ... (Bellin, Dunge and Gunzenhauser, 2010p. 26). In this study, the teachers' use of a variety of instructional approaches showed a positive effect of two points, but was not statistically significant.

Other variables such as gender differences, with girls performing better than boys in reading, have been repeatedly encountered, both in PIRLS and in PISA (Mullis et al., 2007; OECD, 2010). School effectiveness research has also shown that school climate and resources; measured by the expectations teachers have of students' performance, by parental involvement and by the amount of material resources such as inadequate facilities, as well as by the socio-economic environment of schools are factors that intervene to explain students' achievement (Dompnier, Patisu, & Bressoux, 2006; Teddlie, Stringfield, & Reynolds, 2000). In addition, some studies suggest that teacher gender and school location might influence students' achievement, because boys and girls may get treated differently in the classroom depending on the gender of the teacher and because youth tends to perform lower in rural schools than in urban settings (Brown & Swanson, 2003; Ma, Ma & Bradley, 2008).

RATIONALE FOR THE STUDY

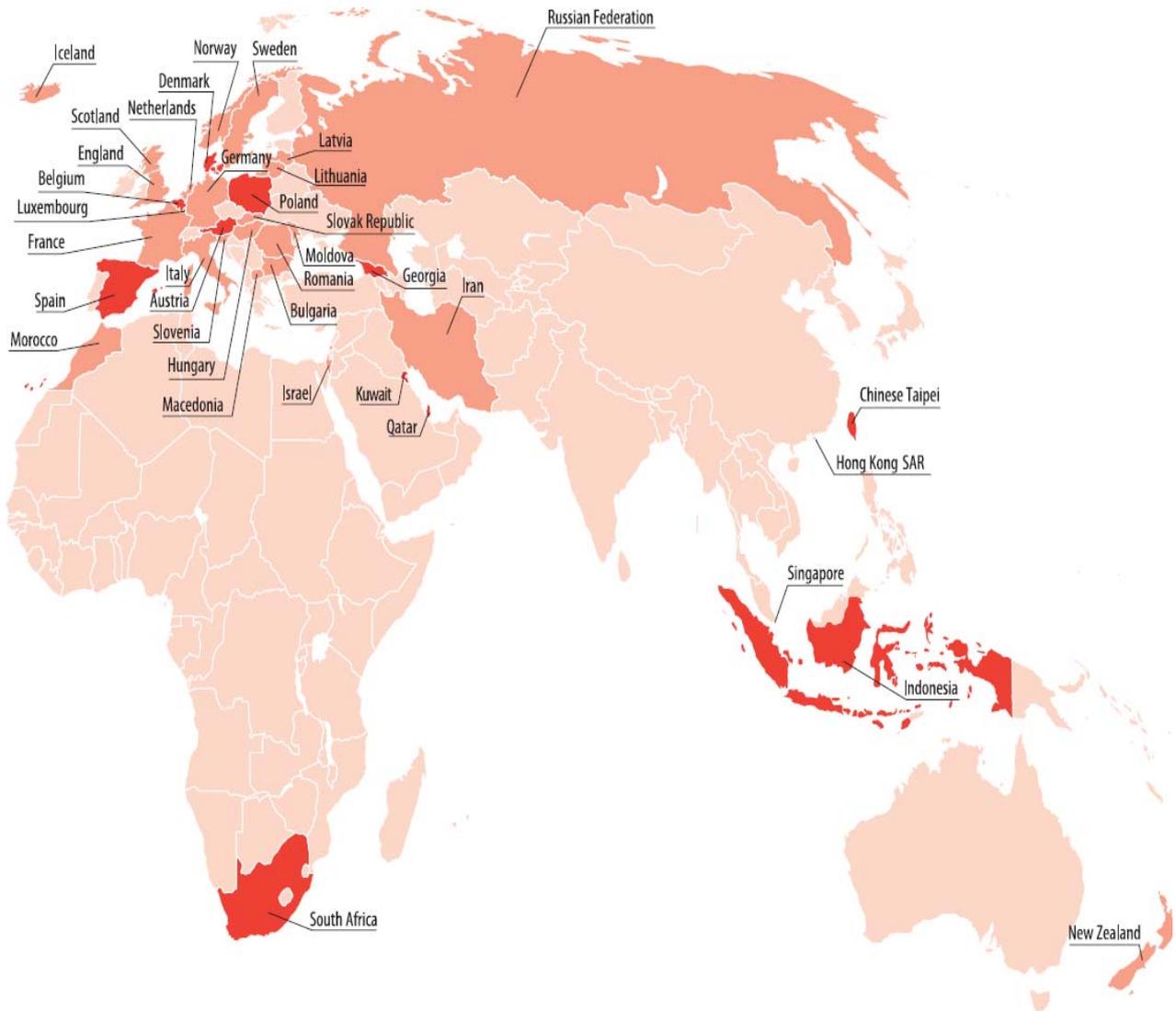
Given that one of the goals of international assessments is to inform national educational policies and that research has identified different explanatory factors related to reading comprehension achievement, investigating how these factors play out in the EU participating countries as a whole and individually is warranted. Specifically, this study addresses the following questions:

1. Is there a relationship between the curriculum emphasis placed in the different reading purposes and processes and students' reading scores?
2. What are the variables that best explain reading achievement? More specifically, what proportion of the variance in student reading achievement can be attributed to (i) student background characteristics, (ii) class characteristics and (iii) school characteristics?

METHODOLOGY

Participants

Out of forty participating countries distributed by six continents, we selected twenty from the twenty-one European Union (EU) countries and deliberately excluded Luxemburg because it presents unique plurilingual instructional policies and practices which may affect the reading achievement of a great many number of children. The following chart shows the PIRLS 2006 participating countries in Europe, Asia, Africa and Oceania. From the European continent, we considered the following EU member states: Austria, French Belgium, Flemish Belgium, Bulgaria, Denmark, England, France, Germany, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Romania, Scotland, the Slovak Republic, Slovenia, Spain and Sweden.



Note: Map extracted from PIRLS 2006 International Report

In total, the sample is comprised of 93,113 students. Considering each participating country, the number of students per country varies between 3581 in Italy and 8110 in Germany.

Table 2 -Number of students per country

Country	N
Austria	5093
Belgium (Flemish)	4479
Belgium (French)	4552
Bulgaria	3863
Denmark	4150
England	4553
France	4404
Germany	8110
Hungary	4068
Italy	3581
Latvia	4162
Lithuania	4701
Netherlands	4178
Poland	4854
Romania	4273
Scotland	4465
Slovak Republic	5380
Slovenia	5337
Spain	4094
Sweden	4816

Data Collected

PIRLS collects information on school curriculum and reading instruction, on literacy-related home resources and practices and on students' attitudes and reading habits. Curriculum can be defined as "a sequence of learning opportunities provided to students in their study of specific content" (Schmidt, McKnight, Houang, Wang, Wiley, Cogan and Wolfe, 2001, p.2). As the following graph depicts, data collected at the school level corresponds to the *intended curriculum*, which includes learning goals as envisioned in official documents and reported in the PIRLS encyclopedia as well as the perception school principals and national representatives have of what is intended in the curriculum. The *implemented curriculum* relates to the opportunities to learn reading that teachers give their students, which is indicative of the type of reading instruction students are exposed to. Lastly, in what concerns the curriculum, the reading score – set at an international mean of 500 and a standard deviation of 100 - can be considered the *achieved curriculum* because it is a measure of what was

actually attained by the students (Schmidt et al., 2001). Thus, the PIRLS information on the achieved curriculum, or students' reading scores, is complemented by information on the students' skills prior to enrolment in compulsory education and the home resources and activities reported by parents in the *Home Questionnaire*, the reading attitudes and habits reported by students in the *Student Questionnaire*, the instructional practices reported by teachers in the *Teacher Questionnaire*, and by the information reported by principals in the *School Questionnaire*.

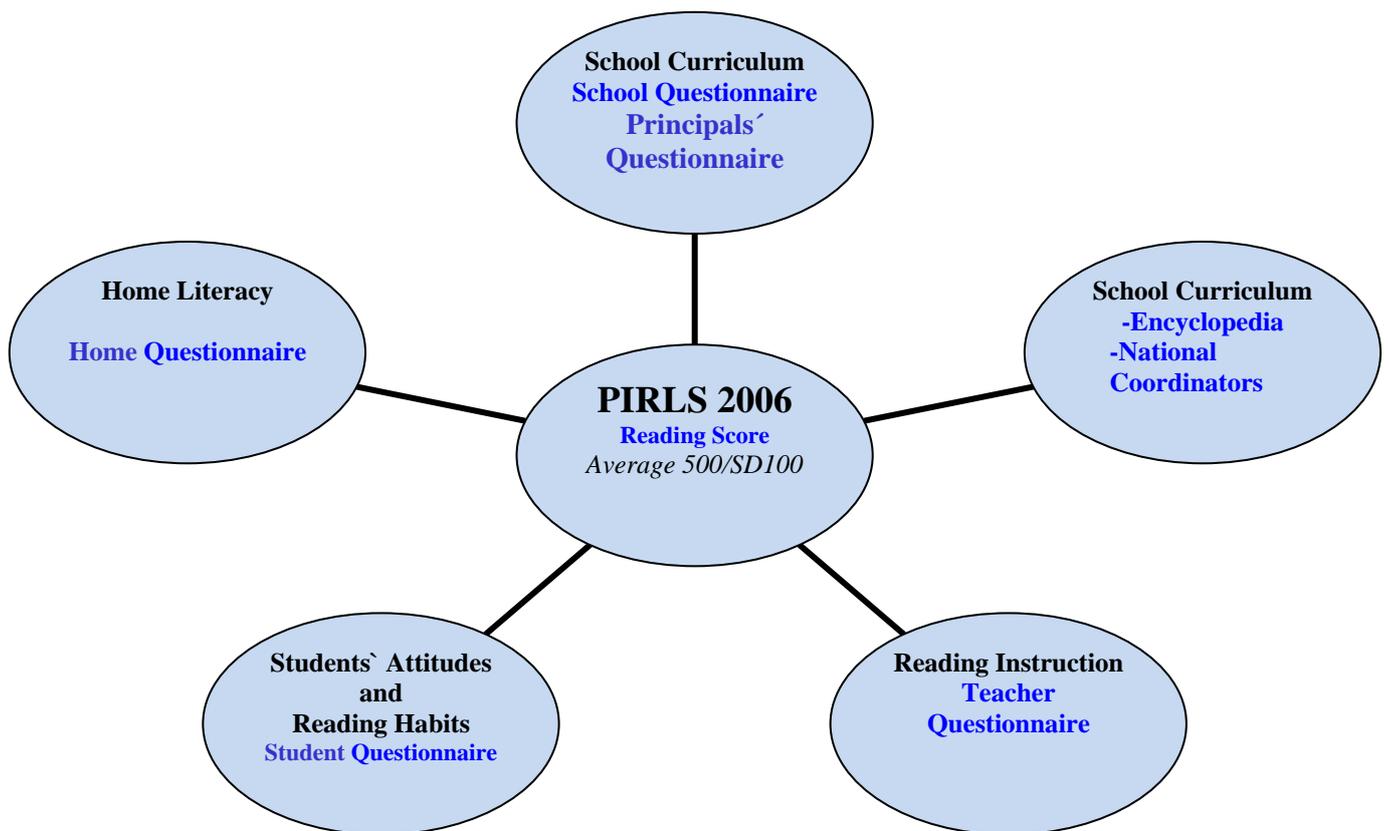


Figure 1 – Reading achievement and curriculum, home and school attitudes and practices

Data Analysis

As for curriculum and instruction emphasis and its relationship with achievement, we used the responses given by school principals in the *School Questionnaire* and calculated Pearson correlation coefficients using the IDB analyzer, the software provided by IEA to run secondary analysis of the PIRLS datasets. The correlations were limited to one reading process; interpreting reading. Given that there was no clear match between the straightforward reading process as described in the PIRLS

assessment framework and the questions in the school questionnaire, we did not explore this relationship. For example, identifying the main idea can be a straightforward process involving retrieving explicit information from the text, but it can also involve integration of information and evaluative judgments based on implicit information. This type of ambiguity precluded the analysis on the relationship between the straightforward reading process and reading achievement.

Secondly, we conducted a content analysis of the PIRLS Encyclopedia according to the reading purposes and reading processes. We coded the curriculum emphasis according to the described incidence stated in the encyclopedia and considered the number of times a specific purpose or process was mentioned. This resulted in a numerical coding per category by country. For example, we counted how many times the interpreting comprehension process was mentioned in the encyclopedia for Austria, for Belgium and so forth. We did the same type of numerical coding for the curriculum emphasis reported by national coordinators and included in the international PIRLS report by assigning a 1 to “little emphasis”, a 2 to “some emphasis” and a 3 to “major emphasis”.

In order to understand the underlying student, home and school factors associated with students’ overall reading achievement, we started by selecting variables that have been identified in the literature as predictors of students’ achievement and by analyzing the corresponding descriptive statistics (e.g. frequencies by category within each variable), the shape of distributions and their differences across countries. Additionally, in the preliminary analysis we constructed cross tabulations between the variables and reading achievement, we calculated correlations among the different explanatory variables and between each explanatory variable and reading achievement. In addition, we used linear regression analysis with country fixed effects to obtain regression coefficients and to measure the proportion of variance explained by each variable. Next, we made decisions concerning using individual variables and/or the Indices constructed by IEA. When individual variables had more explanatory power than the Indices where they were included, we opted for including the individual variables. Also, we made decisions with regard to recoding certain variables.

Specifically, from the two individual variables that were part of Indices, we used the original

categorical variable on the incidence of “Parental Book Reading” – “often”, “sometimes” and “never or almost never” - from the Index of Home Early Literacy Activities (HELA). This variable had a much stronger correlation with reading achievement than the HELA index reflecting a composite measure derived from six different activities a) Parental book reading, b) Telling stories, c) Singing songs, d) Playing with alphabet toys, e) Playing word games, and f) Reading aloud signs and labels. Next, we recoded and used “Knowledge of the Alphabet” from the derived Index of Early Literacy Skills (HAIB), which included students’ ability to a) Recognize most letters of the alphabet, b) Read some words, c) Read some sentences, d) Write letters of the alphabet and e) Write some words and was originally coded into “very well”, “moderately well”, “not very well” and “not at all” according to parents’ judgments about their children’s ability to perform these skills when they began compulsory school. Given that the difference in achievement between the last two categories (know the alphabet “not very well” and “not at all”) was only three points and that research supports the notion that knowing more than 50% of the letters of the alphabet is what really impacts future reading ability, we merged them and obtained a variable recoded in three categories (Piastra and Wagner, 2010).

The other two indices, the Index of Home Educational Resources - HER (including the number of books in the home, number of children’s books, the presence of computer and of a study desk, access to a daily newspaper and parents’ educational level) and the Index of Students’ Attitudes toward Reading – SATR (including five variables, among which one about whether students enjoyed reading) proved to explain more of the variance in achievement than any of the individual variables that composed them. Therefore, we used these indices.

The data has a hierarchical structure in which students are nested in classes, and classes are nested in schools. Therefore, we used multilevel modeling (Goldestein, 2003) to conduct the data analysis and to investigate which explanatory factors could be found at the school, class and student levels with respect to reading achievement. Level 1 consists of student variables, Level 2 represents the class and Level 3 the school. The variance components model was applied to the data and the model was then estimated using iterative generalized least squares (IGLS) (Goldestein, 1986). The

computational component was generated using MLWin 2.24 software (Rabash, Steele, Browne, & Goldstein, 2009). The bottom-up procedure, the deviance and the Akaike's information criteria (Akaike, 1981) were used to decide which variables to include in the model and the multicollinearity was checked.

The multilevel model was built according to country fixed effects because this controls for unobserved heterogeneity due to historical and/or institutional factors unique to individual countries. That is, because there are unique effects of each country that correspond to country-specific correlations with the independent variables we account for this by computing differencing statistics to reduce individual country effects. Our final model included three levels: The first was composed of home and student characteristics, the second captured class variables and school characteristics as reported by school principals. Accordingly, the conceptual framework we followed is captured in Figure 2.

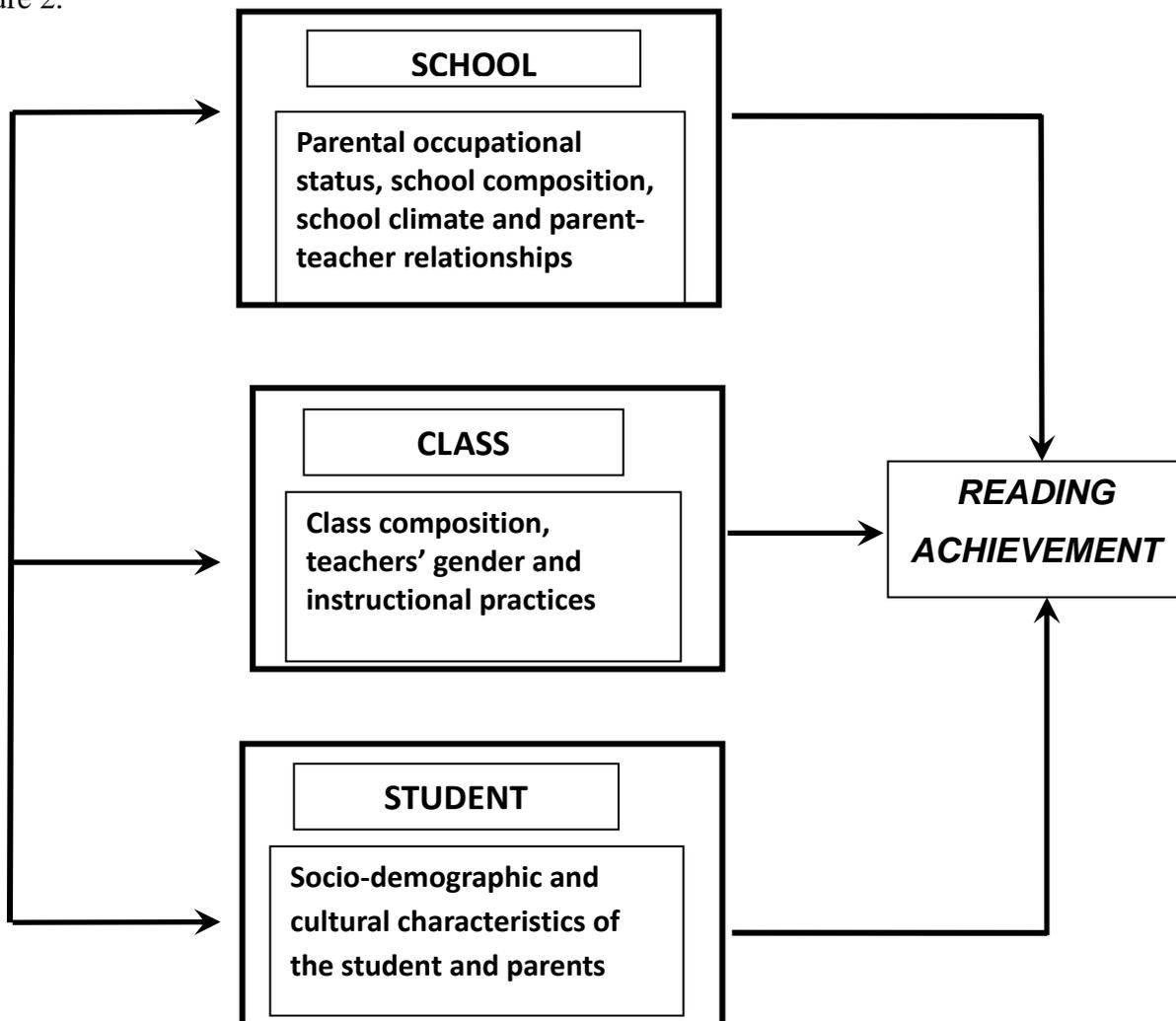


Figure 2 – Conceptual framework of the multilevel model

Additionally, we computed separate multi-level models per country in order to complement our analysis and understand which variables are more or less significant in explaining reading achievement in each country. After we present a description of the variables used at each level of the analysis, we begin by discussing the results pertaining to the first research question investigating whether curriculum and instruction was linked to reading achievement. Secondly, we present the results of the multilevel model at the EU level with the 20 countries grouped and lastly we include the multilevel results by country with a brief explanation.

Variables

In the first level, corresponding to the individual characteristics of the students, we entered the following variables:

- Gender – dichotomous variable with a value of 1 for girls (reference group) and 2 for boys;
- Language spoken at home – dichotomous variable with a value of 1 if the language of the test is the same as the one spoken at home and 2 when it is not spoken at home;
- Parents' highest occupational status – variable that includes: professional, small business owner, clerical, skilled worker, general laborer and others for the highest occupational status of one of the parents. The first category represents the highest level of occupational status for and the last option the lowest level;
- Employment situation of the father - variable that considers full time job, part time job and looking for job;
- Employment situation of the mother - the same as the previous variable for the father;
- Pre-school attendance - dichotomous variable with the value 1 for yes and 2 for no;
- Index of Home Educational Resources - variable that considers high, medium and low levels constructed by IEA;
- Index of students' attitudes toward reading - variable that considers high, medium and

low levels constructed by IEA;

- Recognize most letters of the alphabet – variable with three categories recoded on the basis of the original four (very well, moderately well, not very well and not at all). Because the difference between the third and the fourth category was only 3 points in terms of reading achievement, we merged these categories into one.
- Parental book reading – variable with three categories corresponding to often, sometimes, never or almost never.
- Reading for fun outside school – variable with three categories corresponding to the intensity of students' reading into everyday or almost everyday, once or twice a week, once or twice a month and never or almost never.

In the second level, corresponding to the class characteristics, we considered:

- Gender of the teacher – dichotomous variable with a value of 1 for females (reference group) and 2 for males;
- Percentage of students not speaking the language of the test – variable that expresses the percentage of students in a class who do not speak the test language
- Percentage of students with few educational resources - variable that expresses the class percentage of students with low home educational resources;
- Teacher uses a variety of organizational/instructional approaches – the variable assumes two values where 1 represents low use of different approaches and 2 represents high use of different approaches as defined by IEA;

In the third and last level, corresponding to the school characteristics, we entered:

- The percentage of students that come from economically disadvantaged homes – the variable assumes the categories 0-10%, 11-25%, 26-50%, more than 50%;
- Location of the school/If rural or not – dichotomous variable with 1 for rural status and

zero for urban or suburban;

- Mean of the parents' highest occupational level – the variable represent the school average of the parents' highest occupational level;
- School instructional resources – the variable assumes three values: high, medium and low as defined by IEA;
- Parent-teacher relationship – variable defined with basis on the percentage of students whose parents attend conferences in school: assumes the categories 0-10%, 11-25%, 26-50%, more than 50%;
- School climate - variable defined with basis on teachers' expectations for student achievement: assumes the categories very high, high, medium, low and very low.

RESULTS

The results indicate that the relationship between the emphasis on reading processes and reading achievement is inexistent or very weak. Unfortunately, with respect to the reading processes, we could only investigate the interpreting process reflected in three questions in the School Questionnaire, because these were the only ones that had a direct match with this reading process, as described in the PIRLS framework. The questions pertained to the emphasis, at the school level, with which students engaged in the following reading activities that require reading between the lines or reading to extrapolate implicit meanings are: 1) Comparing different texts, 2) Making generalizations and inferences based on text and 3) Describing style and structure of text. To check if there were any differences, we also run the analysis for *Overall Reading* in addition to *Interpret Reading*.

Table 27 included in Appendix I shows that the correlations are very weak in all countries, ranging from 0 to .14 in absolute values. When found, the negligible relationships reflect a statistically significant value due to the large sample sizes. Indeed, when dealing with large sample sizes it is better to consider the strength of the relationship rather than the significance of the p. value (<http://janda.org/c10/Lectures/topic06/L24-significanceR.htm>).

Subsequent content analysis of curriculum emphasis focused on the reading purposes and processes indicated by national coordinators and on the curricula descriptions in the PIRLS encyclopaedia. Again, this qualitative analysis seems to indicate that there is no relation between students' scores on the reading for information or for literary purposes and the respective curriculum emphasis in these reading purposes (see Table 28 in Appendix I). For example, as per the information reported by Bulgaria's national representatives the same emphasis is placed in the two purposes, but students score higher on reading for information. Likewise, as per the information in the encyclopaedia, France scores higher on reading for information. However, the curriculum emphasis seems to be on reading for literary purposes. Similar discrepancies can be found in the other countries, which make the curriculum information counterintuitive as an indicator of students' performances.

The same can be said about the association between the reading processes and reading achievement. That is, there seems to be no relation between curriculum emphasis and students' reading scores in what concerns reading for straightforward interpreting or reading that requires a critical evaluation of the text (see Table 29 in Appendix I). Specifically, in some countries like Hungary the national coordinators report a stronger emphasis on the *straightforward* comprehension process than on the *interpreting and evaluating* one. However, the students have higher scores on the last process which is more in accord with the information in the Encyclopaedia.

Next, we present the findings related to the second question of the study, which addresses the factors that explain reading achievement. First, we show the descriptive statistics for all the variables included in the model.

Descriptive Statistics

We list the descriptive statistics for the individual-level variables in Table 3. The average reading achievement of all the students in the sample is approximately 536, with a standard deviation of 67.83. For this variable the minimum is 145.84 and the maximum is 793.68. In what concerns the gender we verify that 50.7% of the students were boys. With respect to immigration background, 4.8% didn't speak the test language at home. For the parents' higher occupational level, the mode is the professional category (37.1% of the parents) and the lowest percentage is obtained for general labourer. Most of the students' fathers worked in full time jobs and 4.8% were looking for a job. The percentage of mothers that had a full time job was 61% and 11.1% were unemployed. The percentage of children that attended pre-school is 93.1%. In what concerns the Index of Home Educational Resources, the percentage of students classified in the high level was 13.5%, in the medium level was 82.7 and for the low level only 3.8%. The distribution of the Index of students' attitudes toward reading corresponds to 48.6% of the students in the high level, 41.7% were classified in the medium level and the remaining were in the low level. About forty one percent (40.8%) of students recognize most of the letters of the alphabet very well, 36% moderately well and 23.2% not very well or not at

all. The distribution of parental book reading is 57.4% for the often category and 4.3% for never or almost never. As the following Table shows, for reading for fun outside school the mode is everyday or almost everyday.

Table 3 – Descriptive statistics of the individual level

Individual level	
Reading achievement	
M	535.83
SD	67.83
Min	145.84
Max	793.68
Gender	
Boys	50.7%
Girls	49.30%
Language spoken at home	
Is the same of the test	95.2%
Is not the same of the test	4.8%
Parent's higher occupation level	
Professional	37.1%
Small business owner	11%
Clerical	26.4%
Skilled worker	15.4%
General labourer	4.1%
Others	6%
Employment situation of the father	
Full time	90.7%
Part time	4.5%
Looking for a job	4.8%
Employment situation of the mother	
Full time	61.0%
Part time	27.9%
Looking for a job	11.1%
Attended pre-school	
Yes	93.1%
No	6.9%
Index of home educational resources	
High	13.5%
Medium	82.7%
Low	3.8%
Index of students attitudes toward reading	
High	48.6%
Medium	41.7%
Low	9.7%
Recognize most letters of the alphabet before ISCED1	
Very well	40.8%
Moderately well	36.0%

Not very well or Not at all	23.2%
Parental book reading	
Often	57.4%
Sometimes	38.3%
Never or almost never	4.3%
Reading for fun outside school	
Everyday or almost everyday	41.8%
Once or twice a week	27.7%
Once or twice a month	12.6%
Never or almost never	17.9%

Table 4 presents the descriptive statistics for the class level. Most of the teachers are female, the mean percentage of students who do not speak the language of the test is 4.8, but the minimum and maximum values vary greatly between classes. The mean percentage of students with few educational resources is 3.81, with a wide range of values between classes. For teachers' use of a variety of organizational approaches, the mean is 1.23.

Table 4 – Descriptive statistics for the class level

Class level	
Gender of the teacher	
Male	11.3%
Female	88.7%
Percentage of students not speaking test language	
Mean	4.77
Standard Deviation	3.07
Minimum	0.00
Maximum	44.40
Percentage of students with few educational resources	
Mean	3.81
Standard Deviation	4.90
Minimum	0.00
Maximum	91.30
Teachers uses variety of organizational approaches	
Mean	1.23
Standard Deviation	0.42
Minimum	1.00
Maximum	2.00

The school level variable listed below show that the most representative interval for the percentage of students in the school that come from economically disadvantaged homes is 0-10%. About a quarter of schools are located in a rural setting, the mean of parents' occupational level is 2.35, and most schools have a high level of instructional resources. For school climate, 71% of the

teachers' expectations for student achievement are high or very high and the mode of parent-teacher relationships is more than 50%.

Table 5 – Descriptive statistics of the school level

School level	
Percentage of students in the school come from economically disadvantaged homes	
0-10%	42.4%
11-25%	31.1%
26-50%	16.4%
More than 50%	10.1%
Location of the school/School is rural	
Yes	25.5%
No	74.5%
Mean of parent's higher occupational level	
Mean	2.35
Standard Deviation	0.65
Minimum	1
Maximum	5
School instructional resources	
High	69%
Medium	26.4%
Low	4.6%
Parent-teacher relationship/Percentage of students with parents attend conferences in school	
0-10%	4.4%
11-25%	5%
26-50%	15.8%
More than 50%	74.8%
School climate/Teachers' expectations for student achievement	
Very high	13.7%
High	57.3%
Medium	27.6%
Low	1.3%
Very low	0.1%

Multivariate Analysis

Table 6 presents the findings of the multilevel analysis. The baseline model, or the null model, allows us to obtain the proportion of variability, calculated using the variances estimated for the errors, between students, between classes within schools and between the schools. The estimates pertaining to the proportion of variance in our data are 85.1%, 9.4% and 5.5%, due to students' characteristics, classes and schools, respectively. Since we found a proportion of variance in the three levels, these results justify the use of multilevel modelling.

Table 6 – Results of the multilevel modelling analysis for the 20 EU countries

	Null model	Final model
Reading Achievement	533.87 (0.70)	739.99 (5.321)
Gender of the student		-1.961 (0.491)
Language spoken at home		-13.674 (1.474)
Parent's highest occupational Level		-7.016 (0.232)
Employment situation of the father		-4.359 (0.608)
Employment situation of the mother		-1.125 (0.401)
Attended pre-school		-0.481 (1.118)
Index of Home Educational Resources		-16.577 (0.682)
Index of Students Attitudes Toward Reading		-15.061 (0.439)
Recognize letters of the alphabet		-15.576 (0.337)
Parental book reading		-12.359 (0.472)
Reading for fun outside school		-6.547 (0.260)
CLASS LEVEL		
Gender of the teacher		-3.275 (1.375)
Percentage of students not speaking test language		0.122 (0.099)
Percentage of students with few educational resources		-0.231 (0.098)
Teacher uses variety of organizational/instructional approaches		-1.449 (1.009)
SCHOOL LEVEL		
Percentage of students in the school come from economically disadvantaged homes		-3.523 (0.531)
Location of the school/If is rural or not		0.528 (1.038)
Mean of parent's highest occupational level		-7.701 (0.950)
School Instructional resources		0.010 (0.810)
Parent-teacher relationship		1.611 (0.580)
School climate/Teachers expectations for student achievement		-3.755 (0.750)
Variance components		
Level 1	963.499	147.343
Level 2	445.495	251.741
Level 3	3267.083	2277.447
R-square		0.427
<i>Deviance:</i>	<i>1027375</i>	<i>457476</i>

All estimates presented in bold are statistically significant at the 0.05 level.

The values in parenthesis indicate standard errors associated to the coefficients which often take a negative sign because most categorical variables are coded either dichotomously or with the lowest value assuming the best category of the variable.

The value of the r-square of the full model is 0.427, which indicates that 42.7% of the total variance in reading achievement is explained by this model. Comparing the null model with the final model there is a clear reduction in the amount of deviance in relation to that found for the null model. This indicates a better fit and a corresponding increase in the explanation of the reading achievement. The variables with the highest impact on students' overall reading score relate to home resources and practices, to students' pre - reading knowledge and their attitudes and to school compositional effects. In addition, at the class level the teacher's gender and the percentage of students with low educational resources also influence students' reading achievement, with a female teacher associated with better performance and a higher percentage of students with few resources in a given class with worse performance. At the school level, the mean of the parents' highest educational level, school climate, the percentage of students coming from economically disadvantaged homes and parent-teacher relationships explain reading achievement.

More specifically, both the students' home educational resources and their attitudes toward reading are about as significant in explaining attainment as their knowledge of the alphabet at the start of compulsory education and their parents' shared book reading practices. The other variable with a strong negative impact on students' overall reading score is not speaking the language of the test at home. Next, our model shows that the employment situation of the father and parents' occupational level also explains reading achievement favouring children of employed fathers and those with parents that have high occupational status. The amount of time students spend reading for fun outside of school also appears to have a positive influence, of an increase of about 7 points, on students' achievement. Clearly, students that have reading habits perform better.

At the class level, we found two variables that are statistically significant. If a teacher is female the students have a better reading score than if they have a male as a teacher. Classes with a high percentage of students with low educational resources have lower achievement, but not by much. In addition, a teacher that uses a variety of organizational/instructional approaches produces higher students' achievement, although the difference is not statistically significant. Finally, considering the

school level, results indicate that the higher the parents' occupational level and the lower the percentage of students coming from economically disadvantaged homes the higher the students' reading scores (about eight for the first and four points for the latter). In addition, a better school climate and good parent/teacher relations explain additional achievement. That is, low teacher expectations for students' achievement is related to a decrease of four points in students' reading and better parent-teacher relations result in a higher reading score by two points.

Country-level Analysis

The following Tables show the results of our model per country. In our description of these results we highlight the main changes in the variables that are statistically significant in each country vis à vis the ones that were significant in the EU model with all 20 countries. The individual country's descriptive statistics with all variables included in the model are in Appendix II. The five variables that have a strong impact on reading achievement at the individual level (student and home characteristics) for the model with all countries are still consistently significant in the large majority of individual countries. These are: 1) Index of home educational resources, 2) Index of students' attitudes towards reading, 3) Recognize most of the letters of the alphabet, 4) Parental book reading, and 5) Reading for fun outside school.

Across all countries, in absolute values, for the first Index of home educational resources the coefficients vary between four in Latvia and twenty eight in Poland, but in Latvia the coefficient is not statistically significant. Regarding the Index of students' attitudes toward reading, the values vary between twelve in Spain and twenty two in Romania. The variable related to the knowledge of the alphabet varies between five in Germany and forty in England. For parental book reading, the variation is from two points in Latvia, which is not statistically significant and twenty two in Scotland and for Reading for fun the range is from four in Sweden to fourteen in England. Considering the coefficients obtained in our model for variables other than the common ones across countries mentioned above, the main statistically significant findings for each country are the following:

- Austria: If the students' language spoken at home is not the same as the test there is a difference in the reading achievement of 28 points and a higher parents' occupational level produces a difference of 6 points. Students that attend schools in a rural environment score 7 points lower than those in other environments. Students in schools where parents have higher occupational levels also score 10 points higher in reading achievement.

- Belgium Flemish: The use of the same language of the test at home produces a higher achievement in the students (9 points). There is an increase of 10 points in reading for students with parents who have a higher occupational level. Students whose father works in a full time job perform better than students whose father is looking for a job. The inverse situation is verified for the mother. Students that attended pre-school tends to score 36 points more in reading achievement. Schools with a lower percentage of students that come from economically disadvantaged homes produce a better score (4 points). If the location of the school is rural, the students' reading achievement decreases by 5 points.

- Belgium French: At the individual level, only two variables have statistically significant coefficients: parents' highest occupational level and the employment situation of the father. For the first variable, there is a corresponding increase in reading achievement of 8 points. A better employment situation of the father produces a higher performance by 10 points. In addition, if schools have a lower average of parental occupational level students score 25 points lower in reading achievement. Additionally, the model indicates that there is no variation between schools in this country.

- Bulgaria: Girls perform better than boys in reading, with a difference of 10 points. The students that speak the same language of the test at home have an increase in reading achievement of 17 points. The parents' occupational level and its average per school indicate that a higher occupational level results in additional 7 and 14 points in the reading achievement, respectively. Students that didn't attend pre-school have higher reading achievement (10 points). If the school is rural, a difference of 21 points can be found for the reading attainment of the students.

- Denmark: We find a difference in reading achievement of 5 points between girls and boys, favoring the first group. The highest occupational level of the parents is associated with better reading performance and better school climate and higher instructional resources produce higher reading achievement (7 and 12 points, respectively).

- England: Students that speak the same language of the test achieve an additional 27 points in reading, when compared to students who do not speak the same language. Those that attend schools that have a higher percentage of students that come from economically disadvantaged homes have lower reading achievement (9 points).

- France: Schools in which the mean of parents' highest occupational level is higher produce an increase in the reading achievement of the students of 13 points.

- Germany: The variable with a strong negative impact on students' overall reading achievement is not speaking the language of the test at home (21 points). Students whose parents have high occupational status and the father has a full time job have an increase in the reading score. Classes with a high percentage of students with few educational resources result in a decrease in the reading score of the students of 1 point. The variables associated to the schools that have an impact in reading achievement are: percentage of students in the school that come from economically disadvantaged homes, the mean of parents' highest occupation level and school climate. For the first variable, the coefficient of the model indicates that a higher percentage produces lower students' reading score (6 points). For the second variable, the coefficient is 7 points which means that for schools with a better occupational level mean the students perform better. A better school climate has a positive impact of 6 points in the reading achievement. In addition, the model indicates that, for Germany, there is no variance between classes.

Hungary: Boys perform better than girls in reading (difference of 5 points). A higher occupational level of the parents and a full time job of the father have a positive impact in the reading score (5 and 11 points, respectively). Similar results, although higher, were found for schools whose students' parents have high occupational level. However, no variance was found between schools.

Italy: The variables with a high impact in students' reading achievement are not speaking the language of the test at home and parent-teacher relationships. The first variable produces a negative impact of 21 points in the reading score and the second variable indicates that good relationships between parents and teachers result in an increase of 17 points in reading. A higher occupational level of the parents reflects a change of 4 additional points in reading achievement. Rural schools produce a decrease of 15 points in the performance of the students.

Latvia: Girls have better performance in reading than boys (8 points). The language spoken at home has a strong impact in the reading score: An increase of 47 points for students whose language is the same of the test. At the individual level and at the school level a higher parental occupational level has a positive impact in reading achievement.

Lithuania: Students' gender and parents' occupational level have a similar impact in the reading score of students in Latvia; 8 and 6, respectively. Moreover, a female teacher is associated with an improved score by 28 points and the mean for the occupational level at the school level produces a difference of 14 points favouring higher occupational levels.

Netherlands: The reading score of boys are higher than that of girls by 5 points. Students who speak the same language of the test have an increase of 22 points in reading achievement. Students whose teachers use a variety of organizational approaches have a higher reading score (6 points). In addition, better school instructional resources allow the students to perform better (11 points). Schools whose parents have a higher occupational level have a positive impact of 7 points in the achievement of students.

Poland: A high occupational level of the parents and a full time job of the mother reflect a better performance of the students (5 and 4 points, respectively).

Romania: Students that attended pre-school have an increase of 30 points in reading achievement. At the student level and at the school level, the occupation of the parents has a positive impact in the reading score (6 and 11 points, respectively).

Scotland: The language spoken at home and having a female teacher impacts reading

achievement (21 points favouring those that speak the same language of the test and 21 points favouring those taught by female teachers). At the individual level and at the school level a higher parental occupational level has a positive impact in reading achievement (8 and 16 points, respectively).

Slovak Republic: Students that have both parents with a full time job perform better (11 points for the father and 6 points for the mother). For teachers' use of a variety of instructional approaches and for the percentage of students that come from economically disadvantaged homes a similar impact to that found for Sweden was apparent in the reading score.

Slovenia: Girls have a higher reading score than boys (8 points). The language spoken at home has a strong impact in the reading score, an increase of 32 points for students whose language is the same of the test. The occupational level of the parents and the employment situation of the mother also have an impact in the reading score. Finally, and counter-intuitively, students that attend schools with a better school climate tend to perform worse than those attending schools with a less ideal school climate (6 points).

Spain: The variables with a significant impact in the reading achievement are the occupational level of the parents and the school percentage of students that come from economically disadvantaged homes. The first variable is similar to Italy and the second indicates that the schools with higher percentages produce a decrease of 11 points in the reading achievement of the students.

Sweden: Students that speak the same language of the test at home score 12 points higher in reading. The occupational level of the parents and the employment situation of the mother have a significant impact in the reading score, as was verified in the previous countries. Teachers that use a variety of instructional approaches have a positive impact of 6 points in the reading achievement and students that attend schools with a higher percentage of students that come from economically disadvantaged homes have a decrease in the reading score of 5 points.

Table 7 – Results of the multilevel modelling analysis for Austria

Austria	Final Model
Reading Achievement	740.278 (26.481)
Gender of the student	2.746(1.882)
Language spoken at home	-28.101(4.812)
Parent's highest occupational Level	-6.412(0.961)
Employment situation of the father	0.432(3.566)
Employment situation of the mother	2.143(1.671)
Attended pre-school	-4.296(10.189)
Index of Home Educational Resources	-24.726(3.420)
Index of Students Attitudes Toward Reading	-12.039(1.709)
Recognize letters of the alphabet	-8.159(1.159)
Parental book reading	-17.576(1.657)
Reading for fun outside school	-8.063(0.989)
Gender of the teacher	1.245(5.181)
Percentage of students not speaking test language	0.133(0.374)
Percentage of students with few educational resources	0.436(0.535)
Teacher uses variety of organizational/instructional approaches	-1.709(3.279)
Percentage of students in the school come from economically disadvantaged homes	-1.340(2.152)
Location of the school/If is rural or not	6.995(3.450)
Mean of parent's highest occupational level	-9.598(4.803)
School Instructional resources	-2.478(4.078)
Parent-teacher relationship	1.331(3.230)
School climate/Teachers expectations for student achievement	-2.952(2.925)
Variance components	
Level 1	2034.276
Level 2	179.637
Level 3	110.170
R-square	0.503

Table 8 – Results of the multilevel modelling analysis for Belgium Flemish

Belgium Flemish	Final Model
Reading Achievement	722.176 (28.431)
Gender of the student	0.779(1.648)
Language spoken at home	-8.808(3.985)
Parent's highest occupational Level	-9.987(0.740)
Employment situation of the father	-5.864(3.466)
Employment situation of the mother	5.330(1.447)
Attended pre-school	-36.084((17.826)
Index of Home Educational Resources	-13.396(2.347)
Index of Students Attitudes Toward Reading	-14.899(1.388)
Recognize letters of the alphabet	-9.801(1.109)
Parental book reading	-9.472(1.300)
Reading for fun outside school	-4.270(0.907)
Gender of the teacher	2.823(2.743)
Percentage of students not speaking test language	-0.390(0.335)
Percentage of students with few educational resources	-0.350(0.430)
Teacher uses variety of organizational/instructional approaches	3.346(2.961)
Percentage of students in the school come from economically disadvantaged homes	-3.644(1.912)
Location of the school/If is rural or not	5.436(2.839)
Mean of parent's highest occupational level	-4.625(3.463)
School instructional resources	3.019(3.264)
Parent-teacher relationship	-0.667(1.858)
School climate/Teachers expectations for student achievement	0.803(3.023)
Variance components	
Level 1	1487.033
Level 2	58.870
Level 3	89.895
R-square	0.650

Table 9 – Results of the multilevel modelling analysis for Belgium French

Belgium French	Final Model
Reading Achievement	756.444 (28.431)
Gender of the student	2.473(2.445)
Language spoken at home	-8.428(5.610)
Parent's highest occupational Level	-7.488(1.141)
Employment situation of the father	-9.607(2.753)
Employment situation of the mother	-1.482(1.735)
Attended pre-school	-31.493(22.428)
Index of Home Educational Resources	-13.204(4.712)
Index of Students Attitudes Toward Reading	-15.962(2.247)
Recognize letters of the alphabet	-7.824(1.602)
Parental book reading	-16.427(2.276)
Reading for fun outside school	-9.416(1.287)
Gender of the teacher	-4.980(4.242)
Percentage of students not speaking test language	-0.249(0.454)
Percentage of students with few educational resources	-0.850(0.578)
Teacher uses variety of organizational/instructional approaches	-0.020(3.350)
Percentage of students in the school come from economically disadvantaged homes	-0.459(2.457)
Location of the school/If is rural or not	-0.498(3.798)
Mean of parent's highest occupational level	-24.750(4.384)
School instructional resources	3.320(2.992)
Parent-teacher relationship	-0.791(2.065)
School climate/Teachers expectations for student achievement	-3.603(2.547)
Variance components	
Level 1	2297.676
Level 2	215.33
Level 3	0
R-square	0.463

Table 10 – Results of the multilevel modelling analysis for Bulgaria

Bulgaria	Final Model
Reading Achievement	723.928 (41.856)
Gender of the student	-9.743(2.355)
Language spoken at home	-16.980(5.839)
Parent's highest occupational Level	-7.479(1.110)
Employment situation of the father	-3.934(2.287)
Employment situation of the mother	-3.297(1.852)
Attended pre-school	9.709(4.013)
Index of Home Educational Resources	-14.406(3.104)
Index of Students Attitudes Toward Reading	-15.348(2.234)
Recognize letters of the alphabet	-18.292(1.871)
Parental book reading	-7.493(2.287)
Reading for fun outside school	-4.612(1.295)
Gender of the teacher	-4.450(11.058)
Percentage of students not speaking test language	0.162(0.561)
Percentage of students with few educational resources	0.022(0.409)
Teacher uses variety of organizational/instructional approaches	-4.392(12.275)
Percentage of students in the school come from economically disadvantaged homes	-6.097(4.767)
Location of the school/If is rural or not	-20.938(10.913)
Mean of parent's highest occupational level	14.234(6.308)
School instructional resources	-4.944(5.194)
Parent-teacher relationship	0.863(5.337)
School climate/Teachers expectations for student achievement	-8.842(7.008)
Variance components	
Level 1	2595.361
Level 2	540.879
Level 3	1099.460
R-square	0.094

Table 11 – Results of the multilevel modelling analysis for Denmark

Denmark	Final Model
Reading Achievement	692.007 (4.926)
Gender of the student	-4.836 (2.212)
Language spoken at home	1.496 (6.667)
Parent's highest occupational Level	-5.300 (1.102)
Employment situation of the father	2.695 (4.774)
Employment situation of the mother	1.281 (2.189)
Attended pre-school	-11.951 (16.442)
Index of Home Educational Resources	-16.900 (2.58)
Index of Students Attitudes Toward Reading	-15.871 (1.989)
Recognize letters of the alphabet	-22.854 (1.646)
Parental book reading	-15.412 (2.401)
Reading for fun outside school	-3.810 (1.316)
Gender of the teacher	-8.231 (5.200)
Percentage of students not speaking test language	0.981 (0.481)
Percentage of students with few educational resources	0.209 (0.610)
Teacher uses variety of organizational/instructional approaches	1.557 (3.564)
Percentage of students in the school come from economically disadvantaged homes	-0.508 (3.073)
Location of the school/If is rural or not	-2.261 (4.504)
Mean of parent's highest occupational level	-14.919 (4.926)
School instructional resources	12.206 (5.925)
Parent-teacher relationship	7.460 (4.920)
School climate/Teachers expectations for student achievement	-7.100 (3.514)
Variance components	
Level 1	232.994
Level 2	81.722
Level 3	232.994
R-square	0.882

Table 12 – Results of the multilevel modelling analysis for England

England	Final Model
Reading Achievement	823.126 (30.849)
Gender of the student	1.819(3.846)
Language spoken at home	-27.065(10.934)
Parent's highest occupational Level	-3.881(2.055)
Employment situation of the father	-7.322(7.026)
Employment situation of the mother	-1.355(3.522)
Attended pre-school	2.388(6.989)
Index of Home Educational Resources	-16.689(4.658)
Index of Students Attitudes Toward Reading	-13.786(3.519)
Recognize letters of the alphabet	-40.035(2.960)
Parental book reading	-20.844(5.586)
Reading for fun outside school	-14.009(2.030)
Gender of the teacher	-7.158(6.053)
Percentage of students not speaking test language	-0.877(0.884)
Percentage of students with few educational resources	0.770(0.933)
Teacher uses variety of organizational/instructional approaches	1.393(5.262)
Percentage of students in the school come from economically disadvantaged homes	-8.854(3.025)
Location of the school/If is rural or not	-9.974(6.769)
Mean of parent's highest occupational level	-0.464(6.518)
School instructional resources	-1.090(6.538)
Parent-teacher relationship	-4.385(3.591)
School climate/Teachers expectations for student achievement	0.453(4.222)
Variance components	
Level 1	3403.954
Level 2	194.178
Level 3	52.410
R-square	0.219

Table 13 – Results of the multilevel modelling analysis for France

France	Final Model
Reading Achievement	698.413 (24.487)
Gender of the student	-1.005(2.091)
Language spoken at home	-5.032(6.147)
Parent's highest occupational Level	-5.850(0.970)
Employment situation of the father	-4.835(2.928)
Employment situation of the mother	-2.314(1.655)
Attended pre-school	4.658(18.832)
Index of Home Educational Resources	-15.610(2.827)
Index of Students Attitudes Toward Reading	-21.237(2.086)
Recognize letters of the alphabet	-16.430(1.554)
Parental book reading	-12.477(2.087)
Reading for fun outside school	-9.198(1.154)
Gender of the teacher	-0.916(3.185)
Percentage of students not speaking test language	-0.132(0.524)
Percentage of students with few educational resources	-0.026(0.504)
Teacher uses variety of organizational/instructional approaches	-3.854(3.119)
Percentage of students in the school come from economically disadvantaged homes	-2.892(1.788)
Location of the school/If is rural or not	5.610(3.263)
Mean of parent's highest occupational level	-12.697(3.338)
School instructional resources	3.280(3.003)
Parent-teacher relationship	2.746(1.710)
School climate/Teachers expectations for student achievement	1.503(2.224)
Variance components	
Level 1	1996.269
Level 2	125.112
Level 3	55.980
R-square	0.534

Table 14 – Results of the multilevel modelling analysis for Germany

Germany	Final Model
Reading Achievement	732.388 (15.394)
Gender of the student	3.097(1.771)
Language spoken at home	-20.657(5.438)
Parent's highest occupational Level	-7.721(0.905)
Employment situation of the father	-3.769(1.688)
Employment situation of the mother	2.269(1.407)
Attended pre-school	1.590(7.346)
Index of Home Educational Resources	-17.582(2.457)
Index of Students Attitudes Toward Reading	-16.208(1.645)
Recognize letters of the alphabet	-4.734(1.082)
Parental book reading	-15.054(1.641)
Reading for fun outside school	-5.223(0.957)
Gender of the teacher	-6.755(4.442)
Percentage of students not speaking test language	0.265(0.224)
Percentage of students with few educational resources	-1.208(0.282)
Teacher uses variety of organizational/instructional approaches	0.571(2.679)
Percentage of students in the school come from economically disadvantaged homes	-5.990(1.686)
Location of the school/If is rural or not	4.011(2.879)
Mean of parent's highest occupational level	-6.583(3.462)
School instructional resources	0.257(2.694)
Parent-teacher relationship	1.509(1.044)
School climate/Teachers expectations for student achievement	-5.650(2.298)
Variance components	
Level 1	1909.392
Level 2	0
Level 3	282.855
R-square	0.531

Table 15 – Results of the multilevel modelling analysis for Hungary

Hungary	Final Model
Reading Achievement	810.781 (55.50)
Gender of the student	4.940(2.247)
Language spoken at home	-17.447(10.628)
Parent's highest occupational Level	-5.138(1.107)
Employment situation of the father	-11.107(2.942)
Employment situation of the mother	2.039(1.932)
Attended pre-school	-25.548(47.877)
Index of Home Educational Resources	-24.341(2.928)
Index of Students Attitudes Toward Reading	-12.442(1.855)
Recognize letters of the alphabet	-12.697(1.396)
Parental book reading	-9.462(2.083)
Reading for fun outside school	-4.379(1.285)
Gender of the teacher	0.224(11.269)
Percentage of students not speaking test language	-0.055(0.600)
Percentage of students with few educational resources	-1.235(0.513)
Teacher uses variety of organizational/instructional approaches	-8.145(5.627)
Percentage of students in the school come from economically disadvantaged homes	-0.643(2.015)
Location of the school/If is rural or not	1.727(4.729)
Mean of parent's highest occupational level	-18.798(3.493)
School instructional resources	-2.343(2.310)
Parent-teacher relationship	1.103(3.649)
School climate/Teachers expectations for student achievement	-6.699(3.928)
Variance components	
Level 1	2191.446
Level 2	236.147
Level 3	0
R-square	0.480

Table 16 – Results of the multilevel modelling analysis for Italy

Italy	Final Model
Reading Achievement	631.681 (40.110)
Gender of the student	1.204(2.379)
Language spoken at home	-23.795(6.638)
Parent's highest occupational Level	-4.450(1.150)
Employment situation of the father	-3.377(3.964)
Employment situation of the mother	-2.724(1.701)
Attended pre-school	4.209(10.417)
Index of Home Educational Resources	-14.089(3.450)
Index of Students Attitudes Toward Reading	-12.907(2.232)
Recognize letters of the alphabet	-17.221(1.596)
Parental book reading	-8.382(1.962)
Reading for fun outside school	-8.986(1.035)
Gender of the teacher	11.646(14.564)
Percentage of students not speaking test language	-0.542(0.542)
Percentage of students with few educational resources	-0.574(0.324)
Teacher uses variety of organizational/instructional approaches	-3.251(6.418)
Percentage of students in the school come from economically disadvantaged homes	-3.241(2.978)
Location of the school/If is rural or not	-14.724(7.116)
Mean of parent's highest occupational level	7.103(5.592)
School Instructional resources	-1.277(4.475)
Parent-teacher relationship	17.004(6.004)
School climate/Teachers expectations for student achievement	-7.936(3.927)
Variance components	
Level 1	1994.160
Level 2	246.656
Level 3	356.807
R-square	0.444

Table 17 – Results of the multilevel modelling analysis for Latvia

Latvia	Final Model
Reading Achievement	736.454 (34.149)
Gender of the student	-8.267(2.002)
Language spoken at home	-46.761(8.890)
Parent's highest occupational Level	-5.921(0.855)
Employment situation of the father	0.320(2.320)
Employment situation of the mother	2.799(1.706)
Attended pre-school	5.155(3.246)
Index of Home Educational Resources	-3.655(2.939)
Index of Students Attitudes Toward Reading	-12.339(1.718)
Recognize letters of the alphabet	-25.761(1.575)
Parental book reading	-2.344(1.955)
Reading for fun outside school	-4.993(1.057)
Gender of the teacher	-11.467(26.824)
Percentage of students not speaking test language	-0.642(0.528)
Percentage of students with few educational resources	1.262(0.704)
Teacher uses variety of organizational/instructional approaches	2.042(5.118)
Percentage of students in the school come from economically disadvantaged homes	0.807(2.250)
Location of the school/If is rural or not	7.212(5.405)
Mean of parent's highest occupational level	-15.604(3.877)
School instructional resources	-0.749(2.120)
Parent-teacher relationship	2.126(2.327)
School climate/Teachers expectations for student achievement	-1.630(3.333)
Variance components	
Level 1	1810.775
Level 2	196.231
Level 3	45.266
R-square	0.561

Table 18 – Results of the multilevel modelling analysis for Lithuania

Lithuania	Final Model
Reading Achievement	739.696 (20.334)
Gender of the student	-8.069(2.352)
Language spoken at home	3.036(6.774)
Parent's highest occupational Level	-6.153(0.711)
Employment situation of the father	-2.338(1.742)
Employment situation of the mother	-1.653(1.353)
Attended pre-school	1.023(2.114)
Index of Home Educational Resources	-11.574(2.352)
Index of Students Attitudes Toward Reading	-11.321(1.512)
Recognize letters of the alphabet	-24.440(1.326)
Parental book reading	-5.171(1.545)
Reading for fun outside school	-4.209(1.004)
Gender of the teacher	-28.618(13.890)
Percentage of students not speaking test language	0.343(0.416)
Percentage of students with few educational resources	-0.265(0.379)
Teacher uses variety of organizational/instructional approaches	4.111(4.125)
Percentage of students in the school come from economically disadvantaged homes	0.837(1.805)
Location of the school/If is rural or not	-3.400(4.552)
Mean of parent's highest occupational level	-13.943(3.151)
School instructional resources	0.469(1.949)
Parent-teacher relationship	-0.634(1.712)
School climate/Teachers expectations for student achievement	-4.763(2.105)
Variance components	
Level 1	1439.231
Level 2	175.892
Level 3	25.095
R-square	0.649

Table 19 – Results of the multilevel modelling analysis for Netherlands

Netherlands	Final Model
Reading Achievement	672.158 (18.775)
Gender of the student	5.232 (2.091)
Language spoken at home	-22.350 (7.834)
Parent's highest occupational Level	-5.394 (3.874)
Employment situation of the father	4.555 (2.952)
Employment situation of the mother	10.048 (2.764)
Attended pre-school	2.524 (7.710)
Index of Home Educational Resources	-7.944 (2.682)
Index of Students Attitudes Toward Reading	-12.839 (1.812)
Recognize letters of the alphabet	-11.450 (1.376)
Parental book reading	-9.771 (2.207)
Reading for fun outside school	-6.260 (1.008)
Gender of the teacher	2.937 (3.160)
Percentage of students not speaking test language	0.649 (0.484)
Percentage of students with few educational resources	-0.558(0.527)
Teacher uses variety of organizational/instructional approaches	-6.228(3.008)
Percentage of students in the school come from economically disadvantaged homes	-3.396 (1.955)
Location of the school/If is rural or not	-2.265 (3.060)
Mean of parent's highest occupational level	-7.357 (3.874)
School instructional resources	11.053 (5.064)
Parent-teacher relationship	-1.959 (1.662)
School climate/Teachers expectations for student achievement	-2.710 (2.522)
Variance components	
Level 1	1279.974
Level 2	105.819
Level 3	0.978
R-square	0.703

Table 20 – Results of the multilevel modelling analysis for Poland

Poland	Final Model
Reading Achievement	752.781 (33.977)
Gender of the student	-2.353(2.127)
Language spoken at home	-14.234(11.732)
Parent's highest occupational Level	-5.149(0.953)
Employment situation of the father	-3.010(1.809)
Employment situation of the mother	-3.700(1.443)
Attended pre-school	0.186(2.519)
Index of Home Educational Resources	-28.235(2.820)
Index of Students Attitudes Toward Reading	-15.345(1.779)
Recognize letters of the alphabet	-26.757(1.680)
Parental book reading	-18.505(2.119)
Reading for fun outside school	-7.218(1.103)
Gender of the teacher	-32.754(22.158)
Percentage of students not speaking test language	-0.775(0.469)
Percentage of students with few educational resources	-0.321(0.302)
Teacher uses variety of organizational/instructional approaches	11.804(6.614)
Percentage of students in the school come from economically disadvantaged homes	-1.024(1.777)
Location of the school/If is rural or not	-1.568(3.561)
Mean of parent's highest occupational level	-2.218(2.653)
School instructional resources	3.319(3.318)
Parent-teacher relationship	3.331(3.540)
School climate/Teachers expectations for student achievement	-3.274(3.103)
Variance components	
Level 1	2881.979
Level 2	138.877
Level 3	70.608
R-square	0.339

Table 21 – Results of the multilevel modelling analysis for Romania

Romania	Final Model
Reading Achievement	753.271 (28.197)
Gender of the student	-4.428 (2.620)
Language spoken at home	2.747 (8.659)
Parent's highest occupational Level	-6.322 (1.261)
Employment situation of the father	-4.239 (2.582)
Employment situation of the mother	2.067 (1.922)
Attended pre-school	-29.907 (8.757)
Index of Home Educational Resources	-17.438 (4.151)
Index of Students Attitudes Toward Reading	-21.852 (2.409)
Recognize letters of the alphabet	-17.749 (1.804)
Parental book reading	-9.937 (2.405)
Reading for fun outside school	-5.808 (1.144)
Gender of the teacher	-7.932 (8.310)
Percentage of students not speaking test language	0.494 (0.360)
Percentage of students with few educational resources	-0.378 (0.369)
Teacher uses variety of organizational/instructional approaches	-0.846 (10.512)
Percentage of students in the school come from economically disadvantaged homes	0.478 (2.891)
Location of the school/If is rural or not	-11.763 (7.012)
Mean of parent's highest occupational level	-10.670 (5.741)
School instructional resources	0.109 (4.354)
Parent-teacher relationship	3.483 (2.516)
School climate/Teachers expectations for student achievement	-8.275 (3.603)
Variance components	
Level 1	2831.901
Level 2	583.660
Level 3	177.738
R-square	0.232

Table 22 – Results of the multilevel modelling analysis for Scotland

Scotland	Final Model
Reading Achievement	805.297 (30.744)
Gender of the student	-5.862(3.792)
Language spoken at home	-21.302(10.279)
Parent's highest occupational Level	-7.552(1.925)
Employment situation of the father	-10.092(7.396)
Employment situation of the mother	-2.668(3.448)
Attended pre-school	-11.061(14.759)
Index of Home Educational Resources	-17.432(4.500)
Index of Students Attitudes Toward Reading	-17.968(3.271)
Recognize letters of the alphabet	-13.123(2.520)
Parental book reading	-21.536(4.839)
Reading for fun outside school	-11.411(1.833)
Gender of the teacher	-21.169(9.401)
Percentage of students not speaking test language	-0.067(0.816)
Percentage of students with few educational resources	-0.669(0.734)
Teacher uses variety of organizational/instructional approaches	-5.394(5.313)
Percentage of students in the school come from economically disadvantaged homes	-5.695(3.196)
Location of the school/If is rural or not	0.848(5.815)
Mean of parent's highest occupational level	-16.229(5.503)
School instructional resources	7.405(7.387)
Parent-teacher relationship	3.424(1.971)
School climate/Teachers expectations for student achievement	-1.790(3.597)
Variance components	
Level 1	3062.205
Level 2	185.698
Level 3	0
R-square	0.305

Table 23 – Results of the multilevel modelling analysis for Slovak Republic

Slovak Republic	Final Model
Reading Achievement	757.449 (21.821)
Gender of the student	-2.880 (1.760)
Language spoken at home	-9.591 (6.155)
Parent's highest occupational Level	-6.207 (40401)
Employment situation of the father	-11.800 (2.248)
Employment situation of the mother	-6.210 (1.490)
Attended pre-school	-9.679 (5.765)
Index of Home Educational Resources	-20.595 (2.564)
Index of Students Attitudes Toward Reading	-13.055 (1.522)
Recognize letters of the alphabet	-12.611 (1.050)
Parental book reading	-13.383 (1.522)
Reading for fun outside school	-4.962 (0.960)
Gender of the teacher	1.058 (6.770)
Percentage of students not speaking test language	-0.444 (0.472)
Percentage of students with few educational resources	-0.541 (0.373)
Teacher uses variety of organizational/instructional approaches	-7.673 (2.719)
Percentage of students in the school come from economically disadvantaged homes	-3.551 (1.841)
Location of the school/If is rural or not	-2.051 (4.078)
Mean of parent's highest occupational level	-6.712 (4.041)
School instructional resources	-2.408 (3.151)
Parent-teacher relationship	0.498 (2.719)
School climate/Teachers expectations for student achievement	-0.579 (2.698)
Variance components	
Level 1	2227.418
Level 2	314.048
Level 3	44.169
R-square	0.447

Table 24 – Results of the multilevel modelling analysis for Slovenia

Slovenia	Final Model
Reading Achievement	758.595 (23.185)
Gender of the student	-8.017(1.813)
Language spoken at home	-31.191(7.205)
Parent's highest occupational Level	-10.342(0.838)
Employment situation of the father	-2.065(2.600)
Employment situation of the mother	-2.982(1.623)
Attended pre-school	-1.850(2.904)
Index of Home Educational Resources	-19.202(2.960)
Index of Students Attitudes Toward Reading	-14.981(1.664)
Recognize letters of the alphabet	-17.809(1.207)
Parental book reading	-12.183(1.873)
Reading for fun outside school	-8.108(0.971)
Gender of the teacher	-0.180(8.938)
Percentage of students not speaking test language	0.400(0.305)
Percentage of students with few educational resources	0.036(0.372)
Teacher uses variety of organizational/instructional approaches	2.981(2.892)
Percentage of students in the school come from economically disadvantaged homes	-1.381(1.583)
Location of the school/If is rural or not	3.872(3.543)
Mean of parent's highest occupational level	-20.826(3.588)
School instructional resources	-0.226(3.034)
Parent-teacher relationship	0.488(2.827)
School climate/Teachers expectations for student achievement	5.962(2.584)
Variance components	
Level 1	2541.606
Level 2	207.863
Level 3	12.663
R-square	0.409

Table 25 – Results of the multilevel modelling analysis for Spain

Spain	Final Model
Reading Achievement	682.010 (26.028)
Gender of the student	2.990(3.224)
Language spoken at home	-8.029(5.369)
Parent's highest occupational Level	-4.111(1.555)
Employment situation of the father	-2.931(4.824)
Employment situation of the mother	-2.620(2.344)
Attended pre-school	-8.258(9.646)
Index of Home Educational Resources	-10.889(4.096)
Index of Students Attitudes Toward Reading	-11.769(3.003)
Recognize letters of the alphabet	-23.874(2.538)
Parental book reading	-13.184(2.876)
Reading for fun outside school	-4.677(1.632)
Gender of the teacher	3.465(4.671)
Percentage of students not speaking test language	0.516(0.650)
Percentage of students with few educational resources	0.082(0.810)
Teacher uses variety of organizational/instructional approaches	-4.827(4.747)
Percentage of students in the school come from economically disadvantaged homes	-10.824(3.031)
Location of the school/If is rural or not	-7.539(5.642)
Mean of parent's highest occupational level	-4.034(3.622)
School instructional resources	0.298(2.966)
Parent-teacher relationship	-0.116(3.436)
School climate/Teachers expectations for student achievement	2.209(3.589)
Variance components	
Level 1	2383.051
Level 2	126.264
Level 3	37.429
R-square	0.455

Table 26 – Results of the multilevel modelling analysis for Sweden

Sweden	Final Model
Reading Achievement	739.303 (13.376)
Gender of the student	-0.468(1.861)
Language spoken at home	-12.661(5.320)
Parent's highest occupational Level	-6.406(0.980)
Employment situation of the father	2.297(2.711)
Employment situation of the mother	-3.588(1.582)
Attended pre-school	-7.268(6.145)
Index of Home Educational Resources	-11.830(2.245)
Index of Students Attitudes Toward Reading	-16.862(1.797)
Recognize letters of the alphabet	-22.341(1.380)
Parental book reading	-11.434(1.967)
Reading for fun outside school	-3.792(1.105)
Gender of the teacher	-3.483(3.984)
Percentage of students not speaking test language	-0.212(0.602)
Percentage of students with few educational resources	-0.137(0.631)
Teacher uses variety of organizational/instructional approaches	-5.895(2.949)
Percentage of students in the school come from economically disadvantaged homes	-4.714(1.793)
Location of the school/If is rural or not	5.679(4.297)
Mean of parent's highest occupational level	-3.357(4.399)
School Instructional resources	0.813(2.994)
Parent-teacher relationship	0.000(0.000)
School climate/Teachers expectations for student achievement	-8.552(2.643)
Variance components	
Level 1	2036.913
Level 2	163.889
Level 3	63.441
R-square	0.516

DISCUSSION AND POLICY IMPLICATIONS

The results of the multilevel analysis indicate that a large proportion of the variance in the model comes from a specific set of individual and family level background characteristics, including home educational resources, home literacy practices in the form of book reading, students' attitudes toward reading, students' reading for fun outside of school, and their ability to recognize letters of the alphabet at the start of compulsory education. At this level, the language spoken at home, the occupational level of the parents and their employment situation and the students' gender also explain achievement. At the class level, having a female teacher and attending a school without a large percentage of peers that have few educational resources results in slightly better reading attainment. Compositional effects related to the economic conditions of the students attending a particular school were also significant indicating that attending schools with a large percentage of economically disadvantaged peers negatively affects students' reading achievement. Our estimates show that this school composition effect is large, but not as large as that associated with parents' occupational level.

These findings have important policy implications as they show which factors can be the focus of educational interventions to improve students' performance. First, while it is possible to intervene to make positive changes in the socio - economic conditions of families and their home educational resources in order to improve reading achievement it is also clear that curriculum and instruction measures can make a difference. For example, launching literacy/reading national plans, like some countries have recently done, can bring educational resources, such as electronic children's books, to the home environment (Portuguese National Reading Plan, 2011, <http://www.planonacionaldeleitura.gov.pt/index1.php>). More importantly, ensuring that children know the alphabet before starting compulsory education would significantly improve their future reading development in grade four. Other significant factors can be addressed by equity measures that can be implemented by national governments, such as the promotion of social and economic diversity in schools to reduce the school compositional effects identified in this study and in previous research (Bellin, Dunge & Gunzenhauser, 2010).

However, even though we controlled for country effects, the country analysis reveal that there are substantial differences among countries with respect to the coefficients that are significant and that explain reading achievement. For example, parents' occupational status is significant in the EU 20 model, with a higher status associated with an increase of 7 points in students' reading attainment, but it is not statistically significant in England and France. Similarly, attending pre-school is positively associated with reading in Bulgaria, but the inverse relationships was found for Belgium Flemish and whereas in France speaking another language at home does not impact reading achievement negatively in Germany this has a strong negative effect. Other variables, such as the students' gender, only favor the achievement of girls over boys in some countries like Hungary and the same for school location, with significantly better achievement in urban schools over rural ones in Italy only.

Therefore, care should be taken when looking at overall trends and individual country results. Nonetheless, it is noteworthy that the same five individual and family level variables that have been previously mentioned and that are significant in the EU 20 model are also significant in all the individual country, with the exception of Latvia where parental book reading and home resources are not significant. Thus, in nineteen countries the explanatory variables that are most stable and constant in terms of showing a significant coefficient are: home resources and home book reading practices, students' attitudes toward reading, reading for fun outside school, and students' ability to recognize letters of the alphabet at the start of compulsory education.

At the individual level, it is noteworthy that children's knowledge of the alphabet, as reported by their parents, has an impact on reading achievement similar and even higher than that of parental book reading in the EU 20 model. This variable was included in the Index of Early Home Literacy Activities (EHLA) and its relation to reading achievement is acknowledged in the PIRLS international report, as is the Index of Early Literacy Skills (HAIB), where alphabet knowledge is included. We show that extracting these two variables related to the frequency of parental book reading and to parents' perceptions of their children's knowledge of the alphabet from their original Indices results in a model with better explanatory power. The variance explained by EHLA index is 2%, whereas the

variance explained by parental book reading is 6.2%. For the HAIB index, the variance explained is 1.6% and for the variable Recognize the Alphabet is 4.3%. Thus, reading achievement is clearly better explained by the contribution of these variables alone and not by the Indices where they are included.

Also, although the fact that alphabet knowledge is a good predictor of reading achievement is well established in psycholinguistic research, this is a significant finding in PIRLS because of the nature of the measure and its longitudinal effects; the time span between the beginning of compulsory education and reading attainment at the fourth grade level. Moreover, even though this independent variable is an indirect measure of children's alphabet knowledge via the perceptions of their parents, it seems to be a good proxy of actual aptitude. Again, letter-name knowledge before formal reading instruction begins is one of the strongest predictors of children's reading ability (Bond & Dykstra, 1967; Riley, 1996, Piasta & Wagner, 2010) and research suggests that it has a reciprocal relation with phonological awareness (PA), or the ability to segment sounds (phonemes) in words. Children need to learn letter names and letter sounds to learn how to read words (Ehri, 1983), but even without explicit instruction in letter sounds, learning about letter names may facilitate PA because some letter names also include their sounds.

Thus, this study extends previous research studies that have detected strong effects of phonological awareness on reading skills much earlier in students' school careers. Specifically, when examining the contribution of PA to fluent reading skills, most studies indicate that it has a strong influence only up to grade two (Landerl and Wimmer, 2008; Ziegler et al., 2010). When this influence has been found at a later stage, in grades four and six, the reading tasks used consist of word lists in the "context of an unfamiliar-to-familiar/novice-to-expert framework" (Share, 2008). In the familiar context students are asked to read high frequency words, or the ones that they are most familiar with because they occur frequently in texts and low frequency words or the ones that occur less frequently in texts. This difference in frequency is irrelevant for the expert reader in terms of influencing the accuracy and speed of word reading. However, the novice reader will typically spend more time reading unfamiliar words because they are not yet a part of his or her mental lexicon.

In PIRLS, the reading framework is also one that students are supposed to be familiar with in terms of the purposes for reading. Importantly though, and in contrast with previous studies, the reading assessment centers on the comprehension of whole texts and not on the accuracy and speed of reading isolated word lists. As such, this study provides evidence of the influence of alphabet knowledge on the reading comprehension of authentic texts.

Students' attitudes toward reading and their educational home resources have the strongest impact on reading achievement among all variables included in the model. This indicates that students that enjoy reading and those that have a favorable home background, in terms of resources and parental educational level, are at an advantage when it comes to reading achievement in school. Conversely, the analysis indicates that, at the school level, the larger the percentage of students coming from economically disadvantaged homes the lower their reading achievement. As Bellin, Dunge and Gunzenhauser (2010) state "The influence of composition variables on achievement was signaled as early as the 1960s by Coleman (1966). His results showed that composition characteristics in terms of the social structure of a school seemed to be more important than the school's resources or the quality of teaching"(p.13). Subsequent research has confirmed the importance of school composition on achievement (Opdenakker & Van Damme, 2001; Rumberger & Palardy, 2005). In particular, findings from the Michigan Reading First program show that "the reading gain for students from schools with a high percentage of students deemed economically disadvantaged was 10% lower than the gain for students in schools with a relatively low percentage of economically disadvantaged students" (Cortina, Carlisle & Zeng, 2008, cited in Bellin, Dunge and Gunzenhauser, 2010, p.14).

Students' gender and that of the teacher show the weakest impact on reading achievement. These variables were included in the model because research indicates that girls perform better than boys in reading in middle and lower secondary school and further suggests that the gender of the teacher may influence student outcomes (Dee, 2007; OECD, 2007). Although in this study we found small positive results favoring girls over boys and higher scores for students with a female teacher, there are wide different among countries. For example, while in some countries the results are

statistically significant in favor of girls, in the majority of the countries there is no difference and in the Netherlands the opposite relationship was observed; boys perform better than girls. For the gender of the teacher, we found that only in Lithuania and Scotland the differences significantly favor students who have a female teacher. Thus, gender gaps in primary education may have different contours than those observed for older students.

Similarly, although the effect of not speaking the language of the test at home does have a negative impact on students' reading in most countries such an effect was not found in French speaking Belgium, Denmark, France and Hungary. The same goes for parental occupational level; higher parental occupations are not linked to better student performance in England, France, the Netherlands and the Slovak Republic. Thus, the significance of these variables in this study does not appear as strong as that detected in PISA (OECD, 2004; 2007). School climate in PIRLS, which equates with social communication in PISA, also appears to influence students' achievement. However, here too there is wide variation between countries. Teachers' expectations for student achievement and parent-teacher relationships do not significantly influence reading attainment in the majority of countries. Only Italy registers a strong positive influence of these two variables that capture school climate while teachers' expectations for student achievement is only significant in Denmark and Slovenia.

In light of the results outlined above, we believe that is a significant finding that students' alphabet knowledge upon entering compulsory school is such a strong determinant in predicting their future reading achievement in grade four. And especially so given that we simultaneously considered the effect of other background characteristics and school compositional effects. This allows us to examine the relative contribution of each factor in predicting reading achievement and the results indicate that alphabet knowledge alone is estimated to contribute to an additional 15 points in the PIRLS scale.

Curriculum design can potentially influence reading achievement. However, the measures we have are not comprehensive enough to allow for a relationship to be found. Namely, curriculum

emphasis in reading is more difficult to assess than in mathematics, where it is possible to know exactly what topics are taught in each country. In addition, the PIRLS includes only 1st, 2nd, 3rd, 4th grades or Not in these grades) as a choice for relative emphasis and no textbook was analyzed to ascertain what is taught in each country. Research has shown that primary school teachers rely heavily on textbooks to teach reading skills and that textbook content and organization impacts students' learning (Araújo, Folgado & Pocinho, 2009; Juel, 1987). Perhaps a better measure of textbook content and topic organization would help us understand the relationship between reading instruction and students' achievement.

Furthermore, we believe that the PIRLS questionnaires could be improved. The School Questionnaire, where Principals indicated the emphasis in teaching certain reading processes did not include questions that are clearly linked to the straightforward reading process. The questions pertaining to whether students make predictions or link their personal experiences to the content of what they are reading can be linked to different processes of comprehension. The same goes for identifying the main idea; one may need to infer information from a text to get at its main idea or simply retrieve explicitly stated information to understand the main idea. Therefore, there is a definite lack of operational clarity about which questions pertain to which processes of comprehension in addition to the lack of detailed curriculum information in the Encyclopedia and the lack of information on textbooks (implemented curriculum). The lack of congruence between the questions in the School Questionnaire and the Teacher's Questionnaire can also contribute to the difficulty in finding any impact of curriculum and instruction variables on reading achievement.

Finally, and in terms of political implications, given the causal relation between alphabet knowledge and reading achievement, it would make sense to advocate for the inclusion of specific alphabet knowledge (letter naming and letter-sound correspondences) as a goal in preschool and kindergarten programs. In the US both the Early Reading First and Reading First programs set the target of identification of, at least, 10 letters by name (preschool). However, the department of Health and Human Services in the US reports that children continue to enter kindergarten knowing less than

half of the letter names and fewer letter sounds (US Department of Health and Human Services, 2006). At the European level, information gathered by Eurydice with the reference year 2009/2010 and included in the Annex, reveals that about half of the EU countries under analysis report that they include phonics knowledge (letter naming and letter knowledge) in their curricula. However, when we compare this to the percentage of children in PIRLS 2006 that know the alphabet “very well” per country, it is difficult to see a clear relationship and to establish a clear pattern between this and curricula design. In some countries where such teaching is not contemplated, the percentage of children who know the letters of the alphabet very well is quite high compared to that of other countries where the alphabet is said to be taught. The data collected in the most recent 2011 PIRLS will be closer to the 2009/2010 Eurydice reference year, which can give us a better insight into how official curricula documents are related to children’s reading attainment.

Nonetheless, given that pre-school attendance in PIRLS does not have a strong impact on reading achievement and that it is not highly correlated with alphabet knowledge, it would seem that, for the most part, children are not learning the alphabet at school. Yet, research shows that school-based instruction on alphabet knowledge yields larger learning effects than home-based instruction (Piasta & Wagner, 2010).

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APPENDIX I

Relations between reading Processes and purposes and reading achievement

Table 27 – The Relationship between the Interpret and Evaluate Process and Achievement

Questions related to the Reading Process <i>Interpret and Evaluate</i> (at which grade does ... receive major emphasis)	Comparing different texts		Making generalizations and inferences based on text		Describing style and structure of text	
	Correlation coefficient: Overall Reading	Correlation coefficient: Interpret Reading	Correlation coefficient: Overall Reading	Correlation coefficient: Interpret Reading	Correlation coefficient: Overall Reading	Correlation coefficient: Interpret Reading
Austria	-.05 (.03)*	-.06 (.03)*	.03 (.03)*	.04 (.03)*	-.03 (.03)*	-.03 (.03)*
Belgium Fl	.00 (.04)	.00 (.04)	-.09 (.03)*	-.08 (.03)*	-.02 (.03)	-.02 (.04)
Belgium Fr	-.02 (.04)	-.02 (.04)	.04 (.03)*	.04 (.04)*	.05 (.04)*	.04 (.04)*
Bulgaria	.04 (.05)*	.04 (.05)*	-.09 (.06)*	-.09 (.06)*	-.06 (.05)*	-.06 (.05)*
Denmark	.00 (.04)*	-.01 (.03)*	.02 (.03)*	.02 (.03)*	.00 (.04)*	.00 (.04)*
England	.04 (.04)	.03 (.04)	.03 (.05)	.03 (.05)	-.03 (.03)	-.04 (.04)
France	.05 (.04)*	.05 (.04)*	-.01 (.03)	-.02 (.03)	.02 (.04)	.02 (.04)
Germany	-.10 (.03)*	-.09 (.03)*	-.09 (.03)*	-.09 (.03)*	-.08 (.03)*	-.08 (.03)*
Hungary	-.07 (.04)*	-.07 (.04)*	-.02 (.04)	-.01 (.04)	-.05 (.05)*	-.04 (.05)*
Italy	.06 (.05)*	.06 (.05)*	.03 (.04)	.03 (.04)	.02 (.04)	.03 (.04)
Latvia	-.01 (.05)	-.01 (.05)	-.05 (.04)*	-.05 (.03)*	-.05 (.04)*	-.05 (.04)*
Lithuania	-.01 (.03)	-.01 (.03)	-.03 (.03)*	-.03 (.03)*	-.01 (.03)	.01 (.03)
Netherlands	-.04 (.04)*	-.02(.04)	.07 (.03)*	.08 (.03)*	.05 (.04)*	.05 (.04)*
Poland	-.04 (.03)*	-.04 (.03)*	-.03 (.02)*	-.03 (.02)*	-.02 (.03)	-.01 (.03)
Romania	.04 (.04)*	.04 (.04)*	.03 (.04)*	.02 (.04)	-.14 (.05)*	-.14 (.06)*
Scotland	.04 (.04)*	.05 (.03)*	.04 (.04)*	.04 (.03)*	-.01 (.04)	-.01 (.04)
Slovak Republic	-.04 (.04)*	-.04 (.04)*	-.06 (.04)*	-.05 (.04)*	-.03 (.04)*	-.03 (.04)*
Slovenia	-.02 (.03)	-.02 (.03)	-.02 (.03)	-.02 (.03)	-.01 (.03)	-.01 (.03)
Spain	.06 (.05)*	.05 (.05)*	.01 (.04)	.02 (.04)	-.04 (.04)*	-.04 (.04)*
Sweden	-.07 (.03)*	-.07 (.03)*	.00 (.03)	.00 (.03)	-.06 (.03)*	-.06 (.03)*

* Statistically significant at the 0.05 level.

The values in parenthesis indicate standard errors associated to the coefficients. The latter are negative because in the School Questionnaire variables are coded from 1 to 4, with 1 reflecting greater emphasis.

Table 28 – The Relationship between Achievement and Reading Purposes

Curriculum emphasis as reported by National coordinators and described in the PIRLS encyclopaedia	Literary Reading Purpose			Informational Reading Purpose		
	Reporting by National Coordinators	Content-analysis of the PIRLS encyclopaedia	Literary Score	Reporting by National Coordinators	Content-analysis of the PIRLS encyclopaedia	Informational Score
Austria	3	8	537	3	5	536
Bulgaria	3	4	542	3	0	550
Belgium Fl	3	7	544	3	10	547
Belgium Fr	1	4	499	3	6	498
Denmark	2	4	547	2	2	542
England	3	3	539	3	2	537
France	3	11	516	3	9	526
Hungary	2	3	557	1	2	541
Italy	3	8	551	3	6	549
Latvia	3	1	539	3	0	540
Lithuania	3	7	542	2	7	530
Netherlands	2	4	545	3	3	548
Poland	1	4	523	3	1	515
Romania	2	11	493	2	6	487
Slovakia	3	12	533	2	3	527
Slovenia	2	8	519	2	2	523
Spain	2	3	516	3	0	508
Scotland	3	4	527	3	4	527
Sweden	3	7	546	3	4	549

* Qualitative coding respects an ascending order, with a higher numeral corresponding to more emphasis on a given process. The literary and informational scores are taken from the PIRLS International Report.

Table 29 – The Relationship between Achievement and Reading Processes

Curriculum emphasis as reported by National coordinators and described in the PIRLS encyclopaedia	Straightforward Reading Process			Interpreting Reading Process		
	Reporting by National Coordinators	Content-analysis of the PIRLS encyclopaedia	Score	Correlation coefficient: Overall Reading	Content-analysis of the PIRLS encyclopaedia	Score
Austria	21	0	544	24	0	530
Bulgaria	19	0	538	21	0	553
Belgium Fl	17	0	545	18	2	547
Belgium Fr	18	2	501	17	2	497
Denmark	12	0	551	9	0	542
England	18	2	533	20	5	543
France	19	1	523	16	0	518
Hungary	16	3	544	13	4	554
Italy	18	1	455	17	0	556
Latvia	20	1	534	17	1	545
Lithuania	13	1	531	13	3	540
Netherlands	18	0	551	12	1	542
Poland	17	0	516	15	1	522
Romania	19	1	489	19	0	490
Slovakia	17	0	529	13	2	531
Slovenia	17	2	519	19	2	523
Spain	18	0	508	19	0	515
Scotland	19	0	525	23	5	528
Sweden	14	0	550	20	3	546

APPENDIX II

Descriptive statistics for the variables of the individual, class and school level

Table 30 – Descriptive statistics of the individual level – Austria, Belgium Flemish, Belgium French and Bulgaria

Individual level	Austria	Belgium Flemish	Belgium French	Bulgaria
Reading achievement				
M	537.65	547.76	500.69	554.64
SD	60.25	51.43	65.03	77.38
Min	292.15	353.61	270.15	267.37
Max	694.28	696.82	687.13	761.90
Gender				
Boys	50.6%	50.7%	49.8%	49.4%
Girls	49.4%	49.3%	50.2%	50.6%
Language spoken at home				
Is the same of the test	92.7%	93.3%	93.0%	90.9%
Is not the same of the test	7.3%	6.7%	7.0%	9.1%
Parent's higher occupation level				
Professional	20.8%	44.4%	40.3%	34.5%
Small business owner	13.9%	14.3%	10.2%	12.1%
Clerical	45.9%	24.8%	29.0%	20.6%
Skilled worker	14.7%	11.9%	13.2%	16.5%
General labourer	4.1%	4.0%	4.3%	12.7%
Others	0.7%	0.6%	2.9%	3.5%
Employment situation of the father				
Full time	95.7%	96.4%	88.9%	78.7%
Part time	2.6%	2.5%	3.5%	12.0%
Looking for a job	1.7%	1.2%	7.6%	9.3%
Employment situation of the mother				
Full time	33.7%	50.9%	50.9%	69.0%
Part time	60.7%	44.9%	30.3%	11.8%
Looking for a job	5.6%	4.1%	18.8%	19.2%
Attended pre-school				
Yes	98.2%	99.4%	98.8%	87.8%
No	1.8%	0.6%	1.2%	12.2%
Index of home educational resources				
High	7.4%	13.9%	5.3%	13.8%
Medium	91.1%	84.0%	90.6%	73.9%
Low	1.5%	2.1%	4.1%	12.3%
Index of students attitudes toward reading				
High	50.3%	37.8%	52.7%	57.6%
Medium	39.6%	45.9%	41.2%	36.3%
Low	10.1%	16.3%	6.1%	6.1%
Recognize most letters of the alphabet before ISCED1				
Very well	29.5%	19.5%	42.3%	57.6%

Moderately well	36.3%	40.6%	37.8%	23.6%
Not very well or Not at all	34.2%	39.9%	19.9%	18.8%
Parental book reading				
Often	54.9%	41.6%	51.4%	49.3%
Sometimes	39.5%	47.09%	42.1%	41.4%
Never or almost never	5.5%	11.4%	6.5%	9.4%
Reading for fun outside school				
Everyday or almost everyday	45.9%	40.0%	49.5%	47.8%
Once or twice a week	25.2%	28.8%	25.7%	27.5%
Once or twice a month	10.4%	14.8%	10.0%	11.5%
Never or almost never	18.5%	16.4%	14.8%	13.2%

Table 31 – Descriptive statistics for the class level - Austria, Belgium Flemish, Belgium French and Bulgaria

Class level	Austria	Belgium Flemish	Belgium French	Bulgaria
Gender of the teacher				
Male	8.5%	25.4%	79.3%	94.2%
Female	91.5%	74.6%	20.7%	5.8%
Percentage of students not speaking test language				
Mean	5.28	4.99	4.92	5.28
Standard Deviation	4.56	5.37	4.24	5.68
Minimum	0.00	0.0	0.0	0.0
Maximum	33.3	88.9	31.6	42.0
Percentage of students with few educational resources				
Mean	3.76	3.18	3.77	5.56
Standard Deviation	3.21	3.98	3.39	9.37
Minimum	0.0	0.0	0.0	0.0
Maximum	21.1	62.5	25.0	91.3
Teachers uses variety of organizational approaches				
Mean	1.27	1.19	1.43	1.06
Standard Deviation	0.45	0.40	0.50	0.25
Minimum	1	1	1	1
Maximum	2	2	2	2

Table 32 – Descriptive statistics of the school level – Austria, Belgium Flemish, Belgium French and Bulgaria

School level	Austria	Belgium Flemish	Belgium French	Bulgaria
Percentage of students in the school come from economically disadvantaged homes				
0-10%	54.5%	63.6%	44.7%	33.3%
11-25%	26.4%	22.3%	23.2%	31.7%
26-50%	13.4%	12.1%	21.5%	14.7%
More than 50%	5.6%	2.0%	10.6%	20.3%
Location of the school/School is rural				
Yes	38.5%	41.5%	26.5%	12.7%
No	61.5%	58.5%	73.5%	87.3%
Mean of parent's higher occupational level				
Mean	2.45	2.34	2.40	2.43
Standard Deviation	0.20	0.29	0.23	0.28
Minimum	1.94	1.42	1.78	1.63
Maximum	3.17	3.44	3.61	4.12
School instructional resources				
High	78.8%	85.9%	45.1%	34.6%
Medium	21.2%	12.0%	49.1%	49.2%
Low	0.0%	2.1%	5.8%	16.1%
Parent-teacher relationship/Percentage of students with parents attend conferences in school				
0-10%	1.2%	3.8%	6.7%	0.8%
11-25%	4.0%	1.4%	5.4%	13.7%
26-50%	5.3%	6.8%	21.7%	24.2%
More than 50%	89.4%	88.0%	66.3%	61.3%
School climate/Teachers' expectations for student achievement				
Very high	12.7%	6.5%	50.6%	5.3%
High	64.0%	76.4%	40.7%	57.7%
Medium	21.5%	17.1%	6.8%	36.3%
Low	1.9%	0.0%	1.9%	0.8%
Very low	0.0%	0.0%	0%	0.0%

Table 33 – Descriptive statistics of the individual level – Denmark, England, France and Germany

Individual level	Denmark	England	France	Germany
Reading achievement				
M	549.24	534.16	522.76	547.14
SD	65.50	83.56	63.39	62.01
Min	297.68	229.24	307.79	282.95
Max	729.82	793.68	707.68	712.41
Gender				
Boys	49.0%	49.0%	51.7%	50.8%
Girls	51.0%	51.0%	48.3%	49.2%
Language spoken at home				
Is the same of the test	95.7%	93.4%	95.7%	97.7%
Is not the same of the test	4.3%	6.6%	4.3%	2.3%
Parent's higher occupation level				
Professional	57.1%	59.1%	43.0%	29.1%
Small business owner	9.6%	10.9%	11.1%	12.6%
Clerical	22.2%	17.5%	24.4%	43.0%
Skilled worker	8.2%	9.2%	15.8%	12.3%
General labourer	2.3%	2.2%	4.5%	2.2%
Others	0.6%	1.1%	1.1%	0.8%
Employment situation of the father				
Full time	97.4%	90.5%	92.9%	89.2%
Part time	1.0%	3.0%	3.6%	4.4%
Looking for a job	1.6%	2.5%	3.6%	6.4%
Employment situation of the mother				
Full time	77.5%	34.9%	55.7%	28.5%
Part time	18.2%	59.7%	34.0%	57.7%
Looking for a job	4.3%	5.4%	10.2%	13.9%
Attended pre-school				
Yes	99.3%	91.2%	99.4%	94.4%
No	0.7%	8.8%	0.6%	5.6%
Index of home educational resources				
High	25.4%	21.7%	15.7%	13.5%
Medium	73.5%	76.6%	80.7%	83.4%
Low	1.1%	1.7%	3.6%	3.2%
Index of students attitudes toward reading				
High	39.3%	38.3%	57.7%	55.3%
Medium	48.9%	45.9%	38.0%	36.2%
Low	11.8%	15.8%	4.4%	8.5%
Recognize most letters of the alphabet before ISCED1				
Very well	53.3%	56.2%	53.9%	29.5%
Moderately well	35.5%	34.8%	33.8%	37.7%
Not very well or Not at all	11.2%	9.0%	12.3%	32.8%
Parental book reading				
Often	70.0%	80.7%	56.5%	64.3%
Sometimes	28.2%	18.6%	39.8%	32.0%

Never or almost never	1.8%	0.7%	3.7%	3.7%
Reading for fun outside school				
Everyday or almost everyday	48.5%	29.6%	51.4%	50.3%
Once or twice a week	29.9%	26.7%	24.2%	24.4%
Once or twice a month	11.0%	14.0%	9.8%	10.2%
Never or almost never	10.6%	29.6%	14.6%	15.1%

Table 34 – Descriptive statistics for the class level – Denmark, England, France and Germany

Class level	Denmark	England	France	Germany
Gender of the teacher				
Male	13.1%	22.7%	29.2%	10.9%
Female	86.9%	77.3%	70.8%	89.1%
Percentage of students not speaking test language				
Mean	4.91	5.52	4.50	5.57
Standard Deviation	4.48	4.38	2.76	7.52
Minimum	0.0	0.0	0.0	0.0
Maximum	39.2	33.3	18.7	52.6
Percentage of students with few educational resources				
Mean	3.03	3.70	3.91	3.71
Standard Deviation	2.94	3.09	3.35	5.75
Minimum	0.0	0.0	0.0	0.0
Maximum	23.1	15.9	27.8	50.0
Teachers uses variety of organizational approaches				
Mean	1.36	1.33	1.32	1.34
Standard Deviation	0.48	0.47	0.47	0.47
Minimum	1	1	1	1
Maximum	2	2	2	0

Table 35 – Descriptive statistics of the school level – Denmark, England, France and Germany

School level	Denmark	England	France	Germany
Percentage of students in the school come from economically disadvantaged homes				
0-10%	62.5%	45.4%	45.1%	36.1%
11-25%	28.1%	13.2%	30.4%	37.3%
26-50%	7.0%	21.4%	8.3%	16.4%
More than 50%	2.4%	20.1%	16.1%	10.2%
Location of the school/School is rural				
Yes	26.6%	14.7%	34.2%	38.9%
No	73.4%	85.3%	65.8%	61.1%
Mean of parent's higher occupational level				
Mean	2.35	2.38	2.40	2.49
Standard Deviation	0.21	0.26	0.22	0.40
Minimum	1.50	1.00	1.35	1.17
Maximum	3.00	3.00	3.53	4.50
School instructional resources				
High	87.7%	79.6%	59.5%	74.3%
Medium	12.3%	20.4%	39.3%	24.7%
Low	0.0%	0.0%	1.1%	1.0%
Parent-teacher relationship/Percentage of students with parents attend conferences in school				
0-10%	0%	8.0%	4.8%	14.8%
11-25%	0%	0.8%	10.2%	6.5%
26-50%	4.9%	7.8%	22.7%	12.5%
More than 50%	95.1%	83.5%	61.2%	66.2%
School climate/Teachers' expectations for student achievement				
Very high	19.0%	30.4%	30.5%	4.8%
High	68.8%	49.2%	52.7%	59.8%
Medium	11.2%	20.4%	15.8%	31.6%
Low	1.1%	0.0%	1.1%	3.5%
Very low	0.0%	0.0%	0.0%	0.4%

Table 36 – Descriptive statistics of the individual level – Hungary, Italy, Latvia and Lithuania

Individual level	Hungary	Italy	Latvia	Lithuania
Reading achievement				
M	556.75	551.40	548.07	540.64
SD	64.86	63.45	56.47	53.14
Min	275.98	318.43	323.60	365.48
Max	752.22	724.95	692.77	706.29
Gender				
Boys	50.6%	51.3%	51.4%	51.0%
Girls	49.4%	48.7%	48.6%	49.0%
Language spoken at home				
Is the same of the test	98.4%	96.8%	98.4%	98.3%
Is not the same of the test	1.6%	3.2%	1.6%	1.7%
Parent's higher occupation level				
Professional	30.7%	26.4%	43.1%	34.4%
Small business owner	14.2%	14.1%	9.4%	8.5%
Clerical	30.4%	27.2%	27.9%	32.2%
Skilled worker	16.8%	27.4%	13.6%	16.1%
General labourer	6.7%	2.7%	5.6%	7.6%
Others	1.1%	2.2%	0.4%	1.1%
Employment situation of the father				
Full time	90.4%	91.0%	92.1%	88.1%
Part time	5.1%	6.5%	3.9%	5.4%
Looking for a job	4.5%	2.5%	4.0%	6.5%
Employment situation of the mother				
Full time	79.8%	48.9%	81.8%	80.4%
Part time	10.9%	32.8%	9.3%	8.5%
Looking for a job	9.3%	18.3%	8.9%	11.1%
Attended pre-school				
Yes	99.9%	98.0%	88.3%	75.2%
No	0.1%	2.0%	11.7%	24.8%
Index of home educational resources				
High	16.8%	8.3%	11.3%	11.9%
Medium	79.6%	83.8%	88.0%	87.0%
Low	3.6%	7.9%	0.7%	1.1%
Index of students attitudes toward reading				
High	50.6%	63.7%	35.0%	47.2%
Medium	37.5%	30.9%	51.6%	45.5%
Low	11.9%	5.5%	13.4%	7.3%
Recognize most letters of the alphabet before ISCED1				
Very well	20.2%	41.1%	54.0%	45.7%
Moderately well	30.3%	37.5%	36.0%	43.3%
Not very well or Not at all	49.5%	21.4%	10.0%	11.0%
Parental book reading				
Often	62.4%	42.1%	60.0%	46.8%
Sometimes	34.4%	46.8%	38.4%	49.8%

Never or almost never	3.2%	11.1%	1.6%	3.4%
Reading for fun outside school				
Everyday or almost everyday	44.3%	38.0%	35.2%	52.0%
Once or twice a week	29.3%	24.9%	32.0%	30.6%
Once or twice a month	16.2%	10.1%	16.4%	9.4%
Never or almost never	10.2%	27.0%	16.3%	7.9%

Table 37 – Descriptive statistics for the class level – Hungary, Italy, Latvia and Lithuania

Class level	Hungary	Italy	Latvia	Lithuania
Gender of the teacher				
Male	2.3%	2.3%	0.4%	1.0%
Female	97.7%	97.7%	99.6%	99.0%
Percentage of students not speaking test language				
Mean	4.28	3.93	4.20	4.55
Standard Deviation	3.19	3.90	3.06	4.08
Minimum	0.0	0.0	0.0	0.0
Maximum	18.7	39.2	20.6	32.5
Percentage of students with few educational resources				
Mean	3.61	5.75	3.07	3.50
Standard Deviation	5.71	7.64	2.26	4.48
Minimum	0.0	0.0	0.0	0.0
Maximum	76.5	53.8	13.7	41.0
Teachers uses variety of organizational approaches				
Mean	1.09	1.11	1.12	1.11
Standard Deviation	0.283	0.31	0.32	0.31
Minimum	1	1	1	1
Maximum	2	2	2	2

Table 38 – Descriptive statistics of the school level – Hungary, Italy, Latvia and Lithuania

School level	Hungary	Italy	Latvia	Lithuania
Percentage of students in the school come from economically disadvantaged homes				
0-10%	23.0%	52.1%	42.3%	36.2%
11-25%	36.9%	27.3%	40.2%	35.4%
26-50%	28.3%	13.4%	13.0%	21.8%
More than 50%	11.9%	7.2%	4.5%	6.6%
Location of the school/School is rural				
Yes	21.5%	11.0%	12.3%	14.5%
No	78.5%	89.0%	87.7%	85.5%
Mean of parent's higher occupational level				
Mean	2.41	2.42	2.39	2.41
Standard Deviation	0.17	0.24	0.19	0.18
Minimum	2.01	1.56	1.94	1.94
Maximum	2.95	3.60	4.13	2.95
School instructional resources				
High	71.5%	53.7%	46.5%	48.3%
Medium	13.7%	44.7%	35.7%	41.9%
Low	14.8%	1.6%	17.8%	9.8%
Parent-teacher relationship/Percentage of students with parents attend conferences in school				
0-10%	0%	0.2%	0%	4.7%
11-25%	2.7%	3.5%	15.4%	4.4%
26-50%	22.5%	6.8%	29.7%	35.0%
More than 50%	74.8%	89.5%	54.9%	55.9%
School climate/Teachers' expectations for student achievement				
Very high	6.6%	12.2%	0.0%	6.2%
High	77.7%	55.7%	41.6%	34.0%
Medium	15.7%	31.4%	58.1%	57.7%
Low	0.0%	0.7%	0.3%	2.1%
Very low	0.0%	0.0%	0.0%	0.0%

Table 39 – Descriptive statistics of the individual level – Netherlands, Poland, Romania and Scotland

Individual level	Netherlands	Poland	Romania	Scotland
Reading achievement				
M	550.50	523.81	500.12	528.85
SD	47.43	71.17	83.98	75.45
Min	367.15	293.43	145.84	276.14
Max	687.84	744.99	724.38	745.24
Gender				
Boys	49.6%	49.2%	51.4%	49.2%
Girls	50.4%	50.8%	48.6%	50.8%
Language spoken at home				
Is the same of the test	97.6%	99.1%	93.7%	96.2%
Is not the same of the test	2.4%	0.9%	6.3%	3.8%
Parent's higher occupation level				
Professional	51.8%	38.7%	15.7%	58.8%
Small business owner	14.6%	11.4%	8.9%	7.9%
Clerical	24.7%	14.7%	22.6%	21.2%
Skilled worker	7.0%	30.1%	36.0%	7.6%
General labourer	1.5%	2.7%	8.1%	3.5%
Others	0.3%	2.4%	8.7%	1.0%
Employment situation of the father				
Full time	91.3%	81.7%	83.2%	94.9%
Part time	7.1%	8.9%	4.2%	2.6%
Looking for a job	1.7%	9.4%	12.6%	2.6%
Employment situation of the mother				
Full time	10.3%	74.4%	74.1%	39.4%
Part time	83.5%	7.3%	5.2%	56.1%
Looking for a job	6.2%	18.4%	20.6%	4.5%
Attended pre-school				
Yes	97.2%	69.5%	94.2%	98.3%
No	2.8%	30.5%	5.8%	1.7%
Index of home educational resources				
High	19.6%	10.2%	5.2%	22.0%
Medium	79.2%	82.3%	81.5%	76.9%
Low	1.2%	7.5%	13.4%	1.1%
Index of students attitudes toward reading				
High	39.3%	44.0%	59.8%	42.6%
Medium	44.6%	44.6%	35.5%	43.0%
Low	16.2%	11.4%	4.6%	14.4%
Recognize most letters of the alphabet before ISCED1				
Very well	23.3%	55.9%	34.3%	36.1%
Moderately well	43.3%	35.1%	35.5%	44.9%
Not very well or Not at all	33.4%	9.0%	30.2%	19.0%
Parental book reading				
Often	72.6%	52.8%	38.7%	80.8%
Sometimes	25.7%	45.8%	53.8%	18.3%

Never or almost never	1.7%	1.4%	7.5%	0.9%
Reading for fun outside school				
Everyday or almost everyday	36.8%	43.3%	25.5%	31.8%
Once or twice a week	22.0%	29.0%	26.4%	24.5%
Once or twice a month	10.6%	12.5%	14.2%	13.8%
Never or almost never	30.5%	15.3%	33.9%	29.9%

Table 40 – Descriptive statistics for the class level – Netherlands, Poland, Romania and Scotland

Class level	Netherlands	Poland	Romania	Scotland
Gender of the teacher				
Male	28.1%	0.5%	9.8%	4.7%
Female	71.9%	99.5%	90.2%	95.3%
Percentage of students not speaking test language				
Mean	4.32	4.03	5.15	4.81
Standard Deviation	3.31	3.22	8.35	3.34
Minimum	0.0	0.0	0.0	0.0
Maximum	25.0	19.5	100.0	33.3
Percentage of students with few educational resources				
Mean	3.11	4.41	5.23	3.23
Standard Deviation	3.17	4.55	8.70	3.22
Minimum	0.0	0.0	0.0	0.0
Maximum	17.6	31.3	78.9	22.2
Teachers uses variety of organizational approaches				
Mean	1.35	1.05	1.07	1.26
Standard Deviation	0.48	0.21	0.25	0.44
Minimum	1	1	1	1
Maximum	2	2	2	2

Table 41 - Descriptive statistics of the school level – Netherlands, Poland, Romania and Scotland

School level	Netherlands	Poland	Romania	Scotland
Percentage of students in the school come from economically disadvantaged homes				
0-10%	56.7%	13.5%	15.4%	47.5%
11-25%	27.7%	47.4%	31.3%	23.2%
26-50%	8.6%	27.0%	21.1%	22.2%
More than 50%	7.0%	12.1%	32.1%	7.1%
Location of the school/School is rural				
Yes	40.4%	27.2%	32.1%	22.9%
No	59.6%	72.8%	67.9%	77.1%
Mean of parent's higher occupational level				
Mean	2.28	2.43	2.41	2.31
Standard Deviation	0.35	0.18	0.18	0.30
Minimum	1.14	1.79	1.94	1
Maximum	3.60	2.95	2.95	3.3
School instructional resources				
High	91.9%	73.7%	57.7%	90.2%
Medium	8.1%	25.3%	32.7%	8.7%
Low	0.0%	1.0%	9.6%	1.1%
Parent-teacher relationship/Percentage of students with parents attend conferences in school				
0-10%	5.1%	1.0%	11.3%	18.7%
11-25%	9.4%	0.8%	9.2%	1.3%
26-50%	17.9%	9.9%	22.9%	1.5%
More than 50%	67.6%	88.2%	54.5%	78.5%
School climate/Teachers' expectations for student achievement				
Very high	7.1%	8.1%	12.3%	43.8%
High	57.9%	74.2%	46.5%	47.9%
Medium	33.8%	17.7%	35.7%	8.3%
Low	1.2%	0.0%	4.4%	0.0%
Very low	0.0%	0.0%	1.0%	0.0%

Table 42 – Descriptive statistics of the individual level – Slovak Republic, Slovenia, Spain and Sweden

Individual level	Slovak Republic	Slovenia	Spain	Sweden
Reading achievement				
M	535.03	523.17	516.32	548.35
SD	70.38	66.61	65.65	60.56
Min	239.12	269.13	254.46	298.91
Max	716.19	711.14	693.14	710.49
Gender				
Boys	50.9%	51.7%	51.1%	51.5%
Girls	49.1%	48.3%	48.9%	48.5%
Language spoken at home				
Is the same of the test	96.3%	97.9%	88%	86.2%
Is not the same of the test	3.7%	2.1%	12%	13.8%
Parent's higher occupation level				
Professional	35.5%	40.8%	40.3%	59.6%
Small business owner	13.7%	8.5%	13.5%	10.4%
Clerical	26.8%	31.7%	20.5%	21.4%
Skilled worker	19.1%	16.0%	16.4%	6.8%
General labourer	3.2%	2.4%	7.5%	1%
Others	1.7%	0.7%	1.8%	0.8%
Employment situation of the father				
Full time	90.0%	95.8%	92%	93.1%
Part time	3.2%	1.2%	5.9%	4.2%
Looking for a job	6.8%	3.0%	2%	2.7%
Employment situation of the mother				
Full time	81.1%	87.6%	58.9%	57.6%
Part time	6.3%	3.5%	25.9%	38.4%
Looking for a job	12.6%	8.9%	15.2%	4%
Attended pre-school				
Yes	96.0%	87%	96.2%	96.4%
No	4.0%	13%	3.8%	3.6%
Index of home educational resources				
High	12.4%	9.2%	15.4%	23.2%
Medium	84.0%	89.3%	79.7%	76.3%
Low	3.5%	1.5%	4.9%	0.4%
Index of students attitudes toward reading				
High	45.8%	52.5%	56.2%	45.7%
Medium	45.2%	39.8%	39.6%	44.4%
Low	9.1%	7.7%	4.2%	9.9%
Recognize most letters of the alphabet before ISCED1				
Very well	26.7%	46.4%	57.8%	50.6%
Moderately well	31.2%	34.6%	31.9%	38%
Not very well or Not at all	42.2%	19%	10.3%	11.4%
Parental book reading				
Often	59.6%	62.8%	45.8%	70.2%

Sometimes	38.5%	36.1%	46.8%	27.9%
Never or almost never	1.9%	1.1%	7.4%	1.9%
Reading for fun outside school				
Everyday or almost everyday	40.4%	37.1%	45.1%	36.5%
Once or twice a week	32.6%	32.3%	27%	30.8%
Once or twice a month	14.4%	15.6%	11%	16.6%
Never or almost never	12.6%	14.9%	16.9%	16.1%

Table 43 – Descriptive statistics for the class level – Slovak Republic, Slovenia, Spain and Sweden

Class level	Slovak Republic	Slovenia	Spain	Sweden
Gender of the teacher				
Male	6.4%	1.7%	25.1%	13.8%
Female	93.6%	98.3%	74.9%	86.2%
Percentage of students not speaking test language				
Mean	4.32	4.73	5.141	4.46
Standard Deviation	4.38	4.57	3.64	2.48
Minimum	0.0	0	0	0
Maximum	52.6	50	20.5	13.3
Percentage of students with few educational resources				
Mean	3.92	3.50	3.73	3.25
Standard Deviation	5.68	3.56	2.94	2.34
Minimum	0.0	0	0	0
Maximum	58.8	64.30	19.4	13.7
Teachers uses variety of organizational approaches				
Mean	1.13	1.28	1.23	1.42
Standard Deviation	0.34	0.45	0.42	0.493
Minimum	1	1	1	1
Maximum	2	2	2	2

Table 44 – Descriptive statistics of the school level – Slovak Republic, Slovenia, Spain and Sweden

School level	Slovak Republic	Slovenia	Spain	Sweden
Percentage of students in the school come from economically disadvantaged homes				
0-10%	37.8%	30.1%	75.8%	51.1%
11-25%	32.4%	46.2%	15.3%	29.6%
26-50%	22.2%	18%	4.8%	9.6%
More than 50%	7.6%	5.6%	4.1%	9.7%
Location of the school/School is rural				
Yes	26.6%	23.9%	17.2%	11.2%
No	73.4%	76.1%	82.8%	88.8%
Mean of parent's higher occupational level				
Mean	2.46	2.41	2.43	2.38
Standard Deviation	0.27	0.18	0.21	0.17
Minimum	1.76	1.81	1.94	1.94
Maximum	4.50	2.95	3.58	2.95
School instructional resources				
High	64.7%	82%	66%	80.3%
Medium	34.2%	16%	24.2%	15.8%
Low	1.2%	1.9%	9.9%	3.9%
Parent-teacher relationship/Percentage of students with parents attend conferences in school				
0-10%	1.5%	0.6%	1.2%	0%
11-25%	4.9%	1.7%	6%	0%
26-50%	31.4%	8.3%	23.4%	0%
More than 50%	62.3%	89.4%	69.4%	100%
School climate/Teachers' expectations for student achievement				
Very high	5.6%	6.1%	5.9%	20.9%
High	50.4%	73.0%	46.4%	61.2%
Medium	42.3%	20.9%	43.9%	17.9%
Low	1.7%	0%	3.8%	0%
Very low	0.0%	0%	0%	0%

APPENDIX III

Knowledge of phonics contemplated in curricula documents (Yes/No) and percentage of children in PIRLS 2006 that recognize the letters of the alphabet “very well”

Intended Curriculum and Phonics Teaching	Teaching the Alphabet: Sounds and Letter names YES	% of children in PIRLS whose parents report they know the alphabet “Very Well”	Teaching the Alphabet: Sounds and Letter names NO	% of children in PIRLS whose parents report they know the alphabet “Very Well”
Austria			X	29%
French Belgium			X	42%
Flemish Belgium			X	19%
Bulgaria	X	53%		
Denmark			X	53%
England	X	57%		
France	X	53%		
Germany			X	29%
Hungary			X	20%
Italy			X	41%
Latvia	X	50%		
Lithuania			X	44%
Netherlands			X	24%
Poland			X	54%
Romania	X	32%		
Scotland	X	35%		
Slovak Republic	X	25%		
Slovenia	X	45%		
Spain	X	57%		
Sweden.			X	50%

Note: Information for the intended curriculum was obtained in the Eurydice study “Teaching Reading in Europe: Contexts, policies and practices”, 2011.

ANNEX

Types of Questions and Comprehension Processes in Narrative and Informational Texts in PIRLS 2006

Reading for Literary Experience – The Little Lump of Clay

	Question	Comprehension Process	Type of Question
1	Number the sentences below in the order the events happened in the story. Number 1 has been done for you.	Focus on and Retrieve Explicitly Stated Information	Constructed response
2	Why was the clump of clay in the bin for such a long time?	Make Straightforward Inferences	Constructed response
3	At the beginning of the story, what did the	Make Straightforward	Constructed response

	lump of clay wish for?	Inferences	
4	Why was the clay eventually taken out of the bin?	Make Straightforward Inferences	Multiple choice
5	What did the boy do that was careless?	Make Straightforward Inferences	Multiple choice
6	The boy left the lump of clay in danger. What was the danger?	Interpret and Integrate Ideas and Information	Constructed response
7	How did the lump of clay feel right after the boy left the pottery workshop?	Make Straightforward Inferences	Multiple choice
8	What wonderful things happened after the lump of clay had been lying by the window for a long time? Why was this so wonderful for the lump of clay?	Focus on and Retrieve Explicitly Stated Information	Constructed response
9	Which words in the story show that the little girl knew what she wanted to make?	Make Straightforward Inferences	Multiple choice
10	Describe the different feelings the clay had at the beginning and the end of the story. Explain why his feelings changed.	Interpret and Integrate Ideas and Information	Constructed response
11	The little girl is an important person in this story. Explain why she was important to what happened.	Interpret and Integrate Ideas and Information	Constructed response

Focus on and Retrieve Explicitly Stated Information – 2 questions

Multiple choice – 0; Constructed response - 2

Make Straightforward Inferences – 6 questions

Multiple choice – 4; Constructed response - 2

Interpret and Integrate Ideas and Information - 3 questions

Multiple choice – 0; Constructed response - 3

Examine and Evaluate Content, Language, and Textual Elements – 0 questions

Reading for Literary Experience – An Unbelievable Night

	Question	Comprehension Process	Type of Question
1	What was the first sign that something unusual was happening?	Make Straightforward Inferences	Multiple choice
2	Where did the crocodile come from?	Make Straightforward Inferences	Multiple choice
3	Which words tell you that Anina was frightened?	Make Straightforward Inferences	Multiple choice
4	Why did Anina think that the crocodile was going to attack?	Make Straightforward Inferences	Multiple choice
5	Put the following sentences in the order in which they happened in the story.	Make Straightforward Inferences	Constructed response
6	Why did Anina call the flamingos?	Make Straightforward	Constructed response

		Inferences	
7	How did the bedroom door get broken?	Focus on and Retrieve Explicitly Stated Information	Multiple choice
8	How did the magazine help Anina? Write two ways.	Interpret and Integrate Ideas and Information	Constructed response
9	At the end of the story, how did Anina feel toward the flamingos?	Make Straightforward Inferences	Multiple choice
10	Name one thing Anina had difficulty explaining to her parents.	Focus on and Retrieve Explicitly Stated Information	Constructed response
11	You learn what Anina was like from the things she did. Describe what she was like and give two examples of what she did that shows this.	Interpret and Integrate Ideas and Information	Constructed response
12	The author does not tell us whether Anina's adventure was all a dream. Give one piece of evidence that it may have been a dream.	Examine and Evaluate Content, Language, and Textual Elements	Constructed response

Focus on and Retrieve Explicitly Stated Information – 2 questions

Multiple choice – 1; Constructed response - 1

Make Straightforward Inferences – 7 questions

Multiple choice – 5; Constructed response - 2

Interpret and Integrate Ideas and Information - 2 questions

Multiple choice – 0; Constructed response - 2

Examine and Evaluate Content, Language, and Textual Elements – 1 question

Multiple choice – 0; Constructed response - 1

Reading to Acquire and Use Information – Antarctica: Land of Ice

	Question	Comprehension Process	Type of Question
1	Where can you find Antarctica on a globe?	Focus on and Retrieve Explicitly Stated Information	Constructed response
2	Antarctica is the coldest place on Earth. What other records does it hold?	Focus on and Retrieve Explicitly Stated Information	Multiple choice
3	What is the coldest part of Antarctica?	Focus on and Retrieve Explicitly Stated Information	Constructed response
4	Think about what the article says about Antarctica. Give two reasons why most people who visit Antarctica choose not to go there between April and September.	Interpret and Integrate Ideas and Information	Constructed response

5	Why does the article tell you that ‘a mug of boiling water thrown in the air would freeze before it hit the ice’?	Make Straightforward Inferences	Multiple choice
6	According to the article, what do penguins use their wings for?	Focus on and Retrieve Explicitly Stated Information	Multiple choice
7	Give three ways penguins are able to keep warm in Antarctica.	Make Straightforward Inferences	Constructed response
8	What are two things you learn about food in Antarctica from Sara’s letter?	Focus on and Retrieve Explicitly Stated Information	Constructed response
9	Think about whether you would like to visit Antarctica. Use what you have read in both <i>Introducing Antarctica</i> and <i>A Letter from Antarctica</i>	Interpret and Integrate Ideas and Information	Constructed response
10	Which section of the article tells you how thick the ice is in Antarctica?	Examine and Evaluate Content, Language, and Textual Elements	Multiple choice
11	In the article, there are two different ways of finding out about Antarctica: <ul style="list-style-type: none"> • Introducing Antarctica • A Letter from Antarctica Which of these kinds of information do you find more interesting and why?	Examine and Evaluate Content, Language, and Textual Elements	Constructed response

Focus on and Retrieve Explicitly Stated Information – 5 questions

Multiple choice – 2; Constructed response - 3

Make Straightforward Inferences – 2 questions

Multiple choice – 1; Constructed response - 1

Interpret and Integrate Ideas and Information - 2 questions

Multiple choice – 0; Constructed response - 2

Examine and Evaluate Content, Language, and Textual Elements - 2 questions

Multiple choice – 1; Constructed response - 1

Reading to Acquire and Use Information – Searching for Food

	Question	Comprehension Process	Type of Question
1	What is the main purpose of the article?	Examine and Evaluate Content, Language, and Textual Elements	Multiple choice
2	What is one thing you should do to take care of the creatures?	Focus on and Retrieve Explicitly Stated Information	Multiple choice
3	Why do you put the apple by the ants’ nest?	Make Straightforward Inferences	Multiple choice
4	Once an ant finds some food, how do the other ants from the nest find it too?	Focus on and Retrieve Explicitly Stated Information	Multiple choice

5	Why do the ants scurry around after you've sprinkled the soil?	Interpret and Integrate Ideas and Information	Constructed response
6	How do pill bugs find the food?	Focus on and Retrieve Explicitly Stated Information	Multiple choice
7	Look at the picture for Study Pill Bugs. How does the picture help you to know what to do in the experiment?	Examine and Evaluate Content, Language, and Textual Elements	Constructed response
8	Why do you need to let your pill bugs walk along the passage before putting the leaves in the box?	N/A	Multiple choice
9	In step 3 of the pill bugs project, what do you think will happen if you move the damp leaves to the left corner of the box?	Interpret and Integrate Ideas and Information	Constructed response
10	What is similar in the way ants and pill bugs find their food?	Interpret and Integrate Ideas and Information	Constructed response
11	Number the steps in the order you would follow to make a wormery. The first one has been done for you.	Make Straightforward Inferences	Constructed response
12	Explain why it is important to put the layers of soil and sand in the bottle.	Interpret and Integrate Ideas and Information	Constructed response
13	Explain why putting the onion and potato on the surface of the soil is important to the wormery project.	Interpret and Integrate Ideas and Information	Constructed response
14	Each project has <i>What happened and Why</i> in a separate box. What is the purpose of these boxes?	Examine and Evaluate Content, Language, and Textual Elements	Constructed response
15	Which of the three projects did you find the most interesting? Use information from the text to explain your answer.	Interpret and Integrate Ideas and Information	Constructed response

Focus on and Retrieve Explicitly Stated Information – 5 questions

Multiple choice – 5; Constructed response - 0

Make Straightforward Inferences – 0 questions

Multiple choice – 0; Constructed response - 0

Interpret and Integrate Ideas and Information - 7 questions

Multiple choice – 3; Constructed response - 4

Examine and Evaluate Content, Language, and Textual Elements – 1 question

Multiple choice – 0; Constructed response - 1

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Abstract

The aim of this report was to identify the school, class and individual student background factors that explain reading literacy achievement in PIRLS 2006. First, we sought to investigate the relationship between curriculum and instruction and achievement. Second, we wanted to identify the factors associated with achievement at different levels of analysis, both at the EU level and the individual country level. Regarding the first question, we did not find any relationship between curriculum and instruction and achievement. Findings related to the second question indicate that our model explains 43% of the variance in students' achievement and that the variables with the highest impact on students' overall reading score relate to home resources and practices, students' pre - reading knowledge and their attitudes and to school compositional effects. Country-level analysis confirms that the variables identified for the model with the 20 countries as having a strong influence on students' reading achievement also exert a significant impact in individual countries, but that their magnitude most likely depends on the characteristics of each country. These findings have important policy implications as they show which factors can be addressed by policy measures to improve students' performance.

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