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Reading literacy achievement in the primary grades

The role of sociocultural and linguistic diversity

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EXPERTISECENTRUM NEDERLANDS

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Chapter 1
Introduction

In the past decade the importance of high-level reading skills and the link between reading skills, economic success and social success has become more prevalent (Pearson, 2012). Reading skills have always been important, however, in contemporary 'information society' they can be considered crucial. The gap between the demands of today's society and the level of students' abilities are becoming more noticeable, also in the Netherlands. In its annual report for 2008, the Dutch Education Inspectorate stated that ".. the Inspectorate has concerns about the growing number of students whose basic skills (language and math) are insufficient to be able to function properly in our society" (p. 4). In order to be able to document children's reading skills cross-nationally, the *International Association for the Evaluation of Educational Achievement* (IEA) started in 2001 with the *Progress in International Reading Literacy Study* (PIRLS). PIRLS provides internationally comparative data about students' reading achievement and associated factors and was inaugurated to provide reliable measurement of trends in reading comprehension over time. To refer to the demands for literacy in today's society, PIRLS introduced the term reading literacy: "Reading literacy is defined as the ability to understand and use those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment" (Mullis, Martin, Kennedy, Trong, & Sainsbury, p. 11, 2009).

The PIRLS framework not only allows a cross-national perspective on children's reading literacy achievement, it also aims to explain individual variation by relating reading literacy scores to a broad range of child, home and school factors. It is a well-known fact that children with a low socio-economic background and language minority children are at risk for falling behind in reading literacy skills. However, it is still by no means clear how linguistic and sociocultural diversity has an impact on reading literacy achievement. Therefore, in the present thesis an attempt will be made to identify those linguistic and sociocultural factors related to the child, and the child's home and school that can explain the variation in reading literacy achievement in the Netherlands.

This chapter starts with an outline of the PIRLS framework, describing the research questions, assessment battery, sampling methods, and procedures. This is followed by a brief introduction on the central theme in this thesis: sociocultural and linguistic diversity in relation to reading literacy achievement. In addition, a framework model is presented which outlines the relationships of the student, home and school predictors that are used in analyses throughout this thesis. Finally, the research questions addressed in this thesis are provided along with an introduction on the four studies being reported in this thesis.

1.1 Progress in International Reading Literacy Study

Progress in International Reading Literacy Study (PIRLS) is conducted under auspices of *International Association for the Evaluation of Educational Achievement* (IEA). IEA was founded in 1959 and is an independent international organization in which research institutes from about 70 countries collaborate. It conducts comparative research and assessment projects concerning educational issues worldwide. PIRLS is a study with a 5 year cycle; PIRLS 2001 was the first assessment. The Ministry of Education, Culture and Science funded the Dutch participation for PIRLS 2001 and 2006. The Netherlands Organisation for Scientific Research (NWO) has financed, at the government's behest, PIRLS 2011 and has committed to fund PIRLS 2016. The Dutch part of PIRLS has been executed by the *National Center for Language Education* (NCLE, 'Expertisecentrum Nederlands') and the *Behavioural Science Institute, Radboud University Nijmegen*, since the first survey in 2001.

1.1.1 PIRLS research questions

PIRLS aims to measure trends in students reading achievement as well as trends in the associated home and school contexts for learning to read in order to provide high quality data that point to key factors that influence teaching and learning as well as international benchmarks that identify strengths and weaknesses in educational systems in perspective of achievement goals and standards for educational improvement and policy recommendations for improving education (Mullis, Martin, Kennedy, Trong & Sainsbury, 2009). Two main research questions are focused on:

1. What are the cross-national differences in reading literacy achievement of students half-way the primary grades?
2. To what extent can the individual variation in reading literacy be explained from student, home, teacher and school factors?

1.1.2 Instruments

PIRLS focused on three core aspects of students' reading literacy (1) purposes for reading, (2) processes of comprehension and (3) reading behaviour and attitudes. The first two aspects were integrated in a reading literacy test; information on the third aspect was obtained by administering a student questionnaire. Detailed information can be found in the PIRLS Framework (Mullis et al., 2009). The development of the PIRLS Framework, the reading literacy test and context questionnaires was led by the *International Study Center Boston College (ISC).*

Reading Literacy Test. The test was constructed in cooperation with the *National Foundation for Educational Research* (NFER) and the participating countries (International Association for the Evaluation of Educational Achievement, 2001 - 2011). The international test was created in English and was translated by the individual countries on the basis of specific requirements. The translation was first conducted by a translator, after which two reading experts developed the final instruments. Subsequently, the translation was reviewed and approved by an independent translator, appointed by IEA.

The reading literacy test consisted of two types of passages, which represented the two purposes for reading: reading for literary experience (literary texts) and reading to acquire and use information (informational texts). When reading (and understanding) texts, students use different comprehension processes, which require a variety of skills and strategies. Within both reading purposes, the PIRLS test was designed to measure four major processes of comprehension: (a) Focus and retrieve explicitly stated information; (b) Make straightforward inferences; (c) Interpret and integrate ideas and information; (d) Examine and evaluate content, language, and textual elements. The test consisted of ten passages: five literary and five informational texts. Multiple choice and constructed-response (open-ended) items were used. The construction of the passages and items used in the main PIRLS assessment were based on field test results. For every PIRLS assessment a number of texts from the previous assessment were used as trend passages. The PIRLS test of 2011 consisted of four new passages, two passages from PIRLS 2006 and four passages used in both 2006 and 2001. The internal consistency of the reading literacy test for the Netherlands was good, with a Cronbach's alpha of > .81 (Mullis, Martin, Kennedy, & Foy, p. 306, 2007).

The ten passages – five informational and five literary passages – were divided

between thirteen booklets, by use of a rotated booklet design. A booklet contained two passages and associated questions. Booklet 13 was a colour 'reader': this was a separate booklet containing two passages, with the test items in an accompanying response booklet. Table 1 shows the distribution of the passages between the booklets for PIRLS 2011.

Table 1

Distribution of passages between booklets PIRLS-2011

	Booklet 1	Booklet 2	Booklet 3	Booklet 4	Booklet 5	Booklet 6	Booklet 7	Booklet 8	Booklet 9	Booklet 10	Booklet 11	Booklet 12	Booklet 13
Passages	Lit 1	Lit 2	Lit 3	Lit 4	Inf 1	Inf 2	Inf 3	Inf 4	Lit 1	Inf 2	Lit 3	Inf 4	Lit 5
	Lit 2	Lit 3	Lit 4	Inf 1	Inf 2	Inf 3	Inf 4	Lit 1	Inf 1	Lit 2	Inf 3	Lit 4	Inf 5

One booklet was randomly allocated to a student. The rotated booklet design enabled all passages to be linked so that ultimately performance of all students could be placed on a single scale using Item Response Theory (IRT) methods. Because only a limited subset of items was administered to each student, and not all passages are equally easy or difficult, the individual student scores could not be used to make comparisons between students (and thus countries). Therefore IRT was used. The PIRLS assessment data were scaled using IRT, with an international mean of 500 and a standard deviation of 100. For each student, based on the skills of that student (determined by two passages) and the difficulty of the items, an expected skill distribution was made. Randomly five points were taken from this distribution, called plausible values. These five plausible values formed the estimated reading literacy score of a student. For detailed information about this process see Foy and Kennedy (2008).

Student, home, teacher & school factors. Information about student's reading behaviour and attitudes as well as regarding the different components of the student's environment was gathered in background questionnaires, which were intended and created solely for PIRLS. Information on the educational system at national level was collected in the PIRLS Encyclopaedia (Mullis, Martin, Minnich, Drucker, & Ragan, 2012). The questionnaires were constructed by ISC in collaboration with the participating countries. The questionnaires were developed in English and translated using explicit guidelines and reviewed by an independent

translator. The international questionnaires could be adapted and supplemented with national options, for instance concerning policy-related issues or country-specific topics.

Each participating student completed a student questionnaire, which included questions about (literacy) activities in and outside of school, attitudes towards reading and student characteristics. Also, the parents or guardians of the participating students answered questions about literacy-related activities in the home (before and after their child began school), home-school connections, reading attitudes and behaviour, and various socioeconomic indicators. The teachers answered the questionnaire with the students taking the PIRLS test in mind. The questionnaire focused on instructional materials and strategies, student assessment, teacher training and education and teacher demographics. Furthermore, principals answered questions concerning the school curriculum, school characteristics, school climate, school environment and school-parents relations.

1.1.3 Sampling

The PIRLS target population was defined by UNESCO's International Standard Classification for Education, ISCED (UNESCO Institute for Statistics, 1999):

…all students enrolled in the grade that represents four years of schooling, counting from the first year of ISCED Level 1, providing the mean age at the time of testing is at least 9.5 years. For most countries, the target grade should be the fourth grade, or its national equivalent (Joncas, 2007).

PIRLS has chosen this grade because students are making the transition from *learning to read* to *reading to learn*. In the Netherlands the national desired population were students in grade 4 ('groep 6'), with an average age of 10; 3 (10; 2 in 2011) at time of testing.

Statistics Canada was responsible for coordinating the sampling in all participating countries. For each PIRLS assessment a representative sample of students from the Netherlands was selected, by means of selecting 150 schools (Martin, Mullis, & Kennedy, 2007). In the Netherlands, a mean student weight indicator (low, medium, high) was used as explicit stratification variable; degree of urbanization (very high, high, moderate, low, very low) was used as implicit stratification variable. School level exclusions consisted of very small schools (less than six 4th grade students in a school) and special education schools. Within school

exclusions consisted of non-native language speakers (less than one year schooling in the Netherlands) and children with disabilities. Overall exclusions were <5.0% of the national desired population. All schools for primary education were available in the sampling frame. All classrooms within a sampled school were sampled. Sampling techniques and stratification variables were kept consistent across years, with the difference that in 2001 and 2006 the schools were selected using a Probability Proportionate to Size sampling technique, which was not used in 2011. In 2011 schools were selected using Systematic sampling with equal probabilities technique (SSRS).

To avoid sample size losses, the sampling plan identified two replacement schools for each sampled school, which could be contacted if the first sampled school refused to participate. These replacement schools were similar to the originally drawn school with respect to the stratification variables and school size. In order to meet IEA's sampling demands, 50% of the originally drawn schools had to participate in PIRLS. The final response (with use of replacement schools) had to be at least 85%. Both requirements had to be met in order to ensure that the participating schools represent the actual desired student population of a country. In the Netherlands these response demands have been met for all three PIRLS assessments. Table 2 shows the numbers of participating countries, as well as the number of Dutch students, classes and schools at the three years of measurement. Each time a different sample of schools was used to gather data.

Table 2

Number of participating countries, Dutch students, classes and schools PIRLS 2001, 2006, 2011

Assessment	Countries	Dutch students	Dutch 4th grade classes	Dutch schools
2001	35	4112	195	135
2006	40	4156	207	139
2011	49	3995	207	138

1.1.4 Procedures

In all schools the reading literacy test as well as the student questionnaire was administered during one morning, the student questionnaire was administered directly after the reading test. The testing sessions were conducted by specially trained test administrators. They also distributed the teacher and principal

questionnaire. The home questionnaire was given to the students to take home and parents could send the questionnaire back by post. The test administrators filled out the so-called *Student Assessment Form* for each group, which provided an overview of the students in the class, the test booklet that was assigned to a student and a unique student number (school-class-student). All instruments were linked using this student number.

The test administrators used a manual in which the internationally standardized procedures regarding the test administration were extensively described. The students were first given an instruction on the course of events during the morning and received a reading instruction. Then they were given 40 minutes to read the first passage in the test booklet and answer the questions. This was followed by a 15-minute break, after which the students started reading the second passage from the test booklet. After finishing the second passage, again in 40 minutes, they had a 30-minute break, followed by answering the student questionnaire. An International Quality Controller, appointed by IEA, and a National Quality controller, appointed by the National Center, both visited 10% of the participating schools in order to monitor proper implementation and quality of the procedures.

The scoring and data-entry were conducted by a group of research assistants, appointed by the National Center. For scoring the constructed-response items, intensive training and instruction, both international and national, had taking place. An International Scoring Guide was available, outlining the possible answers to a question and the number of points that should be appointed for each answer. An answer could be appointed three, two, one or zero points. Approximately 40% of the constructed-response items were scored twice by different scorers to calculate interrater reliability. Also cross-country reliability (all countries score answers from English students) and trend reliability were checked (answers given by students in previous assessments were scanned and scored during the following assessments).

The completed questionnaires and test materials were then entered in *WinDEM* (Windows Data Entry Manager, software created by IEA) and the participation status from the students were complemented in *WinW3S* (Windows Within-School Sampling, software created by IEA). Next, the two programs were linked, and when all data had been checked, it was sent to *IEA Data Processing and research Center* (DPC) for data-cleaning, -validation and -verification.

1.2 Sociocultural and linguistic diversity in reading literacy achievement

In perspective of the PIRLS framework, our study aimed to elaborate on the second research question on the individual variation in reading literacy. In the context of elementary education in the Netherlands the focus was to examine the role of sociocultural and linguistic variation in reading literacy achievement.

1.2.1 The role of sociocultural diversity

A large amount of research aimed at determining factors contributing to the individual differences in reading achievement. From a sociocultural perspective, factors related to the students' socioeconomic background such as parental education, income, occupation and sociocultural capital, such as the number of books in the home, were evidenced to have an impact on reading literacy attainment (Hoff, 2013; Sirin, 2005). Also several other aspects of the home environment have been identified in literature as predictors of reading achievement (e.g. Bracken & Fischel, 2008), for instance reading attitudes of the parents (e.g. Baker & Scher, 2002; De Jong & Leseman, 2001) and the early literacy activities undertaken by the parents (e.g. Davidse, De Jong, Bus, Huijbregts, & Swaab, 2011; Sénéchal, 2006).

Several studies have recognized the existence of a 'gender gap', girls outperforming boys with regard to reading achievement (Ma, 2008; Marks, 2008). Research indicated a relation between SES and the achievements of girls and boys (e.g. Entwisle, Alexander, & Olson, 2007). Mensah and Kiernan (2010) found that the achievements of boys are more influenced by their SES than the achievements of girls. Based on their longitudinal research of primary school children, Entwisle et al. (2007) concluded that the educational expectations of parents with low SES is more positive for girls than for boys, while parents with high SES seemed to have similar expectations for their sons and daughters. The attribution theory states that the gender gap is related to a disadvantage for girls compared to boys in self-confidence or self-concept (e.g. Boaler, 1997; Salisbury, Rees, & Gorard, 1999). The importance of self-concept or self-confidence in relation to achievement (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Marsh, Hau, Artelt, Baumert, & Peschar, 2006) as well as other aspects of student engagement, such as motivation and self-concept, was addressed in a number of studies (e.g. Petscher, 2010; Wigfield & Eccles, 2000).

Next to sociocultural factors concerning the parents, the sociocultural status of the school may also have an impact on children's literacy development. It has been found that school-related SES such as the socioeconomic background of the community, as identified by the school location and the school population, was related to the reading literacy achievement of all students in that school (Dronkers, 2010; Rauh, Parker, Garfinkel, Perry, & Andrews, 2003). Also the literacy environment in a class or school was found to be an important factor in reading attainment (Serpell, 2001). Furthermore, the influence of educational practices on reading achievement was evidenced in research. For example it has been proven that the time spent on reading in a classroom as well as the time spent on giving instruction concerning reading strategies influences literacy achievement (e.g. Guthrie, McRae, Coddington, Klauda, Wigfield, & Barbosa, 2009; Spörer, Brunstein, & Kieschke, 2009).

1.2.2 The role of linguistic diversity

The influence of linguistic diversity on reading achievement has been recognized in previous research. Second language (L2) students still lag behind their first language (L1) peers with regard to reading literacy achievement (Droop & Verhoeven, 2003; Koda, 2007). This achievement gap has his origins in the student's home language environment. Many of the families of L2 students mainly speak their native language in the home setting and the L2 children enter primary education with limited or no proficiency of the Dutch language. Therefore L2 students start learning to read in a language they have not yet fully mastered (August & Shanahan, 2006; Verhoeven, 2011). This achievement gap has an impact throughout the school career of L2 students (Dagevos, Gijsberts, & Van Praag, 2003; Verhoeven & Vermeer, 2006). It has indeed been found that Dutch children with high educated parents make more progress during elementary school than children of poorly educated immigrant parents (Driessen, Van Der Silk, & Van Der Bot, 2002; Luyten & Ten Bruggencate, 2011). Also, the student engagement of second language (L2) students can be affected by the discrepancy between the L2 students' language skills and the language being used in the school curriculum, making them less confident about their abilities (e.g. Guthrie, Coddington, & Wigfield, 2009).

While there is a strong relationship between SES and linguistic background for immigrant students, Marks (2005) found that although L2 students' lesser achievement was largely due to SES factors, these SES factors could not explain all of

the variance. Also the influence background factors have on a student's reading ability may differ between the subgroups of L1 and L2 learners (Van Elsäcker, 2002).

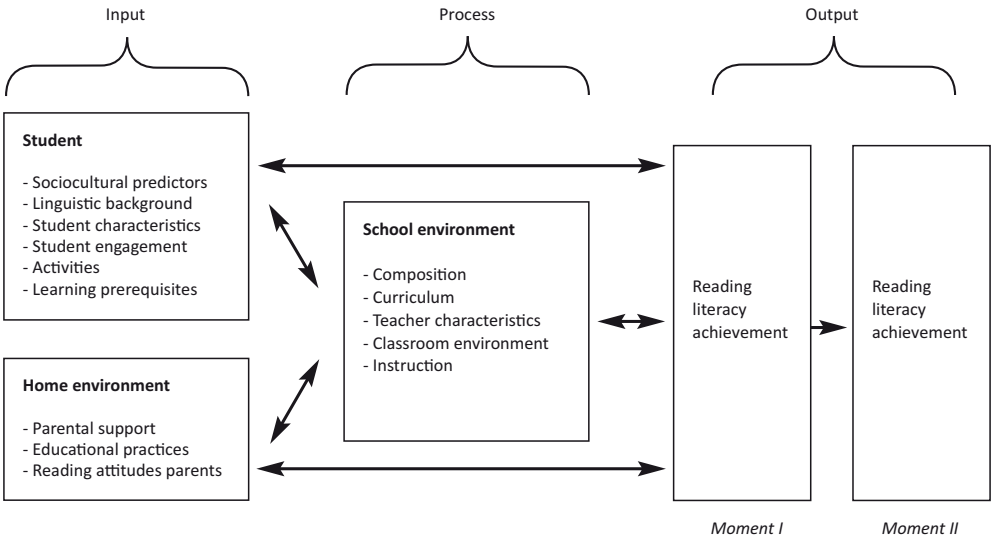
1.2.3 Towards a general explanatory model

PIRLS collected data on the various contexts in which students learn to read. The outline of the relationships between the student's environment on reading achievement and behaviour and attitudes were stated in the PIRLS framework (Mullis, Martin, Kennedy, Trong, & Sainsbury, p. 35, 2009) . The predictors at the student, home, class and school level that were collected all have, according to literature that is extensively discussed in the next chapters in this thesis, a relationship with reading achievement.

Scheerens (1990) constructed the CIPO (**C**ontext, **I**nput, **P**rocess and **O**utput) integrated model of school effectiveness, which described key aspects of educational systems and outlined the interrelationships of the various categories of variables that influence school effectiveness and achievement outcomes. In the current thesis, we will start from a framework model to explain the relationships between student, home and school factors related tot reading literacy outcomes which is partly based on both this CIPO- model originally developed by Scheerens (1990) and a later version by Thiel (2012). In Figure 1, this model is presented.

Figure 1

Modeling individual variation in reading literacy achievement



The model distinguishes the three main groups of predictors in this study – student, home and school/class – and outlines the output factors, in our case reading literacy achievement. First, input factors concerning the student are sociocultural predictors and linguistic background; student characteristics, such as gender and age; and student engagement, for instance attitudes, reading motivation and self-concept; activities, like amount of time that a student spends reading or playing computer games and learning prerequisites, which in their turn affect achievement outcomes. Second, the home environment factors, which refer to parental support and educational practices, such as early literacy activities and expectations, and parents' reading attitudes. Third, the school environment, which is the process factor. This process factor entails those factors that refer to the practices that take place within the school and within the classroom, as well as school characteristics. For instance the school curriculum and composition, and the teacher characteristics, such as gender, schooling and experience; the classroom environment, such as the size and climate; as well as instruction, the activities that are offered and didactics that are used. The output level refers to reading literacy achievement. The frame model shows that the input and process factors influence achievement, but that the achievement outcomes in their turn also influence the input and process factors. The model also includes a longitudinal factor, expressing that reading literacy achievement at one moment in time influences future achievement.

Although several aspects of this model have been tested and the role of linguistic and sociocultural diversity on reading achievement has been recognized in literature, multi-factor approaches in context of reading literacy comprising linguistic and sociocultural factors are scarce. Most of the studies that have been conducted used a standard one-level analysis model, not taking into account the data dependence that an educational setting entails, possibly resulting in inflated test statistics (Agresti & Finlay, 2009; Snijders & Bosker, 2012). Furthermore, although a large amount of research aimed at determining predictors of reading achievement for both L1 and L2 students, so far, an explanatory model of differences in reading literacy for L1 versus L2 students is lacking. Additionally, while the influence of predictors, such as student engagement and school characteristics on achievement, has been documented, literature which outlined a comparative perspective with regard to various school subjects is lacking and the (differential) relationship of sociocultural factors on different school subjects is not yet recognized. Additionally, the stability of the influence of the predictors on reading

achievement over time is unknown and it is not clear how linguistic and sociocultural factors may have an impact on trends of reading literacy results over the years.

1.3 The present study

1.3.1 Research questions

The aim of the present thesis is to yield new insights in the individual variation in reading literacy achievement, by conducting in-depth analyses on the reading literacy achievement data of fourth-grade children in the Netherlands during the past decade in relation to sociocultural and linguistic factors. The following research questions are addressed in this thesis:

1a. To what extent can the individual variation in reading literacy achievement be predicted from student, home, class and school factors?
1b. Do the same predictors apply for first and second language students?
2. Is children's mathematics achievement predicted by the same student, home, class and school factors?
3. To what extent can the trend in reading literacy achievement in the past decade be related to these factors?

In order to address these research questions in-depth analyses were conducted on PIRLS 2001, 2006 and 2011 data, and the instruments used in PIRLS were combined with other (inter)national surveys in order to examine the relationship between reading achievement and an array of predictors for fourth grade students in the Netherlands. We used the variables presented in the framework model in Figure 1 to work out the above research questions in the present thesis.

1.3.2 The present thesis

For answering the research questions four studies are reported in this thesis. In order to answer the first research question, we conducted two studies. In the first study we combined PIRLS questionnaire data with data from a national survey called *Cohort Study Primary Education* (PRIMA), conducted by the Institute for Applied Social Sciences (ITS) and the SCO-Kohnstamm Institute between 1994 and 2005. The PRIMA study was designed to measure student and school performance in the Netherlands. PRIMA assessed developments in primary education against

government educational policies in order to obtain an overall view of how well this sector of the education system was performing. PRIMA was conducted every two years and involved a representative sample of students in elementary education in the Netherlands (cf. Driessen, Van Lange, & Vierke, 2002). A sub-sample of the schools that participated in PRIMA also took part in an additional study, linking the PRIMA data with PIRLS data. Differences between first and second language students in reading literacy achievement, decoding, language, mathematics, and nonverbal reasoning skills, reading motivation and self-confidence, and home reading resources were explored following a longitudinal design.

The second study examined how linguistic and sociocultural diversity have an impact on reading literacy achievement, using PIRLS 2006 data. A multilevel modeling analysis was conducted to explore to what extent linguistic background, socioeconomic status, home and school literacy environment and reading attitudes explain differences in the individual variation in reading literacy achievement of L1 and L2 students.

The third study addresses the second research question and explored the relationship between reading and mathematics achievement and its (differential) predictors. For this study the instruments used in PIRLS and *Trends in Mathematics and Science Study* (TIMSS) were combined. TIMSS started in 1995 and measures the performance in both mathematics and science of 4th grade students. TIMSS has a cycle of four years and is, similar to PIRLS, initiated by IEA. In the Netherlands TIMSS was coordinated by the University of Twente. In 2011, the four-year cycle of TIMSS and the five-year cycle of PIRLS came into alignment, providing the unique opportunity to combine the two studies and conduct an assessment of the two core curriculum subjects, reading and mathematics. In the Netherlands this additional project was called TIPI (**TI**MSS and **PI**RLS). For this additional project, that was conducted alongside the regular PIRLS and TIMSS survey, a sample of 50 schools was selected. For TIPI the same students were tested in reading literacy and in mathematics/science, providing us the opportunity to explore the differential relationships for reading and mathematics achievement with their predictors.

In the fourth study, we used PIRLS 2001, 2006 and 2011 data to answer the third question of how the trend in reading literacy achievement in the past decade can be explained from differential sociocultural and educational factors. Therefore, the trend in reading literacy achievement over three moments of measurement was related to a variety of student, home, class and school factors.

Finally, the last chapter presents general conclusions related to the role of sociocultural and linguistic factors in reading literacy achievement. Moreover, limitations on the present study and implications for the educational field will be discussed.

References

Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences*. Upper Saddle River, NJ: Pearson Education.

August, D., & Shanahan, T. (Eds.). (2006). *Developing literacy in second-language learners*. Mahwah, NJ: Lawrence Erlbaum Associates.

Aunola, K., Nurmi, J.E., Niemi, P., Lerkkanen, M.K., & Rasku-Puttonen, H. (2002). Developmental dynamics of achievement strategies, reading performance, and parental beliefs. *Reading Research Quarterly, 37*, 310-327.

Baker, L., & Scher, D. (2002). Beginning readers' motivation for reading in relation to parental beliefs and home reading experiences. *Reading Psychology, 23*, 239-269.

Boaler, J. (1997). Reclaiming school mathematics: The girls fight back. *Gender and Education*, *9*(3), 285-306.

Bracken, S.S., & Fischel, J.E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education & Development, 19*(1), 45-67.

Dagevos, J., Gijsberts, M., & Van Praag, C. (2003). *Rapportage minderheden 2003. Onderwijs, arbeid en sociaal-culturele integratie [Report Minorities 2003. Education, labour and social-cultural integration]*. Den Haag, The Netherlands: SCP.

Davidse, N.J., De Jong, M.T., Bus, A.G., Huijbregts, S.C.J., & Swaab, H. (2011). Cognitive and environmental predictors of early literacy skills. *Reading and Writing, 24*, 395-412.

De Jong, P.F., & Leseman, P.M. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology, 39*(5), 389-414.

Driessen, G., Van Der Silk, F., & Van Der Bot, K. (2002). Home language and language proficiency: A large-scale longitudinal study in Dutch primary schools. *Journal of Multilingual and Multicultural Development, 23*(3), 175-194.

Driessen, G., Van Langen, A., & Vierke, H. (2002). *Basisonderwijs: veldwerkverslag, leerlinggegevens en oudervragenlijsten, Basisrapportage PRIMA-cohortonderzoek. [Primary school: Fieldwork Report, student information, and parents' questionnaires, Basic report of PRIMA Cohort Study]*. Nijmegen, The Netherlands: ITS.

Dronkers, J. (2010). *Positieve maar ook negatieve effecten van etnische diversiteit in scholen op onderwijsprestaties? Een empirische toets met internationale PISA-data. [Positive but also negative effects of ethnic diversity in schools on educational achievement? An empirical test with cross-national PISA-data]*. Inaugural speech, June 17, 2010. Maastricht, Maastricht University, School of Business and Economics.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*, 78-103.

Education Inspectorate. (2008). *The state of education in the Netherlands 2006/2007*. Utrecht, The Netherlands: Author.

Entwisle, D.R., Alexander, K.L., & Olson, L.S. (2007). Early schooling: The handicap of being poor and male. *Sociology of Education, 80*(2), 114-138.

Foy, P., & Kennedy, A.M. (Eds.). (2008). *PIRLS 2006 user guide for the international database.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Guthrie, J.T., Coddington, C.S., & Wigfield, A. (2009). Profiles of motivation for reading among African American and Caucasian students. *Journal of Literacy Research, 41*, 317-353.

Guthrie, J.T., McRae, A., Coddington, C.S., Klauda, S.L., Wigfield, A., & Barbosa, P. (2009). Impacts of comprehensive reading instruction on diverse outcomes of low- and high-achieving readers. *Journal of Learning Disabilities, 42*(3), 195-214.

Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology, 49*(1), 4-14.

International Association for the Evaluation of Educational Achievement. (2001 - 2011). *PIRLS reading literacy test and questionnaires.* Chestnut Hill, MA: Boston College.

Joncas, M. (2007). PIRLS 2006 sample design. In M.O. Martin, I.V.S. Mullis, & A.M. Kennedy (Eds.), *PIRLS 2006 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Koda, K. (2007). Reading and language learning: Cross-linguistic constraints of second language reading development. *Language Learning, 57*, 1-44.

Luyten, H., & Ten Bruggencate, G. (2011). The presence of matthew effects in Dutch primary education, development of language skills over a six-year period. *Journal of Learning Disabilities, 44*(5), 444-458.

Ma, X. (2008). Within-school gender gaps in reading, mathematics, and science literacy. *Comparative Education Review, 52*(3), 437-460.

Marks, G.N. (2005). Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and Racial Studies, 28*(5), 925-946.

Marks, G.N. (2008). Accounting for the gender gaps in student performance in reading and mathematics: Evidence from 31 countries. *Oxford Review of Education, 34*(1), 89-109.

Marsh, H.W., Hau, K.T., Artelt, C., Baumert, J., & Peschar, J. (2006). OECD's brief self-report measure of educational psychology's most useful affective constructs: Cross-cultural, psychometric comparisons across 25 countries. *International Journal of Testing, 6*(4), 311-360.

Martin, M.O., Mullis, I.V.S., & Kennedy, A.M. (Eds.). (2007). *PIRLS 2006 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mensah, F.K., & Kiernan, K.E. (2010). Gender differences in educational attainment: Influences of the family environment. *British Educational Research Journal, 36*(2), 239-260.

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

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P (2007). *PIRLS 2011 international report.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I.V.S., Martin, M.O., Minnich, C.A., Drucker, K.T., & Ragan, M.A. (Eds.). (2012). *PIRLS 2011 encyclopedia. Education policy and curriculum in reading*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Pearson. (2012). *The Learning Curve*. London: Author.

Petscher, Y. (2010). A meta-analysis of the relationship between student attitudes towards reading and achievement in reading. *Journal of Research in Reading, 33*(4), 335-355.

Rauh, V.A., Parker, F.L., Garfinkel, R.S., Perry, J., & Andrews, H.F. (2003). Biological, social, and community influences on third-grade reading levels of minority head start children: A multilevel approach. *Journal of Community Psychology, 31*, 255-278.

Salisbury, J., Rees, G., & Gorard, S. (1999). Accounting for the differential attainment of boys and girls at school. *School leadership & Management, 19*(4), 403-426.

Scheerens, J. (1990). School effectiveness research and the development of process indicators of school functioning. *School Effectiveness and School Improvement, 1*, 61-80.

Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading, 10*(1), 59-87.

Serpell, R. (2001). Cultural dimensions of literacy promotion and schooling. In L. Verhoeven & C. Snow (Eds.), *Literacy and motivation: Reading engagement in individuals and groups* (pp. 243-273). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Sirin, S.R. (2005). Socio-economic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Snijders, T.A.B., & Bosker, R.J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling (2nd Edition).* London: Sage Publishers.

Spörer, N., Brunstein, J.C., & Kieschke, U. (2009). Improving students' reading comprehension skills: Effects of strategy instruction and reciprocal teaching. *Learning and Instruction, 19*, 272-286.

Thiel, O. (2012). Socio-economic diversity and mathematical competence. *European Early Childhood Education Research Journal, 29*(1), 61-81.

UNESCO Institute for Statistics. (1999). *Operational manual for ISCED 1997: International standard classification of Education*. Paris: Author.

Van Elsäcker, W. (2002). *Development of reading comprehension: The engagement perspective*. Enschede, The Netherlands: Feboprint.

Verhoeven, L., & Vermeer, A. (2006). Sociocultural variation in literacy achievement. *British Journal of Educational Studies, 54*(2), 189-211.

Verhoeven, M. (2011). Multiple embedded inequalities and cultural diversity in educational systems: A theoretical and empirical exploration. *European Educational Research Journal, 10*(2), 189-203.

Wigfield, A., & Eccles, J.S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68-81.

Chapter 2

Predictors of reading literacy in first and second language learners[1]

Abstract

In this study an attempt was made to construct a multi-factor model predicting the development of reading literacy in the upper grades of primary school in the Netherlands for subgroups of 729 first language (L1) learners and 93 second language (L2) learners. Following a longitudinal design, it was explored to what extent the variation in reading literacy development in L1 and L2 from grade 4 to grade 6 can be explained from children's word decoding, language, mathematics and nonverbal reasoning skills, reading motivation and self-confidence as well as their home reading resources. The results showed that L1 and L2 learners differed in reading literacy skills, language, mathematics, and reasoning skills. Structural equation modeling showed that the reading literacy development in both L1 and L2 learners could be explained from decoding, language, mathematics and reasoning skills, as well as their motivation and self-confidence. A striking difference was the fact that home reading resources had an impact on reading literacy in L1 learners but not in L2 learners.

[1]This chapter is based on:
Netten, A., Droop, M., & Verhoeven, L. (2011). Predictors of reading literacy for first and second language learners. *Reading and Writing: An Interdisciplinary Journal, 24*(4), 413-425.

Introduction

For a student to become a successful and productive adult in society, good reading skills are essential. To refer to the demands for literacy in today's society the term reading literacy was introduced as "the ability to understand and use those written language forms required by society and/or valued by the individual" (Mullis, Kennedy, Martin, & Sainsbury, 2006, p. 3). Reading literacy and the factors that are associated with that ability have been a topic for study for many researchers. The Simple View of Reading states that reading comprehension is a product of two components; decoding and linguistic comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990). Decoding is the ability to transform printed letter strings into a phonetic code (Perfetti, 1985). Linguistic comprehension is, according to Gough and Tunmer (1986) "the process by which given lexical information, sentences and discourses are interpreted" (p. 7). Although many researchers have tried to modify, complicate and refute this theory (Joshi & Aaron, 2000; Adlof, Catts, & Little, 2006), there seems to be a consensus that these components form the basis of reading comprehension abilities (Perfetti, Landi, & Oakhill, 2005). However, Joshi, Williams, and Wood (1998) found that although the components of the simple view of reading, decoding and language comprehension accounted for most of the variance in reading comprehension, IQ was also a significant predictor. Another related factor is mathematics. Reading literacy and mathematics involve similar cognitive demands which could explain the relationship that is observed between reading and mathematics in several studies (Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2005). Lundberg and Sterner (2005) found close to forty percent of shared variance between reading literacy achievement and mathematics.

Background characteristics may also contribute to the variance in reading literacy. It has indeed been found that parents contribute to the reading abilities of their children through various environmental factors, such as motivational factors, reading literacy activities, and reading attitudes (Tabors & Snow, 2001). Snow and Beals (2006) demonstrated that besides literacy activities, such as reading a book together with a child, even those natural interactions between parent and child that occur during day to day activities can contribute to children's literacy abilities. In a similar vein, De Jong and Leseman (2001) examined the impact of preschool home environment for later literacy development in primary school. They found that even after first grade word-decoding ability and reading comprehension were controlled

for, home measures remained to have an impact on third grade reading comprehension. Reading can thus be seen as an activity which benefits from practice, and it can be assumed that for many children a great deal of that practice takes place at home. A positive and reciprocal relationship between children's reading ability, the time they spent reading, and their reading motivation has indeed been found (Guthrie & Wigfield, 2000). Cox and Guthrie (2001) also made clear that, when other factors such as ability were controlled for, the amount of reading for enjoyment was predicted most highly by reading motivation. Another factor by which parents influence their children's reading achievement is academic self-confidence. Parents' positive beliefs and expectations about their children's abilities have a strong influence on their children's own beliefs about their academic abilities (Meece, Bower-Glienke, & Burg, 2006). Students who have positive experiences and believe that they will do well in school turn out to obtain better school results (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002).

An important factor in children's background is the language spoken at home. Several studies have shown that second language learners lag behind their first language peers in reading literacy skills (Droop & Verhoeven, 2003; Organisation for Economic Co-operation and Development [OECD], 2007; Mullis, Martin, Gonzales, & Kennedy, 2003; Mullis, Martin, Kennedy, & Foy, 2007; Van Der Veen, Van Der Meijden, & Ledoux, 2004). Second language students are often faced with the complex task of learning to read in a language they are not accustomed to speak before they enter primary education. Given that learning to read comes down to learning to connect the spoken form of a language with the printed form (Wang, Perfetti, & Liu, 2005), a problem for second language learners can be expected. Indeed, research has shown that problems with the spoken second language may have an impact on reading processes, especially in the domain of reading comprehension skills (Geva & Verhoeven, 2000; Verhoeven, 2000). Several studies have also shown that in case of a mismatch between children's language abilities and the language being used in the school curriculum the reading motivation and self-confidence of L2 learners may be threatened (Aarnoutse, Van Leeuwe, Voeten, & Oud, 2001; Guthrie, Coddington, & Wigfield, 2009). Besides linguistic factors, cognitive factors, such as mathematics and reasoning skills may also play a substantial role in the acculturation and reading acquisition of the L2 learner (Marks, 2005; Van Diepen, 2007).

To conclude, previous research has shown that differences in reading literacy

among both L1 and L2 learners can be accounted for by factors on the part of the child, such as word decoding, language, mathematics, general (nonverbal) cognitive skills, reading motivation, and self-confidence, as well as home factors, related to the quantity and quality of parental input. However, in most of the studies conducted so far a comparative explanatory model of differences in reading literacy for L1 vs L2 learners was generally lacking. Therefore, the present study followed a multi-factor approach to arrive at a general explaining model of the differences in reading literacy development among first and second language learners in the upper grades of primary education in the Netherlands. Following a longitudinal design, it was explored to what extent the variation in reading literacy development in L1 and L2 from grade 4 to grade 6 can be explained from children's word decoding, language, mathematics, and nonverbal reasoning skills, reading motivation, and self-confidence as well as their home reading resources. An attempt was made to find an answer to the following questions:

1. What are the differences between L1 and L2 learners in reading literacy, decoding, language, mathematics, and nonverbal reasoning skills, reading motivation and self-confidence, and home reading resources?
2. Can the reading literacy development of L1 and L2 learners to the same extent be explained from their decoding, language, mathematics, and nonverbal reasoning skills, reading motivation and self-confidence, and home reading resources?

Method

Participants

A representative sample of 822 children from 48 schools participated in the present study. These children form part of the so-called PRIMA study, a longitudinal cohort study on the learning of language, mathematics and reading abilities among students in elementary education in the Netherlands (Driessen, Van Lange, & Vierke, 2002). Seven hundred twenty-nine of the participants (340 boys, 389 girls) were first language learners with both parents born in the Netherlands, the remaining 93 students (54 boys, 39 girls) had parents originating from other countries (66% form Mediterranean countries, 20% from ex-colonies, 14% other countries) and were considered second language learners.

Materials

Reading Literacy. The level of reading literacy ability was assessed with the grade 4 and grade 6 versions of the standardized CITO Reading Comprehension Test (Staphorsius & Krom, 1998). This test consists of texts with multiple-choice questions which comprise a scale for reading literacy throughout the elementary grades. The tests for both the fourth and the sixth grade consist of three parts with 25 multiple choice questions each. The first module of the test was equal for all students, after which the score on the test determined whether the students took a difficult or an easier module in part two of the testing. The total number of correct answers was then transformed into a scaled achievement score, which ranges between 0 and 100.

Language Test. The test was designed to give an indication of the general proficiency level in Dutch. The test tested three types of linguistic skills: Morphological, Syntactical, and Semantic (ITS, 1994a). The students had to evaluate whether each of the 59 sentences in the test were correct or incorrect. The internal consistency of this task was good with a Cronbach's alpha of .77.

Decoding Test. Decoding skill was assessed using a standardized Dutch word-reading test, the Three Minutes Test (Verhoeven, 1995). Only Card 3 of the test was administered, which has less frequent polysyllabic words of increasing difficulty. The students were required to read as many words as possible out loud in one minute. The score was the total number of words read correctly. The internal consistency of this task was high with a Cronbach's alpha of .90.

Nonverbal Reasoning Test. Nonverbal Reasoning was measured using two subtests of a nonverbal intelligence test (ITS, 1994b): Composing Figures and Exclusion. Composing Figures involved 19 items requiring the child to identify the missing part of a figure out of four alternatives. Exclusion involved 15 items requiring the child to identify the deviant figure out of four alternatives. The internal consistency of this task was good with a Cronbach's alpha of .77.

Mathematics Test. The CITO Calculation and Mathematics Test contain 83 items concerned with numbers, measurement and time (Janssen, Kraemer, & Noteboom, 1995). The internal consistency of the task was high with a Cronbach's alpha of .89.

Reading Motivation. The scale consisted of eight items from the IEA Student Questionnaire (International Association for the Evaluation of Educational Achievement [IEA], 2001). The scale concerned the frequency of reading for fun outside school, reading stories, novels outside school, borrowing books from the library to read outside school, reading silently in school and the responses to the

following four statements: 'I only read if I have to' (reverse coded), 'I would be happy if someone gave me a book as a present'; 'I think reading is boring' (reverse coded), 'I enjoy reading'. The internal consistency of this task was good with a Cronbach's alpha of .77.

Academic Self-confidence. The scale consisted of five items taken from the PRIMA Questionnaire (Driessen et al., 2002): 'I perform generally well'; 'I am one of the best students in the class'; 'most of the children in my class perform better than I do' (reverse coded); 'my teacher thinks I perform well'; 'I don't need a lot of help at school'. The internal consistency of this task was good with a Cronbach's alpha of .75.

Home Reading Resources. The scale consisted of three items related to the number of books in the home, the presence of a computer and a newspaper in the home. The internal consistency of this task was high with a Cronbach's alpha of .91.

Procedure

All variables were collected in grade 4. Reading Literacy was again measured in grade 6. Trained master students administered the data. The test for word decoding was administered individually, all other tests were administered group-wise.

In order to address the first question, t-tests were conducted to test differences between predictor measures, and analysis of variance with repeated measures was undertaken to examine the development of reading literacy across grades.

To find an answer to the second question, a series of LISREL (Version VIII, Jöreskog & Sörbom, 1993) was conducted to explore the relations between the children's reading literacy and its predictors. An attempt was made to design a structural model with Nonverbal Reasoning and Home Reading Resources as background variables, Decoding, Language, Mathematics, Reading Motivation, and Academic Self-confidence as intermediate variables, and Reading Literacy in grade 4 and 6 as criterion variable. To determine whether the model predicts reading literacy results in grade 6 for both first and second language learners, and whether the strengths of the relationships between the entered variables are similar for the two subgroups, the model was tested using data for L1 and L2 learners, separately. The parameters of the model were estimated using a Maximum Likelihood procedure. The Goodness-of-fit of the proposed model was evaluated with five indicators, according to Hu and Bentler's (1999) criteria: the ratio of the chi-square value to the degrees of freedom (less than 3), the Goodness of Fit Index (GFI>.85), the Adjusted Goodness of Fit (AGFI>.90); Normed Fit Index (NFI>.90); Root Mean Square Error of Approximation (RMSEA<.08).

Results

Differences between L1 and L2 learners.

Table 1 presents the means and standard deviations of all measured variables for L1 and L2 learners. From t-test analyses, it was evidenced that the differences in mean scores on Nonverbal Reasoning (t (820) = -2,53, $p < .01$), Home Reading Resources (t (820) = -8,23, $p < .001$), Language (t (820) = 8,24, $p < .001$), and Mathematics (t (820) = -4,71, $p < .001$) were significant. In addition, analysis of variance on the Reading Literacy results with Grade (4 vs 6) and Group (L1 vs L2) as factors showed a significant effect for Group (F (1,820) = 46.06, $p < .001$) and Grade (F (1,820) = 1074.40, $p < .001$) with no significant interaction (F (1, 820) = .94, $p > .05$.

Table 1

Means and standard deviations on predictor and criterion variables for L1 and L2 learners

	L1 learners		L2 learners	
	M	*SD*	*M*	*SD*
Nonverbal Reasoning (max 34)	26.36	4.23	25.17	4.65
Home Reading Resources (max 2)	1.71	.23	1.50	.26
Decoding (max 116)	72.50	16.37	70.63	17.44
Language (max 1197,40)	1085.95	32.81	1062.49	28.28
Mathematics (max 131)	96.80	9.08	91.88	10.41
Reading Motivation (max 4)	1.96	.68	1.97	.67
Academic Self-confidence (max 5)	3.28	.71	3.29	.67
Reading Literacy grade 4 (max 100)	38.20	14.98	27.24	12.59
Reading Literacy grade 6 (max 100)	58.46	16.06	48.17	15.16

Structural relations for L1 and L2 learners

The preliminary analysis was to examine the correlations between the predictor and criterion variables for L1 and L2 learners, as shown in Table 2. The overall pattern looks quite similar for L1 and L2 learners. For both groups, a strong autocorrelation between Reading Literacy as measured in grades 4 and 6. A significant correlation was also found between Reading Literacy, on the one hand, and predictor measures, on the other hand, with the exception of Home Reading Resources which showed only a significant correlation in the group of L1 learners.

Table 2

Correlations between variables for L1 learners (upper row) and L2 learners (lower row)

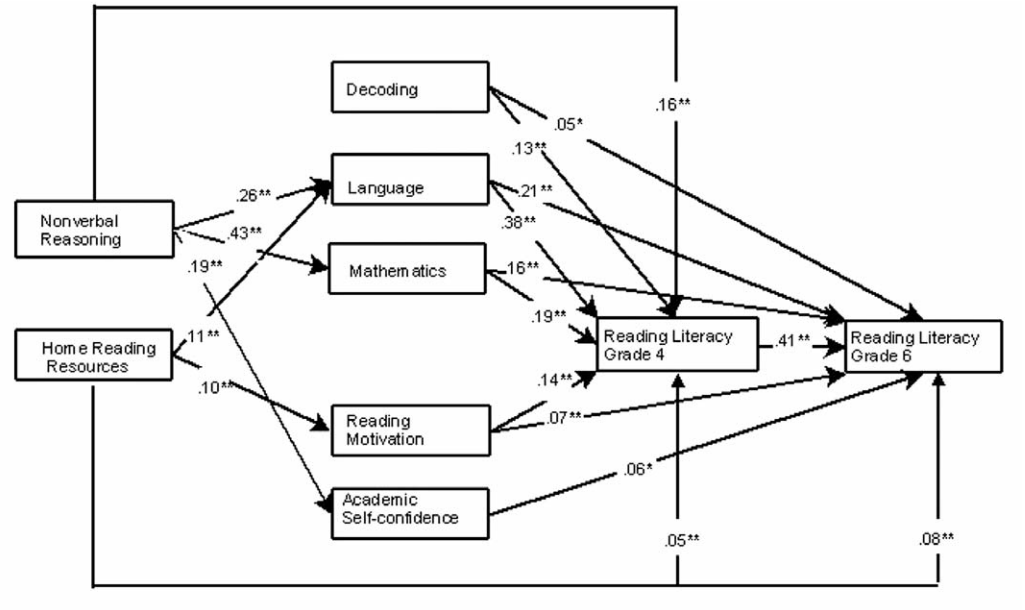
	Nonverbal Reasoning	Home read.	Decoding M	Language SD	Math.	Reading Motivation	Academic Self-confidence	Reading Literacy grade 4
Home Reading (max 34)	.20** -.01							
Decoding	.05 .16	.18** -.15						
Language	.30** .32**	.21** .00	.45** .29**					
Math.	.44** .43**	.19** -.09	.29** .33**	.46** .49**				
Reading Motivation	.09 -.03	.15** .11	.26** .21*	.30** .28**	.12** -.10			
Academic Self-confidence	.19** .23*	.12* -.16	.17** .08	.22** .13	.45** .42**	.08* .08		
Reading Literacy grade 4	.39** .50**	.25** .00	.41** .36**	.63** .61**	.51** .56**	.33** .29**	.27** .30**	
Reading Literacy grade 6	.38** .40**	.29* -.08	.41** .49**	.63** .56**	.55** .52**	.32** .29**	.32** .35**	.72** .74**

*Note. *p < .05. ** p < .01.*

To begin with, a structural model was constructed for L1 students entering all background and intermediate variables in the model (see Figure 1). The standardized regression weights are presented in the model. The fit of the model was good (Chi-square = 31,80, df = 8, *p* =.00, GFI = 0.99, AGFI = 0.95, NFI = 0.99, RMSEA = 0.063). The model explained 60% of the variance in Reading Literacy in grade 6 for the L1 students.

Figure 1

Structural model predicting reading literacy for L1 learners

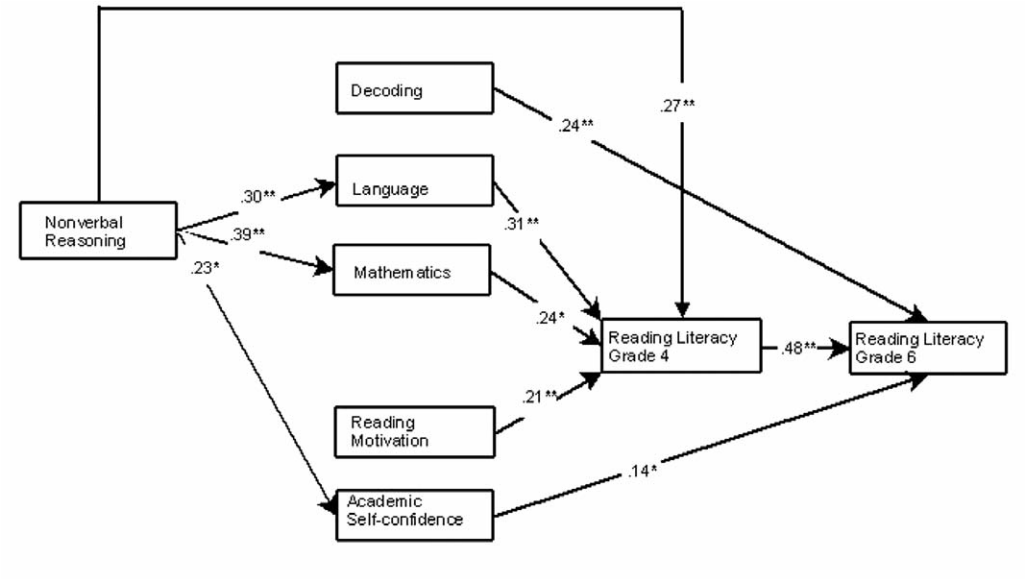


As expected the best predictor for Reading Literacy in grade 6 was Reading Literacy in grade 4. Language, Mathematics, and Decoding were strong to moderate predictors for explaining the development in Reading Literacy, whereas the predictive power of Reading Motivation and Academic Self-confidence was small but significant. Furthermore, Nonverbal Reasoning was found to predict Reading Literacy, as well as the intermediate variables of Language, Mathematics, and Academic Self-confidence. Home Reading Resources contributed significantly to the prediction of Reading Literacy and the intermediate variables of Language and reading Motivation.

Another structural model was constructed for L2 students, entering the same background, intermediate and criterion variables in the model. The result is presented in Figure 2.

Figure 2

Structural model predicting reading literacy for L2 learners



The fit of the model was good (Chi-square = 7.30, df = 8, *p* =.5, GFI = 0.98, AGFI = 0.91, NFI = 0.98, RMSEA = 0.0). The model explained 63% of the variance in Reading Literacy in grade 6 for the second language students.

Home Reading Resources did not predict any of the intermediate variables or criterion variables significantly, and is not shown in the model. It can be seen that Reading Literacy in grade 4, Decoding, and Academic Self-confidence were important predictors of Reading Literacy in grade 6 whereas Language, Mathematics, and Reading Motivation significantly predicted Reading Literacy in grade 4. Furthermore, Nonverbal Reasoning predicted Reading Literacy and the intermediate variables Language, Mathematics, and Academic Self-confidence.

Conclusions and discussion

From the present study several conclusions can be drawn. First of all, the data show that first and second language learners differ in language and reading comprehension scores in the upper grades of Dutch primary schools. This result is conforming with previous studies in the Netherlands (Verhoeven, 2000; Aarnoutse et al., 2001; Van Elsäcker, 2002; Droop & Verhoeven, 2003) and elsewhere

(Dugunoglu & Verhoeven,1998; Genesee, Lindholm-Leary, Saunders, & Christian, 2006; Koda, 2007). Significant differences were also found in mathematics and nonverbal reasoning skills. It can be assumed that problems in understanding school-based instruction in Dutch schools may have caused this arrear in nonverbal abilities (cf. Cummins, 2000). Another striking result is that the home reading resources of L2 learners were significantly less as compared to L1 learners. This result has been noted in other studies focusing on the home literacy environment of linguistically diverse groups of learners (De Jong & Leseman, 2001; Van Elsäcker, 2002; Van Diepen, 2007; Mullis et al., 2006).

Furthermore, our structural models show that the interrelationships between reading literacy, intermediate school-related abilities and motivations, and nonverbal reasoning skills are highly comparable. In both cases, more than 60 percent of the variance in reading literacy by the end of primary school could be explained. For both groups, a strong autoregressive relationship of reading comprehension in grades 4 and 6 was evidenced. This result confirms the outcome of earlier studies (e.g. Droop & Verhoeven, 2003; Van Elsäcker, 2002), along with a moderate prediction of decoding, language and mathematics, on the one hand, and reading motivation and academic self-confidence, on the other hand. The prediction of reading literacy from word decoding and language conforms with the simple view of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) which was also evidenced in other studies among L2 learners (Proctor, August, Carlo, & Snow, 2006; Gottardo & Mueller, 2009). The results show that students who have a positive reading motivation and high self-confidence in grade 4 show better reading literacy abilities in grade 6. These findings are consistent with the findings of previous research on the relationship between reading literacy and reading motivation (Aunola et al., 2002; Wigfield & Guthrie, 1997; Guthrie & Wigfield, 2000). Moreover, nonverbal reasoning showed to have a direct impact on reading literacy and its intermediate variables language, mathematics and self-confidence. This result is consistent with previous research which has demonstrated that intelligence is an important predictor for reading literacy (Brooks, Fulker, & DeFries, 1990; Tiu, Thompson, & Lewis, 2003), especially in the latter grades (Stanovich, Cunningham, & Feeman, 1984).

A striking difference in the two models concerned the role of home reading resources. Not only did we find a difference in the amount of resources available, but also in its predictive power. For L1 learners, home reading resources appeared

to have an impact on reading literacy and on children's language abilities and reading motivation. For the L2 learners, however, a relationship between home reading resources and criterion as well as predictor measures was generally lacking. It can tentatively be concluded that other factors, such as the sociocultural orientation and language use within immigrant families, may have suppressed the relationship between home reading resources and children's reading literacy skills. A similar conclusion was also arrived at in other studies focusing on the influence of home literacy environment on a child's reading abilities (Serpell, 2001; Dickinson & Tabors, 2002; Marks, 2005).

Of course, several limitations apply to the present study. First of all, the size of the group of second language students in our study was rather small. In order to be able to arrive at more definite answers to the question of differences in the literacy development of first and second language learners larger samples are needed. Moreover, our sample of L2 learners can be considered quite heterogeneous which makes it hard to generalize the results. This is especially the case for relationships between reading literacy and variables in the sociocultural domain (cf. Driessen, 2001). Furthermore, the operationalization of background variables can be improved in future studies by using observations instead of questionnaires. By introducing naturalistic variables in the domain of home reading resources the validity of outcomes can be enhanced (cf. Wasik, 2004).

The results of the present study show a considerable difference in reading literacy ability between first and second language learners at the end of primary school. Since school success relies partly on reading abilities, this difference has important consequences for society. When students enter primary school, or preferably even before that, the students at risk at falling behind should receive additional language instruction. Trying to prevent the gap from forming or at least to break the cycle as soon as possible. Lesaux and Siegel (2003) found in a longitudinal study that a model of early identification and intervention for second language students at risk of falling behind in grade 1 resulted in latter grades in an achievement level in reading and spelling comparable with their L1 peers. In the case of the Dutch second language students, a content-based approach could be followed with an intervention focused on vocabulary acquisition and oral language proficiency (Droop & Verhoeven, 2003). Although some research has claimed that the influence of decoding skills would be relatively more important in earlier grades and not at the end of primary education (Joshi et al., 1998), the present study

suggests that decoding skills remain important throughout primary education. This is in line with previous research showing that speed of single word reading accounts for a large amount of the variance in reading comprehension ability (Perfetti, 1985). Finally, continuity between home and school experiences can be seen as critical in the context of cultural and linguistic diversity (Dickinson & Tabors, 2002). School teams should give room to parental involvement in perspective of continuity of literacy experiences. It is by bridging the gap between literary socialization in the home and literacy education at school that the motivation, engagement, and participation of students in classroom instruction can be enhanced.

References

Aarnoutse, C., Van Leeuwe, J., Voeten, M., & Oud, H. (2001). Development of decoding, reading comprehension, vocabulary and spelling during the elementary school years. *Reading and Writing: An Interdisciplinary Journal, 14,* 61-89.

Adlof, S.M., Catts, H.W., & Little, T.D. (2006). Should the simple view of reading include a fluency component? *Reading and Writing: An Interdisciplinary Journal*, *19*, 933-958.

Aunola, K., Nurmi, J.E., Niemi, P., Lerkkanen, M.K., & Rasku-Puttonen, H. (2002). Developmental dynamics of achievement strategies, reading performance, and parental beliefs. *Reading Research Quarterly, 37*, 310-327.

Brooks, A., Fulker, D.W., & DeFries, J.C. (1990). Reading performance and general cognitive ability: A multivariate genetic analysis of twin data. *Personality and Individual Differences, 11*(2), 141-146.

Cox, K.E., & Guthrie, J.T. (2001). Motivational and cognitive contributions to students' amount of reading. *Contemporary Educational Psychology, 26*(1), 116-131.

Cummins, J. (2000). *Language, power, and pedagogy. Bilingual children in the crossfire*. Clevedon, England: Multilingual Matters.

De Jong, P.F., & Leseman, P.M. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology, 39*(5), 389-414.

Dickinson, D., & Tabors, P. (2002). Fostering language and literacy in classrooms and homes. *Young Children, 57*(2), 10-18.

Driessen, G. (2001). Ethnicity, forms of capital, and educational achievement. *International Review of Education, 47*(6), 513-538.

Driessen, G., Van Langen, A., & Vierke, H. (2002). *Basisonderwijs: veldwerkverslag, leerlinggegevens en oudervragenlijsten, Basisrapportage PRIMA-cohortonderzoek [Primary school: Fieldwork Report, student information, and parents' questionnaires, Basic report of PRIMA Cohort Study]*. Nijmegen, The Netherlands: ITS.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*, 78-103.

Genesee, F., Lindholm-Leary, K., Saunders, W., & Christian, D. (2006). *Educating English language learners: A synthesis of research evidence*. New York, NY: Cambridge University Press.

Geva, E., & Verhoeven, L. (2000). Basic processes in early second language reading. *Scientific Studies of Reading, 4*, 261-353 (Special issue).

Gottardo, A., & Mueller, J. (2009). Are first- and second-language factors related in predicting second-language reading comprehension? *Journal of Educational Psychology, 101,* 330-344.

Gough, P.B., & Tunmer, W.E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*, 6-10.

Guthrie, J.T., & Wigfield, A. (2000). Engagement and motivation in reading. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Volume 3*. Mahwah, NJ: Lawrence Erlbaum Associates.

Guthrie, J.T., Coddington, C.S., & Wigfield, A. (2009). Profiles of motivation for reading among African American and Caucasian students. *Journal of Literacy Research, 41*, 317-353.

Hoover, W.A., & Gough, P.B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127-160.

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.
International Association for the Evaluation of Educational Achievement (IEA). (2001). *PIRLS 2001 student questionnaire.* Chestnut Hill, MA: Boston College.
ITS. (1994a). *PRIMA taaltoets [PRIMA language test]*. Nijmegen, The Netherlands: Author.
ITS. (1994b). *Nonverbale intelligentie test: Bijgestelde versie van testreeksen groep 6 ontwikkeld door RION [Nonverbal intelligence test: Adapted from testing series grade 4 developed by RION]*. Nijmegen, The Netherlands: Author.
Janssen, J., Kraemer, J.M., & Noteboom, A. (1995). *CITO rekenen-wiskunde [CITO calculating and mathematics]*. Arnhem, The Netherlands: CITO.
Jöreskog, K., & Sörbom, D. (1993). *LISREL 8: Structural equation modelling with the SIMPLIS command language*. Hillsdale, NJ: Lawrence Erlbaum Associates.
Joshi, R.M., & Aaron, P.G. (2000). The component model of reading: Simple view of reading made a little more complex. *Reading Psychology, 21*, 85-97.
Joshi, R.M., Williams, K.A., & Wood, J.R. (1998). Predicting reading comprehension from listening comprehension: Is this the answer to the IQ debate? In C. Hulme & R.M. Joshi (Eds.), *Reading and spelling: Development and disorder*. Mahwah, NJ: Lawrence Erlbaum Associates.
Koda, K. (2007). Reading and language learning: Cross-linguistic constraints of second language reading development. *Language Learning, 57*, 1-44.
Lerkkanen, M.K., Rasku-Puttonen, H., Aunola, K., & Nurmi, J.E. (2005). Mathematical performance predicts progress in reading comprehension among 7-year olds. *European Journal of Psychology of Education, 20*(2), 121-138.
Lesaux, N.K., & Siegel, L.S. (2003). The development of reading in children who speak English as a second language. *Developmental Psychology, 39*, 1005-1019.
Lundberg, I., & Sterner, G. (2005). Reading, arithmetic, and task orientation. How are they related? *Annals of Dyslexia, 56*(2), 361-376.
Marks, G.N. (2005). Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and Racial Studies, 28*(5), 925-946.
Meece, J.L., Bower-Glienke, B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology, 44*, 351-373.
Mullis, I.V.S., Kennedy, A.M., Martin, M.O., & Sainsbury, M. (2006). *Assessment framework and specifications* (2nd ed.). Chestnut Hill, MA: Boston College.
Mullis, I.V.S., Martin, M.O., Gonzales, E.J., & Kennedy, A.M. (2003). *PIRLS 2001 international report. IEA's study of reading literacy achievement in primary school in 35 countries*. Boston, MA: International Study Center, Lynch School of Education, Boston College.
Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international Report.* Boston, MA: International Study Center, Lynch School of Education, Boston College.
Organisation for Economic Co-operation and Development (OECD). (2007). *PISA 2006 science competencies for tomorrow's world.* Paris, France: Author.
Perfetti, C.A. (1985). *Reading ability*. New York, NY: Oxford University Press.
Perfetti, C.A., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skill. In M.J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 227-247). Oxford, England: Basil Blackwell.
Proctor, C.P., August, D., Carlo, M.S., & Snow, C.E. (2006). The intriguing role of Spanish language vocabulary knowledge in predicting English reading comprehension. *Journal of Educational Psychology, 98*, 159-169.

Serpell, R. (2001). Cultural dimensions of literacy promotion and schooling. In L. Verhoeven & C. Snow (Eds.), *Literacy and motivation: Reading engagement in individuals and groups* (pp. 243-273). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Snow, C.E., & Beals, D.E. (2006). Mealtime talk that supports literacy development. *New Directions for Child and Adolescent Development, 111*, 51-66.

Stanovich, K., Cunningham, A., & Feeman, D.J. (1984). Intelligence, cognitive skills and early reading processes. *Reading Research Quarterly, 19*, 175-190.

Staphorsius, G., & Krom. R. (1998). *CITO toetsen begrijpend lezen* [CITO Reading Comprehension Tests]. Arnhem, The Netherlands: CITO.

Tabors, P., & Snow, C. (2001). Young bilingual children and early literacy development. In S. Neuman & D. Dickinson (Eds.), *Handbook of early literacy research* (pp. 159-178). New York, NY: Guilford Press.

Tiu, R.D., Thompson, L.A., & Lewis, B.A. (2003). The role of IQ in a component model of reading. *Journal of Learning Disabilities, 36*, 424-436.

Van Diepen, M. (2007). *Variation in reading literacy: A cross-national approach*. Nijmegen, The Netherlands: Radboud University.

Van Elsäcker, W. (2002). *Development of reading comprehension: The engagement perspective.* Enschede, The Netherlands: Feboprint.

Van der Veen, I., Van Der Meijden, A., & Ledoux, G. (2004). *School en klaskenmerken basisonderwijs. Basisrapportage PRIMA-cohortonderzoek. Vijfde meting 2002-2003*. [School and class characteristics in primary education: Report PRIMACohort study. Fifth measurement 2002-2003]. Amsterdam, The Netherlands: SCO.

Verhoeven, L. (1995). *Drie Minuten Toets* [Three Minutes Test]. Arnhem, The Netherlands: CITO.

Verhoeven, L. (2000). Components in early second language reading and spelling. *Scientific Studies of Reading, 4*(4), 313-330.

Wang, M., Perfetti, C.A., & Liu, Y. (2005). Chinese-English biliteracy acquisition: Cross-language and writing system transfer. *Cognition, 97*, 67-88.

Wasik, B.H (Eds.). (2004). *The handbook of family literacy*. Mahwah, NJ: Lawrence Erlbaum Associates.

Wigfield, A., & Guthrie, J.T. (1997). Relations of children's motivation for reading to the amount and breadth of their reading. *Journal of Educational Psychology*, 420-432.

Chapter 3

Role of sociocultural and linguistic diversity in reading literacy: a multilevel approach[2]

Abstract

This study examined how linguistic and sociocultural diversity have an impact on the reading literacy outcomes of a representative sample of 3549 first language (L1) and 208 second language (L2) fourth grade students in the Netherlands. A multilevel modeling analysis was conducted using PIRLS 2006 data to explore to what extent linguistic background, socioeconomic status (SES), home and school literacy environment and reading attitudes explain differences in reading literacy achievement. Significant differences between L1 and L2 students were found with regard to reading literacy achievement, SES and the home and school literacy environment. Multilevel modeling analysis showed 34.7% of explained variance in reading literacy achievement, whereby the student level accounts for most of the explained variance. In the final model, linguistic background, SES, home and school literacy environment and reading attitudes were found to have a significant effect on reading literacy achievement.

[2]This chapter is based on:
Netten, A., Luyten, H., Droop, M., & Verhoeven, L. (resubmitted). Role of linguistic and sociocultural diversity in reading literacy achievement: A multilevel approach.

Introduction

When it comes to the attainment of reading literacy, the particular sociolinguistic position of minority groups should be recognized (cf. August & Shanahan, 2006; Verhoeven, 2011). Ethnic minority groups are often confronted with the task of learning to read in the dominant language, which they usually learn as a second language. Previous studies showed consistent findings of lower reading literacy abilities for second language students (Kindler, 2002; OECD, 2007). Research to date has identified sociocultural factors that influence and explain the variation in reading achievement for both first (L1) and second (L2) language students (De Jong & Leseman, 2001; Lesaux, Lipka, & Siegel, 2006). However, most of the studies conducted, failed to take into account the hierarchical structure and interdependent nature of the data which an educational setting entails (Hox, 1998). In standard one-level analysis methods, the assumption is made that the data were obtained through a random one-stage sampling method, where all students in a given population have the same chance of being selected. However, most studies conduct multi-stage sampling methods, where first schools are selected at stage one and classes and students within these schools are selected at the next stages. The assumption of identically distributed and independent observations that a one-level analysis method requires, is often neglected in educational research (Muthén, 1991; Snijders & Bosker, 2012), which may result in inflated test statistics (Hox, 1998; Muthén, 1991; Snijders & Bosker, 2012).

Therefore, in the present study, multilevel modeling analysis was conducted to investigate the role of sociocultural factors - home and school socioeconomic status, home and school literacy environment and reading attitudes - in explaining the variation in reading literacy achievement of linguistically diverse groups in the Netherlands.

Home and school socioeconomic status

Factors related to the student's socioeconomic background, such as parental education, income and occupation, have an effect on reading literacy achievement (Marks, 2005; Sirin, 2005). It has indeed been found that Dutch children with high educated parents make more progress during elementary school than children of low educated and/or immigrant parents (Driessen, Van Der Silk, & Van Der Bot, 2002; Luyten & Ten Bruggencate, 2011). Stahl (1999) stated that three year old

children of high educated parents have a vocabulary that is five times the size of the vocabulary of children of low educated parents. This may in turn affect the attainment of reading ability in both L1 and L2 students (Rydland, Aukrust, & Fulland, 2012; Verhoeven & Van Leeuwe, 2008).

The school SES has an impact on children's literacy development, in addition to the home SES. Previous research states that school-related SES factors, such as the school location and population, predict children's reading literacy achievement (Portes & Macleod, 1996; Rauh, Parker, Garfinkel, Perry, & Andrews, 2003). Dronkers (2010) also found that a higher share of students with a migrant background at a school may hamper reading achievement of these students.

Literacy environment of the home and school

The literacy environment in both the family and the school are important factors that influence reading achievement (De Jong & Leseman, 2001; Tabors & Snow, 2001). Parents play an important role in creating a constructive reading environment, for instance through their attitude towards reading and the literacy activities they carry out with their child (Baker & Scher, 2002; Snow & Beals, 2006). The home literacy environment of L2 students has been a topic of investigation for various studies (Mullis, Martin, Kennedy, & Foy, 2007; Van Diepen, 2007; Van Elsäcker, 2002). Scheele, Leseman and Mayo (2010) showed that the amount of language learning activities at home differed between L1 and L2 students. The Turkish-Dutch and Moroccan-Dutch children in their study participated in less shared book reading and fewer oral language interactions in both L1 and L2 than the L1 Dutch students.

The literacy environment that surrounds a student is not limited to the home, but also comprises the student's neighbourhood, peer-group, school and class, which all have their own subculture of literacy and language practices and traditions (Serpell, 2001). The literacy environment in a class or school also plays an important factor in reading attainment. There is a relationship between the number of opportunities students receive to apply and improve their skills -by spending more time on reading in classrooms- and their reading achievement (Duke & Pearson, 2002; Sonnenschein, Stapleton, & Benson, 2010). Also the quality of the instructional approach influences ability outcomes (Guthrie, McRae, Coddington, Klauda, Wigfield, & Barbosa, 2009). Teaching reading strategies, such as making predictions, positively affect the students' reading literacy abilities (McKeown, Beck, & Blake, 2009; Spörer, Brunstein, & Kieschke, 2009; Van Keer, 2004).

Reading attitudes

Another important factor to consider is the student's reading attitude (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002; Cox & Guthrie, 2001; Guthrie, Wigfield, Humenick, Perencevich, Taboada, & Barbosa, 2006; Verhoeven & Snow, 2001). When students are motivated to read and consider themselves confident readers, they will in turn spend more time reading and hence improve their reading levels, as well as their vocabulary and knowledge of the world (Guthrie & Wigfield, 2000; Perfetti, Landi, & Oakhill, 2005; Taboada, Tonks, Wigfield, & Guthrie, 2009). Research shows aspects of motivation and self-confidence to be influenced by linguistic factors (Dörnyei, 2001). For instance, the difference between the home language and the language used in school may influence the motivation and self-confidence of L2 students (Aarnoutse, Van Leeuwe, Voeten, & Oud, 2001; Guthrie, Coddington, & Wigfield, 2009). In a similar vein, low expectations for future success could be a motivational explanation for the lower reading achievement of L2 students (Graham, Taylor, & Hudley, 1998; Taylor & Graham, 2007).

Problem statement

The focus of the present study will be on students with a Turkish or Moroccan ethnic background, which are the two largest ethnic minority groups in the school population in the Netherlands. These groups share characteristics of SES, migration history and sociocultural orientation and can be seen as highly comparable in these respects (Driessen, 2001). Many of the families mainly speak their native language in the home setting and the second and third generation of immigrant children enter primary education in the Netherlands with a limited knowledge of the Dutch language, which has an impact throughout their school career (Dagevos, Gijsberts, & Van Praag, 2003; Driessen & Dekkers, 2007; Verhoeven & Vermeer, 2006). Lower achievement scores in the majority language remain throughout the primary school years, despite various initiatives launched for enhancing language proficiency and school performance (Driessen & Dekkers, 2007; Ministry of Education, Culture, and Science, 2011).

A better understanding of the influence of sociocultural factors on the reading achievement of L1 and L2 students may help in creating interventions for enhancing reading ability. In order to identify those factors that would be eligible for interventions, we chose to divide the predictors into antecedent conditions and malleable factors. The antecedent conditions are those conditions that cannot be

influenced by the educational system, school or teacher. They are set conditions students enter primary education with, such as SES. Malleable factors are those factors that could be altered in order to get a better output and therefore can be a focus for programs aimed at improving reading achievement.

In the present study, the variation in reading literacy achievement of Dutch L1 students and Turkish-Dutch and Moroccan-Dutch L2 students was related to the home and school SES, home and school literacy environment and reading attitudes. Multilevel modeling analyses were conducted in order to find an answer to the following questions:

1. What are the differences between L1 and L2 students in reading literacy achievement, home and school socioeconomic status, home and school literacy environment and reading attitudes?
2. To what extent are home and school socioeconomic status, home and school literacy environment and reading attitudes related to the students' reading literacy achievement, and are these factors to the same extent related to the reading literacy abilities of L1 and L2 students?

Method

Participants

A representative sample of 3757 children from 207 classes in 139 schools in the Netherlands participated in the present study. The study was part of the Progress in International Reading Literacy Study (PIRLS) conducted by the International Association for the Evaluation of Educational Achievement (IEA, 2006), for which the Dutch data were collected by the first author of this article. All grade 4 classes and students in a school participated in the study. Of the 139 schools, 59.0% had one grade 4 class, 35.3% had two grade 4 classes and 5.8% had more than two grade 4 classes. The mean age of the participants was 10;3 years. To identify the groups of L1 and L2 students the question "Which language did you speak before you started school" from the student questionnaire was used. The students who answered yes for either Turkish or Moroccan (this can either be Moroccan-Arabic or Berber) were selected for the L2 group. Only those students who answered they spoke Dutch before they started school were selected in the L1 group. The group of L1 students consisted of 3549 students (49% boys and 51% girls), the remaining 208 students (55% boys and 45% girls) had a Turkish-Dutch (n = 123) or Moroccan-Dutch (n = 85) background and form the group of L2 students.

Variables

Students, parents, teachers and school principals answered questions concerning a variety of aspects regarding learning to read, such as home and school experiences, school and class characteristics, attitudes, and organization (International Association for the Evaluation of Educational Achievement, 2006). All scales that are mentioned below were derived from the PIRLS Questionnaires and constructed using a factor analysis by the IEA (Foy & Kennedy, 2008) and were confirmed using the Dutch data. Only scales with an internal consistency of Cronbach's alpha >.60, were seen as satisfactory and were used to conduct the analyses.

Reading Literacy achievement*.* The level of reading literacy achievement was assessed with the PIRLS Reading Literacy Test, α = .81 (Mullis, Kennedy, Martin, & Sainsbury, 2006, p. 306).

PIRLS Student Questionnaire. The students' *gender* was represented by a dummy variable: 0 = Boy, 1 = Girl. *Computer use at home and at school* was indicated by a four-point scale (4 = Every day or almost every day, 3 = Once or twice a week, 2 = Once or twice a month, 1 = Never or almost never).

Reading activities at home: The scale *(*α = .72) consisted of 12 items and concerned the frequency of reading comic books, stories or novels, books that explain things, magazines, newspapers, directions or instructions and the responses to the following statements: how often do you.. read aloud to someone at home; listen to someone at home reading to you; ..talk with your friends about what you are reading; talk with family about reading; read for fun outside of school; read to find out things you want to learn. The answers were given using a four-point scale (4 = Every day or almost every day, 3 = Once or twice a week, 2 = Once or twice a month, 1 = Never or almost never).

Reading activities at school: The scale *(*α = .64) consisted of nine items and concerned the responses to the following statements: how often does the teacher read aloud to the class; how often do you.. read aloud to the whole class; read aloud to a small group; read silently on your own; read books you choose yourself; answer questions in a workbook; write something about what you have read; answer questions aloud about what you have read; talk with other students about what you have read. The answers were given on a four-point scale (4 = Every day or almost every day, 3 = Once or twice a week, 2 = Once or twice a month, 1 = Never or almost never).

Reading attitude: The scale *(α* = .68) consisted of five items and concerned the responses to the following statements: I only read if I have to (reverse coded); I like talking about books with other people; I would be happy if someone gave me a book as a present; I think reading is boring (reverse coded); I enjoy reading. The answers were given using a four-point scale (4 = Agree a lot, 3 = Agree a little, 2 = Disagree a little, 1 = Disagree a lot).

Reading self-concept: The scale *(α* = .74) consisted of four items: reading is very easy for me; I do not read as well as other students in my class (reverse coded); when I'm reading by myself, I understand almost everything I read; I read slower than other students in my class (reverse coded). The answers were given using a four-point scale (4 = Agree a lot, 3 = Agree a little, 2 = Disagree a little, 1 = Disagree a lot).

Home Questionnaire. Home SES was measured with two variables: parents' education (ranging from 1 = Not been to school, to 3 = ISCED Level 2, to 8 = Beyond ISCED Level 5A, first degree) and parents' occupation (ranging from 1 = Never worked outside the home, to 6 = Trade worker and 11 = Technician). The parents indicated the *number of books in the home* on a five-point scale (1 = 0-10 books, 2 = 11-25 books, 3 = 26-100 books, 4 = 101-200 books, 5 = ≥ 200 books). The parents' responses to the question: In a typical week, how much time do you usually spend reading for yourself at home, were used to determine the variable *parents reading at home*. The answers were given using a four-point scale (1 = ≥ 1 hour a week, 2 = 1-5 hours a week, 3 = 6-10 hours a week, 4 = ≥10 hours a week).

Early literacy activities in the home: The scale *(α* = .73) consisted of seven items and reflects the parents' responses to the question how often they performed the following activities with their child before it began grade 1: reading books; telling stories; singing songs; playing with alphabet toys; playing word games; writing letters or words; reading aloud signs and labels. The answers were given using a three-point scale (1 = Never or almost never, 2 = Sometimes, 3 = Often).

Parents' attitudes toward reading: The scale *(α* = .84) consisted of five items: I read only if I have to (reverse coded); I like talking about books with other people; I like to spend my spare time reading; I read only if I need information (reverse coded); reading is an important activity in my home. The answers were given using a four-point scale (4 = Agree a lot, 3 = Agree a little, 2 = Disagree a little, 1 = Disagree a lot).

Teacher questionnaire. *Class size* and *reading strategies* were selected from the teacher questionnaire. The *reading strategies* scale *(α* = .80) consisted of the

following seven items, in which teachers were asked to indicate how often they ask their students to: identify the main ideas of what they have read; explain their understanding of what they have read; compare what they have read with their experiences; compare what they have read with other things they have read; make predictions; make generalizations; and describe the style or structure. The answers were given using a four-point scale (4 = Every day or almost every day; 3 = Once or twice a week; 2 = Once or twice a month; 1 = Never or almost never).

School questionnaire. School SES was measured with three variables from the school questionnaire: *school location* or city size (1 = Less that 3.000 people to 6 = More than 500.000 people), the *percentage economically disadvantaged students* (1 = 0-10%, 2 = 11-25%, 3 = 26-50%, 4 = ≥ 50%) and the *percentage L2 students* (1 = 0-10%, 2 = 11-25%, 3 = 26-50%, 4 = ≥ 50%).

Procedure

A stratified multi-stage cluster sampling design was used to select schools. Schools were stratified by urbanization level and 'average school weight' (indicator of the percentage students with low educated parents), and were selected by the PPS (probability proportionate to size) sampling technique at first stage. At the second stage all fourth grade classes and students were selected. Data collected in this manner have a hierarchical structure and are interdependent. A three-level modeling analysis was chosen to take into account the stratification and cluster effects and data dependence (Snijders & Bosker, 2012). The multilevel modeling analysis was conducted with MLWiN 2.0 software (Rasbash, Steele, Browne, & Prosser, 2005). In order to adequately estimate the population characteristics, sampling weights were assigned to each student, class and school. These weights adjusted for any stratification or disproportional sampling of the relevant subgroups and for any non-responses. We used the appropriate weights in the analyses, which ensures that the weighted sample corresponds to the actual sample size in a country (Foy & Kennedy, 2008).

Scale scores have been obtained using Item Response Theory, with an international mean of 500 (sd= 100). The individual student achievement scores are expressed in so called plausible values. There are five plausible values for reading literacy. For detailed information about this process see Martin, Mullis and Kennedy (2007). The analyses were conducted for each plausible value separately, after which the analyses were repeated for the other plausible values to make sure no significant differences were detected.

All four questionnaires had missing values due to non-response or incomplete answers. For the predictors derived from the student questionnaire, complete data were available for 88.7% of the students. Non-response was higher for the home questionnaire; complete data from this questionnaire were available for 68.0% of the students. For the teacher questionnaire data were obtained from 87.0% of the teachers. On the school questionnaire 83.5% of the schools provided complete data on the selected predictors. Multiple Imputation was chosen to handle the missing values in the dataset (Collins, Schafer, & Kam, 2001; Schafer, 1999). This procedure was executed using SAS software (SAS Institute, 2003).

Descriptive statistics, followed by Analyses of Variance (ANOVA), were carried out to investigate significant differences between the means of the L1 and L2 students on the predictors. To answer the second research question, a series of multilevel modeling analyses were conducted to explore the relations between reading literacy and its predictors. All predictors that were entered in the multilevel model were first divided into antecedent conditions and malleable factors. An overview of all the predictors is shown in Table 1.

Table 1

Mapping antecedent conditions and malleable factors

		Sociocultural factor	Predictor
Antecedent conditions	Student	Characteristics	Gender
			Linguistic background
		SES home	Education mother
			Education father
			Occupation mother
			Occupation father
		Literacy environment home	Early literacy activities in the home
			Parents' attitudes toward reading
			Parents' reading at home
			Number of books in the home
	School/class	SES school	School location
			Percentage economical disadvantaged students
			Percentage L2 students
Malleable factors	Student	Reading attitudes	Reading attitude
			Reading self-concept
		Literacy environment home	Reading activities outside school
			Computer use at home
	School/class	Literacy environment school	Reading activities at school
			Reading strategies
			Computer use at school
		SES school	Class size

The multilevel modeling analysis was conducted for all students with the first model (model 0), entailing the distribution of the total variance in reading literacy achievement across the school, class and student level. The antecedent student predictors were entered next (model 1), followed by the school antecedent predictors (model 2). The next model (model 3) also included the malleable student predictors and the final model (model 4) integrated all antecedent and malleable predictors of the student and school. Finally, in order to determine whether the strengths of the relationships between the entered predictors were similar for L1 and L2 students the interaction effects for the variable linguistic background, were examined.

Results

Research question 1: What are the differences between L1 and L2 learners in reading literacy achievement and socioeconomic status of the home and school, literacy environment of the home and school and reading attitudes?

Analyses of Variance were carried out to investigate differences between the groups of L1 and L2 students on the background predictors. Both the mother ($F(1, 3755) = 100.20$, $p < .000$) and the father ($F(1, 3755) = 74.76$, $p < .000$) of L1 students reported a higher educational level compared to the L2 parents. No significant differences between the groups of L1 and L2 were found with regard to the occupation of the mother ($F(1, 3755) = 1.20$, $p < .272$) and the father ($F(1, 3755) = .32$, $p < .569$).

The L2 students live in larger cities (school location; $F(1, 3755) = 128.1$, $p < .000$), and attend schools with a higher percentage low SES students ($F(1, 3755) = 486.59$, $p < .000$), as well as a higher percentage L2 students ($F(1, 3755) = 466.23$, $p < .000$). Also the average class size for the L1 and L2 students differed significantly ($F(1, 3755) = 84.1$, $p < .000$). L2 students are taught in smaller classes than the L1 students, because schools with large numbers of disadvantaged students (including L2) receive extra funding for staff.

The descriptive statistics and results of Analyses of Variance on the other predictors are presented in Table 2. It shows that L1 students performed significantly better on reading literacy. L1 students had significantly more books in the home; had parents with a more positive attitude toward reading, who read significantly more hours at home. The L2 students reported more reading activities in- and outside school and they used the computer more often at school than the L1 students. No significant differences were found on the other predictors.

Table 2

Means, Standard Deviations and Analyses of Variance

		L1 students	L2 students	*p*
Reading Literacy	*M*	554	510	.000
	SD	49.75	50.49	
Early literacy activities in the home (max 2)	*M*	1.35	1.32	.124
	SD	.34	.34	
Parents' attitudes toward reading (max 3)	*M*	2.26	1.98	.000
	SD	.69	.69	
Parents reading at home (max 3)	*M*	1.48	.84	.000
	SD	.88	.80	
Number of books in the home (max 4)	*M*	2.33	1.41	.000
	SD	1.29	1.25	
Reading attitude (max 3)	*M*	1.76	1.73	.641
	SD	.77	.73	
Reading self-concept (max 3)	*M*	2.20	2.27	.110
	SD	.69	.58	
Reading activities outside school	*M*	1.10	1.39	.000
	SD	.50	.55	
Computer use at home (max 4)	*M*	2.38	2.42	.529
	SD	.82	.91	
Reading activities at school	*M*	1.31	1.55	.000
	SD	.44	.49	
Reading strategies (max 3)	*M*	1.59	1.63	.238
	SD	.43	.43	
Computer use at school (max 4)	*M*	1.55	1.70	.012
	SD	.87	.79	

Research question 2: To what extent are socioeconomic status of the home and school, literacy environment of the home and school and reading attitudes related to the students' reading literacy achievement, and are these factors to the same extent related to the reading literacy abilities of L1 and L2 learners?

In order to answer research question 2 multilevel modeling analyses were performed estimating a sequence of five models. Three-level modeling was used for the so-called zero model (without any predictors), with schools at the highest level. The model showed that most of the variance was situated at the student level (83.9%), but there was also a considerable amount of class-level variance (16.1%). The percentage of school-level variance was non-existing (0.1%), this suggested that the differences between Dutch schools are small. In model 1 the antecedent student predictors were entered. These predictors explained 20.1% of the total variance. When the antecedent school/class predictors were included (model 2) the total amount of explained variance rose to 21.1%. Model 3 also included the malleable student predictors and explained 34.3%. When the malleable school/class predictors were included (model 4) the amount of variance explained hardly increased, the gain was only 0.4%.

The results of the analyses are shown in Table 3. The effects indicate to what extent reading literacy achievement increases or decreases proportionally in relation to one variable, while controlling for the effects of the other predictors, entered in the model.

The first model showed that seven predictors had a significant effect on reading literacy achievement. Linguistic background had the strongest effect. Gender was also a significant predictor in model 1, with girls outperforming boys. The educational level of the mother and the father as well as the occupation of the mother had a significant effect. Also early literacy activities that were carried out by the parents before grade 1 and the parents' attitudes towards reading had a positive effect on reading literacy achievement.

When the antecedent school predictors were added in Model 2, only the percentage L2 students in a school had a significant effect. The effect was negative, so reading achievement of students in a school decrease, when more L2 students attend that school.

As for the malleable student predictors that were entered in Model 3, reading attitude and reading self-concept were found to be important predictors for reading literacy.

Table 3

Multilevel modeling analysis addressing the impact of predictors on student achievement (n=3757). Fixed effects (standard errors in brackets)

	Model 0		Model 1		Model 2		Model 3		Model 4	
β	550.262	(1.851)	460.912	(5.589)	465.851	(5.742)	417.470	(6.947)	417.692	(9.570)
Linguistic background (1 = Dutch)			**30.345**	(3.517)	**27.407**	(3.545)	**29.295**	(3.145)	**28.393**	(3.383)
Gender (1=girl)			**5.770**	(1.719)	**5.748**	(1.707)	-0.131	(1.551)	-0.182	(1.546)
Education mother			**5.295**	(0.584)	**5.105**	(0.583)	**5.272**	(0.522)	**5.274**	(0.518)
Education father			**3.714**	(0.627)	**3.643**	(0.632)	**2.229**	(0.588)	**2.080**	(0583)
Occupation mother			**-0.556**	(0.240)	**-0.503**	(0.240)	-0.414	(0.233)	**-0.459**	(0.229)
Occupation father			0.329	(0.318)	0.357	(0.317)	0.578	(0.297)	0.575	(0.294)
Early literacy activities home			**14.361**	(2.967)	**14.683**	(2.958)	**8.434**	(2.697)	**8.849**	(2.693)
Parents' attitudes to reading			**6.578**	(1.555)	**6.451**	(1.534)	**2.881**	(1.364)	**2.945**	(1.370)
Parents reading at home			-0.501	(1.096)	-0.484	(1.093)	0.615	(0.976)	0.587	(0.967)
Number of books in the home			0.453	(0.853)	0.317	(0.853)	-0.024	(0.712)	-0.173	(0.713)
School location					0.267	(1.004)	-0.287	(0.940)	-0.435	(0.974)
% economical disadvant. stud.					-0.513	(1.926)	-0.126	(1.813)	0.130	(1.756)
% L2 students					**-5.586**	(1.916)	**-6.044**	(1.879)	**-5.717**	(1.841)
Reading attitude							**12.650**	(1.117)	**12.734**	(1.132)
Reading self-concept							**22.381**	(1.448)	**22.138**	(1.433)
Reading activities outside sch.							-1.174	(1.493)	0.948	(1.586)
Computer use at home							-0.856	(0.902)	-0.718	(0.939)
Reading activities at school									**-5.696**	(1.747)
Reading strategies teacher									0.089	(2.110)
Class size									0.326	(0.257)
Computer use at school									-1.187	(1.299)
Variance components										
Explained (%)			20.1		21.1		34.3		34.7	

In Model 3, gender no longer had a significant effect; after controlling for reading attitudes and self-concept, the differences between boys and girls were no longer significant.

In the final model the malleable school/class predictors were entered. Only reading activities at school contributed significantly to the prediction of reading literacy. The more reading activities took place at school as described by the student, the lower the reading achievement.

To conclude, in the final model, ten of the entered predictors had a significant effect: linguistic background, education mother and father, occupation mother, early literacy activities at home, parents' attitudes towards reading, percentage L2 students, reading attitude, reading self-concept and reading activities at school.

The analyses that were conducted to examine the differences between L1 and L2 students showed that linguistic background explained 5.34% of the variance in reading literacy (see Table 4). The interaction effects were examined in order to determine whether the strength of the relationships between the entered predictors is similar for L1 and L2 students. Although the effect sizes for some of the predictors were large, no significant interaction effects were found. This indicated that the extent of the effects of the predictors included in the model did not differ for L1 and L2 students.

Table 4

Multilevel modeling analysis addressing the differences between L1 and L2 students (n=3757)

Variance components		Model linguistic background
School-level variance	0.1%	0.1%
Class-level variance	16.1%	12.6%
Student-level variance	83.9%	81.9%
Explained (%)		5.34%

Conclusions and discussion

The present study confirms previous findings that L1 students outperform L2 students regarding their reading literacy achievement in the Netherlands (Aarnoutse et al., 2001; Droop & Verhoeven, 2003; Van Elsäcker, 2002; Verhoeven, 2000). This result can lead us to the assumption that the limited Dutch language proficiency this group enters primary education with, has a continuing effect throughout their education (Dagevos et al., 2003; Driessen & Dekkers, 2007).

In response to the first research question - What are the differences between L1 and L2 learners in reading literacy achievement and socioeconomic status of the home and school, literacy environment of the home and school and reading attitudes - the results show significant differences between L1 and L2 students regarding the lower level of education, which is in line with previous research (Ministry of Education, Culture, and Science, 2011; Tesser & Dronkers, 2007). The home and school literacy environment were also found to differ between the groups of L1 and L2 students, with first language students reporting more home reading resources and a more positive home reading environment, confirming the outcome of earlier studies (De Jong & Leseman, 2001; Scheele et al., 2010). There were no differences found between the subgroups on reading attitudes, telling us that the motivation to read and self-confidence about their own reading abilities can be considered the same for L1 and L2 students.

In response to the first part of the second research question - To what extent are socioeconomic status of the home and school, literacy environment of the home and school and reading attitudes related to the students' reading literacy achievement - the results show that there are strong links between the predictors and reading literacy achievement; the full model explained more than one-third of the variance in reading literacy. Most of the variance was situated at the student level and almost 16% of the variance was situated at class level. The percentage at the school level was extremely small, suggesting that differences between Dutch schools are quite minimal. In the final model, linguistic background, various aspects of home and school SES, home and school literacy environment and reading attitudes made significant contributions to the prediction of students' reading literacy achievement. The influence of SES on reading ability of students is evident in previous research (Driessen et al., 2002; Verhoeven & Vermeer, 2006). Our findings are consistent with Marks' (2005) conclusion that L2 students' weaker performance is largely due to SES factors, but that these SES factors cannot explain all of the variance. It was also found that the percentage of L2 students in a school influenced the reading literacy abilities of students, which is consistent with previous studies indicating the influence of school population on individual achievement (Portes & Macleod, 1996; Rauh et al., 2003).

Home and school literacy environment have significant effects on students' reading literacy achievement, as has been found in previous research (Baker & Scher, 2002; Christian, Morrison, & Bryant, 1998; De Jong & Leseman, 2001; Tabors

& Snow, 2001; Van Diepen, 2007). The reading achievement decreases with an increase in the number of reading activities in a class. An explanation for this result could be that teachers spent more time on reading activities in a class where the majority of the students experience difficulties with reading. The current findings are also in accordance with research on the relationship between reading achievement and reading attitudes (Aunola et al., 2002; Guthrie & Wigfield, 2000) showing that students who are highly motivated to read and perceive themselves as being good readers have better reading abilities (Perfetti et al., 2005; Taboada et al., 2009).

In order to determine whether the strengths of the relationships between the entered factors are similar for the two subgroups of L1 and L2 students, and to answer the second part of the second research question - are these factors to the same extent related to the reading literacy abilities of L1 and L2 learners - the interaction effects were examined. The present study did not show any significant differences in effect between the groups of L1 and L2 students. This is an interesting outcome and in contrast to previous research (Van Elsäcker, 2002). It suggests that the relationships between the sociocultural factors, used in the model, and reading literacy abilities, are the same for L1 and L2 students. For instance, a positive literacy environment is of equal importance for the group of L1 and L2 students with regard to their reading literacy skills. Of course we have to take into account that the group size of L2 students in this study was rather small. In order to confirm the outcome, further research should include a larger sample size of students.

Several other limitations apply to the present study. Although this study sheds light on the sociocultural factors that influence reading literacy achievement at grade 4, the cross-sectional data does not allow for causal inference, and merely tells something about a single point in time, therefore a longitudinal study should be conducted (Lesaux, Siegel, & Rupp, 2007). Additionally, as not all ethnic minorities in the Netherlands can be seen as a homogeneous group with respect to their history, economic circumstances and predictors in the sociocultural domain, the results of the present study should not be generalized to all ethnic minority groups (Driessen, 2001).

These limitations notwithstanding, the present study contributes insights about the sociocultural factors influencing both L1 and L2 students' reading ability and allows us to make assumptions about the implications for students, lagging behind in reading ability. In order to identify those factors that would be eligible for interventions, we chose to divide the predictors into antecedent conditions and malleable factors. A

malleable factor that had a positive effect on reading achievement was the students' literacy environment. Early interventions should start before the children enter primary education (Dickinson & Porche, 2011; Lesaux & Siegel, 2003), and aim at improving language skills, focusing on vocabulary stimulation through the literacy environment offered in the home and daycare, playgroup or kindergarten. By educating kindergarten and preschool teachers about the importance of early literacy activities and making them aware of their own practices, the quality of support they provide for children's language and literacy development can be improved (Dickinson & Caswell, 2007; Dickinson & Porche, 2011).

Further policy recommendations that can be derived from the present study relate to the students' reading attitudes. Guthrie, Coddington, and Wigfield (2009) stated that groups of students who experience diverse cultural, social, and academic environments may vary in distinctive motivations and motivational profiles. While the current study found reading attitudes to be of importance for both L1 and L2 students, this should be addressed and given their own attention and intervention implications. In order to motivate the specific subgroups of students, initiatives should take into account the sociocultural environment and build stronger relations between neighborhood and school.

References

Aarnoutse, C., Van Leeuwe, J., Voeten, M., & Oud, H. (2001). Development of decoding, reading comprehension, vocabulary and spelling during the elementary school years. *Reading and Writing: An Interdisciplinary Journal, 14*(1-2), 61-89.

August, D., & Shanahan, T. (Eds.). (2006). *Developing literacy in second-language learners*. Mahwah, NJ: Lawrence Erlbaum Associates.

Aunola, K., Nurmi, J.E., Niemi, P., Lerkkanen, M.K., & Rasku-Puttonen, H. (2002). Developmental dynamics of achievement strategies, reading performance, and parental beliefs. *Reading Research Quarterly, 37*(3), 310-327.

Baker, L., & Scher, D. (2002). Beginning readers' motivation for reading in relation to parental beliefs and home reading experiences. *Reading Psychology, 23*(4), 239-269.

Collins, L.M., Schafer, J.L., & Kam, C.M. (2001). A comparison of inclusive and restrictive strategies in modern missing data procedures. *Psychological Methods, 6*(4), 330-351.

Cox, K.E., & Guthrie, J.T. (2001). Motivational and cognitive contributions to students' amount of reading. *Contemporary Educational Psychology, 26*(1), 116-131.

Christian, K., Morrison, F., & Bryant, F.B. (1998). Predicting kindergarten academic skills: Interactions among child care, maternal education, and family literacy environments. *Early Childhood Research Quarterly, 13*(3), 501-521.

De Jong, P.F., & Leseman, P.M. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology, 39*(5), 389-414.

Dagevos, J., Gijsberts, M., & Van Praag, C. (2003). *Rapportage minderheden 2003. Onderwijs, arbeid en sociaalculturele integratie [Report Minorities 2003. Education, labour and social-cultural integration]*. Den Haag, The Netherlands: SCP.

Dickinson, D.K., & Caswell, L. (2007). Building support for language and early literacy in preschool classrooms through in-service professional development: Effects of the Literacy Environment Enrichment Program (LEEP). *Early Childhood Research Quarterly, 22*, 243-260.

Dickinson, D.K., & Porche, M.V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development, 82*(3), 870-886.

Dörnyei, Z. (2001). New themes and approaches in second language motivation research. *Annual Review of Applied Linguistics*, *21*, 43-59.

Driessen, G. (2001). Ethnicity, forms of capital, and educational achievement. *International Review of Education, 47*(6), 513-538.

Driessen, G., & Dekkers, H. (2007). Inequality: Educational theory and public policy. In R. Teese., S. Lamb & Duru-Bellat (Eds.), *International studies in educational inequality, theory and policy volume 3* (pp. 257-274).

Driessen, G., Van Der Silk, F., & Van Der Bot, K. (2002). Home language and language proficiency: A largescale longitudinal study in Dutch primary schools. *Journal of Multilingual and Multicultural Development, 23*(3), 175-194.

Dronkers, J. (2010). *Positieve maar ook negatieve effecten van etnische diversiteit in scholen op onderwijsprestaties? Een empirische toets met internationale PISA-data [Positive but also negative effects of ethnic diversity in schools on educational achievement? An empirical test with cross-national PISA-data]*. Inaugural speech, June 17, 2010. Maastricht, Maastricht University, School of Business and Economics.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*(1), 78-103.

Duke, N. K., & Pearson, D. (2002). Effective practices for developing reading comprehension. In A. E. Farstrup & S. J. Samuels (Eds.), *What research has to say about reading instruction,* 205-242. Newark, DE: International Reading Association.

Foy, P., & Kennedy, M. (2008). *PIRLS 2006 user guide for the international database*. Boston, MA: International Study Center, Lynch School of Education, Boston College.

Graham, S., Taylor, A.Z., & Hudley, C. (1998). Exploring achievement values among ethnic minority early adolescents. *Journal of Educational Psychology, 90*(4), 606-620.

Guthrie, J.T., Coddington, C.S., & Wigfield, A. (2009). Profiles of motivation for reading among African American and Caucasian students. *Journal of Literacy Research, 41*(3)*,* 317-353.

Guthrie, J.T., McRae, A., Coddington, C.S., Klauda, S.L., Wigfield, A., & Barbosa, P. (2009). Impacts of comprehensive reading instruction on diverse outcomes of low- and high-achieving readers. *Journal of Learning Disabilities, 42*(3), 195-214.

Guthrie, J.T., & Wigfield, A. (2000). Engagement and motivation in reading. In M.L. Kamil, B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Volume 3*. Mahwah, NJ: Lawrence Erlbaum Associates.

Guthrie, J.T., Wigfield, A., Humenick, N.M., Perencevich, K.C., Taboada, A., & Barbosa, P. (2006). Influences of stimulating tasks on reading motivation and comprehension. *Journal of Educational Research, 99*(4), 232-245.

Hox, J. (1998). Multilevel modeling: When and why. In I. Balderjahn, R. Mathar & M. Schader (Eds.), *Classification, data analysis, and data highways* (pp. 147-154). Springer Verlag: New York.

International Association for the Evaluation of Educational Achievement (IEA). (2006). *PIRLS 2006.* Chestnut Hill, MA: Boston College.

Kindler, A.L. (2002). *Survey of the states' limited English proficient students and available educational programs and services, 2000-2001, summary report*. Washington, DC: National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs.

Lesaux, N.K., Lipka, O., & Siegel, L.S. (2006). Investigating cognitive and linguistic abilities that influence reading comprehension skills of children from diverse linguistic backgrounds. *Reading and Writing: An Interdisciplinary Journal, 19*(1)*,* 99-131.

Lesaux, N.K., & Siegel, L.S. (2003). The development of reading in children who speak English as a second language. *Developmental Psychology, 39*(6), 1005-1019.

Lesaux, N.K., Siegel, L.S., & Rupp, A.A. (2007). Growth in reading skills of children from diverse linguistic backgrounds: Findings from a 5-year longitudinal study. *Journal of Educational Psychology, 99*(4), 821-834.

Luyten, H., & Ten Bruggencate, G. (2011). The presence of Matthew effects in Dutch primary education, development of language skills over a six-year period. *Journal of Learning Disabilities, 44*(5), 444-458.

Marks, G.N. (2005). Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and Racial Studies, 28*(5), 925-946.

Martin, M.O., Mullis, I.V.S., & Kennedy, A.M. (2007). *PIRLS 2006 technical report*. Chestnut Hill, MA: Boston College.

McKeown, M.G., Beck, I.L., & Blake, R.G.K. (2009). Rethinking reading comprehension instruction: A comparison of instruction for strategies and content approaches. *Reading Research Quarterly, 44*(3),218-253.

Ministry of Education, Culture, and Science. (2011). *Trends in Beeld [Trend Images]*. The Hague. Retrieved January 4, 2011, from http://www.trendsinbeeld.minocw.nl/TrendsInBeeld_2011.pdf

Mullis, I.V.S., Kennedy, A.M., Martin, M.O., & Sainsbury, M. (2006). *Assessment framework and specifications* (2nd ed.). Chestnut Hill, MA: Boston College.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report.* Boston, MA: International Study Center, Lynch School of Education, Boston College.

Muthén, B. (1991). Multilevel factor analysis of class and student achievement components. *Journal of Educational Measurement, 28*(4)*,* 338-354.

Organisation for Economic Co-operation and Development (OECD). (2007). *PISA 2006 science competencies for tomorrow's world.* Paris, France: Author.

Perfetti, C.A., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skill. In M.J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 227-247). Oxford, England: BasilBlackwell.

Portes, A., & Macleod, D. (1996). Educational progress of children of immigrants: The roles of class, ethnicity, and school context. *Sociology of Education, 69*(4), 255-275.

Rasbash, J., Steele, F.D., Browne, W., & Prosser, B. (2005). *A user's guide to MLwiN, Version 2.0.* Bristol: Centre for Multilevel Modelling, University of Bristol.

Rauh, V. A., Parker, F. L., Garfinkel, R. S., Perry, J. & Andrews, H. F. (2003). Biological, social, and community influences on third-grade reading levels of minority head start children: A multilevel approach. *Journal of Community Psychology, 31*(3)*,* 255-278.

Rydland, V., Aukrust, V., & Fulland, H. (2012). How word decoding, vocabulary and prior topic knowledge predict reading comprehension. A study of language-minority students in Norwegian fifth grade classrooms. *Reading and Writing: An Interdisciplinary Journal, 25*(2), 465-482.

SAS Institute. (2003). SAS/STAT Software: Reference (Version 9.1)[Computer software]. Cary, NC: Author.

Schafer, J.L. (1999). Multiple Imputation; a primer. *Statistical Methods in Medical Research, 8*(1)*,* 3-15.

Scheele, A., Leseman, P.M., & Mayo, A.Y. (2010). The home language environment of monolingual and bilingual children and their language proficiency. *Applied Psycholinguistics*, *31*(1), 117-140.

Serpell, R. (2001). Cultural dimensions of literacy promotion and schooling. In L. Verhoeven & C. Snow (Eds.), *Literacy and motivation: Reading engagement in individuals and groups* (pp. 243-273). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Sirin, S.R. (2005). Socio-economic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Snijders, T.A.B., & Bosker, R.J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling (2nd Edition).* London: Sage Publishers.

Snow, C.E., & Beals, D.E. (2006). Mealtime talk that supports literacy development. *New Directions for Child and Adolescent Development, 111*, 51-66.

Sonnenschein, S., Stapleton, M.L., & Benson, A. (2010). The relation between the type and amount of instruction and growth in children's reading competencies. *American Educational Research Journal, 47*(2), 358-389.

Spörer, N., Brunstein, J.C., & Kieschke, U. (2009). Improving students' reading comprehension skills: Effects of strategy instruction and reciprocal teaching. *Learning and Instruction, 19*(3), 272-286.

Stahl, S.A. (1999). *Vocabulary Development*. Cambridge/MA: Brookline Books.

Taboada, A., Tonks, S.M., Wigfield, A., & Guthrie, J.T. (2009). Effects of motivational and cognitive variables on reading comprehension. *Reading and Writing: An Interdisciplinary Journal, 22*(1), 85-106.

Tabors, P., & Snow, C. (2001). Young bilingual children and early literacy development. In S. Neuman & D. Dickinson (Eds.), *Handbook of early literacy research* (pp. 159-178). New York, NY: Guilford Press.

Taylor, A.Z., & Graham, S. (2007). An examination of the relationship between achievement values and perceptions of barriers among low-SES African American and Latino students. *Journal of Educational Psychology, 99*(1), 52-64.

Tesser, P., & Dronkers, J. (2007). Equal opportunities or social closure in the Netherlands? *Proceedings of the British Academy, 137*, 359-401.

Van Diepen, M. (2007). *Variation in reading literacy: A cross-national approach*. Nijmegen, The Netherlands: Radboud University.

Van Elsäcker, W. (2002). *Development of reading comprehension: The engagement perspective.* Enschede, The Netherlands: Feboprint.

Van Keer, H. (2004). Fostering reading comprehension in fifth grade by explicit instruction in reading strategies and peer tutoring. *British Journal of Educational Psychology, 74*(1), 37-70.

Verhoeven, L. (2000). Components in early second language reading and spelling. *Scientific Studies of Reading, 4*(4), 313-330.

Verhoeven, L., & Snow, C. (2001). *Literacy and motivation: Reading engagement in individuals and groups*. London: Lawrence Erlbaum Associates, Publishers.

Verhoeven, L., & Van Leeuwe, J. (2008). Prediction of the development of reading comprehension: A longitudinal study. *Applied Cognitive Psychology, 22*(3), 407-423.

Verhoeven, L., & Vermeer, A. (2006). Sociocultural variation in literacy achievement. *British Journal of Educational Studies, 54*(2), 189-211.

Verhoeven, M. (2011). Multiple embedded inequalities and cultural diversity in educational systems: A theoretical and empirical exploration. *European Educational Research Journal, 10*(2), 189-203.

Chapter 4

Differential predictors of reading literacy and mathematics achievement[3]

Abstract

In this study, the relationship between reading literacy and mathematics achievement and the differential relationships of student characteristics, parental support, student engagement, school and teacher characteristics and educational practices with these subjects, were examined. Multilevel modeling analyses were conducted, using data from a combined PIRLS and TIMSS 2011 study. In line with previous research the results showed a strong relationship between reading and mathematics achievement. In the comparative model five factors were found to have an effect on both reading and mathematics achievement; the student's age when starting first grade, parental involvement, the expectations of the parents regarding the education attainment level of their child, school enjoyment and the student's self-concept. For self-concept, however, the effect was much stronger for mathematics than for reading. The study confirmed the importance of early literacy activities at home for reading achievement, while no relation between early numeracy activities and mathematics achievement was found. Also, socioeconomic status was found to be a predictor of reading achievement, but not for mathematics achievement.

[3] This chapter is based on:
Netten, A., Meelissen, M., Drent, M., Droop, M., & Verhoeven, L. (submitted). Differential Predictors of 4th Grade Reading Literacy and Mathematics Achievement.

Introduction

Reading and mathematics are a primary focus of schooling and are skills that are essential to participate in today's society. The relationship between reading and mathematics achievement has been evidenced in previous research and several studies have tried to determine factors contributing to the individual differences in achievement in these subjects (De Smedt, Taylor, Archibald, & Ansari, 2010; Durand, Hulme, Larkin, & Snowling, 2005; Grimm, 2008; Hecht, Torgesen, Wagner, & Rashotte, 2001; Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2005; Purpura, Hume, Sims, & Lonigan, 2011). However, only a few studies investigated both reading and mathematics achievement using random samples of typically-developing primary school students and most studies were limited in their availability of context factors. In the current study, in-depth analyses on large-scale assessment data were conducted in order to examine the relationship between reading and mathematics achievement and to explore the differential relationship between these subjects and an array of predictors on the level of the student, home, class and school. In this study the focus was on relevant predictors relating to student characteristics, parental support, student engagement, school and teacher characteristics and educational practices as described in the literature.

The influence of student characteristics on reading and mathematics achievement has been recognized in previous research. For instance, several studies have documented the existence of a 'gender gap' among students in the western world. Girls outperform boys with regard to reading achievement (Ma, 2008; Marks, 2008), but they underachieve in mathematics compared to boys (e.g. Boaler, 1997; Hyde, 2005; Ma & Cartwright, 2003). There is some evidence that the gender gaps in reading and mathematics are related (Marks, 2008; Van Langen, Bosker, & Dekkers, 2006). However, the effect sizes that are usually found are small (Driessen & Van Langen, 2007) and recent research suggests that the gender gaps are, in fact, closing (Lindberg, Hyde, Petersen, & Linn, 2010; Rutkowski, Rutkowski, & Plucker, 2012). Besides gender, several predictors of achievement related to student characteristics have been mentioned. To start with, factors related to the student's socioeconomic status (SES) such as parental education, income and occupation as well as the sociocultural status of the home, for instance the number of books in the home, may have an impact on reading literacy and mathematics attainment (Sirin, 2005; Thiel, 2012; Verhoeven & Van Leeuwe, 2012; Verhoeven, 2011). Also the effects on achievement of the student's linguistic background, related to the lower

level of language proficiency of second language students, are well established (Droop & Verhoeven, 2003; Verhoeven & Van Leeuwe, 2008).

Next, the link between parental support and the home educational environment that parents provide - such as literacy and numeracy activities they undertake with their child - with both reading and mathematics has become evident (Bracken & Fischel, 2008; Davidse, De Jong, Bus, Huijbregts, & Swaab, 2011; Dickinson & Porche, 2011; Jordan, Hanich, & Kaplan, 2003; Katzir, Lesaux, & Kim, 2009; Krajewski & Schneider, 2009; Sénéchal, 2006; Sénéchal & LeFevre, 2002; Tabors & Snow, 2001). Next to the influences of the home environment, motivational aspects also need to be considered. Research has shown that the views of parents concerning their children's academic successes and failures, influence their children's own views and expectations about their academic abilities (Meece, Bower-Glienke, & Burg, 2006).

Furthermore, studies have shown that the individual variation in achievement may be substantially related to student engagement. This refers to students' motivation, their self-efficacy – the confidence in their ability to succeed and to complete a task – and their involvement in the subject matter (e.g. Eccles & Wigfield, 2002; Guthrie & Wigfield, 2000; Ma & Xu, 2004; Petscher, 2010; Wigfield & Eccles, 2000). It is suggested that students who are confident about their future successes in a specific subject, have an advantage throughout various educational subjects because student's self-reliance transcends the subject matter (Aunola, Nurmi, Niemi, Lerkkanen, & Rasku-Puttonen, 2002). Students' motivation has a positive and reciprocal relationship with reading achievement and the time students read at home for their enjoyment (Cox & Guthrie, 2001; Guthrie & Wigfield, 2000). These motivational processes may vary between groups with diverse ethnic or sociocultural backgrounds (Guthrie, Coddington, & Wigfield, 2009).

Besides the influences on the level of individual students, research has shown that the school characteristics, such as the population of a school (Jensen & Rasmussen, 2011; Rauh, Parker, Garfinkel, Perry, & Andrews, 2003; Thorpe, 2006), as well as aspects regarding the school climate (cf. Thapa, Cohen, Guffey, & Higgins-D'Allessandro, 2013) are found to be important predictors for the achievement level of all students in a school and class. Furthermore, teacher characteristics, such as gender, have an impact on the student's achievement (Kikas, Peets, Palu, & Afanasjev, 2009). It is important to note, however, that the influence of the gender of the teacher on achievement has been under debate. Some argued that the

'feminization' of primary school teachers in several western countries has caused a decrease in school achievement of boys because of the lack of male role models (Carrington & Skelton, 2003; Veendrick, Taveccio, & Doornenbal, 2004), while others found no effects of the gender of the teacher on student's achievement, attitudes or motivation (Carrington, Tymms, & Merell, 2008; Driessen & Doesborgh, 2004; Helbig, 2012).

Of course, achievement of students can also be explained from educational factors. For example, the learning opportunities that a student has through the time that is spent on reading and mathematics in the classroom and through homework have become evident in previous research (Guthrie, McRae, Coddington, Klauda, Wigfield, & Barbosa, 2009; Sonnenschein, Stapleton, & Benson, 2010).

The studies outlined above suggest several important factors to consider when examining differences in achievement. These factors, though, may have a differential relationship for reading and mathematics achievement. For instance, not all of the home factors may be equally important for both reading and mathematics. Eamon (2002) stated that the influence of SES on reading as well as mathematics achievement was linked by its associations with the home environment, while the activities and experiences provided by the parents were of less influence on mathematics achievement and more on reading achievement.

For the current study the instruments used in the *Progress in International Reading Literacy Study* - PIRLS - and *Trends in Mathematics and Science Study* - TIMSS - were combined in order to examine the relationship between reading and mathematics achievement and their predictors for fourth grade students in the Netherlands. Although a large amount of research has been aimed at determining predictors for both reading and mathematics achievement, so far, literature which outlined a comparative perspective with regard to these subjects was scarce. Furthermore, most of the studies that were conducted used a standard one-level analysis model, which does not take into account the data dependence which an educational setting entails and which results can lead to inflated test statistics (Agresti & Finlay, 2009; Snijders & Bosker, 2012). The differential relationships for reading and mathematics achievement with their predictors are by no means clear, and a comparative multilevel model exploring differences in the relationships between factors relating to reading and mathematics achievement was generally lacking. Through using large-scale assessment data in the current study, predictors at the level of the student, parents, class and school were generated for both

outcome measures, allowing for a sequence of multilevel modeling analyses to be conducted (Subedi, 2007). By doing so an attempt was made to yield new insights in the differential relationship between reading and mathematics achievement and student characteristics, parental support, student engagement, school and teacher characteristics and educational practices.

Method

Participants

Both PIRLS and TIMSS are initiated by the IEA (*International association for the evaluation of Educational Achievement*) and conducted their data collection together in 2011. The Netherlands participated in PIRLS and TIMSS and also in an additional project in which the same students were tested in reading literacy and in mathematics. This additional project was called TIPI - **TI**MSS and **PI**RLS -, the studies from which data is used in the current study. A total of 970 fourth grade students from 51 classes in 33 Dutch elementary schools participated in TIPI. The mean age of the participants was 10; 1 years, 50.3% were girls and 49.7% were boys. The fourth grade students, their parents, teachers, and school principals filled out a context questionnaire. All four questionnaires had missing values due to non-response or incomplete answers. For the factors derived from the student questionnaire complete data were available for 99.3% of the students. Non-response was higher for the home questionnaire; on the factors selected from this questionnaire complete data were available for 60.8% of the students. For the teacher questionnaire complete data were obtained from 92.2% of the teachers. On the school questionnaire 87.9% of the schools provided complete data on the selected factors. We chose to delete all students with missing parent-, school- and teacher questionnaires, keeping 499 students for analysis.

Materials

Reading Literacy Test. The level of reading literacy achievement was assessed with the PIRLS Reading Literacy Test-2011 (International Association for the Evaluation of Educational Achievement, 2011a). The total number of correct answers in the reading literacy test was transformed into a scaled achievement score by means of Item Response Theory with an international mean of 500 and a standard deviation of 100. Because only a limited subset of items was administered to each student, plausible value methodology was used to generate five plausible

values for each student. For detailed information about this process see Foy and Kennedy (2008).

Mathematics Test. The level of mathematics achievement was assessed with the TIMSS-2011 test (International Association for the Evaluation of Educational Achievement, 2011b). The total number of correct answers in the test was transformed into a scaled achievement score by means of Item Response Theory with an international mean of 500 and a standard deviation of 100. Because only a limited subset of items was administered to each student, the plausible value methodology was used to generate five plausible values for each student for mathematics as well. For detailed information about this process see Foy and Kennedy (2008).

Student, Home, Teacher and School Questionnaire. The fourth grade students, their parents, teachers, and school principals filled out a questionnaire on a variety of factors concerning the learning environment, reading and math activities, background characteristics, home (literacy) environment, motivation, and perception of reading instructions and school environment.

Table 1 presents an overview of the factors, the values of the items, the reliability of the constructed scales (Cronbach's alpha) and the overall means and standard deviations of the factors.

Table 1

Overview of factors overall means, standard deviations and means

Name	Values	α	Overall Mean (SD)
STUDENT CHARACTERISTICS			
Students' gender	0=girl, 1=boy	-	-
Linguistic background	0=Dutch, 1=non-Dutch	-	7% non-Dutch
'Late' student	0=started in grade 1 at age 6 or younger 1=started in grade 1 at age 7 or older		7% ≥ age 7
Educational level mother	1=not been to school, 8=beyond ISCED 5a	-	4.70 (1.78)
Books at home	1=10 or <, 5=≥ 200	-	3.18 (1.28)
PARENTAL SUPPORT			
Early literacy activities	1=never, 3=often	.74	2.33 (.39)
Early numeracy activities	1=never, 3=often	.70	2.42 (.36)
Early literacy abilities (parent view)	1=not at all, 4= very well	.91	2.58 (.78)
Early numeracy abilities (parent view)	1=no numbers, 4=all 10 numbers	.60	1.44 (.70)
Parental involvement	1=never, 4=every day	.86	2.78 (.66)
Parental educational expectations	1=ISCED 2, 6=beyond ISCED 5a	-	3.00 (1.66)
STUDENT ENGAGEMENT			
Reading for fun	1=never, 4=every day	-	3.06 (1.03)
School enjoyment	1=disagree a lot, 4=agree a lot	.68	3.37 (.62)
Self-concept reading	1=disagree a lot, 4=agree a lot	.78	3.24 (.59)
Self-concept mathematics	1=disagree a lot, 4=agree a lot	.91	3.11 (.79)
Involvement reading lessons	1=disagree a lot, 4=agree a lot	.65	3.27 (.51)
Involvement mathematics lessons	1=disagree a lot, 4=agree a lot	.68	3.33 (.52)
Reading attitude	1=disagree a lot, 4=agree a lot	.80	2.84 (.73)
Mathematics attitude	1=disagree a lot, 4=agree a lot	.88	3.09 (.78)
SCHOOL AND TEACHER CHARACTERISTICS			
School location	1=urban, 3=rural	-	2.06 (.90)
Class SES (mean educational level)	0=high, 1=low		.52 (.18)
% of students in school display early literacy abilities (school view)	1=<25%, 4=>75%	.85	2.25 (.73)
% of students in school display early numeracy abilities (school view)	1=<25%, 4=>75%	.75	2.53 (.87)
Teachers' gender	0=female, 1=male	-	31% male
Teachers expectations	1=very low, 5=very high	-	3.44 (.61)
EDUCATIONAL PRACTICES			
Reading homework	1=no homework, 5=every day	-	1.74 (.79)
Mathematics homework	1=no homework, 5=every day	-	1.56 (.55)
Time spent on reading	Average number of minutes spent on reading in a week	-	240.6 (121.4)
Time spent on mathematics	Average number of minutes spent on math in a week	-	315.9 (67.8)

The factors that consist of various items will be discussed next. All factors were constructed using a factor analysis by the IEA (Foy & Kennedy, 2008) and were confirmed using the Dutch data. Only scales with an internal consistency of Cronbach's alpha >.60 were seen as satisfactory. The scales that met this level of Cronbach's alpha were used to conduct the analysis.

Early literacy abilities. Scale consisted of five items: recognizing most of the letters of the alphabet; reading some words; reading sentences; writing letters of the alphabet; writing some words.

Early numeracy abilities. Scale consisted of two items: recognizing the written numbers from 1–10 and writing the numbers from 1–10.

Early literacy activities in the home. Scale consisted of seven items reflecting the parents' responses to the question how often they performed the following literacy activities with their child before it began grade 1: reading books; telling stories; singing songs; playing with alphabet toys; playing word games; writing letters or words; reading aloud signs and labels.

Early numeracy activities in the home. Scale consisted of six items reflecting the parents' responses to the question how often they performed the following numeracy activities with their child before it began grade 1: saying counting rhymes or singing counting songs; playing with number toys (e.g. blocks with numbers); counting different things; playing games involving shapes; playing with building blocks or construction toys; playing games or card games.

Parental involvement (parent view). Scale consisted of eight items: discuss my child's schoolwork with him/her; help my child with his/her schoolwork; make sure my child sets aside time to do his/her homework; ask my child what he/she has learned in school; check if my child has done his/her homework; help my child practice his/her reading; help my child practice his/her math skills; talk with my child about what he/she is reading.

School enjoyment. Scale consisted of three items: I like being in school; I feel safe when I am at school; I feel I belong at this school.

Self-concept reading. Scale consisted of seven items: I usually do well in reading; reading is easy for me; reading is harder for me than for many of my classmates (reverse coded); if a book is interesting, I don't care how hard it is to read; I have trouble reading stories with difficult words (reverse coded); my teacher tells me I am a good reader; reading is harder for me than another subject (reverse coded).

Self-concept mathematics. Scale consisted of seven items: I usually do well in mathematics; mathematics is harder for me than for many of my classmates (reverse coded); I am just not good at mathematics (reverse coded); I learn things quickly in mathematics; I am good at working out difficult mathematics problems; my teacher tells me I am good at mathematics; mathematics is harder for me than any other subject (reverse coded).

Involvement reading lessons. Scale consisted of four items: I know what my teacher expects me to do; my teacher is easy to understand; I am interested in what my teacher says; my teacher gives me interesting things to do.

Involvement mathematics lessons. Scale consisted of four items: I know what my teacher expects me to do; my teacher is easy to understand; I am interested in what my teacher says; my teacher gives me interesting things to do.

Reading attitude. Scale consisted of five items: I only read if I have to (reverse coded); I like talking about books with other people; I would be happy if someone gave me a book as a present; I think reading is boring (reverse coded); I enjoy reading.

Mathematics attitude. Scale consisted of six items: I enjoy learning mathematics; I wish I did not have to study mathematics (reverse coded); mathematics is boring (reverse coded); I learn many interesting things in mathematics; I like mathematics; it is important to do well in mathematics.

Percentage of students in school display early literacy abilities. Scale consisted of five items concerning the percentage of students in the school who were able to do the following when they started primary school (grade 1): recognizing most of the letters of the alphabet; reading some words; reading sentences; writing letters of the alphabet; writing some words.

Percentage of students in school display early numeracy abilities. Scale consisted of three items concerning the percentage of students in the school who were able to do the following when they started primary school (grade 1): counting to 100 or up; recognizing written numbers 1-10; writing numbers 1-10.

Procedure

A stratified multi-stage cluster sampling design was used to select the TIPI-schools in the Netherlands. Schools were stratified by urbanization level and 'average school weight' (indicator of the percentage students with low educated parents). For TIPI the sample consisted of 50 schools. For each school in the main sample, two replacement schools were drawn at the same time. These replacement schools resembled the schools in the main sample in terms of stratification characteristics. In total, 33 schools participated in the study, of which 15 were replacements schools. At the second stage all fourth grade students and classes in the sampled school were selected.

The student tests and the questionnaires were administered at the schools in the spring of 2011. In most schools the tests and the student questionnaires were administered on the same day. The order of testing was randomly determined. This means that in half of the classes the students started with the reading literacy test in the morning and did the mathematics and science test in the afternoon, while it

was the other way around in the other half of the classes. The testing sessions were conducted by specially trained test administrators, who also collected the teacher and school questionnaire. The parent questionnaire was given to the students to take home and parents could send the questionnaire back by post.

Analysis

Data collected by the multi-stage cluster sampling design applied in TIPI has a hierarchical structure and is interdependent. To take into account the stratification and cluster effects and data dependence, a multilevel modeling analysis was chosen (Snijders & Bosker, 2012) using the Statistical Package for Social Sciences (SPSS), version 21 (SPSS Inc., 2001, Chicago, IL). Two-level modeling was used with classes at the highest level.

First, in the so-called empty model, the between class variance and the variance in student level of achievement in both mathematics and reading were determined. The association between reading literacy and mathematics achievement was analysed. Because of the 'test-rotation system' in both TIMSS and PIRLS, in which the test items were distributed among several booklets and these booklets were randomly assigned to the students (one booklet per student), the individual student achievement scores are expressed in so called plausible values. There are five plausible values for mathematics and five plausible values for reading literacy. The analyses were conducted for each plausible value separately. The effect sizes for all five plausible values for mathematics were averaged, incorporating the differences in standard errors for the different effect sizes (Von Davier, Gonzales, & Mislevy, 2009).

Second, the relation of student, home and school factors with reading and mathematics achievement was explored. Multilevel modeling analyses were performed using a sequence of five models. Model 1 consists of factors related to student characteristics, such as age, gender and those factors related to linguistic and cultural background. Model 2 included factors related to parental support. Model 3 concerns the student's engagement. Model 4 related to the school and teacher characteristics, such as the school population and the gender of the teacher. Model 5 outlined the educational practices. Factors within the same model were entered simultaneously in the analysis.

For each model first the assigned factors were entered, after which the factors with non-significant effects were deleted, starting with the factor with the least predictive effect. Then the model was run again. This process was continued until

only those factors with a significant effect were left in the model. For a few factors this entailed that although they did not have a significant effect when all factors of the model were entered, after deleting various factors they became significant. So these factors were still kept for the subsequent model, leading to a final model in which all factors with significant (and constant) effects in previous model(s) were combined. All factors were standardized in order to compare the different effect sizes. This procedure was applied for both reading and mathematics achievement.

As stated above, there are five plausible values for mathematics, as well as for reading literacy. The analyses were conducted with the first plausible value as the dependent variable. For the final model (with only significant effects) the effect sizes of the factors for all five plausible values were averaged, taking into account the difference in standard errors of each of the five plausible values (Von Davier et al., 2009).

Results

First, the so-called zero model, without any factors, was fitted as shown in Table 2. This model indicates the level of variance in reading and mathematics achievement that can be 'explained' by differences between individual students or by differences between schools and classes.

Table 2

Overview of factors overall means, standard deviations and means

Variance components	Reading achievement	Mathematics achievement
Class/school level	18.0%	14.8%
Student level	82.0%	85.1%

Table 2 shows that for both subjects most of the variance is situated at the student level, but there is also a considerable amount of school/class-level variance. The distribution of the variance at school/class level and student level for reading and mathematics achievement is in line with the results of analyses on previous Dutch PIRLS and TIMSS data (Meelissen & Luyten, 2008). Second, the association between reading literacy and mathematics achievement was analysed. It showed a strong association between achievement in reading and mathematics (coeff. =.54, SE=.04).

Table 3

Effects of student, parent, school and teacher factors on reading literacy (n=499)

	Model 1		Model 2		Model 3		Model 4		Model 5	
Regression coefficients	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)
Student characteristics										
Gender (1 = boy)	-.01	(.04)	-	-	-	-	-	-	-	-
Linguistic background	.02	(.04)	-	-	-	-	-	-	-	-
(1 = non-Dutch)										
Educational level mother	**.22**	(.05)	**.10**	(.05)	.08	(.04)	-	-	-	-
Books at home	.07	(.05)	-	-	-	-	-	-	-	-
'Late' student	**-.15**	(.04)	**-.11**	(.04)	**-.11**	(.04)	**-.11**	(.04)	**-.11**	(.04)
(1= ≥ 7 year old gr. 1)										
Parental support										
Early literacy activities			**.15**	(.04)	**.13**	(.04)	**.14**	(.04)	**.14**	(.04)
Early literacy abilities			**.08**	(.04)	.04	(.04)	-	-	-	-
Parental involvement			**-.25**	(.04)	**-.21**	(.04)	**-.21**	(.04)	**-.21**	(.04)
Parents expectations			**.23**	(.05)	**.19**	(.05)	**.24**	(.04)	**.24**	(.04)
Student engagement										
Leisure time reading					.05	(.05)	-	-	-	-
School enjoyment					**.09**	(.04)	**.11**	(.04)	**.11**	(.04)
Self-concept reading					**.16**	(.04)	**.19**	(.04)	**.19**	(.04)
Involvement reading lessons					.03	(.04)	-	-	-	-
Reading attitude					.03	(.05)	-	-	-	-

Table 3

Effects of student, parent, school and teacher factors on reading literacy (n=499), continued

	Model 1		Model 2		Model 3		Model 4		Model 5	
Regression coefficients	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)
School and teacher characteristics										
School location							-.09	(.07)	-	-
Class SES (1=low)							-.12	(.07)	**-.17**	**(.06)**
% of students in school display early literacy abilities							.05	(.07)	-	-
Teacher gender (1=male)							-.05	(.07)	-	-
Teacher expectations							.07	(.06)	-	-
Educational practices										
Reading homework									-.03	(.06)
Time spent reading									.07	(.06)
Variance components										
Explained (%)	10.6		26.0		30.5		31.3		31.5	

Significance level p < 0.05 printed in bold

Reading literacy achievement

Table 3 shows the effects of student, parent, school and teacher factors on reading literacy achievement for the five models. The effects indicate to what extent reading literacy achievement increases or decreases proportionally while controlling for the effects of the other factors entered in the model. The factors with a statistically significant effect on reading literacy achievement are printed in bold.

First, the factors concerning the student characteristics were entered in the model. The model showed two factors to have a significant effect, the educational level of the mother had a positive effect and the so-called 'late' students (7 years or older at the time they entered grade 1) performed less well than their peers. Gender had no significant effect in the model. The parental support factors were entered in model 2 and showed all factors to have a significant effect. Model 3 included the factors related to student engagement and showed that school enjoyment and self-concept in reading had a significant positive effect on reading ability. The early literacy abilities no longer had a significant effect on reading achievement in model 3. When the school and teacher characteristics were added in model 4, class SES showed a non-significant effect on reading achievement. However, after deleting the other non-significant factors (starting with the one with the least predictive effect) and running the model again, class SES became significant and was kept for the subsequent model after all. The factors of model 5 showed no significant effects.

Table 3 also shows the explained variance by each model for reading literacy achievement. As shown, the first model with only the factors concerning student characteristics explained 10.6% of the variance in reading literacy achievement. In the last model (model 5) the explained variance in reading literacy achievement became 31.5%.

Mathematics achievement

Table 4 presents the effects of student, parent, school and teacher factors on mathematics achievement.

In model 1 the factors concerning students' characteristics were entered. The results showed that three out of the five factors have a significant positive effect on mathematics achievement. The difference between boys and girls had a significant effect in this model, but this effect was no longer present in model 3 and further on. The age at which a student entered grade 1 was a negative predictor. Also the educational level of the mother was a strong predictor in the model. Only one of these factors sustained until the final model; the age of student entering grade 1. In model 2, only the early numeracy activities that were undertaken by the parents with their child before it started grade 1 was not a significant factor in the model. In model 3 four student engagement factors that were added in this model were found to be significant predictors. All four factors sustained as a significant predictor in the next models. In this model the disadvantage for girls in mathematics disappeared. Model 4 did not show any significant effects. Model 5 showed that the amount of time spent on mathematics by the teacher in a week had a significant negative effect.

Table 4 also shows the explained variance by each model. As can be seen, the first model explained only 7.4% of the variance in mathematics achievement. Model 2 included parental support factors and explained 24.3% of the variance. In model 3, when student engagement was included in the model, 38.0% of the variance was explained. In model 4 the explained variance in mathematics achievement became 36.8%. In the last model (model 5) 39.1% of the variance was explained.

Table 4

Effects of student, parent, school and teacher factors on mathematics (n=499)

	Model 1		Model 2		Model 3		Model 4		Model 5	
Regression coefficients	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)
Student characteristics										
Gender (1 = boy)	**.11**	(.04)	**.11**	(.04)	.02	(0.4)	-	-	-	-
Linguistic background	-.05	(.04)	-	-	-	-	-	-	-	-
(1 = non-Dutch)										
Educational level mother	**.18**	(.05)	.09	(.05)	-	-	-	-	-	-
Books at home	.08	(.05)	-	-	-	-	-	-	-	-
'Late' student	**-.12**	(.04)	-.08	(.04)	**-.07**	(.03)	**-.07**	(.03)	**-.07**	(.04)
(1= ≥ 7 year old gr. 1)										
Parental support										
Early numeracy activities			.08	(.04)	-	-	-	-	-	-
Early numeracy abilities			**.17**	(.04)	**.10**	(.03)	**.10**	(.03)	**.10**	(.03)
Parental involvement			**-.29**	(.04)	**-.17**	(.03)	**-.16**	(.04)	**-.17**	(.04)
Parents expectations			**.21**	(.05)	**.14**	(.04)	**.15**	(.04)	**.14**	(.04)
Student engagement										
Leisure time reading					.06	(.04)	-	-	-	-
School enjoyment					**.08**	(.04)	**.08**	(.04)	**.08**	(.04)
Self-concept math					**.51**	(.04)	**.52**	(.04)	**.53**	(.04)
Involvement math lessons					**-.11**	(.04)	**-.11**	(.04)	**-.12**	(.04)
Math attitude					**-.10**	(.05)	**-.09**	(.05)	**-.10**	(.05)

Table 4

Effects of student, parent, school and teacher factors on mathematics (n=499), continued

	Model 1		Model 2		Model 3		Model 4		Model 5	
Regression coefficients	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)	Std. coeff.	(SE)
School and teacher characteristics										
School location							-.09	(.08)	-	-
Class SES (1=low)							-.09	(.08)	-	-
% of students in school display early numeracy abilities							-.08	(.08)	-	-
Teacher gender (1=male)							-.01	(.07)	-	-
Teacher expectations							.05	(.07)	-	-
Educational practices										
Math homework									.07	(.07)
Time spent math									**-.14**	(.07)
Variance components										
Explained (%)	7.4		24.3		38.0		36.8		39.1	

Significance level p < 0.05 printed in bold

Comparative model

Table 5 shows the average effect sizes of all significant factors for reading achievement and mathematics achievement in a final model. The effect sizes for all five plausible values were averaged, incorporating the differences in standard errors for the different effect sizes.

Table 5

Average effects and standard error of student, parent, school and teacher factors on mathematics and reading achievement, final model (n=499)

	Reading literacy		Mathematics	
Regression coefficients	Std. coeff.	(SE)	Std. coeff.	(SE)
Student characteristics				
'Late' student (1= ≥ 7 year old gr. 1)	**-.12**	(.04)	**-.10**	(.05)
Parental support				
Early literacy activities	**.12**	(.04)	-	-
Early numeracy abilities	-	-	.07	(.04)
Par. involvement	**-.19**	(.04)	**-.15**	(.04)
Par. expectations	**.23**	(.04)	**.15**	(.04)
Student engagement				
School enjoyment	**.11**	(.04)	**.10**	(.04)
Self-concept	**.21**	(.04)	**.53**	(.04)
Involvement math lessons	-	-	**-.10**	(.05)
Math attitude	-	-	**-.10**	(.05)
School and teacher characteristics				
Class SES (1=high)	**-.17**	(.06)	-	-
Educational practices				
Time spent math	-	-	-.10	(.06)

Significance level p < 0.05 printed in bold

In the final model five factors had a significant effect on both reading literacy and mathematics achievement: the age of a student when starting grade 1, parental involvement, the expectations of the parents regarding the education attainment level of their child, school enjoyment and the student's self-concept. The age of the student when starting grade 1 had a negative effect on both reading achievement and mathematics. Students that enter grade 1 at a later age performed less well than their younger peers. The amount of parental involvement also had a negative effect on both reading and mathematics achievement. Parents are more involved in their child's education when the child displays lesser achievement than its peers. The expectations of the parents regarding the level of education that their child will attain also had a significant positive effect. Children whose parents expect that they

will attain a high level of education are indeed students who perform well in reading and mathematics; the same applies to children with low achievement, whose parents expect a lower level of educational attainment. Enjoying school was positively related to the achievement of students. The student's opinion about the school safety and belonging positively influences both reading and mathematics achievement. Also, self-concept (with regard to the subject) has been found to be a predictor - the strongest predictor in the model - for both mathematics and reading.

In the model for reading two other factors were found to be significant predictors, namely early literacy activities and class SES. Students whose parents indicated that they performed literacy related activities with their child before it began grade 1, such as reading books and telling stories, had a significantly higher reading literacy achievement than students whose parents did not undertake these activities. Finally in the reading model the class SES (the mean educational level of the parents of a class) had a positive effect. The proportion of students in a class with highly educated parents is positively related to the reading achievement of the students.

In the mathematics model early numeracy abilities as reported by the parents showed a non-significant effect in this final model with all five plausible values used. Also the time that was spent on math in the classroom became non-significant in this final model. Two additional student engagement factors were found to have a significant effect in the mathematics model: mathematics attitude and the students' perception on lessons in mathematics. Students who have a negative mathematics attitude and report not to enjoy mathematics and students who find the mathematics lessons not interesting perform better than students with a positive attitude and a positive perception of the lessons.

Conclusion and discussion

The goal of this study was to explore the relationship between reading literacy and mathematics achievement of fourth grade students and the differential relationships between these subjects and their predictors by conducting multilevel modeling analyses. In line with previous research the results show a strong relationship between reading and mathematics achievement (De Smedt et al., 2010; Durand et al., 2005; Grimm, 2008; Hecht, et al., 2001; Purpura et al., 2011).

When comparing the results of the multilevel models for both reading and mathematics achievement, five factors were found to have a statistically significant

effect on both subjects. First, students that enter grade 1 at a later age perform less well than their younger peers for both reading and mathematics achievement. This result contributes to the debate about grade retention. Students who are held back a grade because of slower academic or social progress before grade 1, still lag behind their classmates regarding achievement levels at fourth grade. This is in line with previous research that shows that grade retention has a negative effect on those retained (Hong & Raudenbush, 2005).

The second common factor is the amount of parental involvement - for instance helping with or discussing homework and asking what the child has learned in school - also had a negative effect on both reading and mathematics achievement. This suggests that parents adjust their actions to the actual attainment level of their children. The third common factor was also a factor related to parental support, namely the educational expectations of the parents (cf. Meece et al., 2006). Dutch parents appear to be well aware of the level of achievement and educational abilities of their child. In most Dutch primary schools students are tested regularly with national tests which provide parents with information about the educational abilities of their children. Another explanation could be that parents' ambition for their children somehow influences their children's actual educational achievements, suggesting that self-confidence or self-concept of the child also plays a part in this relation. More in-depth research (such as interviews with parents and students and/or analyses in which indirect effects are examined) is needed to further investigate this relationship.

The fourth and fifth common factor both relate to student engagement. As a start the importance of high self-concept for both reading and mathematics achievement becomes evident in the current study, which is in line with previous research outlining the importance of this aspect of student engagement (Guthrie & Wigfield, 2000; Ma & Xu, 2004; Petscher, 2010). However, although self-concept was the strongest predictor in the model for both mathematics and reading, the effect was much stronger for mathematics than for reading. Finally, enjoying school is positively related to the achievement of students. The student's opinions about the school safety and belonging at school had a positive effect on both reading and mathematics achievement. This endorses the importance of a positive school climate for student achievement (cf. Thapa et al., 2013).

Furthermore, the gender of the teacher showed no statistically significant effect in the model for both reading and mathematics achievement, which is in line with

previous research (Carrington et al., 2008; Driessen & Doesborgh, 2004; Helbig, 2012).

Next to these five common factors that relate to both reading and mathematics achievement, several differential factors became apparent in the current study. To begin with, both the student's involvement in mathematics lessons and the student's math attitude showed a negative relationship with mathematics achievement, while no effects were found for reading achievement. This finding is in contradiction with the previous stated research on student engagement. It seems to illustrate that, for mathematics, the belief in their own capacities outweighs the students' attitude. Putting it differently, a student does not have to like mathematics, it just has to believe it will succeed in it.

Furthermore, the current study confirms that early literacy activities - such as reading books and telling stories - have a positive effect on reading achievement above and beyond the influence of family background factors such as SES and linguistic background (Sénéchal, 2006; Sénéchal & LeFevre, 2002). This is in line with previous research underlining the importance of a positive home literacy environment (Bracken & Fischel, 2008; Davidse et al., 2011). However, we found no relation between early numeracy activities that take place in the home and mathematics achievement. Also, the current study confirmed that SES is a predictor of reading achievement (e.g. Sirin, 2005; Thiel, 2012). The school composition - the proportion of students with low SES backgrounds - negatively relates with reading achievement (Jensen & Rasmussen, 2011; Thorpe, 2006). However, no effect was found in the model for mathematics achievement. The relation between reading achievement and early literacy activities at home as well as SES is consistent with a more general perspective that the home environment influences student achievement (e.g. Dickinson & Porche, 2011; Jordan et al., 2003; Purpura et al., 2011). However, the present study indicates that while the home environment was related to reading achievement, it was not associated to mathematics achievement. These findings are in line with the research of Eamon (2002), who found that the cognitive home environment was related directly to reading achievement but not to mathematics achievement.

The current study found no evidence of a gender gap in reading, which is in contradiction with other studies (Ma, 2008; Marks, 2008). The gender gap in mathematics (boys outperforming girls) was small and disappeared when self-concept was entered in the model. This result supports recent findings that the gender gap seems to be leveling (cf. Lindberg et al., 2010; Rutkowski et al., 2012).

Based on the present study, however, stating that the gender gap is indeed closing is premature. It is important to consider that the sample size of this study is rather small and the predictor variables at different levels had missing data. Further research is necessary to confirm the outcome.

Some limitations apply to the current study. The parental questionnaire showed the largest amount of missing data. Non-response appeared to be related to the education level of the parents; parents with a low level of education were responding to the home questionnaire less than better educated parents. This has implications for the generalizability of the results.

Another limitation that applies to the present study is the definition of linguistic background. More detailed information about the language use in the home might have added to the prediction of reading literacy. Also in the current study, SES was operationalized with one single item, the educational level of the mother. Research suggests that an index using multiple items, not only the educational level of the parents, but also the occupational status and family wealth would better represent the SES component (Caro & Cortés, 2012).

Given that the present study follows a cross-sectional design, the causality between factors influencing achievement cannot be determined and therefore the 'why question' cannot be answered. Longitudinal research to establish causal relationships would be an improvement. As well as cross-national comparisons, that could yield insights in the predictors that have a relationship with reading and/or mathematics achievement across countries. Also observations of parent early literacy and numeracy activities and parent-child interaction might enhance the understanding of the influences of the home environment and experiences on the achievement of students.

The present study shows the commonalities and differences between the various relevant predictors in relation to both reading and mathematics achievement, providing a comparative multilevel model that has several implications for practice and policy. To begin with, students who show a lag in development in kindergarten and are held back a grade, still show lesser achievement in the upper grades in both reading and mathematics achievement. This is in line with research investigating the effects of kindergarten retention policies of schools, which found that the cognitive development of students during the repetition year was impeded (Hong & Raudenbush, 2005). Furthermore, the present finding that reading and mathematics achievement are substantially related to self-concept, adds to the

literature on the role of student engagement in explaining individual differences. This is in line with the expectancy-value theory of achievement motivation that stresses the importance of a student's belief in a good outcome when performing a task for greater motivation and better results (cf. Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). It is important to note that the current study reveals that self-concept plays a more important role for mathematics than for reading achievement. The results seem to imply that positive motivation and practices that emphasize effort and learning and de-emphasize performance leads to the best achievement outcome (Stipek et al., 1998). A final important outcome of the present study is that school enjoyment is related to both reading and mathematics achievement. Aspects related to school safety, healthy relationships, engaged learning and teaching and school improvement efforts are associated with school climate. School climate reforms are important to enhance student's overall well-being and therewith their achievement outcomes (Thapa et al., 2013).

References

Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences*. Upper Saddle River, NJ: Pearson Education.

Aunola, K., Nurmi, J.E., Niemi, P., Lerkkanen, M.K., & Rasku-Puttonen, H. (2002). Developmental dynamics of achievement strategies, reading performance, and parental beliefs. *Reading Research Quarterly, 37*, 310-327.

Boaler, J. (1997). Reclaiming school mathematics: The girls fight back. *Gender and Education*, *9*(3), 285-306.

Bracken, S.S., & Fischel, J.E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education & Development, 19*(1), 45-67.

Caro, H.C., & Cortés, D. (2012). Measuring family socioeconomic status: An illustration using data from PIRLS 2006. *IERI Monograph Series: Issues and Methodologies in Large-Scale Assessments, 5*, 9-33.

Carrington, B., & Skelton, C. (2003). Re-thinking 'role models': equal opportunities in teacher recruitment in England and Wales. *Journal of Educational Policy 18*(3), 253-265.

Carrington, B., Tymms, P., & Merrell, C. (2008). Role models, school improvement and the 'gender gap'– do men bring out the best in boys and women the best in girls? *British Educational Research Journal, 34*(3), 315-327.

Cox, K.E., & Guthrie, J.T. (2001). Motivational and cognitive contributions to students' amount of reading. *Contemporary Educational Psychology, 26*(1), 116-131.

Davidse, N.J., De Jong, M.T., Bus, A.G., Huijbregts, S.C.J., & Swaab, H. (2011). Cognitive and environmental predictors of early literacy skills. *Reading and Writing, 24*, 395-412.

De Smedt, B., Taylor, J., Archibald, L., & Ansari, D. (2010). How is phonological processing related to individual differences in children's arithmetic skills? *Developmental science, 13*(3), 508-520.

Dickinson, D.K., & Porche, M.V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development, 82*(3), 870-886.

Driessen, G., & Doesborgh, J. (2004). *De feminisering van het basisonderwijs. Effecten van geslacht van de leerkracht op prestaties, de houding en het gedrag van leerlingen [The feminization of primary education. The effects of teachers' gender on achievement, attitude and behaviour of students].* Nijmegen, the Netherlands: ITS.

Driessen, G., & Van Langen, A. (2007). Sekseverschillen in het onderwijs 'The boys' problem' in internationaal perspectief [Gender differences in education 'The boys' problem' in international perspective]. *Mens & Maatschappij, 82*(2), 109-132.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*(1), 78-103.

Durand, M., Hulme, C., Larkin, R., & Snowling, M. (2005). The cognitive foundations of reading and arithmetic skills in 7-to 10-year-olds. *Journal of Experimental Child Psychology, 91*(2), 113-136.

Eamon, M.K. (2002). Effects of poverty on mathematics and reading achievement of young adolescents. *The Journal of Early Adolescence, 22*(1), 49-74.

Eccles, J.S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*, 109-132.

Foy, P., & Kennedy, A.M. (Eds.). (2008). *PIRLS 2006 user guide for the international database.* Chestnut Hill, MA: Boston College.

Grimm, K.J. (2008). Longitudinal associations between reading and mathematics achievement. *Developmental Neuropsychology, 33*(3), 410-426.

Guthrie, J.T., Coddington, C.S., & Wigfield, A. (2009). Profiles of motivation for reading among African American and Caucasian students. *Journal of Literacy Research, 41*, 317-353.

Guthrie, J.T., McRae, A., Coddington, C.S., Klauda, S.L., Wigfield, A., & Barbosa, P. (2009). Impacts of comprehensive reading instruction on diverse outcomes of low- and high-achieving readers. *Journal of Learning Disabilities, 42*(3), 195-214.

Guthrie, J.T., & Wigfield, A. (2000). Engagement and motivation in reading. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Volume 3*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hecht, S.A., Torgesen, J.K., Wagner, R.K., & Rashotte, C.A. (2001). The relations between phonological processing abilities and emerging individual differences in mathematical computation skills: A longitudinal study from second to fifth grades. *Journal of Experimental Child Psychology, 79*(2), 192-227.

Helbig, M. (2012). Boys do not benefit from male teachers in their reading and mathematics skills: Empirical evidence from 21 European Union and OECD countries. *British Journal of Sociology of Education, 33*(5), 661-677.

Hong, G., & Raudenbush, S.W. (2005). Effects of kindergarten retention policy on children's cognitive growth in reading and mathematics. *Educational Evaluation and Policy Analysis, 27*(3), 205-224.

Hyde, J.S. (2005). The gender similarities hypothesis. *The American Psychologist*, *60*(6), 581-592.

International Association for the Evaluation of Educational Achievement. (2011). *PIRLS 2011 Assessment*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College and Amsterdam the Netherlands: Author.

International Association for the Evaluation of Educational Achievement. (2011). *TIMSS 2011 Assessment.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College and Amsterdam the Netherlands: Author.

Jensen, P., & Rasmussen, A.W. (2011). The effect of immigrant concentration in schools on native and immigrant children's reading and math skills. *Economics of Education Review, 30*(6), 1503-1515.

Jordan, N.C., Hanich, L.B., & Kaplan, D. (2003). A longitudinal study of mathematical competencies in children with specific mathematics difficulties versus children with comorbid mathematics and reading difficulties. *Child Development, 74,* 834-850.

Katzir, T., Lesaux, N.K., & Kim, Y.S. (2009). The role of reading self-concept and home literacy practices in fourth grade reading comprehension. *Reading and Writing, 22*(3), 261-276.

Kikas, E., Peets, K., Palu, A., & Afanasjev, J. (2009). The role of individual and contextual factors in the development of maths skills. *Educational Psychology, 29*(5), 541-560.

Krajewski, K., & Schneider, W. (2009). Early development of quantity to number-word linkage as a precursor of mathematical school achievement and mathematical difficulties: Findings from a four-year longitudinal study. *Learning and Instruction, 19*(6), 513-526.

Lerkkanen, M.K., Rasku-Puttonen, H., Aunola, K., & Nurmi, J.E. (2005). Mathematical performance predicts progress in reading comprehension among 7-year olds. *European Journal of Psychology of Education, 20*(2), 121-137.

Lindberg, S.M., Hyde, J.S., Petersen, J.L., & Linn, M.C. (2010). New trends in gender and mathematics performance: A meta-analysis. *Psychological bulletin, 136*(6), 1123-1135.

Ma, X. (2008). Within-school gender gaps in reading, mathematics, and science literacy. *Comparative Education Review, 52*(3), 437-460.

Ma, X., & Cartwright, F. (2003). A longitudinal analysis of gender differences in affective outcomes in mathematics during middle and high school. *School Effectiveness and School Improvement*, *14*(4), 413-439.

Ma, X., & Xu, J. (2004). The causal ordering of mathematics anxiety and mathematics achievement: A longitudinal panel analysis. *Journal of Adolescence, 27*(2), 165-179.

Marks, G.N. (2008). Accounting for the gender gaps in student performance in reading and mathematics: Evidence from 31 countries. *Oxford Review of Education, 34*(1), 89-109.

Meece, J.L., Bower-Glienke, B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology, 44*, 351-373.

Meelissen, M.R.M., & Luyten, H. (2008). The Dutch gender gap in mathematics: Small for achievement, substantial for beliefs and attitudes. *Studies in Educational Evaluation 34*(2), 82-93.

Petscher, Y. (2010). A meta-analysis of the relationship between student attitudes towards reading and achievement in reading. *Journal of Research in Reading, 33*(4), 335-355.

Purpura, D.J., Hume, L.E., Sims, D.M., & Lonigan, C.J. (2011). Early literacy and early numeracy: The value of including early literacy skills in the prediction of numeracy development. *Journal of experimental child psychology, 110*(4), 647-658.

Rauh, V.A., Parker, F.L., Garfinkel, R.S., Perry, J., & Andrews, H.F. (2003). Biological, social, and community influences on third-grade reading levels of minority head start children: A multilevel approach. *Journal of Community Psychology, 31,* 255-278.

Rutkowski, D., Rutkowski, L., & Plucker, J.J. (2012). Trends in education excellence gaps: A 12-year international perspective via the multilevel model for change. *High Ability Studies, 23*(2), 143-166.

Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading, 10*(1), 59-87.

Sénéchal, M., & LeFevre, J.A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child development, 73*(2), 445-460.

Sirin, S.R. (2005). Socio-economic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Snijders, T.A.B., & Bosker, R.J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling (2nd Edition).* London: Sage Publishers.

Sonnenschein, S., Stapleton, M.L., & Benson, A. (2010). The relation between the type and amount of instruction and growth in children's reading competencies. *American Educational Research Journal, 47*(2), 358-389.

Stipek, D., Salmon, J.M., Givvin, K.B., Kazemi, E., Saxe, G., & MacGyvers, V.L. (1998). The value (and convergence) of practices suggested by motivation research and promoted by mathematics education reformers. *Journal for Research in Mathematics Education*, 465-488.

Subedi, B.R. (2007). Predicting reading proficiency in multilevel models: An ANOVA-like approach of interpreting effects. *Educational Research and Evaluation, 13,* 327 -348.

Tabors, P., & Snow, C. (2001). Young bilingual children and early literacy development. In S. Neuman & D. Dickinson (Eds.), *Handbook of early literacy research* (pp. 159-178). New York, NY: Guilford Press.

Thapa, A., Cohen, J., Guffey, S., & Higgings - D'Allessandro, A. (2013). A review of school climate research. *Review of Educational Research*. doi: 10:3102/0034654313483907

Thiel, O. (2012). Socio-economic diversity and mathematical competences. *European Early Childhood Education Research Journal, 20*(1), 61-81.

Thorpe, G. (2006). Multilevel analysis of PISA 2000 reading results for the United Kingdom using pupil scale. *School Effectiveness and School Improvement, 17*(1), 33-62.

Van Langen, A., Bosker, R., & Dekkers, H. (2006). Exploring cross-national differences in gender gaps in education. *Educational Research and Evaluation*, *12*(2), 155-177.

Veendrick, L., Tavecchio, L., & Doornenbal, J. (2004). Jongens als probleem: inleiding bij het themadeel [Boys being a problem: introduction to this part]. *Pedagogiek, 24*(1), 12-22.

Verhoeven, L., & Van Leeuwe, J. (2008). Prediction of the development of reading comprehension: A longitudinal study. *Applied Cognitive Psychology, 22*, 407-423.

Verhoeven, L., & Van Leeuwe, J. (2012). The simple view of second language reading throughout the primary grades. *Reading & Writing, 25*, 1805-1818.

Verhoeven, M. (2011). Multiple embedded inequalities and cultural diversity in educational systems: A theoretical and empirical exploration. *European Educational Research Journal*, *10*(2), 189-203.

Von Davier, M., Gonzalez, E., & Mislevy, R. (2009). What are plausible values and why are they useful? *IERI. Monograph series. Issues and methodologies in large-scale assessments, 2*, 9-36.

Wigfield, A., & Eccles, J.S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68-81.

Chapter 5

Sociocultural and educational factors for reading literacy decline in the past decade[4]

Abstract

This study examined sociocultural and educational factors in explaining the reading literacy achievement of fourth-grade children (about 10 years of age) in the Netherlands during the past decade. Using 2001, 2006 and 2011 PIRLS data, a multilevel modeling analysis was conducted to examine reading literacy achievement over the years in relation to gender, SES, ethnicity, linguistic background, number of books in the home, and school SES as sociocultural factors, and early literacy activities and abilities, reading strategy instruction, time spent on reading and computer use at home as educational factors. A significant decline in reading achievement between 2001 and 2011 was evidenced with more than eighty percent of the residual variance located at the student level. All factors, except for early literacy abilities, reading strategy instruction and time spent on reading, showed statistically significant effects on reading literacy. Almost all these effects applied to both literary and expository text genres, and to higher-order as well as to lower-order reading comprehension processes. Cohort differences in reading literacy appeared related to student gender and classroom SES. In addition these cohort differences interacted with educational factors, namely early literacy activities in the home and early literacy abilities established in the school.

[4]This chapter is based on:
Netten, A., Voeten, M., Droop, M., & Verhoeven, L. (2014). Sociocultural and Educational Factors for Reading Literacy Decline in the Netherlands in the Past Decade. *Learning and Individual Differences, 32,* 9-18.

Introduction

A great deal of research has been aimed at investigating differences in student achievement over time and between educational systems, the results of which have led to a growing concern about declining student reading performance in several countries (cf. International Association for the Evaluation of Educational Achievement, 2001 - 2011; Organisation for Economic Co-operation and Development, 2000 - 2010), including Australia (Thomson, De Bortoli, Nicholas, Hillman, & Buckley, 2010), England (Bradshaw, Ager, Burge, & Wheater, 2010; Jerrim, 2011), Ireland (Perkins, Moran, Cosgrove, & Shiel, 2010), the United States (Gioia, 2008), as well as the Netherlands (Scheerens, Luyten, & Van Ravens, 2011; Vermeer & Van der Steeg, 2011). Although it is not clear which factors cause this decline in ability (Bauerlein, Munson, Prehoda, Stotsky, Greene, & O'Connor, 2008), some research points out the link with changes in society and the literacy environment. In recent decades a reduction in reading has been observed, both a reduction in the number of readers, as well as a diminishing amount of time spent on reading (Gioia, 2008; Huysmans, De Haan, & Van den Broek, 2004), due to alternative activities and new media (Clark, 2012). It is, however, by no means clear how sociocultural and educational factors may have an impact on trends of reading literacy results over the years. Therefore, in the present study the focus was on the reading literacy achievement over the past decade of children in the Netherlands in relation to relevant sociocultural and educational factors being described in the literature.

Recent studies have shown that the individual variation in reading literacy achievement may be substantially related to various demographic subgroups that exist in the student population. To begin with, several studies have documented the existence of a 'gender gap' among students in the western world. The gender gap is on the one hand associated with lower achievement and interest in mathematics and science of girls (Hyde, 2005; Ma & Cartwright, 2003) and suggests on the other hand a higher performance in reading compared with the reading performance of boys (Ma, 2008; Marks, 2008), although some evidence suggests that this gap is shrinking (Rutkowski, Rutkowski, & Plucker, 2012). Furthermore, the achievement gap between students from ethnic or linguistic minority groups and their peers needs to be considered. Such achievement gap has been evidenced in several studies (e.g. August & Shanahan, 2006; Droop & Verhoeven, 2003; Verhoeven & Van Leeuwe, 2008, 2012). Next to the influences at the level of individual students,

research has shown that the proportion of children from minority groups in a school or class, may influence reading achievement of all students in that school (Dronkers, 2010). These school characteristics, such as the school population and its location have been shown to predict children's reading literacy achievement (Portes & Macleod, 1996; Rauh, Parker, Garfinkel, Perry, & Andrews, 2003). It is important to note that the differences in achievement between students from ethnic or linguistic minority groups and their peers can largely be explained by socioeconomic factors, such as parental education, income and occupation (Marks, 2005; Lubiensky & Crane, 2010). The influence of socioeconomic and sociocultural status on reading ability has indeed become evident in previous research (Caro & Lenkeit, 2012; Hoff, 2013; Lubienski & Crane, 2010; Sirin, 2005) and can be seen as an indicator of the degree of equality in education (Yang Hansen, Rosén, & Gustafsson, 2011).

Of course, the reading literacy achievement of students can also be explained from educational factors. The effects on early literacy of early literacy experiences in the home (e.g. De Jong & Leseman, 2001; Serpell, 2001), or in the school (Dickinson & Porche, 2011; Whitehurst & Lonigan, 1998) are well established. Early literacy activities that take place in the home or the school appear to be related to reading literacy achievement of children, above and beyond the influence of demographic variables (Bracken & Fischel, 2008; Sénéchal, 2006) and are important predictors of reading achievement across the primary grades (Sénéchal & LeFrevre, 2002). Besides early literacy activities, several educational predictor variables of reading literacy have been mentioned. To begin with, the instructional approach that is used impacts the ability outcomes (Guthrie et al., 2009). In several studies, the focus has been on the instruction of reading strategies, such as identifying the main idea of a text and knowledge and use of story structure, which may help improve the students reading literacy abilities (McKeown, Beck, & Blake, 2009; Oakhill & Cain, 2012; Spörer, Brunstein, & Kieschke, 2009; Van Keer, 2004). It has also been found that time spent on reading as well as variation in teaching approaches are important predictors of reading literacy outcomes. Success in reading literacy has been shown to be dependent on the number of times strategies are offered to students and the time they are given to internalize these skills (Duke & Pearson, 2002; Sonnenschein, Stapleton, & Benson, 2010), as well as the variety of reading strategies taught (Ness, 2011).

Recent literature stresses the importance of the increasing use of home media and their shifting influence on a student's life and achievement. It has been found that home media may have a differentiated effect on the achievement of girls and

boys and of various demographic subgroups (Hofferth, 2010; Hofferth & Moon, 2012). During a period in which the nature of literacy experiences of students is rapidly evolving due to new technologies and social practices of literacy change (Greenhow & Robelia, 2009), the influence of these new media practices on reading ability has to be considered as well.

The aim of the present study was to yield new insights in the dynamics of reading literacy achievement by conducting in-depth analyses on the reading literacy achievement of fourth-grade children in the Netherlands during the past decade in relation to sociocultural and educational factors. First, we examined the trend in reading literacy achievement across the period from 2001 to 2011. In 2001 the IEA (International Association for the Evaluation of Educational Achievement) started with PIRLS (Progress in International Reading Literacy Study). PIRLS provides internationally comparative data about students' reading achievement and associated factors and is a study with a 5-year cycle; the first assessment was in 2001. The target population of PIRLS includes all students enrolled in the grade that represents four years of schooling, counting from the first year of ISCED Level 1, by UNESCO's International Standard Classification for Education (UNESCO Institute for Statistics, 1999). The reason for this choice was that in this grade students are making the transition from learning to read to reading to learn. PIRLS focuses on three core aspects of reading literacy: purposes for reading, processes of comprehension, and reading behaviour and attitudes. The first two aspects have been integrated in the reading literacy test; information regarding students' reading behaviour and attitudes as well as regarding the different components of the students' environment was gathered by four background questionnaires (School, Teacher, Student and Home). The PIRLS Reading Literacy Test consists of two types of passages that represent the two purposes for reading: Reading for literary experience (literary texts) and Reading to acquire and use information (expository texts). Within both text genres, each PIRLS assessment has been designed to measure two major processes of reading comprehension: lower-order processes, such as retrieval and straightforward inference processes, and higher-order processes including interpreting, examining and evaluating processes. Detailed information may be found in the PIRLS assessment framework (Mullis et al., 2009).

In the present study an attempt was made to explain the variation in reading literacy achievement over the years in relation to sociocultural factors like gender, SES, ethnicity, linguistic background, number of books in the home and school SES

as well as educational factors like early literacy activities and abilities, reading strategies, time spent on reading and computer use. Multilevel modeling was used to answer the following research questions:

1. How did the level of fourth-grade reading literacy achievement in the Netherlands change during the past decade?
2. Which sociocultural and educational factors relate to the variation in Dutch reading literacy achievement?
3. How are the differences in reading literacy achievement between the three cohorts (2001, 2006 and 2011) related with sociocultural and educational factors?

The trends in reading literacy achievement were not only studied for the total literacy achievement scores, but also for the components of reading literacy: text genres and comprehension processes. This was done in order to examine whether the text type and the comprehension processes play a role in explaining the trend in reading results. In primary education there is a stronger focus on narrative text in the earlier grades with a gradual shift to expository texts in the higher grades. Also more attention is paid to higher-order comprehension processes in higher grades. This becomes already important in grade 4 in connection with reading to learn.

In order to answer the research questions, the possibilities and implications for statistical procedures using large-scale assessment data (Rutkowski, Gonzalez, Joncas, & Von Davier, 2010) and the hierarchical structure of the data (Hox, 1998; Muthén, 1991; Snijders & Bosker, 2012) have been taken into account. The current study contributes to the literature on the decline in reading achievement in two ways. First, the present study examined changes in reading literacy achievement by conducting a multilevel modeling analysis on a nation-wide dataset that contains detailed information on the reading achievement of three cohorts of ten-year-old students from respectively the years 2001, 2006 and 2011. Second, in an attempt to unravel the predictors that can help explain the trend in reading achievement over the years, the role of a broad range of sociocultural and educational factors was explored.

Method

Participants

A total of 12263 grade-4 students from 412 Dutch elementary schools participated in 2001, 2006 or 2011 in PIRLS conducted by the IEA. The Dutch 2006 and 2011 data were collected by the first author. The mean age of the participants

was 10; 3 years. Table 1 shows the numbers of participating students, classes and schools at the three years of measurement. Each time a different sample of schools was used to gather data.

Table 1

Number of participating students, classes and schools

Measurement	Students	4th grade classes	Schools
2001	4112	195	135
2006	4156	207	139
2011	3995	207	138
Total	12263	609	412

Variables

Students, parents, teachers and school principals answered questions on a variety of aspects concerning learning to read, such as home and school experiences, school and class characteristics, attitudes and curriculum (International Association for the Evaluation of Educational Achievement, 2001, 2006, 2011). All scales were constructed using factor analyses by the IEA (Foy & Kennedy, 2008) and were confirmed using the Dutch data. All scales had an internal consistency of Cronbach's Alpha > .6 and were seen as satisfactory.

Reading Literacy: The level of reading literacy achievement was assessed with the PIRLS Reading Literacy Test. The internal consistency of this task was good with a Cronbach's alpha of > .81 (Mullis, Martin, Kennedy, & Foy, 2007, p. 306). PIRLS assessed two text genres: literary and expository texts. Within both text genres, each PIRLS assessment was designed to measure four major processes of reading comprehension: focusing on and retrieving explicitly stated information; making straightforward inferences; interpreting and integrating ideas and information; and examining and evaluating content, language, and textual elements. These four processes of comprehension are combined in two measurement scales; the lower-order scale combines the retrieval and straightforward inference processes; the higher-order scale combines the interpreting, examining and evaluating processes. Each of the two scales comprises about half of the assessment items.

Because only a limited subset of items was administered to each student, and not all passages were equally easy or difficult, the individual student scores could not be used to make comparisons between students. Therefore Item Response

Theory (IRT) was used. The PIRLS assessment data were scaled using IRT, with an international mean of 500 and a standard deviation of 100. For each student, based on the skills of that student (determined by two passages) and the difficulty of the items, an expected skill distribution was constructed. Randomly five points were taken from this distribution, called plausible values. These five plausible values form the estimated reading literacy score of a student. By calibrating the items these plausible values have been made comparable across cohorts. For detailed information about this process see Martin, Mullis, and Kennedy (2007).

Sociocultural factors

Gender: Gender of the student was represented by a dummy variable: 0 = Girl, 1 = Boy.

Ethnicity: Determined by the question "In which country was your mother/ father born" from the student questionnaire. In line with the definition used by the Dutch Central Bureau of Statistics (2000), the students with a father and/or mother born outside the Netherlands were placed in the non-Dutch group: 0 = Dutch, 1 = Non-Dutch.

Linguistic diversity: Determined by the question "Which language did you speak before you started school" from the student questionnaire. Those students that answered to have spoken only Dutch before they started school were selected in the first language group (0 = Dutch), all other answers resulted in the second language group (1 = Non-Dutch).

The number of books in the home: Based on a five-point scale (1= 0-10, 2 = 11-25, 3 = 26-100, 4 = 101-200; 5 ≥ 200) from the student questionnaire.

Educational level mother: The educational level of the mother and the father (0 = Low educational level, 1 = High educational level, ISCED level 5a or beyond) were asked for in the home questionnaire as an indication of the socioeconomic status of the home. Because of the high correlation between these variables only the educational level of the mother was used in the analyses.

School characteristics: Four questions from the school questionnaire were used; the *school size* (the total enrollment of students in school)*, school location* (1 = Urban, 2 = Suburban, 3 = Rural), the *percentage economically disadvantaged students* (1 = 0-10%, 2 = 11-25%, 3 = 26-50%, 4 = more than 50%) and the *percentage second language learners* (1 = 0-10%, 2 = 11-25%, 3 = 26-50%, 4 = More than 50%).

Educational factors

Early literacy activities in the home: Questions from the home questionnaire were used. The scale consisted of seven items and reflected the parents' responses to the question how often they performed the following activities with their child before he or she began grade 1: reading books; telling stories; singing songs; playing with alphabet toys; playing word games; writing letters or words; reading aloud signs and labels. The answers were given using a three-point scale (3 = Often, 2 = Sometimes, 1 = Never or almost never). The internal consistency of this task was satisfactory with a Cronbach's alpha of .69.

The computer use at home: Indicated by a four-point scale (4 = Every day or almost every day, 3 = Once or twice a week, 2 = Once or twice a month, 1 = Never or almost never) from the student questionnaire.

Early literacy abilities: Questions from the school questionnaire were used. The scale consisted of five items concerning the number of students in the school who were able to do the following when they started primary school: recognizing most of the letters of the alphabet; reading some words; reading sentences; writing letters of the alphabet; and writing some words. The answers were given using a four-point scale (1 = <25%; 2 = 25-50%; 3 = 51-75%; 4 = >75%). The internal consistency of this scale was good with a Cronbach's alpha of .83.

Reading strategy instruction: The instruction of reading strategies was determined by a question from the teacher questionnaire. The scale consisted of the following seven items, in which teachers were asked to indicate how often they ask their students to: identify the main ideas of what they have read; explain their understanding of what they have read; compare what they have read with their experiences; compare what they have read with other things they have read; make predictions; make generalizations; and describe the style or structure. The answers were given using a four-point scale (4 = Every day or almost every day, 3 = Once or twice a week, 2 = Once or twice a month, 1 = Never or almost never). The internal consistency of this scale was good with a Cronbach's alpha of .85.

Time spent on reading: Was derived from the following question from the teacher questionnaire: "Regardless of whether or not you have formally scheduled time for reading instruction, in a typical week about how much time do you spend on reading instruction or reading activities with the students (Include things you do across curriculum areas and during formally scheduled time for reading instruction)". The teachers indicated time spent by number of hours and minutes.

Procedure

A stratified multi-stage cluster sampling design was used to select elementary schools and students in the Netherlands. Schools were stratified by five categories of degree of urbanization and three categories of 'average school weight' (indicator of the percentage students with low educated parents), a total of 15 strata. All fourth-grade classes and their students in the sampled school were selected. Sampling techniques and stratification variables were consistent across years; the only difference was that in 2001 and 2006 the schools were selected using a Probability Proportionate to Size sampling technique, which was not used in 2011. In 2001 and 2006 selection probabilities of schools varied according to school size; in 2011 all schools had an equal probability of being selected. The differing selection probabilities made the use of sampling weights for schools desirable. In our multilevel models we only used school-level weights, applied to the classroom level in the two-level models. No weights were used for the classrooms and the students because all grade-4 classrooms with all their students of a selected school entered the sample. These weights varied in 2001 from 0.30 to 2.34, in 2006 from 0.33 to 2.39, and in 2011 from 0.95 to 1.24.

Data collected in this manner have a hierarchical structure, which leads to dependent observations. More importantly, the clustering of students in classrooms and schools leads to variation in the data at different levels. To take into account the clustering effects, a multilevel modeling analysis was chosen (Snijders & Bosker, 2012). The analyses were conducted with Mplus software, version 7 (Muthén & Muthén, 1998-2012). To accommodate the sampling design, weights were used in the multilevel models at the school level. These weights adjust for disproportional sampling and for non-compliance of schools. The five plausible values were handled by treating them as multiple imputations. This implies that each analysis was repeated five times, once for each of the plausible values, and that the results were combined and standard errors were estimated following the multiple imputation approach.

All questionnaires had missing values due to non-response or incomplete answers. For the predictors derived from the student questionnaire complete data were available for 88.7% of the students. The highest missing data rate was observed for linguistic background (6.8%) and ethnicity (3.9%). The number of students with all values missing was negligibly small (n = 19). Non-response was much higher for the home questionnaire than for the other questionnaires; on the

two predictors selected from the home questionnaire complete data were available for only 57.2% of the students. Both predictors were missing for 36.5% of the students. Non-response appeared to be related to the education level of the parents; parents with a low level of education were less responding to the questionnaire than better educated parents (Central Bureau of Statistics, 2009). For the teacher questionnaire, complete data were obtained from 86.4% of the teachers. Of the 609 teachers in the three samples 11.3% provided no data on any of the two selected predictors, representing 9.6% of the students. On the school questionnaire 78.4% of the 412 schools provided complete data on the three selected predictors. For 55 schools (13.3% of the schools, 12.6% of the students) these predictors were missing completely. Table 2 shows the number of students with valid data on each of the predictors by year of measurement. At the student level complete data on all predictors were available for 4621 students (37.7%); for 98.3% of the students data were available on more than half of the predictors, and for 76.7% of the students at most two predictors had a missing value.

To make sure that all available data were used in the analyses, we included the variances of the predictors at the appropriate levels in the models as parameters to be estimated. Thereby, the missing values were taken care of in the Full Information Maximum Likelihood (FIML) estimation procedure (Enders, 2010). All analyses were based on the total sample of students (N = 12263); students with missing values on any predictor variable were kept in the analyses by using FIML. Parameters were estimated by Mplus with the MLR estimator (Muthén & Muthén, 1998-2012), using nonnormality robust estimation of standard errors (Yuan & Bentler, 2000; Yuan, Yang-Wallentin, & Bentler, 2012).

The results section starts with the descriptive statistics for the sociocultural and educational factors by year of measurement. Next, the results of the multilevel analyses are presented to answer the research questions. To answer the first question a three-level model was used: students within classrooms/teachers within schools. This model was used to examine the changes in reading literacy achievement of fourth-grade students in the past decade in the Netherlands. The model included only the achievement variables and two dummy variables for the year of measurement; one to contrast 2006 with 2001 and one to contrast 2011 with 2001. This model estimates the average trend across time and decomposes the reading literacy score variance into components at each of the three levels.

Next, the sociocultural and educational factors were taken into account by

adding them as predictors at the individual and the classroom/school level, to answer the second and third research questions. Because of technical problems - no or very slow convergence of the iterations - encountered in some models, we used two-level rather than three-level models. The source of these problems was that many schools had only one grade-4 classroom; schools had an average of less than 1.5 classrooms in the database. As a consequence it was hardly possible to distinguish classroom-level and school-level variance. Therefore we used classrooms as the highest level. Both the classroom- and school-level variables were assigned to the second level. This results in a clustering effect at the classroom level, which was taken care of in the analyses by correcting the standard errors. Some of the student-level variables were also entered at the classroom level. All analyses were executed for the overall reading literacy performance. To gain insight into the role of text genre and complexity of comprehension processes the analyses were also performed on the scores for the two text genres and the two processes of comprehension separately. In these analyses, the two text genres were combined in one model as two correlated dependent variables. The same procedure was followed for the two comprehension processes.

Finally, in order to explore what changes can be detected in relationships of reading literacy achievement with sociocultural and educational factors, interaction effects with year of measurement were examined.

Results

Table 2 presents descriptive statistics for the predictors by year of measurement. The table shows the (unweighted) means and standard deviations, together with the numbers of cases (n), which differ because of missing values.

Table 2

Descriptives: unweighted means and standard deviations of students on the predictors per year of measurement

		2001			2006			2011		
	Max.	N	Mean	SD	N	Mean	SD	N	Mean	SD
Gender (1=boy)	1	4029	.50	(0.500)	4156	.50	(0.500)	3994	.49	(0.500)
Educational level mother (1=high)	1	2494	.27	(0.442)	2577	.34	(0.475)	2203	.37	(0.482)
Ethnicity (1= not Dutch)	1	3890	.20	(0.399)	4062	.22	(0.413)	3837	.22	(0.416)
Linguistic background (1=not Dutch)	1	3732	.31	(0.462)	4025	.21	(0.411)	3677	.37	(0.482)
Number of books in the home	5	3999	2.93	(1.148)	4082	2.95	(1.123)	3941	2.98	(1.076)
School size	1123	3352	374.83	(191.285)	3585	339.84	(152.038)	3283	324.28	(164.260)
School location (1=suburban)	1	3609	.27	(0.446)	3610	.36	(0.479)	3381	.42	(0.493)
School location (1=rural)	1	3609	.39	(0.487)	3610	.40	(0.489)	3381	.41	(0.492)
Early literacy activities	3	2521	2.26	(0.365)	2780	2.34	(0.373)	2222	2.36	(0.373)
Computer use at home	4	3968	3.38	(1.123)	4095	3.39	(0.826)	3946	3.44	(0.750)
Early literacy abilities	4	3658	1.50	(0.580)	3415	1.65	(0.631)	3250	1.97	(0.680)
Reading strategies	4	3621	2.41	(0.575)	3759	2.62	(0.447)	3689	2.82	(0.459)
Time spent on reading in a week	1200	3520	216.12	(118.530)	3723	242.22	(164.03)	3589	268.13	(187.340)

Some variables were strongly skewed to the right: school size, time spent on reading, and early literacy abilities. To better meet the normality assumptions, these three variables were transformed by taking the logarithm. Table 2 shows the untransformed variables. Differences between the three samples on the student level variables were tested by multilevel (logistic) regression, using sampling weights and using the logarithmically transformed variables.

The proportion of students with a highly educated mother increased by year of measurement; this was statistically significant between 2001 and 2006. No significant differences were observed for ethnicity, or for the number of books at home. For linguistic background, however, a significant decrease of the proportion non-Dutch was observed in 2006 but in 2011 this proportion was significantly higher than in both 2001 and 2006. The early literacy activities increased significantly in 2006 and 2011 compared with 2001. Computer use at home did increase significantly in 2011 compared with both 2001 and 2006. At the class level, instruction of reading strategies increased significantly by year of measurement, but the differences in time spent on reading were not statistically significant. At the school level, significant differences were found between the years of measurement for all three predictors. The sample schools in 2011 were on average smaller than in 2001. Also, the 2011 sample included less schools from urban areas (14.5%) compared with 2001 (31%) and 2006 (21.1%). Early literacy abilities increased on average; this increase was statistically significant in 2011 compared with both previous years.

Reading literacy achievement in the past decade

Table 3 shows the estimated means of reading achievement per year of measurement. The means decline. This decline was statistically significant between 2001 and 2011 (z = -1.994, p =.046), but not between 2001 and 2006 (z = -1.827, p = .068).

Table 3

Estimated means, variances and correlations from multilevel analyses of the reading literacy test (five plausible values, n=12263)

	Reading literacy		Text genres				Processes of comprehension			
			Literary		Expository		Lower-order scale		Higher-order scale	
	Mean	(*SE*)	Mean	(*SE*)	Mean	(*SE*)	Mean	(*SE*)	Mean	(*SE*)
2001	551.557	(2.953)	549.556	(3.087)	550.414	(3.261)	553.477	(3.167)	549.566	(2.837)
2006	544.611	(2.451)	541.944	(2.575)	545.124	(2.390)	548.527	(2.978)	539.959	(2.192)
2011	544.396	(2.033)	543.154	(2.358)	545.720	(1.997)	547.262	(2.199)	542.047	(2.012)
Variance components										
Student level	2481.034		2716.474		2450.826		3279.757		2305.148	
Class level	198.565		235.541		164.825		229.134		167.494	
School level	367.059		367.023		369.630		411.567		328.221	
Correlations										
Student level				.770				.889		
Class level				.980				1.000		
School level				.981				.988		

Note: ICC class: .185 ; ICC school: .116

A similar pattern of results was obtained for the means of the two text genres, showing a decline in results from 2001 to 2006, but a stand still from 2006 to 2011. Only the differences in means between 2001 and 2006 for the literary texts were found significant (z = -1.979, p = .048). Using a multivariate Wald test, it was tested whether the average trends differ for the two text genres. No significant difference was found (χ^2 (2) = 1.230, p = .541).

Next the differences for the processes of comprehension were examined. The means of the lower-order scale show a decline of about five scale points from 2001 to 2006, and one scale point from 2006 to 2011, but these differences in means were not significant (2006 vs. 2001: z = -1.102, p = .270; 2011 vs. 2001: z = -1.608, p = .108). The higher-order scale, however, showed a larger and statistically significant decline of 10 scale points from 2001 to 2006 (z = -2.668, p = .008), but a small improvement of two points from 2006 to 2011, which is still a significant difference with 2001 (z = -2.169, p = .030). The multivariate Wald test showed significant differences in the trends between the two processes of comprehension (χ^2 (2) = 16.966, p < .001). The decline in reading literacy achievement between 2001 and 2006 seems, therefore, to be more associated with the higher-order processes than with the lower-order processes.

Table 3 also shows the distribution of the total variance in reading literacy achievement across the school, class and student levels. Table 3 points out that most of the variance is situated at the student level (81.4%). The school level holds 12.0% and the class level 6.5% of the variance in overall reading literacy achievement. This distribution of variances over the levels is approximately the same for the four components of reading literacy (ranging at the student level from 81.8% for the literary texts to 83.7% for the retrieve-inference processes). The intraclass correlation (ICC) is at the school level about .12 and at the classroom level about .19. These coefficients express how much alike the test scores are of students in the same school, respectively the same classroom. The relatively high school-level variance compared with the classroom-level variance indicates that test scores of different classrooms in the same school relatively highly resemble each other.

The correlations in Table 3 show that the two text genres, literary and expository, were highly correlated at the individual level and even higher at the classroom and school level. The same was found for the two processes of comprehension.

Role of sociocultural and educational factors

As mentioned before, two-level modeling was used with classrooms at the highest level. The classroom-level variance is the sum of two components: differences between classrooms within schools and differences between schools. Combining classrooms and schools results in correlated residuals at the second level; this was counteracted by correcting the standard errors by using in Mplus the option 'complex' for the school level, which corrects the standard errors for the relatively high likeness of classrooms within schools.

Gender was used only as a within-level variable. The variables educational level mother, ethnicity, linguistic background and number of books in the home, were used at the within level to act as an individual student variable as well as at the between level acting as a class-level variable, in order to see the contextual effects of these student variables. School size was transformed by taking the logarithm of the number of students in the school. School location was represented by two dummy variables (suburban and rural). All predictors, except the dummy variables, were grand-mean centered. The results of the analyses are shown in Table 4. The statistically significant effects on reading literacy achievement are in boldface type ($p < .05$).

Table 4

Estimated two-level regression of the five plausible values for reading literacy outcomes on sociocultural and educational factors (n=12263)

	Reading literacy		Text genres				Processes of comprehension			
			Literary		Expository		Lower-order scale		Higher-order scale	
Regression coefficients	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)
Student level										
Gender (1 = boy)	**-8.881**	(1.104)	**-10.362**	(1.974)	**-7.659**	(1.276)	**-5.950**	(1.611)	**-10.086**	(1.081)
Educational level mother	**18.621**	(1.744)	**17.186**	(1.599)	**17.588**	(1.456)	**20.218**	(1.982)	**16.387**	(1.519)
Ethnic minority	**-5.243**	(1.697)	**-4.737**	(1.737)	**-4.005**	(1.768)	**-4.061**	(2.006)	**-6.506**	(1.598)
Non-Dutch language	**-9.353**	(1.585)	**-9.462**	(1.422)	**-9.851**	(1.422)	**-10.503**	(1.937)	**-7.621**	(1.861)
Number of books	**7.864**	(0.645)	**7.173**	(0.618)	**6.919**	(0.540)	**7.731**	(0.824)	**6.789**	(0.534)
Early literacy activities	**8.320**	(1.811)	**9.646**	(2.219)	**5.968**	(2.034)	**7.855**	(2.645)	**8.610**	(1.815)
Computer use	**-1.522**	(0.760)	-0.765	(0.979)	**-1.576**	(0.723)	**-1.631**	(0.724)	-0.824	(0.601)
Class level										
Intercept (2001)	**555.326**	(4.782)	**446.999**	(19.204)	**457.141**	(18.036)	**447.764**	(19.577)	**459.834**	(18.603)
School size[1]	**9.755**	(1.904)	**9.784**	(2.061)	**9.320**	(1.906)	**9.982**	(2.232)	**8.579**	(1.996)
Suburban	**9.345**	(2.759)	**9.630**	(2.717)	**10.029**	(2.567)	**9.458**	(2.809)	**9.050**	(2.497)
Rural	**6.538**	(3.145)	5.533	(3.064)	**9.320**	(2.998)	**6.134**	(3.108)	**6.160**	(2.851)
Prop. high educational level mother	**39.702**	(9.564)	**41.463**	(10.282)	**40.510**	(9.634)	**43.725**	(11.592)	**38.394**	(10.367)
Prop. ethnic minority	**-25.760**	(8.227)	**-26.348**	(8.996)	**-25.512**	(8.334)	**-30.254**	(10.182)	**-23.672**	(8.730)
Prop. non-Dutch	**-22.665**	(9.788)	**-22.049**	(9.674)	**-21.343**	(9.426)	**-21.972**	(10.992)	**-20.288**	(9.699)
Mean nr. of books	**16.333**	(4.083)	**17.826**	(4.381)	**14.262**	(4.245)	**17.708**	(4.413)	**15.387**	(4.094)
Early literacy abilities[2]	0.846	(2.919)	-0.352	(3.095)	0.821	(3.101)	0.365	(3.116)	0.598	(2.838)

Table 4

Estimated two-level regression of the five plausible values for reading literacy outcomes on sociocultural and educational factors (n=12263)), continued

	Reading literacy		Text genres				Processes of comprehension			
			Literary		Expository		Lower-order scale		Higher-order scale	
Regression coefficients	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)	Coeff.	(*SE*)
Reading strategies	0.379	(1.804)	0.464	(1.934)	-0.125	(1.782)	0.017	(2.011)	-0.840	(1.694)
Time reading[3]	-0.895	(1.787)	-0.939	(1.898)	-0.111	(1.705)	-0.755	(1.912)	-0.509	(1.653)
2006 vs. 2001	**-10.263**	(2.591)	**-11.155**	(2.851)	**-8.367**	(2.941)	**-8.144**	(3.616)	**-12.632**	(2.507)
2011 vs. 2001	**-11.154**	(2.586)	**-10.760**	(3.326)	**-8.359**	(3.265)	**-10.204**	(2.800)	**-11.263**	(2.453)
R square										
Student level	**0.075**	(0.006)	**0.064**	(0.006)	**0.062**	(0.006)	**0.057**	(0.006)	**0.067**	(0.006)
Class level	**0.542**	(0.044)	**0.536**	(0.043)	**0.543**	(0.047)	**0.547**	(0.052)	**0.554**	(0.052)

Significance level p < 0.05 printed in bold

[1]Natural logarithm of number of students in the school.

[2]Natural logarithm of scale score.

[3]Natural logarithm of time in hours.

The results showed that, after controlling for all sociocultural and educational factors, the reading literacy outcomes decreased significantly between 2001 and 2006, and between 2001 and 2011. This is the case for the overall reading literacy outcomes, as well as for the two text genres and the processes of comprehension. The estimated means for 2006 and 2011 did barely differ.

The results at the student level show that all variables had a significant effect on reading literacy achievement. The girls outperformed the boys significantly for all components of reading literacy. Students with a highly educated mother showed significantly better results than students with a lower educated mother, and the number of books in the home showed a significant positive relationship with reading literacy achievement. The students with at least one parent born outside the Netherlands lagged behind peers of whom both parents were born in the Netherlands. Students who spoke another language than Dutch before they entered primary education performed less well than their monolingual Dutch-speaking peers. Early literacy activities in the home had a strong effect. Students whose parents indicated that they performed literacy-related activities with their child before he or she began grade 1, such as reading books and telling stories, had a significantly higher reading literacy achievement than students whose parents did not undertake these activities. The student's computer use at home showed to have a negative effect on the overall reading achievement. The more time a student spent at the computer at home, the lower the reading literacy achievement. The results were the same for all components of reading literacy, the only exception being that comprehending literary texts and higher-order comprehension processes were not significantly associated with computer use.

Contextual effects at the class or school level appeared for all tested student variables. The proportion of students with highly educated mothers as well as the proportion of students with a non-native and a non-Dutch linguistic background had additional effects on reading literacy performance on top of the effects of these variables at the student level. The same was true for the average number of books in the home. In classrooms with relatively more students with highly educated mothers and with a higher average number of books in the home, the average reading literacy achievement was higher. But in classes with a higher proportion of students with a non-native and a non-Dutch background, average reading literacy achievement was lower. The class composition appeared to reinforce the effects of the student level background variables on reading literacy achievement, for all components of reading literacy.

School size and school location showed statistically significant effects on the reading literacy outcomes. For the literary texts, however, there was no statistically significant difference between the schools in rural and urban areas. Reading strategy instruction and the time spent on reading in a class had no significant effects in the model.

Early literacy abilities, a school-level variable, was not found to be a significant predictor in the model. The percentage of students in a school that have some literacy skills (such as writing some letters or words) before they enter grade 1, did not predict the reading achievement in grade 4. Also, reading strategy instruction and the time spent on reading in a class had no significant effects in the model.

The R square showed that 7.5% of the variance at the student level and 54.2% of the variance at the class level was accounted for by the sociocultural and educational factors. These percentages were approximately the same for all components of reading literacy.

Interaction effects

For each predictor the interaction with year of measurement was tested separately, every time starting from the model in Table 4. Next, a model was constructed including all statistically significant interactions. For practical reasons only the statistical results of this last model are reported in the text (not shown in Table 4). Interaction tests were only performed for the total score of Reading Literacy. Interactions were tested by forming product variables of a predictor with the two dummy variables for year of measurement. For two of the three student level predictors within classes a statistically significant interaction with year of measurement was found, namely for gender and for early literacy activities in the home. For student's computer use at home, however, the interaction with year of measurement was not statistically significant. For the other student level variables the interaction with year of measurement was tested both at the within (students within classes) and at the between level (classes/schools). This included interactions with mother's education, ethnic and linguistic background, and number of books in the home. A statistically significant interaction was found with mother's education, but only at the between-classrooms level; the proportion of students in the classroom with a highly educated mother interacted with year of measurement in its effect on reading literacy achievement. Finally, interactions of year of measurement with between-level predictors were tested: school size, school

location, reading strategies, time spent on reading and early literacy abilities. Only the last predictor showed a significant interaction with year of measurement. All in all four statistically significant interactions were detected. These four interactions were all added to the final model and tested again. After combining into one model results stayed the same.

The results of the model with interaction effects are discussed now. Regarding sociocultural factors two statistically significant interactions were found. For gender, both product variables showed a positive and statistically significant coefficient: for 2006 vs. 2001, b = 8.267 (p = .004), and for 2011 vs. 2001, b = 8.577 (p = .002). This result implies that the average decrease in reading literacy achievement between 2001 and 2006 was to a very large extent due to a decrease for the girls (by 9.34) and not so much for the boys (only 1.073). For the boys, no statistically significant differences in reading literacy achievement between the three years of measurement could be found. In 2006 girls on average still scored higher than boys, but the gender difference in 2006 was only half the size of the gender difference in 2001. Between 2006 and 2011 no important changes could be detected; both the average reading literacy achievement and the gender difference remained practically the same.

Educational level of the mother did not interact with year of measurement for students within classrooms, but the classroom proportion of students with a highly educated mother showed a significant interaction: for 2006 vs. 2001, b = -27.025 (p = .097), and for 2011 vs. 2001, b = -32.154 (p = .030). This result implies that for classroom averages the relationship between reading literacy achievement and educational level of mothers became less steep in 2006 and 2011 than it was in 2001.

Concerning educational factors, also two interactions were found to be statistically significant. For early literacy activities in the home, varying only between students within classrooms, one of the two product variables was found to be statistically significant: for 2006 vs. 2001, b = 14.679 (p = .004), but not for 2011 vs. 2001, b = 8.383 (p = .153). This pattern of results implies that the average decrease in reading literacy achievement between 2001 and 2006 became less for students with a larger amount of early literacy activities at home. This interaction may also be viewed as a pattern of regressions of reading literacy achievement on early literacy activities, differing by year of measurement. For 2001 the model predicted a flat line, no relationship at all with early reading literacy activities. For 2006 and 2011 a positive relationship is implied by the model, but stronger for 2006 than for 2011.

For the school-level variable "early literacy abilities" one statistically significant product variable was found: for 2006 vs. 2001, *b* = -4.768 (*p* = .512), and for 2011 vs. 2001, *b* = -13.845 (*p* = .036). This pattern of results implies that the school-level relationship of reading literacy achievement with early literacy abilities was declining over time from 2001 to 2011. In the 2001 data a positive relationship was observed. In later cohorts the school average of early literacy abilities appeared no longer important.

Conclusions and discussion

The purpose for this study was to further examine the decline in reading literacy achievement that several western countries are faced with in the last years (Thomson et al., 2010; Bradshaw et al., 2010; Jerrim, 2011; Perkins et al., 2010; Gioia, 2008), by exploring this trend in view of various subgroups that exist in the student population. Also, the present study seeks to provide new insights in the predictors that can help explain this trend of declining student performances.

By conducting in-depth analyses on PIRLS 2001, 2006 and 2011 data, a statistically significant decline in reading literacy achievement of fourth-grade students in the Netherlands in the past decade was evidenced (cf. Scheerens et al., 2011; Vermeer & Van der Steeg, 2011). The decline was unchanged after allowing for effects of sociocultural and educational factors. The present results, however, show that the decline in reading literacy achievement was mainly between 2001 and 2006, while the results remained stable between 2006 and 2011. The decline, thus, did not deteriorate in the last five years. Also for the two distinguished text genres - literary and expository texts - a similar pattern of results was found, showing a decline in results from 2001 to 2006, but stabilization from 2006 to 2011.

When examining the trend further we found the decline in reading literacy achievement to be related to higher-order comprehension processes. The test items comprising this scale require complex cognitive processes and reading experience, such as knowledge of text structure and the skill to identify the main idea of a text, all of which are important skills for reading comprehension (Oakhill & Cain, 2012). Therefore, the Dutch educational system seems to be well equipped to teach the students the basic reading skills and the students have mastered these basic comprehension skills, but they experience difficulties when faced with questions that require more complex cognitive processes.

With respect to sociocultural factors, we found evidence for gender differences in reading literacy achievement, with girls performing better than boys - which replicates previous findings (Organisation for Economic Co-operation and Development, 2007, 2010; Ma, 2008; Marks, 2008). The gender gap was the largest in 2001, reduced almost by half in 2006 and stabilized in 2011. This achievement pattern and the evidenced interaction effects indicate that the average decline in reading literacy achievement in the Netherlands can be attributed to a declining performance of the girls.

The current study also confirms the reading literacy achievement gap between students from ethnic or linguistic minority groups and their peers and showed that SES, ethnicity and linguistic background are statistically significant predictors of reading literacy achievement (e.g. Droop & Verhoeven, 2003; Verhoeven & Van Leeuwe, 2012). In addition, this achievement gap cannot be fully explained by socioeconomic factors (Marks, 2005; Lubiensky & Crane, 2010). The results show that these predictors all make a unique contribution in explaining the variance in reading achievement, illustrating a place for linguistic background alongside ethnicity and SES in a model when explaining differences in achievement between socioculturally diverse groups (Martin, Liem, Mok, & Xu, 2012).

These background variables all operate strongly at both the student and the classroom level. Hence the school composition - especially the proportion of students from low SES families and the proportion of ethnic and linguistic minority students - negatively relates with reading achievement (Dronkers, 2010; Portes & Macleod, 1996; Rauh et al., 2003). For instance, students who grow up in low SES families are more likely to have lower reading achievement than their high SES peers and they perform even worse when they attend a low SES school. The school SES composition seems to strengthen inequalities between high and low SES students (Caro & Lenkeit, 2012). The results of the current study, however, show that the influence of the proportion of students in a class with either low or high SES is smaller in 2011 than in 2001. Therefore the school SES composition seems to be of lesser importance nowadays, than ten years ago.

Students in smaller schools and in urban areas perform significantly worse than students in larger schools and in suburban or rural areas, which in the current study cannot be fully explained by the SES or ethnic composition of the schools; these differences by school size and school location exist even after school SES and ethnic composition are controlled for.

With respect to the educational factors, neither reading strategy instruction nor time spent on reading were found to be significantly related to overall reading literacy achievement in the current study, which seems to be in contradiction with previous research (Duke & Pearson, 2002; McKeown et al., 2009; Sonnenschein et al., 2010; Spörer et al., 2009; Van Keer, 2004). A reason for this result could be the way the instructional practices were operationalized. The current study uses questionnaire data, which might not reflect the actual teacher practices and therefore is limited in its interpretation of the results (cf. Wilkinson, 1998). In future research, strategy use and reading time should be examined using observations or monitoring within classroom settings (Guthrie et al., 2004).

Students reported to spend more time behind a computer than ten years ago. The computer use at home appeared to be negatively related to reading achievement, with the literary texts and higher-order processes as exception. Before this result can lead to any conclusions, we have to take into account the limitations of the current study. Research has shown that the different activities that are undertaken by the students using the computer, such as exploring websites, e-mail or playing computer games, have a differentiated relation with achievement (Hofferth & Moon, 2012). In order to come to a more definite answer, future research should aim at examining the relationship between reading achievement and those distinct activities.

In the past decade the number of literacy-related activities that were undertaken by the parents with their child before grade 1, such as reading books and telling stories, increased and was found to have a significant positive relationship with all of the components of reading literacy, which is in agreement with previous research (e.g. Dickinson & Porche, 2011; Whitehurst & Lonigan, 1998). It was found that the amount of early literacy activities that take place in the home predict reading achievement above and beyond the influence of family background variables (cf. Bracken & Fischel, 2008; Sénéchal, 2006; Sénéchal & LeFrevre, 2002). Also, the current study found that the decline in reading literacy achievement in the past decade became less for students whose parents had undertaken more early literacy activities at home. Therefore, reinforcing the need for parents to provide an environment that fosters development and learning seems mandatory.

In addition, more students appeared to possess some literacy skills (such as writing some letters or reading some words) before they entered grade 1. This was found to have a statistically significant interaction effect with time. The pattern of results implies that the class-level relationship of reading literacy achievement with

early literacy abilities was declining over time from 2001 to 2011. Therefore, although more students nowadays display early literacy skills before grade 1, such as being able to write some letters or read some words, the influence of these skills on reading comprehension in grade 4 was small. Which raises the question whether teaching preschool children to read and write has a long-term advantage (Suggate, Schaughnecy, & Reese, 2013).

It is important to note that working with large-scale assessment data involves several limitations. Test scores for reading literacy achievement were missing by design. Therefore, we had to work with five plausible values for each student on the total reading test as well as on each of its components. This feature necessitated the use of multiple imputation, analyzing five data sets for each criterion variable and averaging the analysis results. This had consequences for the statistical tests and fit measures that could be used. We mainly used z-tests based on the standard errors derived from the multiple imputation procedure. Furthermore, multiple imputation severely restricted possibilities for the analysis of residuals to assess model fit.

Another limitation was that the data were hierarchical involving three levels and predictors at each of these levels while, due to practical problems, we could only estimate two-level models. Classrooms were defined as the second level, though relatively high school-level variance of reading literacy achievement existed. We made sure to correct the standard errors for correlated data at the school level. Nevertheless, it is still possible that some standard errors have been underestimated. Ignoring an important level can lead to different research conclusions (Opdenakker & Van Damme, 2000). Classroom-level variance and school-level variance could not be effectively separated because most participating schools had only one grade-4 classroom. This may have caused disaggregation bias for the effects of school-level predictors on reading literacy achievement.

To conclude, the present study can be seen as a first step in unraveling the predictors that influence the reading literacy decline. Although cross-national research is necessary to further investigate the international decline and frame additional policy and educational implications, the current study clearly provides several clues that may counteract the reading-literacy decline.

First, the results from the current study indicate that attention should be paid to more complex cognitive processes such as examining and evaluating the content of texts, and interpreting and integrating ideas and information. Ness (2011) found that although the amount of time teachers dedicated to teaching reading strategies

was on the rise, the number of strategies taught was limited and there was an absence of multiple strategy instruction. In order to enhance teacher instruction, investments in both the improvement of the quality of teacher education and the quality of the available resources and materials are necessary (Kuiper, Van der Hoeven, Folmer, Van Graft, & Van den Akker, 2010; Ness, 2011).

The second recommendation stems from the evidenced relationship between early literacy activities, such as reading books and telling stories, and reading achievement. Sénéchal and LeFrevre (2002) found that parental involvement in both informal interactions to print, such as shared book reading experiences, as well as more formal interactions, such as teaching their child about reading and writing, before the beginning of grade 1 were directly or indirectly linked to reading outcomes at the end of grade 3. In order to enhance the knowledge of the parents on this subject and to improve the home literacy environment, family literacy programs are an important tool and are proven to have a positive outcome on reading achievement of children (cf. Van Steensel, McElvany, Kurvers, & Herppich, 2011).

Third, the current study shows that an achievement gap between minority groups and their peers still exists. Continued attention to cultural and linguistic diversity in schools can therefore be recommended. This finding confirms the need for early literacy programs that are aimed at closing the achievement gap between at-risk children and their peers before the children enter primary education (e.g. Stoep & Van Elsäcker, 2005). In previous research, Dickinson and Porche (2011) found that the language support children receive before grade 1 has effects on reading comprehension in grade 4. But they stress that the way teachers interact with the children, the language they use (such as the use of sophisticated vocabulary), is of vital importance.

References

August, D., & Shanahan, T. (Eds.). (2006). *Developing literacy in second-language learners*. Mahwah, NJ: Lawrence Erlbaum Associates.

Bauerlein, M., Munson, L., Prehoda, L., Stotsky, S., Greene, J. P., & O'Connor, E. (2008). "To read or not to read": Responses to the new NEA study. *Academic Questions, 21*(2), 195-220.

Bracken, S.S., & Fischel, J.E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education & Development, 19*(1), 45-67.

Bradshaw, J., Ager, R., Burge, B., & Wheater, R. (2010). *PISA 2009: Achievement of 15-year-olds in England*. Slough, England: NFER.

Caro, D.H., & Lenkeit, J. (2012). An analytical approach to study educational inequalities: 10 hypothesis tests in PIRLS 2006. *International Journal of Research and Method in Education, 35*(1), 3-30.

Central Bureau of Statistics. (2000). *Standaarddefinitie allochtonen [Standard definition immigrants]*. The Hague, The Netherlands: Author.

Central Bureau of Statistics. (2009). *Bevolkingstrends [Trends in population].* The Hague/Heerlen, The Netherlands: Author.

Clark, C. (2012). *Children's and young people's reading today: Findings from the 2011 National Literacy Trust's annual survey*. London: National Literacy Trust.

De Jong, P.F., & Leseman, P.M. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology, 39*(5), 389-414.

Dickinson, D.K., & Porche, M.V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development, 82*(3), 870–886.

Dronkers, J. (2010). *Positieve maar ook negatieve effecten van etnische diversiteit in scholen op onderwijsprestaties? Een empirische toets met internationale PISA-data. [Positive but also negative effects of ethnic diversity in schools on educational achievement? An empirical test with cross-national PISA-data]*. Inaugural speech, June 17, 2010. Maastricht, Maastricht University, School of Business and Economics.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*(1), 78-103.

Duke, N.K., & Pearson, D. (2002). Effective practices for developing reading comprehension. In A.E. Farstrup & S.J. Samuels (Eds.), *What research has to say about reading instruction* (pp. 205–242). Newark, DE: International Reading Association.

Enders, C.K. (2010). *Applied missing data analysis*. New York & London: The Guilford Press.

Foy, P., & Kennedy, M. (2008). *PIRLS 2006 user guide for the international database*. Boston, MA: International Study Center, Lynch School of Education, Boston College.

Gioia, D. (Eds.). (2008). *To read or not to read: A question of national consequence*. Washington, DC: DIANE Publishing.

Greenhow, C., & Robelia, B. (2009). Old communication, new literacies: Social network sites as social learning resources. *Journal of Computer-Mediated Communication, 14*(4), 1130-1161.

Guthrie, J.T., Wigfield, A., Barbosa, P., Perencevich, K.C., Taboada, A., Davis, M.H., Scafiddi, N.T., & Tonks, S. (2004). Increasing reading comprehension and engagement through concept-oriented reading instruction. *Journal of Educational Psychology, 96*(3), 403–423.

Guthrie, J.T., McRae, A., Coddington, C.S., Klauda, S.L., Wigfield, A., & Barbosa, P. (2009). Impacts of comprehensive reading instruction on diverse outcomes of low- and high-achieving readers. *Journal of Learning Disabilities, 42*(3), 195-214.

Hoff, E. (2013). Interpreting the early language trajectories of children from low-SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology, 49*(1), 4-14.

Hofferth, S.L. (2010). Home media and children's achievement and behavior. *Child development, 81*(5), 1598-1619.

Hofferth, S.L., & Moon, U.J. (2012). Electronic play, study, communication, and adolescent achievement, 2003–2008. *Journal of Research on Adolescence, 22*(2), 215-224.

Hox, J. (1998). Multilevel modeling: When and why. In I. Balderjahn, R. Mathar, & M. Schader (Eds.), *Classification, data analysis, and data highways,* 147–154. New York: Springer Verlag.

Huysmans, F., De Haan, J., & Van den Broek, A. (2004). *Achter de schermen: Een kwart eeuw lezen, luisteren, kijken en internetten [Behind the scenes: A quarter century of reading, listening, watching and internet use]* . The Hague, The Netherlands: Sociaal en Cultureel Planbureau.

Hyde, J. S. (2005). The gender similarities hypothesis. *The American Psychologist*, *60*(6), 581–592. International Association for the Evaluation of Educational Achievement (2001 - 2011). *PIRLS reading literacy test and questionnaires.* Chestnut Hill, MA: Boston College.

Jerrim, J. (2011). *England's "plummeting" PISA test scores between 2000 and 2009: Is the performance of our secondary school pupils really in relative decline*. Department of Quantitative Social Science - Institute of Education: University of London.

Kuiper, W., Van der Hoeven, M., Folmer, E., Van Graft, M., & Van den Akker, J. (2010). *Leerplankundige analyse van PISA-trends [Curriculum-based analysis of PISA- trends].* Enschede: Stichting Leerplanontwikkeling.

Lubienski, S.T., & Crane, C.C. (2010). Beyond free lunch: Which family background measures matter? *Education Policy Analysis Archives*, *18*(11), 1-43.

Ma, X. (2008). Within-school gender gaps in reading, mathematics, and science literacy. *Comparative Education Review 52*(3), 437-460.

Ma, X., & Cartwright, F. (2003). A longitudinal analysis of gender differences in affective outcomes in mathematics during middle and high school. *School Effectiveness and School Improvement*, *14*(4), 413–439.

Marks, G.N. (2005) Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and Racial Studies, 28*(5), 925-946.

Marks, G.N. (2008). Accounting for the gender gaps in student performance in reading and mathematics: Evidence from 31 countries. *Oxford Review of Education, 34*(1), 89-109.

Martin, A.J., Liem, G.A.D., Mok, M.M.C., & Xu, J. (2012). Problem solving and immigrant student mathematics and science achievement: Multination findings from the Programme for International Student Assessment. *Journal of Educational Psychology*, doi: 10.1037/a0029152.

Martin, M.O., Mullis, I.V.S., & Kennedy, A.M. (Eds.). (2007). *PIRLS 2006 technical report*. Chestnut Hill, MA: Boston College.

McKeown, M.G., Beck, I.L., & Blake, R.G.K. (2009). Rethinking reading comprehension instruction: A comparison of instruction for strategies and content approaches. *Reading Research Quarterly, 44*(3), 18-253.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report.* Boston, MA: International Study Center, Lynch School of Education, Boston College.

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

Muthén, B. (1991). Multilevel factor analysis of class and student achievement components. *Journal of Educational Measurement, 28,* 338-354.

Muthén, L.K. & Muthén, B.O. (1998-2012). *Mplus User's Guide. Seventh Edition*. Los Angeles, CA: Muthén & Muthén.

Ness, M. (2011). Explicit reading comprehension instruction in elementary classrooms: Teacher use of reading comprehension strategies. *Journal of Research in Childhood Education, 25*(1), 98-117.

Oakhill, J.V., & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading, 16*(2), 91–121.

Opdenakker, M.C., & Van Damme, J. (2000). The importance of identifying levels in multilevel analysis: An illustration of the effects of ignoring the top or intermediate levels in school effectiveness research. *School Effectiveness and School Improvement, 11,* 103-130.

Organisation for Economic Co-operation and Development (OECD). (2000-2010). *PISA.* Paris, France: Author.

Perkins, R., Moran, G., Cosgrove, J., & Shiel, G. (2010). PISA 2009: *The performance and progress of 15-year-olds in Ireland. Summary report*. Dublin: Educational Research Centre.

Portes, A., & Macleod, D. (1996). Educational progress of children of immigrants: The roles of class, ethnicity, and school context. *Sociology of Education, 69*, 255-275.

Rauh, V.A., Parker, F.L., Garfinkel, R.S., Perry, J., & Andrews, H.F. (2003). Biological, social, and community influences on third-grade reading levels of minority head start children: A multilevel approach. *Journal of Community Psychology, 31,* 255-278.

Rutkowski, L., Gonzalez, E., Joncas, M., & Von Davier, M. (2010). International large-scale assessment data: Issues in secondary analysis and reporting. *Educational Researcher, 39*, 142-151.

Rutkowski, D., Rutkowski, L., & Plucker, J.J. (2012). Trends in education excellence gaps: A 12-year international perspective via the multilevel model for change. *High Ability Studies, 23*(2), 143-166.

Scheerens, J., Luyten, H., & Van Ravens, J. (2011). *Visies op onderwijskwaliteit met illustratieve gegevens over de kwaliteit van het Nederlandse primair en secundair onderwijs [Visions on quality of education with illustrative data on the quality of Dutch primary and secondary education].* Enschede, The Netherlands: University Twente.

Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading, 10*(1), 59-87.

Sénéchal, M., & LeFevre, J.A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child Development, 73*(2), 445-460.

Serpell, R. (2001). Cultural dimensions of literacy promotion and schooling. In L. Verhoeven & C. Snow (Eds.), *Literacy and motivation: Reading engagement in individuals and groups,* 243-273. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Sirin, S.R. (2005). Socio-economic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Snijders, T.A.B., & Bosker, R.J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd Edition). London: Sage Publishers.

Sonnenschein, S., Stapleton, M.L., & Benson, A. (2010). The relation between the type and amount of instruction and growth in children's reading competencies. *American Educational Research Journal, 47*(2), 358-389.

Spörer, N., Brunstein, J.C., & Kieschke, U. (2009). Improving students' reading comprehension skills: Effects of strategy instruction and reciprocal teaching. *Learning and Instruction, 19*, 272-286.

Stoep, J., & Van Elsäcker, W. (2005). *Peuters interactief met taal [Interactive language with toddlers]*. Nijmegen, The Netherlands: National Center for Language Education.

Suggate, S.P., Schaughency, E.A., & Reese, E. (2013). Children learning to read later catch up to children reading earlier. *Early Childhood Research Quarterly, 28*, 33-48.

Thomson, S., De Bortoli, L., Nicholas, M., Hillman, K., & Buckley, S. (2010). *Highlights from the full Australian report: Challenges for Australian education: Results from PISA 2009.* Australia: ACER.

UNESCO Institute for Statistics. (1999). *Operational manual for ISCED 1997: International standard classification of Education*. Paris: Author.

Van Keer, H. (2004). Fostering reading comprehension in fifth grade by explicit instruction in reading strategies and peer tutoring. *British Journal of Educational Psychology, 74*, 37-70.

Van Steensel, R., McElvany, N., Kurvers, J., & Herppich, S. (2011). How effective are family literacy programs? Results of a meta-analysis. *Review of Educational Research, 81*(1), 69-96.

Verhoeven, L., & Van Leeuwe, J. (2008). Prediction of the development of reading comprehension: A longitudinal study. *Applied Cognitive Psychology, 22*, 407-423.

Verhoeven, L., & Van Leeuwe, J. (2012). The simple view of second language reading throughout the primary grades. *Reading & Writing, 25*, 1805-1818.

Vermeer, N., & Van Der Steeg, M. (2011). *Onderwijsprestaties Nederland in perspectief [Education Performance of the Netherlands in perspective].* The Hague, The Netherlands: CPB.

Whitehurst, G.J., & Lonigan, C.J. (1998). Child development and emergent literacy. *Child Development, 69*(3), 848-872.

Yang Hansen, K., Rosén, M., & Gustafsson, J.E. (2011). Changes in the multi-level effects of socio-economic status on reading achievement in Sweden in 1991 and 2001. *Scandinavian Journal of Educational Research, 55*(2), 197-211.

Yuan, K.H., & Bentler, P. (2000). Three likelihood-based methods for mean and covariance structure analysis with nonnormal mising data. *Sociological Methodology, 30*, 165-200.

Yuan, K.H., Yang-Wallentin, F., & Bentler, P. (2012). ML versus MI for missing data with violation of distribution conditions. *Sociological Methods & Research, 41,* 598-629.

Wilkinson, A.A.G. (1998). Dealing with diversity: Achievement gaps in reading literacy among New Zealand students. *Reading Research Quarterly, 33*(2), 144-167.

Chapter 6
Summary and discussion

This thesis attempted to identify predictors that explain the individual variation in reading literacy achievement in the Netherlands, across subgroups of students, school subjects and time. Four studies were executed, to explore (1) the predictors of reading literacy at the level of the student, the home, the classroom and the school, (2) the specificity of the predictors in terms of linguistic diversity, (3) the commonalities and differences between the predictors for reading and mathematics achievement and (4) the stability of reading achievement and the impact of the predictors over time. In this final chapter the findings of the four studies will be reviewed, limitations of working with large-scale assessment data will be discussed and some implications will be provided.

6.1 Predictors of reading literacy

The predictors of reading literacy achievement for first (L1) and second (L2) language students was the main focus of the first study in this thesis. For this study we used PIRLS data in combination with data from a national survey called *Cohort Study Primary Education* (PRIMA). By combining these studies we were able to provide a longitudinal view on the development of reading literacy from grade 4 to the end of primary school, grade 6, for L1 and L2 students. We examined the differences between L1 and L2 students in reading literacy achievement, decoding, language skills, mathematics, nonverbal reasoning skills, reading motivation, academic self-confidence and home reading resources and explored whether these predictors were to the same extent related to reading literacy achievement for L1 and L2 students.

The results showed that L1 students outperform L2 students in regard to reading achievement and language scores, which is consistent with previous research (e.g. Droop & Verhoeven, 2003; Kindler, 2002; Koda, 2007) and that these differences in achievement persisted in 6th grade. Significant differences between L1 and L2 students were also found in mathematics and nonverbal reasoning skills, which may be related to problems that L2 students experience in understanding school-based instruction in Dutch schools (cf. Cummins, 2000). Structural equation modeling showed that the reading literacy development in both L1 and L2 students could be

explained from decoding, language skills, mathematics and reasoning skills, as well as their reading motivation and self-confidence. For both groups, a strong autoregressive relationship of reading comprehension in grades 4 and 6 was demonstrated. The results are in line with the Simple View of Reading that states that reading literacy achievement is a product of two components; decoding and language comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990). However, while some research suggests that the influence of decoding skills is of lesser importance in the upper grades of primary education (Joshi, Williams, & Wood, 1998), our research evidenced the influence of decoding skills even at the end of primary school for both L1 and L2 students.

Our findings also confirmed the influence of reading motivation and self-confidence on reading achievement (e.g. Guthrie & Wigfield, 2000); both L1 and L2 students with a high reading motivation and self-concept in grade 4 showed better reading literacy abilities in grade 6. While we expected reading motivation and self-confidence to relate to reading achievement for both L1 and L2 students, we still anticipated a difference in the level of reading motivation and academic self-confidence between L1 and L2 students due to the discrepancy between the L2 students language abilities and the language being used in the school curriculum that could affect these factors (e.g. Aarnoutse, Van Leeuwe, Voeten, & Oud, 2001; Guthrie, Coddington, & Wigfield, 2009). A new finding of this study is that there seem to be no differences with regard to the amount of reading motivation and academic self-confidence between L1 and L2 students. This seems to illustrate that for L2 students the belief in their own reading capacities and the motivation to read is not affected by their lesser reading abilities compared to their L1 peers.

The home literacy environment was found to differ between the groups of L1 and L2 students, with first language students reporting more home reading resources - such as the number of books in the home, the presence of a computer and a newspaper in the home- than their L2 peers, confirming the outcome of earlier studies (cf. Scheele, Leseman, & Mayo, 2010). Furthermore, the results showed that the home environment influences reading achievement for L1 students, which corresponds with previous research (e.g. Dickinson & Porche, 2011). However, our study contributes to the debate about the influence of the home literacy environment on reading achievement (cf. De Jong & Leseman, 2001; Scheele et al., 2010) by showing a positive relationship between home reading resources and reading achievement for L1 students, while no such relationship was found for L2

students. This suggests that the home literacy environment provided by the parents is of lesser importance for the development of reading skills for L2 students, than for their L1 peers. Based on the present study, however, stating that the home literacy environment of L2 students has no relationship with their reading achievement is premature. More in-depth research (such as interviews with parents to better outline the home literacy environment) is needed to shed more light on this relationship.

6.2 Role of linguistic and sociocultural diversity

In Chapter 3, the impact of linguistic and sociocultural diversity on reading literacy achievement was explored. In this study we focused on the differences between L2 students with a Turkish or Moroccan ethnic background and native Dutch students (L1). We sought to find out whether differences between L1 and L2 students in reading literacy achievement and various student, home and school predictors could be evidenced, as well as whether these predictors were to the same extent related to the reading literacy abilities of L1 and L2 students. A multilevel modeling analysis, which takes into account the hierarchical structure and interdependent nature of the data (Snijders & Bosker, 2012) was conducted using PIRLS 2006 data to explore to what extent linguistic background, socioeconomic status (SES), the home and school literacy environment and reading attitudes explain differences in the individual variation in reading literacy achievement of L1 and L2 students.

The study showed that L1 students performed significantly better on reading literacy than L2 students and that L1 students reported more home reading resources -such as the number of books in the home- and a more positive home reading environment. Also differences in the school literacy environment were found -L2 students reported more reading activities in- and outside school and they used the computer more often at school than the L1 students-. No differences were found between the subgroups on reading attitudes, showing again that the motivation to read and self-confidence about their own reading abilities can be considered the same for L1 and L2 students.

Multilevel modeling analysis was performed estimating a sequence of five models. In the final model, linguistic background, various aspects of home and school SES, home and school literacy environment and reading attitudes made significant contributions to the prediction of students' reading literacy achievement.

At the level of the student, the study showed students' reading attitude to be an important predictor of reading literacy achievement, supporting previous findings (e.g. Eccles & Wigfield, 2002; Guthrie & Wigfield, 2000). Students who are motivated to read, who have a positive reading attitude and are confident they are good readers, have better reading abilities. With respect to the level of the parents, predictors related to the SES of the home -education level of the mother and father and occupation of the mother- were related to reading achievement, in accordance to earlier research (e.g. Sirin, 2005). Moreover, this study confirmed that the lower achievement of L2 students cannot be fully explained by SES factors (Marks, 2005; Lubiensky & Crane, 2010). Also the positive effect of the home literacy environment -parents attitudes toward reading- and the early literacy activities undertaken by the parents with their child before it began grade 1 -such as reading books and telling stories- on reading achievement was confirmed (e.g. Bracken & Fischel, 2008), even beyond the influence of family SES background variables (e.g. Sénéchal, 2006). Regarding school-level predictors, we found the percentage of L2 students in a school influenced the reading literacy abilities of all students, which was consistent with previous studies indicating the influence of school population on individual achievement (Dronkers, 2010; Rauh, Parker, Garfinkel, Perry, & Andrews, 2003). Also, the reading achievement decreased with an increase in the number of reading activities in a class. This suggests that in classes with a relatively large amount of students struggling with reading, the teacher sets aside more time for reading activities, which is a result of the Dutch educational system that allows schools to determine their own curriculum.

In order to determine whether the strengths of the relationships between the predictors and reading achievement outcomes were the same for L1 and L2 students, the interaction effects were also examined. The study did not show any significant differences in effect between the groups of L1 and L2 students. Which suggests that the relationships between the predictors used in the model and reading literacy achievement are highly similar for L1 and L2 students.

6.3 Predictors of reading literacy and mathematics achievement

In order to arrive at a comparative multilevel model displaying the commonalities and differences between the predictors in relation to both reading and mathematics achievement, we examined the differential relationship between these subjects and an array of predictors on the level of the student, home, class

and school by combining the PIRLS and TIMSS 2011 studies. Both PIRLS and TIMSS are conducted under auspices of the IEA (*International association for the evaluation of Educational Achievement*) and conducted their data collection together in 2011. The Netherlands not only participated in PIRLS and TIMSS, but also in an additional project in which the same students were tested in reading literacy and in mathematics. This study, described in Chapter 4, outlined a sequence of eight multilevel modeling analyses, which examined the relation of several factors with both reading and mathematics achievement. Based on current literature, we included factors related to student characteristics, parental support, student engagement, school and teacher characteristics and educational practices in the analyses.

The outcomes of the multilevel analyses displayed a strong association between reading literacy and mathematics achievement, in line with previous research (e.g. Grimm, 2008; Purpura, Hume, Sims, & Lonigan, 2011) and showed that for both subjects most of the variance could be 'explained' by differences between individual students, although differences between schools and classes also allocated a considerable amount. The comparative model showed five common factors that had a significant effect on both reading literacy and mathematics achievement, all factors on the level of the individual student. The first common factor was the age of a student when starting grade 1; students who stayed an extra year in kindergarten -for instance because of slower academic or social progress-, still lag behind their classmates regarding achievement levels at fourth grade. This result contributes to the debate about grade retention and supports the view that merely repeating the kindergarten curriculum is not enough to reach a positive effect, increasing both quantity and quality of the learning opportunities for repeaters is necessary to attain better achievement outcomes (Hong & Raudenbush, 2005). Furthermore, two common factors were found to be related to parental support; the amount of parental involvement and the educational expectations of the parents. These results showed that Dutch parents are well aware of the actual achievement level of their children and they adjust their actions –such as helping their child with homework- according to the need of the child. This endorsed previous research that the views of parents concerning their children's academic successes and failures, influences their children's academic abilities (cf. Meece, Bower-Glienke, & Burg, 2006). The fourth and fifth common factors, both related to student engagement, were school enjoyment and self-concept. Students who enjoy

school showed better achievement outcomes, which corresponds with the literature on the influence of the school climate on achievement (cf. Thapa, Cohen, Guffey, & Higgins-D'Allessandro, 2013). Our research showed that although self-concept was an important factor for both reading and mathematics achievement, the effect was much stronger for mathematics. The importance of self-concept for students' achievement has been well established in previous research (e.g. Petscher, 2010; Wigfield & Eccles, 2000).

Next to these commonalities, some differential factors were detected for reading and mathematics achievement. First, student involvement in mathematics lessons as well as mathematics attitude showed a negative relationship with mathematics achievement. This is in contrast with reading achievement, for which no relationships were found between involvement in reading lessons and reading attitude with achievement. This suggests that, for mathematics, the self-concept of students about their abilities outweighs the students' attitude and involvement. Hence a student does not have to like mathematics, it just has to believe it will succeed in it. Second, our study showed that the students' home environment - more specifically early literacy activities- and SES had an effect on reading achievement, supporting previous findings (e.g. Davidse, De Jong, Bus, Huijbregts, & Swaab, 2011; Thiel, 2012). However, no relation was found between factors relating to the home environment and mathematics achievement. This is in line with the research of Eamon (2002) who found that the cognitive home environment -such as the activities and experiences provided by the parents- were related to reading achievement, but not to mathematics achievement. This suggests that mathematics is much more a school-related skill, whereas the groundwork for future reading ability is laid in the home environment.

6.4 Stability of reading literacy achievement over time

In Chapter 5 a multilevel analysis was conducted using PIRLS 2001, 2006 and 2011 data in order to investigate the changes in reading literacy achievement and to explore the (changing) role of various relevant sociocultural and educational factors in explaining the variation in reading literacy in the Netherlands. The results showed a significant decline in reading literacy achievement of 4th grade students in the past decade, although the largest decline occurred between 2001 and 2006, and the mean achievement seemed to stabilize between 2006 and 2011. When examining the trend further, the results indicated that the decline in reading literacy

achievement could be attributed to a decline in achievement regarding the higher-order comprehension processes. Students appeared to be less skilled nowadays in answering test items that require complex cognitive processes and reading experience, such as knowledge of text structure and the skill to identify the main idea of a text, than students ten years ago.

Further analyses revealed that the trend in reading literacy achievement was related to gender differences and to some extent with the influence of SES of students but not with ethnic or linguistic background. The multilevel modeling analysis showed no interaction effects for linguistic background, suggesting that the influence of the linguistic background on student achievement has remained the same in the last ten years. Four factors were found to have a link with the revealed trend in reading achievement. First, the gender gap in reading achievement (girls outperforming boys) seems to be leveling, which is in line with recent research suggesting that the gender gap is in fact closing (Lindberg, Hyde, Petersen, & Linn, 2010; Rutkowski, Rutkowski, & Plucker, 2012). The gender gap was the largest in 2001, reduced almost by half in 2006 and stabilized in 2011. This achievement pattern and the evidenced interaction effects indicated that the average decline in reading literacy achievement in the Netherlands can be attributed to a declining performance of the girls. Second, we found that the influence of the proportion of students in a class with either low or high SES was smaller in 2011 than in 2001. Thus the school SES composition seems to be of less importance now, than it was ten years ago. Third, there was a link between the achievement trend and early literacy activities. Early literacy activities in the home undertaken by the parents -such as reading books and telling stories- were found to have a significant positive relationship with reading literacy at grade 4, which is in agreement with previous research (e.g. Dickinson & Porche, 2011). Furthermore, early literacy activities at home predicted reading achievement above and beyond the influence of family background variables, as stated in earlier research (Sénéchal & LeFevre, 2002). Moreover, our research indicated that the decline in reading literacy achievement in the past decade was less for students whose parents had undertaken more early literacy activities at home than for their peers whose parents had undertaken less early literacy activities. In addition, more students had some literacy skills -such as writing some letters or reading some words- before they entered grade 1. This school-level variable “early literacy abilities” was the fourth factor that showed a link with the trend in reading achievement. As stated before, more children

displayed early literacy skills before grade 1 in 2011, compared to children in 2001. However, the pattern of interaction results implied that the relationship of reading literacy achievement in grade 4 with early literacy abilities was declining over time from 2001 to 2011. In 2001, a positive relationship was observed between early literacy abilities -such as being able to write some letters or read some words- and reading literacy achievement, while the relationship between the two variables became negative in 2011. Therefore, the long-term advantage of teaching preschool children to read and write seems unclear, while the benefits of early literacy activities, such as shared book reading, are evident.

Previous studies showed that SES, ethnicity and linguistic background are strong predictors of reading literacy achievement (e.g. Sirin, 2005; Verhoeven & Van Leeuwe, 2012), however, our approach to put all these predictors in one multilevel design revealed that the effect of students' sociocultural and linguistic background goes beyond the impact on the level of the student. Besides the effects of SES, ethnicity, linguistic background and number of books in the home at the student level, contextual effects at the class or school level appeared for all four predictors. In classes with on average low SES, low average number of books in the home, and a higher proportion of students from an ethnic or linguistic minority group, average reading literacy achievement was lower. The class composition appeared to reinforce the effects of the student level background variables on reading literacy achievement. These findings showed that the school composition may strengthen inequalities between minority students and their peers. Also, the results of our analysis made it clear that sociocultural and linguistic factors make a unique contribution in explaining the individual variation in reading literacy achievement. This shows the need for including linguistic background alongside factors such as ethnicity and SES, in a model that is aimed at explaining differences in reading literacy achievement between socioculturally diverse groups (cf. Martin, Liem, Mok, & Xu, 2012).

6.5 Limitations

The research methodology that is used in this thesis and that is typically used when working with internationally comparative large scale assessment data still holds a number of questions and issues that need to be taken into consideration when interpreting the results and in future research (Rutkowski, Gonzalez, Joncas, & Von Davier, 2010).

First, multilevel analysis is the newest available technique that can be used when working with data from international comparative studies. In standard one-level analysis methods the assumption is made that the data is obtained through a random one-stage sampling method, where all students in a given population have the same chance of being selected. In practice, however, international comparative studies conduct multi-stage sampling methods, where first schools are selected at stage one and classes and students within these schools are selected at the next stages. Therefore the assumption of identically distributed and independent observations that a one-level analysis method requires is not the case. Educational data is clustered (nested) data, in which a student is nested within a class, which is nested within a school. Classes nested in a school and students nested in a class have similar characteristics and are interdependent. When we fail to take into account the hierarchical structure of the data and the interdependence, an accurate estimation of population parameters cannot be made and the standard errors are negatively biased, which results in inflated test statistics (Agresti & Finlay, 2009; Snijders & Bosker, 2012). Therefore when analyzing large scale assessment data from international comparative studies a multilevel modeling analysis should be conducted. The clustering of students in classes and schools leads to variation in the data at three different levels, the level of the student, the class and the school. However, due to limitations of the statistical packages -no or very slow convergence of the iterations encountered when working with comprehensive models- in two studies, outlined in this thesis, we chose to use two-level models, which means that it is possible that standard errors may have been underestimated.

Second, test scores for reading literacy achievement are missing by design. Therefore, five plausible values for each student on the total reading test -as well as on the mathematics test used in Chapter 4- are used. There are some statistical options to handle these plausible values. A few statistical software programs can make use of multiple imputation, analyzing five data sets for each criterion variable and averaging the analysis results automatically. When using software that does not have this multiple imputation option, the analysis can be conducted with one plausible value at a time as the dependent variable, after which the effect sizes of the variables for all five plausible values can be averaged, taking into account the difference in standard errors of each of the five plausible values (Von Davier, Gonzalez, & Mislevy, 2009).

The third complication we encountered when analyzing the PIRLS data was that the predictor variables at different levels had missing values due to non-response or incomplete answers. The predictor variables are derived from four questionnaires, one filled in by the students, one by their parents, one by their teachers, and one by their school principals. Especially the parental questionnaire showed a large amount of missing data in all three PIRLS measurements. More importantly, it appeared that higher educated parents seemed more inclined to complete the questionnaire than lower educated parents. There are different possibilities in how to handle these missing data. In Chapter 5 we used all available data in the analyses. We included the variances of the predictors at the appropriate levels in the models as parameters to be estimated. Thereby, the missing values were taken care of in the full information maximum likelihood (FIML) estimation procedure in Mplus. In Chapter 2 multiple imputation was chosen to handle the missing values in the dataset using SAS software. In Chapter 4 we chose to delete all students with missing parent-, school- and/or teacher questionnaires.

The fourth and final complication we encountered when analyzing the PIRLS data was that the sampling procedure for the data collection in 2011 differed from the procedure for the previous two data collections. In 2001 and 2006 selection probabilities of schools varied according to school size (probability proportionate to size sampling technique); in 2011 all schools had an equal probability of being selected (systematic sampling with equal probabilities technique). This had consequences for our analyses in Chapter 5. The differing selection probabilities made the use of sampling weights for schools necessary when conducting analyses. Weights are usually used in the multilevel models to accommodate the sampling design. These weights adjust for disproportional sampling and for non-compliance of schools. In our multilevel model in Chapter 5 we only used school-level weights, applied to the class level in the two-level models. No weights were used for the classes and the students because all grade-4 classrooms with all their students of a selected school entered the sample. Since school size was in the models as a covariate, one may argue that use of sampling weights was not necessary. The proper use of sampling weights for international comparative research is under debate, although the use or non-use of these weights does not seem to affect the finding of significant effects (Snijders & Bosker, 2012).

6.5 Implications

"One of the major challenges for each and every school system is to decide what interventions it should make in order to improve its performance" (Mourshed, Chijioke, & Barber, p. 24, 2010). The studies outlined in this thesis suggest that educational policy reforms in the Netherlands should focus on three aspects: early literacy, higher-order comprehension processes and school climate.

To begin with, this thesis showed an achievement gap between L1 and L2 students, that was persistent during the last decade. Most L2 students enter primary education with a very limited knowledge of the Dutch language and the Dutch educational system seems to be struggling with closing this gap (Verhoeven & Vermeer, 2006). Also, this thesis confirmed the gap between students from low SES and high SES families and recognized the influence of sociocultural factors, such as the number of books in the home. The solution for these achievement gaps seems to lie in early intervention, such as provided by early education programs. These programs focus on all at-risks students -from low SES backgrounds, or ethnic or linguistic minority groups- and try to prevent or close the gap before students enter first grade at age six (Lesaux & Siegel, 2003). These programs should be aimed at both the literacy environment that is offered in daycare, playgroup and kindergarten, as well as the home literacy environment.

Our research has shown that the influence of teaching young children to read and write before grade 1 seems to have a limited outcome in the upper grades, while the early literacy activities at home -such as reading books together- has a strong positive relationship with reading ability in grade 4. This suggests that early education programs should focus on enhancing the language skills of young children by vocabulary stimulation. The programs should teach educators about the importance of early literacy activities. Educators have to be mindful of their own practices and the quality of the support they provide -such as the use of sophisticated vocabulary- in order to enhance the children's language development (Dickinson & Caswell, 2007; Dickinson & Porche, 2011). Castro, Páez, Dickinson, & Frede (2011) provide an overview of instructional practices and strategies that are of importance in teaching L2 students in early education.

Although changes in the home are more difficult to establish, parents are an important tool in trying to close this achievement gap since continuity between home and school/kindergarten experiences are essential in the context of cultural and linguistic diversity (Dickinson & Tabors, 2002). The need for parents to provide

an environment that fosters development and learning is reinforced by the results in this thesis. It is key to educate parents about the importance of literacy-related experiences for young children.

Our research has shown a decline in students reading performance in the last decade. To tackle the problem of these declining student results and to improve the reading achievement of students, more attention should be paid to the higher-order comprehension processes, such as examining and evaluating the content of texts. The Dutch educational system seems to be well equipped to teach the students the basic reading skills and the Dutch students have mastered these basic comprehension skills, as shown in the PIRLS results, but they experience difficulties when faced with questions that require more complex cognitive processes and reading experience. One way to achieve this is to put more emphasis on teaching reading strategies, particularly multiple strategy instruction (Ness, 2011). Teachers should receive additional (in-service) training to improve the quality of instruction and the necessary resources and materials should be provided.

Furthermore, the outcomes in this thesis are advocates for attention to the school-climate. Students benefit from a school environment in which they feel safe and experience a sense of belonging. In their literature review Thapa et al. (2013) associate aspects related to school safety, healthy relationships, engaged learning and teaching and school improvement efforts with school climate. School climate reforms are important to enhance students' overall well-being and therewith their achievement outcomes. Additionally, our findings show a strong relationship between student engagement and reading achievement. Teachers can foster student motivation and self-concept by providing a positive learning climate in which awards are given for students' commitments and efforts and less emphasis is put on performance (Stipek et al., 1998).

International comparative achievement studies, such as PIRLS, TIMSS and PISA (*Program for International Student Assessment)* aim at international benchmarking of education systems. These studies reveal trends in achievement, serve as an indicator of the quality of education (Borghans, 2007) and are becoming increasingly influential in shaping educational policies (Antenbrink, Burger, Cornet, Rensman, & Webbink, 2005; Pearson, 2012). First, they offer researchers a unique database for reading literacy and mathematics achievement and associated context variables and second, they can provide policy-makers with additional information and help them in developing educational policies and reforms based on research

evidence. Therefore it is important that the data from international comparative large-scale assessments are open source, freely accessible and easily useable for all researchers.

References

Aarnoutse, C., Van Leeuwe, J., Voeten, M., & Oud, H. (2001). Development of decoding, reading comprehension, vocabulary and spelling during the elementary school years. *Reading and Writing: An Interdisciplinary Journal, 14*, 61-89.

Agresti, A., & Finlay, B. (2009). *Statistical methods for the social sciences*. Upper Saddle River, NJ: Pearson Education.

Antenbrink, P., Burger, K., Cornet, M., Rensman, M., & Webbink, D. (2005). *Nederlands onderwijs en onderzoek in internationaal perspectief [The Dutch system of education: Performance, research, and innovation from an international perspective]*. Utrecht, The Netherlands: Dutch Bureau for Economic Policy Analysis.

Borghans, L. (2007). *De betekenis van internationale indicatoren voor de verbetering van het onderwijs [The meaning of international indicators for improving the education system]*. Maastricht, The Netherlands: University of Maastricht.

Bracken, S.S., & Fischel, J.E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education & Development, 19*(1), 45-67.

Castro, D.C., Páez, M.M., Dickinson, D.K., & Frede, E. (2011). Promoting language and literacy in young dual language learners: Research, practice, and policy. *Child Development Perspectives, 5*(1), 15-21.

Cummins, J. (2000). *Language, power, and pedagogy. Bilingual children in the crossfire*. Clevedon, England: Multilingual Matters.

Davidse, N.J., De Jong, M.T., Bus, A.G., Huijbregts, S.C.J., & Swaab, H. (2011). Cognitive and environmental predictors of early literacy skills. *Reading and Writing, 24*, 395-412.

De Jong, P.F., & Leseman, P.M. (2001). Lasting effects of home literacy on reading achievement in school. *Journal of School Psychology, 39*(5), 389-414.

Dickinson, D.K., & Caswell, L. (2007). Building support for language and early literacy in preschool classrooms through in-service professional development: Effects of the Literacy Environment Enrichment Program (LEEP). *Early Childhood Research Quarterly, 22*, 243-260.

Dickinson, D.K., & Porche, M.V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development, 82*(3), 870-886.

Dickinson, D., & Tabors, P. (2002). Fostering language and literacy in classrooms and homes. *Young Children, 57*(2), 10-18.

Dronkers, J. (2010). *Positieve maar ook negatieve effecten van etnische diversiteit in scholen op onderwijsprestaties? Een empirische toets met internationale PISA-data [Positive but also negative effects of ethnic diversity in schools on educational achievement? An empirical test with cross-national PISA-data]*. Inaugural speech, June 17, 2010. Maastricht, Maastricht University, School of Business and Economics.

Droop, M., & Verhoeven, L. (2003). Language proficiency and reading ability in first- and second-language learners. *Reading Research Quarterly, 38*, 78-103.

Eamon, M.K. (2002). Effects of poverty on mathematics and reading achievement of young adolescents. *The Journal of Early Adolescence, 22*(1), 49-74.

Eccles, J.S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*, 109-132.

International Association for the Evaluation of Educational Achievement. (1995 - 2011). *TIMSS mathematics and science test and questionnaires.* Chestnut Hill, MA: Boston College.

Gough, P.B., & Tunmer, W.E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*, 6-10.

Grimm, K.J. (2008). Longitudinal associations between reading and mathematics achievement. *Developmental Neuropsychology, 33*(3), 410-426.

Guthrie, J.T., Coddington, C.S., & Wigfield, A. (2009). Profiles of motivation for reading among African American and Caucasian students. *Journal of Literacy Research, 41*, 317-353.

Guthrie, J.T., & Wigfield, A. (2000). Engagement and motivation in reading. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Volume 3*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hong, G., & Raudenbush, S.W. (2005). Effects of kindergarten retention policy on children's cognitive growth in reading and mathematics. *Educational Evaluation and Policy Analysis, 27*(3), 205-224.

Hoover, W.A., & Gough, P.B. (1990). The simple view of reading. *Reading and Writing: An Interdisciplinary Journal, 2*, 127-160.

Joshi, R.M., Williams, K.A., & Wood, J.R. (1998). Predicting reading comprehension from listening comprehension: Is this the answer to the IQ debate? In C. Hulme & R.M. Joshi (Eds.), *Reading and spelling: Development and disorder*. Mahwah, NJ: Lawrence Erlbaum Associates.

Kindler, A.L. (2002). *Survey of the states' limited English proficient students and available educational programs and services, 2000-2001, summary report*. Washington, DC: National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs.

Koda, K. (2007). Reading and language learning: Cross-linguistic constraints of second language reading development. *Language Learning, 57*, 1-44.

Lesaux, N.K., & Siegel, L.S. (2003). The development of reading in children who speak English as a second language. *Developmental Psychology, 39*, 1005-1019.

Lindberg, S.M., Hyde, J.S., Petersen, J.L., & Linn, M.C. (2010). New trends in gender and mathematics performance: A meta-analysis. *Psychological Bulletin, 136*(6), 1123-1135.

Lubienski, S.T., & Crane, C.C. (2010). Beyond free lunch: Which family background measures matter? *Education Policy Analysis Archives*, *18*(11), 1-43.

Marks, G.N. (2005) Accounting for immigrant non-immigrant differences in reading and mathematics in twenty countries. *Ethnic and Racial Studies, 28*(5), 925-946.

Martin, A.J., Liem, G.A.D., Mok, M.M.C., & Xu, J. (2012). Problem solving and immigrant student mathematics and science achievement: Multination findings from the Programme for International Student Assessment. *Journal of Educational Psychology*. doi: 10.1037/a0029152

Meece, J.L., Bower-Glienke, B., & Burg, S. (2006). Gender and motivation. *Journal of School Psychology, 44*, 351-373.

Mourshed, M., Chijioke, C., & Barber, M. (2010). *How the world's most improved school systems keep getting better*. London: McKinsey & Company.

Ness, M. (2011). Explicit reading comprehension instruction in elementary classrooms: Teacher use of reading comprehension strategies. *Journal of Research in Childhood Education, 25*(1), 98-117.

Organisation for Economic Co-operation and Development. (2000-2010). *PISA.* Paris, France: Author.

Pearson. (2012). *The Learning Curve*. London: Author.

Petscher, Y. (2010). A meta-analysis of the relationship between student attitudes towards reading and achievement in reading. *Journal of Research in Reading, 33*(4), 335-355.

Purpura, D.J., Hume, L.E., Sims, D.M., & Lonigan, C.J. (2011). Early literacy and early numeracy: The value of including early literacy skills in the prediction of numeracy development. *Journal of Experimental Child Psychology, 110*(4), 647-658.

Rauh, V.A., Parker, F.L., Garfinkel, R.S., Perry, J., & Andrews, H.F. (2003). Biological, social, and community influences on third-grade reading levels of minority head start children: A multilevel approach. *Journal of Community Psychology, 31,* 255-278.

Rutkowski, L., Gonzalez, E., Joncas, M., & Von Davier, M. (2010). International large-scale assessment data: Issues in secondary analysis and reporting. *Educational Researcher, 39*, 142-151.

Rutkowski, D., Rutkowski, L., & Plucker, J.J. (2012). Trends in education excellence gaps: A 12-year international perspective via the multilevel model for change. *High Ability studies, 23*(2), 143- 166.

Scheele, A., Leseman, P.M., & Mayo, A.Y. (2010). The home language environment of monolingual and bilingual children and their language proficiency. *Applied Psycholinguistics, 31*, 117-140.

Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading, 10*(1), 59-87.

Sénéchal, M., & LeFevre, J.A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child development, 73*(2), 445-460.

Sirin, S.R. (2005). Socio-economic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Snijders, T.A.B., & Bosker, R.J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling (2nd Edition).* London: Sage Publishers.

Stipek, D., Salmon, J.M., Givvin, K.B., Kazemi, E., Saxe, G., & MacGyvers, V.L. (1998). The value (and convergence) of practices suggested by motivation research and promoted by mathematics education reformers. *Journal for Research in Mathematics Education*, 465-488.

Thapa, A., Cohen, J., Guffey, S., & Higgings-D'Allessandro, A. (2013). A review of school climate research. *Review of Educational Research*. doi: 10:3102/0034654313483907

Thiel, O. (2012). Socio-economic diversity and mathematical competences. *European Early Childhood Education Research Journal, 20*(1), 61-81.

Verhoeven, L., & Van Leeuwe, J. (2012). The simple view of second language reading throughout the primary grades. *Reading & Writing, 25*, 1805-1818.

Verhoeven, L., & Vermeer, A. (2006). Sociocultural variation in literacy achievement. *British Journal of Educational Studies, 54*(2), 189-211.

Von Davier, M., Gonzalez, E., & Mislevy, R. (2009). What are plausible values and why are they useful? *IERI. Monograph series. Issues and methodologies in large-scale assessments, 2*, 9-36.

Wigfield, A., & Eccles, J.S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68-81.

Nederlandse samenvatting
(Summary in Dutch)

In de hedendaagse informatiemaatschappij is leesvaardigheid essentieel voor het behalen van economisch en sociaal succes. Dit proefschrift brengt predictoren in kaart die de individuele variatie in leesvaardigheid van leerlingen in Nederland verklaren met als doel ons begrip van de factoren die kunnen leiden tot succesvolle leesprestaties te bevorderen. Hierbij staan sociaal-culturele en linguïstische diversiteit in relatie tot leesvaardigheid centraal. *Hoofdstuk 1* bevat een korte inleiding over dit overkoepelende thema. In *Hoofdstuk 2 – 5* worden vier studies beschreven die (1) de predictoren van leesvaardigheid op het niveau van de leerling, de ouders, de klas en de school identificeren, (2) de specificiteit van de predictoren in termen van de taalachtergrond van de leerlingen onderzoeken, (3) de gemeenschappelijkheden en de verschillen aan het licht brengen tussen de predictoren voor lees- en rekenvaardigheid en (4) de stabiliteit van het leesvaardigheidsniveau en de invloed van de predictoren in de tijd verkennen.

In alle studies in dit proefschrift is gebruikgemaakt van data afkomstig uit *Progress in International Reading Literacy Study* (PIRLS). PIRLS is een internationaal vergelijkend onderzoek op het gebied van leesvaardigheid dat wordt geïnitieerd door de *International Association for the Evaluation of Educational Achievement* (IEA). De internationale coördinatie van PIRLS is in handen van het *TIMSS en PIRLS International Study Cente*r verbonden aan het Boston College (VS). In Nederland voert het Expertisecentrum Nederlands in samenwerking met de Radboud Universiteit Nijmegen, Behavioural Science Institute, het Nederlandse aandeel in PIRLS uit in opdracht van het Ministerie van Onderwijs, Cultuur en Wetenschap en de Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO).

In het kader van PIRLS wordt wereldwijd onderzocht welke factoren thuis en op school samenhangen met het leesniveau van negen- en tienjarige kinderen. PIRLS hanteert de volgende definitie van leesvaardigheid: “Leesvaardigheid is de vaardigheid om geschreven taal, die van belang is in de maatschappij en/of van belang is voor het individu, te begrijpen en te gebruiken. Jonge lezers kunnen betekenis verlenen aan een verscheidenheid aan teksten. Ze lezen om te leren, ze lezen om deel uit te maken van groepen lezers op school en in het dagelijks leven, en ze lezen voor het plezier”. Het PIRLS-onderzoek wordt elke vijf jaar uitgevoerd, de eerste meting heeft in 2001

plaatsgevonden. De doelgroep van PIRLS bestaat uit leerlingen die vier jaar formele scholing hebben genoten; in Nederland zijn dit leerlingen uit groep 6. Naast de afname van de leestoets wordt met vragenlijsten informatie verzameld over de achtergrond van leerlingen, school- en thuiskenmerken. Er zijn vragenlijsten ontwikkeld voor de leerlingen, leerkrachten, schoolleiders en ouders.

PIRLS richt zich op drie aspecten van leesvaardigheid: Ten eerste maakt PIRLS onderscheid tussen twee *leesdoelen*, namelijk lezen voor ontspanning, om ervaring op te doen (verhalende teksten) en lezen om informatie te verzamelen en te gebruiken (informatieve teksten). Daarnaast dienen leerlingen bij het lezen (en begrijpen) van teksten verschillende processen te gebruiken. Zij hebben hierbij allerlei vaardigheden en strategieën nodig. De PIRLS-toets is zodanig samengesteld dat de leerlingen bij het beantwoorden van elke vraag telkens één van de volgende vier *begripsprocessen* moeten gebruiken; opzoeken en terugvinden van informatie in een tekst, directe conclusies trekken, interpreteren en integreren van ideeën en informatie, onderzoeken en evalueren van de inhoud, de taal en andere kenmerken van een tekst. Tot slot worden het *leesgedrag en de attitudes* van de leerlingen in kaart gebracht door vragen die worden gesteld in de leerlingvragenlijst.

In *Hoofdstuk 1* wordt het PIRLS-onderzoek nader uiteengezet en wordt ingegaan op het PIRLS-raamwerk. Dit raamwerk geeft een omschrijving van de doelen van PIRLS en beschrijft de toetsconstructie. Daarnaast worden de PIRLS-steekproeftrekking, de -toetsbatterij en de (internationale) -procedures beschreven. Ook wordt een model gepresenteerd dat de onderlinge relaties van de leerling-, ouder-, klas- en schoolpredictoren die worden gebruikt in de verschillende studies schetst.

Bij de eerste studie, beschreven in *Hoofdstuk 2*, is gebruikgemaakt van PIRLS-2001 data en data afkomstig uit een aanvullend Nederlands cohortonderzoek genaamd PRIMA. Het PRIMA-cohortonderzoek is tussen 1994 en 2005 uitgevoerd door ITS en het SCO-Kohnstamm Instituut. In een aanvullend onderzoek is bij een deel van de PRIMA-leerlingen in groep 6 naast de toetsen voor lees-, taal-, reken- en decodeer-vaardigheid en nonverbale cognitieve vaardigheden ook de PIRLS-2001 toetsbatterij afgenomen. Ook waren de toetsresultaten van deze leerlingen in groep 8 bekend.

De studie brengt ten eerste de verschillen en overeenkomsten tussen leerlingen die Nederlands leren als eerste (NT1) en als tweede (NT2) taal met betrekking tot verschillende predictoren in kaart. De groep NT2 leerlingen is hierbij gedefinieerd als leerlingen van wie beide ouders in het buitenland geboren zijn. Vervolgens is een longitudinaal model ontwikkeld waarmee de vaardigheden van leerlingen op het

gebied van begrijpend lezen in groep 8 voorspeld kunnen worden door de vaardigheden en achtergrondvariabelen in groep 6. Dit longitudinale model is toegepast voor de twee subgroepen leerlingen. Hierbij is onderzocht of de relaties tussen de predictoren en leesvaardigheid verschillend zijn voor NT1 en NT2 leerlingen.

De resultaten laten zien dat NT1 leerlingen over betere lees-, reken-, taalvaardigheden en non-verbale cognitieve vaardigheden beschikken dan NT2 leerlingen en dat NT1 leerlingen thuis een positiever leesklimaat hebben dan NT2 leerlingen (met o.a. meer boeken in huis, een computer en een krant). Met betrekking tot leesmotivatie en zelfvertrouwen (ten aanzien van schoolse prestaties) worden er geen verschillen gevonden tussen NT1 en NT2 leerlingen. Voor NT2 leerlingen wordt het geloof in hun eigen schoolse capaciteiten en de motivatie om te lezen dus niet beïnvloed door hun zwakkere leesvaardigheid in vergelijking met hun NT1 leeftijdsgenoten.

Het longitudinale model laat zien dat de ontwikkeling van leesvaardigheid voor zowel NT1 als NT2 leerlingen kan worden verklaard door hun decodeer-, reken- en taalvaardigheid, hun non-verbale cognitieve vaardigheden, en hun leesmotivatie en zelfvertrouwen ten aanzien van schoolse prestaties. Voor beide groepen wordt aangetoond dat leesvaardigheid in groep 6 een sterke voorspeller is voor leesvaardigheid in groep 8. Een opvallend verschil is dat het leesklimaat thuis (onder andere het aantal boeken thuis) wel een positieve relatie heeft met de prestaties van NT1 leerlingen, maar dat dit niet het geval is voor NT2 leerlingen. Dit suggereert dat het leesklimaat dat door de ouders wordt geboden van minder belang is voor de ontwikkeling van leesvaardigheid voor NT2 leerlingen, dan voor hun NT1 leeftijdsgenoten.

Ook in de tweede studie, die wordt beschreven in *Hoofdstuk 3*, ligt de focus op verschillen tussen NT1 en NT2 leerlingen. In deze studie bestaat de onderzoeksgroep van NT2 leerlingen uitsluitend uit Turks-Nederlandse en Marokkaans-Nederlandse leerlingen. Er is nader bestudeerd in welke mate leerling-, ouder-, school- en klaskenmerken samenhangen met de leesvaardigheid van de leerlingen en of de samenhang hetzelfde is voor NT1 en NT2 leerlingen. Hiervoor zijn analyses uitgevoerd op PIRLS-2006 data aan de hand van een multilevel analyse techniek. Deze techniek houdt rekening met de verschillende niveaus waarop de data verzameld zijn (leerlingen in klassen op scholen), maar ook met de geclusterde steekproeftrekking van PIRLS.

Het uiteindelijke multilevel model toont dat leerlingen die gemotiveerd zijn om te lezen, een positieve houding ten opzichte van lezen hebben en vol zelfvertrouwen zijn over hun leesprestaties, betere leesprestaties laten zien. Daarnaast blijken de verschillen tussen NT1 en NT2 leerlingen niet in zijn geheel te kunnen worden verklaard door de sociaal-economische status (SES) van de leerlingen.

Er zijn geen significante interactie-effecten aangetoond, hetgeen suggereert dat de relaties tussen de predictoren en leesvaardigheid vergelijkbaar zijn voor NT1 en NT2 leerlingen. Met andere woorden, de leesattitude van leerlingen is van even groot belang voor de leesprestaties van NT2 als NT1 leerlingen.

In de derde studie, beschreven in *Hoofdstuk 4,* is onderzocht in hoeverre de gevonden predictoren van leesvaardigheid ook samenhangen met rekenvaardigheid. In 2011 deed zich de unieke mogelijkheid voor om PIRLS te koppelen aan *Trends in Mathematics and Science Study* (TIMSS), omdat de dataverzameling van PIRLS en TIMSS in deze meting eenmalig gelijktijdig viel. TIMSS is een internationaal vergelijkend onderzoek, eveneens uitgevoerd onder de auspiciën van het IEA, op het gebied van rekenvaardigheid en natuuronderwijs (science). Er is, in samenwerking met Universiteit Twente, een aanvullend onderzoek uitgevoerd, genaamd TIPI, dat parallel liep aan de reguliere PIRLS- en TIMSS-dataverzameling. Voor het TIPI-onderzoek zijn bij leerlingen zowel de PIRLS-toets als de TIMSS-toets afgenomen.

Er blijkt een sterke relatie tussen leesvaardigheid en rekenvaardigheid. De multilevel analyse toont vijf gemeenschappelijke predictoren die significante relaties hebben met zowel lees- als rekenvaardigheid. De eerste predictor is de leeftijd van de leerling bij de start in groep 3. De analyses laten zien dat leerlingen die zeven jaar of ouder waren toen ze in groep 3 startten (verlengde kleuterperiode) in groep 6 minder goede lees- en rekenprestaties laten zien dan hun klasgenoten. De tweede en derde predictor liggen op het vlak van thuisomgeving, namelijk ouderbetrokkenheid en de verwachtingen van de ouders met betrekking tot het opleidingsniveau dat hun kind zal voltooien. Deze resultaten tonen aan dat ouders zich terdege bewust zijn van het werkelijke prestatieniveau van hun kinderen en ze hun acties en betrokkenheid - zoals het helpen van hun kind met huiswerk - aanpassen aan de behoefte van het kind. De vierde gemeenschappelijke predictor is het schoolklimaat; aspecten met betrekking tot de veiligheid van de school en gevoelsbeleving van de leerling beïnvloeden de prestaties van de leerlingen. Het

zelfvertrouwen van de leerling met betrekking tot respectievelijk lezen en rekenen is de laatste gemeenschappelijke predictor, hoewel deze predictor een veel sterkere relatie heeft met rekenen dan met lezen.

Naast deze gemeenschappelijke predictoren zijn ook verschillen gevonden tussen de predictoren van lees- en rekenvaardigheid. Zo blijken de betrokkenheid van de leerling bij de rekenles en de rekenattitude juist negatieve verbanden te hebben met de rekenvaardigheid, terwijl deze verbanden bij leesvaardigheid (respectievelijk de betrokkenheid bij de leesles en de leesattitude) niet werden gevonden. Leerlingen hoeven rekenen niet leuk te vinden om goed te presteren, als ze maar het vertrouwen hebben dat ze de taak zullen volbrengen. Een ander verschil is dat de thuisomgeving - meer specifiek: de activiteiten die werden ondernomen omtrent beginnende geletterdheid en de SES van de leerlingen - geen relatie had met rekenvaardigheid, maar wel met leesvaardigheid. Dit wijst erop dat rekenvaardigheid veel meer een school-gerelateerde vaardigheid is, terwijl de basis voor toekomstige leesvaardigheid wordt gelegd in de thuisomgeving.

In de vierde studie, beschreven in *Hoofdstuk 5,* zijn de veranderingen in het leesvaardigheidsniveau van tienjarige leerlingen in Nederland gedurende het afgelopen decennium in kaart gebracht en is de (veranderende) rol van verschillende relevante sociaal-culturele en onderwijs gerelateerde factoren in het verklaren van de variatie in leesvaardigheid verkend. Hiertoe is een multilevel analyse uitgevoerd met behulp van de data van PIRLS-2001, -2006 en -2011. Daarnaast zijn de ontwikkelingen in de tijd ook bekeken in het licht van de leesdoelen (verhalende en informatieve teksten) en begripsprocessen (lagere- en hogere-orde begripsprocessen) die binnen PIRLS worden gehanteerd.

De resultaten tonen een significante daling van de gemiddelde leesvaardigheid van groep 6 leerlingen in de afgelopen tien jaar, hoewel de grootste daling zich voordeed tussen 2001 en 2006 en de daling tot stilstand lijkt te zijn gekomen tussen 2006 en 2011. De daling in leesvaardigheid kan worden toegeschreven aan een afname van de prestaties ten aanzien van hogere-orde begripsprocessen. Leerlingen blijken in 2011 minder bekwaam in het beantwoorden van toetsvragen die hogere cognitieve vaardigheden vereisen, zoals kennis van de tekststructuur en de vaardigheid om de hoofdgedachte van een tekst te identificeren, dan groep 6 leerlingen tien jaar geleden.

Daarnaast kan de trend in leesvaardigheid in verband worden gebracht met vier predictoren. Ten eerste met genderverschillen. Het verschil in leesvaardigheid

tussen meisjes en jongens (waarbij meisjes beter presteren dan jongens) blijkt af te vlakken. Dit verschil was het grootst in 2001, verminderde met bijna de helft in 2006 en stabiliseerde zich in 2011. Dit patroon en de gevonden interactie-effecten geven aan dat de gemiddelde daling van het leesvaardigheidsniveau in Nederland kan worden toegeschreven aan een dalende prestatie van de meisjes. Ten tweede kan de trend in leesvaardigheid in verband worden gebracht met de invloed van SES. Er blijkt een significant interactie-effect voor de schoolcompositie; de invloed van het percentage leerlingen in een klas met lage dan wel hoge SES is verminderd in de afgelopen tien jaar. In de derde plaats is de invloed van beginnende geletterdheid op latere leesprestaties veranderd: de analyses laten zien dat de daling van het leesvaardigheidsniveau in de afgelopen tien jaar minder groot was voor leerlingen van wie de ouders meer activiteiten met betrekking tot beginnende geletterdheid ondernomen hadden met hun kinderen - zoals voorlezen en verhaaltjes vertellen - dan hun leeftijdsgenoten van wie de ouders minder tijd besteed hadden aan deze activiteiten. In de vierde plaats impliceert het patroon van interactie-effecten dat de relatie van leesvaardigheid in groep 6 met beginnende geletterdheid mettertijd juist afneemt. In 2011 beheersten meer leerlingen bepaalde vaardigheden met betrekking tot beginnende geletterdheid - zoals het schrijven van enkele letters of het lezen van sommige woorden - vóór zij naar groep 3 gingen dan in 2001, maar de invloed van deze vaardigheden op latere leesvaardigheid is in de afgelopen tien jaar afgenomen. Het langetermijneffect van in de kleuterklassen leren lezen en schrijven blijft daarom onduidelijk, terwijl de voordelen van de activiteiten van beginnende geletterdheid, zoals samen boeken lezen, helder lijken.

Er zijn geen aanwijzingen dat deze dalende trend gerelateerd is aan de taalachtergrond van leerlingen. NT1 leerlingen presteren beter dan NT2 leerlingen, maar de multilevel modellen laten geen interactie-effecten zien. Dit houdt in dat de invloed van de taalachtergrond op de begrijpend leesprestaties van leerlingen gelijk is gebleven in de afgelopen tien jaar en de achterstand van NT2 leerlingen op NT1 leerlingen niet kleiner is geworden.

Tenslotte worden in *Hoofdstuk 6* van dit proefschrift de complicaties en beperkingen van het werken met data afkomstig uit internationaal vergelijkende onderzoeken zoals PIRLS uiteengezet en worden de resultaten van de verschillende studies nog eens kort besproken. Het proefschrift wordt afgesloten met een aantal implicaties voor het beleid. De studies in dit proefschrift laten zien dat hervormingen van het onderwijsbeleid in Nederland zich zouden moeten richten op drie aspecten:

beginnende geletterdheid, hogere-orde begripsprocessen en het schoolklimaat. De achterstand die NT2 leerlingen op NT1 leerlingen hebben ten aanzien van leesvaardigheid is in het afgelopen decennium nauwelijks verminderd. Aandacht voor de ontwikkeling van beginnende geletterdheid in de VVE door zowel leidsters als ouders is van essentieel belang voor het stimuleren van de taalontwikkeling van leerlingen. Daarnaast is het noodzakelijk dat in het begrijpend leesonderwijs meer aandacht besteed wordt aan de hogere-orde begripsprocessen en het aanleren van leesstrategieën. Met name op deze vaardigheden laten Nederlandse leerlingen een dalende trend zien. Tenslotte is aandacht voor het creëren van een positief schoolklimaat vereist om de prestaties van de leerlingen te verhogen. Leerlingen hebben baat bij een schoolomgeving waarin ze zich veilig voelen.

Dankwoord

Bij de totstandkoming van dit proefschrift zijn veel mensen betrokken geweest. Ik wil deze mensen bedanken voor hun bijdrage.

Ludo Verhoeven & Mienke Droop
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(oud) EN-collega's
Internationale PIRLS-collega's
Schoolleiders, leerkrachten, ouders en leerlingen die hebben meegewerkt aan de PIRLS-onderzoeken en de PIRLS-girls die de scholen bezochten
Paranimfen: Harriëtte van Balveren-Netten en Marian Bruggink
Familie en vrienden

Curriculum vitae

Andrea Netten is geboren op 5 december 1977 te Oss. Na het behalen van haar vwo-diploma op het Maaslandcollege te Oss in 1996, begon zij aan haar opleiding aan de Radboud Universiteit Nijmegen (toen nog Katholieke Universiteit Nijmegen). In 2001 rondde zij de studie Psychologie af. Direct daarna is zij gaan werken bij het Expertisecentrum Nederlands. In 2004 startte zij met haar werkzaamheden voor PIRLS. Zij was als nationaal onderzoekscoördinator verantwoordelijk voor de Nederlandse bijdragen aan dit internationale IEA-onderzoek voor de metingen in 2006 en 2011. Momenteel werkt ze aan de voorbereidingen van PIRLS-2016.

Andrea Netten was born on the 5th of December 1977, in Oss, the Netherlands. She obtained her pre-academic degree at the Maaslandcollege in Oss in 1996. That same year she enrolled at Radboud University Nijmegen, where she received her Master's degree in Psychology in 2001. Immediately after, she was employed by the National Center for Language Education in Nijmegen. In 2004 she began her work for PIRLS. She was the National Research Coordinator responsible for the Dutch contribution to this international IEA project for the studies in 2006 and 2011. She is currently working on the preparations for PIRLS 2016.

Appendix

Example PIRLS passage (in Dutch)

Het klompje klei

Diana Engel

Helemaal bovenin een oude toren was een werkplaats. Het was de werkplaats van een pottenbakker, vol met tonnen glazuur in allerlei kleuren, draaischijven, ovens en natuurlijk ook veel klei. Vlakbij het raam stond een grote houten bak met een zware deksel. Hierin werd de klei bewaard. Helemaal onder op de bodem in een hoekje lag het oudste stuk klei. Hij kon zich bijna niet meer herinneren wanneer hij voor het laatst was gebruikt, dat was heel lang geleden. Elke dag werd het zware deksel opgetild en grepen een paar handen snel een zakje of stukje klei. Het klompje klei kon de vrolijke geluiden horen van mensen die druk aan het werk waren.

"Wanneer ben ik nu eens aan de beurt?" vroeg hij zich af. Maar de dagen gingen voorbij in de duisternis van de bak en het klompje klei gaf de moed bijna op.

Op een dag kwam er een grote groep kinderen met hun meester de werkplaats binnen. Heel veel handen grabbelden in de bak. Het klompje klei werd als laatste gekozen, maar hij was in ieder geval uit de bak!

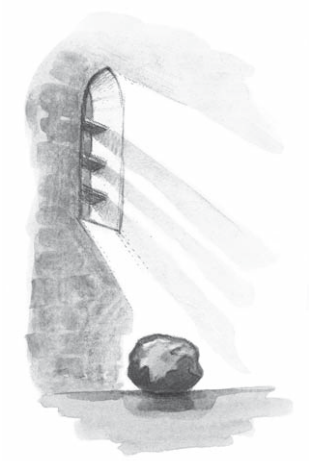
"Dit is mijn grote kans!" dacht hij, terwijl hij zijn ogen dichtkneep tegen het felle licht.

Een jongen legde de klei op een schijf en draaide hem zo hard mogelijk rond. "Dit is leuk," dacht het klompje klei. De jongen probeerde, terwijl de schijf ronddraaide, de klei omhoog te trekken. Het klompje klei vond het heel spannend, want nu werd hij eindelijk iets. Nadat hij had geprobeerd een kom te maken, gaf de jongen het op. Hij kneedde en sloeg de klei in elkaar tot een ronde bal.

"Tijd om op te ruimen", zei de meester. De werkplaats was gevuld met het geluid van kinderen die bezig waren met poetsen, vegen, wassen en afdrogen. Alles droop van het water.

De jongen liet het klompje klei ergens vlakbij het raam met een plof vallen en haastte zich naar zijn vriendjes. Na een tijdje liep de werkplaats leeg. Het was er nu rustig en donker. Het klompje klei was verschrikkelijk bang. Hij miste niet alleen de natte bak, hij wist ook dat hij in gevaar was.

"Nu is het allemaal voorbij", dacht hij. "Ik zal hier blijven liggen en uitdrogen tot ik zo hard ben als een steen."



Hij lag bij het open raam en kon zich niet bewegen. Hij voelde hoe al het vocht langzaam uit hem wegtrok. De zon scheen fel, ‘s nachts blies een koude wind naar binnen, tot hij keihard was. Hij was zo hard dat hij bijna niet meer kon nadenken. Hij wist alleen dat nu alle hoop verloren was.

Maar ergens diep in het klompje klei zat nog een klein druppeltje vocht en hij weigerde het te laten gaan.

“Regen”, dacht hij.

“Water”, zuchtte hij.

“Alsjeblieft”, kreunde het droge wanhopige klompje.

Een wolk dreef voorbij en kreeg medelijden met het klompje klei en toen gebeurde er iets geweldigs. Grote regendruppels vlogen door het raam naar binnen en vielen op het klompje klei. De hele nacht bleef het regenen en ‘s morgens was hij weer helemaal lekker zacht.

Plotseling hoorde hij stemmen in de werkplaats.

“O nee”, zei een vrouw. Ze was een pottenbakker die vaak gebruik maakte van de werkplaats. “Iemand heeft het raam het hele weekend open laten staan! We moeten de rotzooi opruimen. Ga jij maar even met een stuk klei spelen, dan ga ik op zoek naar een paar handdoeken”, zei ze tegen haar dochter.

Het meisje zag het klompje klei dat bij het raam lag.

“Dat lijkt me een mooi klompje voor mij”, zei ze.

Al snel was ze met de klei aan het drukken en kneden en maakte ze er allerlei mooie vormen van. Haar vingers voelden heerlijk aan voor het klompje klei.

Het meisje dacht na terwijl ze aan het kneden was en haar handen bewogen met een doel. Het klompje klei voelde hoe hij zachtjes veranderde in een ronde holle vorm. Een paar kneepjes en hij had een handvat.

"Mama, mama," riep het meisje, "ik heb een beker gemaakt!"

"O, wat mooi", zei haar moeder. "Zet hem maar op de plank, dan wordt hij in de oven gebakken. Dan kun je hem glazuren in welke kleur je maar wilt."

Al snel was de beker klaar om te worden meegenomen naar zijn nieuwe huis. Nu woont hij op een plank in de keuken, naast alle andere bekers en schotels en kommen. Ze zijn allemaal heel verschillend en sommige zijn heel mooi.

"Ontbijten!" roept de moeder, terwijl ze de nieuwe beker op tafel zet en volgiet met warme chocolademelk.

Het meisje houdt hem voorzichtig vast. Wat is hij gelukkig met zijn gladde nieuwe vorm. En wat doet hij zijn werk goed!

De beker is trots op zichzelf. "Eindelijk, eindelijk ben ik iets."

Vragen Het klompje klei

1. Zet voor deze zinnen een nummer om aan te geven in welke volgorde deze dingen gebeurden. Nummer 1 hebben we al ingevuld.

   ___ Door de regen werd het klompje klei nat en zacht.

   ___ Een jongen probeerde een kom te maken van het klompje klei.

   ___ Een meisje maakte een beker van het klompje klei.

   ___ Het klompje klei droogde uit.

   1 ___ Het klompje klei lag in de bak.

2. Waarom bleef het klompje klei zo lang in de kist liggen?

   1 _____

   _____

3. Wat wenste het klompje klei aan het begin van het verhaal?

   1 _____

   _____

4. Waarom werd het klompje klei uiteindelijk toch uit de bak gehaald?

Ⓐ Alle andere klompen klei werden al gebruikt.

Ⓑ Het lag boven op alle andere klompen klei.

Ⓒ De jongen koos dat klompje klei speciaal uit omdat hij het mooi vond.

Ⓓ De meester zei tegen de jongen dat hij dat klompje moest gebruiken.

5. Wat was slordig van de jongen?

Ⓐ Hij liet de klei op de draaischijf liggen.

Ⓑ Hij draaide de schijf zo hard mogelijk rond.

Ⓒ Hij liet het klompje klei bij het raam liggen.

Ⓓ Hij kneedde en sloeg de klei in elkaar.

6. Het klompje klei was in gevaar toen de jongen het achterliet. Wat was het gevaar?

1 _____

_____

10 89

7. Hoe voelde het klompje klei zich toen de jongen wegging uit de werkplaats?

(A) tevreden

(B) bang

(C) boos

(D) trots

8. Wat gebeurde er wat zo fijn was voor het klompje klei nadat het lange tijd bij het raam had gelegen? Waarom was dit zo fijn voor het klompje klei?

2

2 1 0 8 9

9. Welke woorden in het verhaal geven aan dat het kleine meisje wist wat ze wilde maken?

Ⓐ ‘Haar vingers voelden heerlijk aan’

Ⓑ ‘Het meisje zag het klompje klei’

Ⓒ ‘Het meisje houdt hem voorzichtig vast’

Ⓓ ‘haar handen bewogen met een doel’

10. Beschrijf de verschillende gevoelens van het klompje klei aan het begin en aan het einde van het verhaal. Leg uit waarom zijn gevoelens veranderden.

3 2 1 0 | 8 9

11. Het kleine meisje speelt een belangrijke rol in dit verhaal. Leg uit waarom ze zo belangrijk is voor wat er gebeurt.

2

2 1 0 8 9

12. De schrijfster van het verhaal doet alsof het klompje klei een mens is. Wat wil de schrijfster dat je je probeert voor te stellen?

A hoe het is in de regen

B hoe een klompje klei zich zou kunnen voelen

C hoe het is om met klei te werken

D hoe het voelt om iets te maken

13. Wat is de **belangrijkste** boodschap van dit verhaal?

A Mensen kun je net zo gemakkelijk kneden en in een vorm duwen als klei.

B Er is veel verdriet in de wereld.

C Alle dingen zijn gelukkig als ze nut hebben.

D Pottenbakken is de beste manier om iets goeds te doen in de wereld.

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