

An evaluation of factors influencing reading literacy across Italian 4th grade students

Fabio Alivernini, Sara Manganelli, Emanuela Vinci, Ines Di Leo

(National Institute for the Educational Evaluation of Instruction and Training, Frascati RM 00044, Italy)

Abstract: Questionnaire data from the PIRLS 2006 study in Italy provided a number of indices in order to summarize factors of educational context influencing reading achievement. The aim of the present paper is to study the relationships between school factors, teacher factors, family factors, student factors and reading achievement by means of multilevel regression analysis. Results show that pupils' attainment in reading is significantly related to: (1) home educational resources (home/student level effect); (2) parents' attitudes toward reading (home/student level effect); (3) students' attitudes toward reading; (4) students' reading self-concept; and (5) teacher career satisfaction (school/teacher level).

Key words: secondary analysis; reading literacy; multilevel regression; PIRLS 2006; background indices

1. Introduction

Reading literacy can be defined as “the ability to understand and use those written language forms required by society and/or valued by the individual” (Mullis, et al., 2003, p. 33). Reading literacy is one of the most important abilities that children have to develop in their early school years since it is an essential requirement for learning across all subjects and for participating fully in their communities and in society in general (Mullis, Kennedy, Martin & Sainsbury, 2006). The Progress in International Reading Literacy Study (PIRLS) was a study conducted under the coordination of the International Association for the Evaluation of Education Achievement (IEA) which aimed to provide internationally comparative data about reading literacy in primary school, focusing on the achievement of children in the fourth year of schooling and their experiences in learning to read at school and at home. PIRLS 2006 was the second, after PIRLS 2001, in a cycle of international assessments carried out every five years, and it included forty countries and five Canadian provinces (of these, twenty-six countries and two provinces had trend data from PIRLS 2001). The target population included all students enrolled in the fourth grade of formal schooling, counting from the first year of primary school as defined by UNESCO's (United Nations Educational, Scientific and Cultural Organization) International Standard Classification for Education (UNESCO, 1997).

The PIRLS 2006 Assessment Framework underlines the importance of contexts in learning to read. This

Fabio Alivernini, Ph.D., National Institute for the Educational Evaluation of Instruction and Training; research fields: educational research, mixed method research and methodological issues.

Sara Manganelli, M.A., National Institute for the Educational Evaluation of Instruction and Training; research fields: educational research, mixed method research and methodological issues.

Emanuela Vinci, M.A., National Institute for the Educational Evaluation of Instruction and Training; research fields: educational research, mixed method research and methodological issues.

Ines Di Leo, M.A., National Institute for the Educational Evaluation of Instruction and Training; research fields: educational research, mixed method research and methodological issues.

includes children’s home, classroom, school and teachers, as well as their national and community environments. To provide a sufficient context for assessing and interpreting students’ reading literacy, PIRLS 2006 collected an extensive range of test and questionnaire data from students as well as from their parents, teachers and school principals.

The theoretical framework of this study is consistent with the PIRLS 2006 assessment framework (Mullis, Kennedy, Martin & Sainsbury, 2006), which takes into consideration the multilevel structure of various factors influencing reading literacy.

The aim of the present study is to provide an initial contribution towards understanding which context variables at various levels affect reading performance in Italian children in the 4th grade.

2. Method

2.1 Participants of the research

The data consisted of the answers of 3,581 pupils (51.4% boys) in 4th grade, as well as those of teachers and principals who took part in the PIRLS 2006 study in Italy.

Table 1 Description of international indices used as independent variables in the analysis (Martin, Mullis & Kennedy, 2007)

Index	Description
Early home literacy activities (EHLA)	This index is based on parents’ reports of the frequency with which they engaged with their children in early literacy activities.
Home educational resources (HER)	Students’ and parents’ reports about aspects of the home environment and the extent to which it supports literacy.
Parents’ attitudes toward reading (PATR)	Parents’ personal inclinations towards reading.
Parents’ perceptions of school environment (PPSE)	Parents’ perceptions of the schools’ efforts to provide a supportive learning environment.
Reading for homework (RFH)	This index sums up teachers’ responses to two questions: “How often do you assign reading as part of homework (for any subject)?” and “In general, how much time do you expect students to spend on homework involving reading (for any subject) each time you assign it?”
Availability of school resources (ASR)	Principals’ reports of how much the school’s capacity to provide instruction is affected by a shortage or inadequacy of resources.
Home-school involvement (HSI)	Principals’ reports of the activities offered by their schools and parents’ involvement in school activities.
Principal’s perception of school climate (PPSC)	This index is based on principals’ description of various factors related to the social climate of the school.
Principals’ perception of school safety (PPSS)	Principals’ perceptions of to what extent various problems (e.g., classroom disturbances, vandalism, physical conflicts among students) occur in their schools.
Teacher career satisfaction (TCS)	Teachers’ reports of satisfaction with their current position and career choice as a whole.
Student safety in school (SSS)	Students’ perception of safety at school and their reports of incidents affecting safety.
Students’ attitudes toward reading (SATR)	Students’ reading preferences.
Students’ reading self-concept (SRSC)	Students’ perceptions of their own reading skills.

2.2 Variables

The dependent variable of the analysis was the Rasch-scaled score for overall reading achievement and the independent variables were the international indices (Martin, Mullis & Kennedy, 2007) based on questionnaires for students, teachers, schools and parents. In addition the authors considered the gender of the student (scored 1/0) to be an independent variable.

The indices used in this article are briefly described in Table 1 and details of their construction can be found in the research of Martin, Mullis and Kennedy (2007).

2.3 Data analysis

First the authors looked at the reliability and discriminative power of indices in the Italian context: indices with a very low Alpha value and low discriminative power were not considered for further analysis. Missing data were imputed using the SPSS 15.0.1 (SPSS Inc., 2006) missing values procedure. In order to develop and test a multilevel model (Hox, 2002), the authors used the strategy of randomly splitting the data file in two. The first random sample was used to develop a satisfying model and the second one to check the results found. The multilevel analysis was conducted using two levels, the home/student level and the school/teacher level. Home and student variables were modeled on the home/student level only, except for the index of home educational resources, which was aggregated at the school level and assessed also at the second level as a contextual variable. The school and the teacher variables were modeled at both the home/student level and the school/teacher level. In considering the explorative purpose of the study only main effects were analyzed and interaction effects were ignored.

The process of analysis was carried out in four stages:

(1) The authors analyzed a model with no explanatory variables (intercept-only model) to estimate the school intra-class correlation;

(2) The authors analyzed a model with pupil level explanatory variables fixed to assess the contribution of each individual explanatory variable. The authors tested the improvement of the final model (the one with only variables significant at the 1% level) compared to the intercept-only model;

(3) At step 3 the authors included the school/teacher level variables, removing from the model those which were not significant at the 1% level;

(4) The authors assessed the final model developed at step 3 using the second random sample of the data file.

3. Results

Table 2 shows the reliability and multiple R between student reading achievement and component variables of indices in the Italian context.

The index of reading for homework (RFH) and the index of home-school involvement (HSI) both had a very low Alpha-value and were therefore excluded from further analysis.

The intra-class correlation in school was 0.23, meaning that roughly 23% of the variance is attributable to school traits. The fixed model developed at stage 2 significantly improved the fitting when compared to the base model: the -2 Restricted Log Likelihood difference between the two models was 3,098.12 (G.L.=7), $p < 0.01$.

The fixed model showed that students perform significantly better ($p < 0.01$) if their home environment supports more literacy, their parents' attitudes toward reading are higher, students' reading self-concept is higher and students' attitudes toward reading are better. The results at stage 3 showed that the only index modeled at the

school/teacher level which significantly improved the fitting was the index of teacher career satisfaction.

Table 2 Reliability and multiple R of indices in the Italian context

Index	Cronbach's alpha between the component variables	Multiple R between student reading achievement and component variables
Early home literacy activities (EHLA)	0.60	0.24
Home educational resources (HER)	0.62	0.32
Parents' attitudes toward reading (PATR)	0.82	0.28
Parents' perceptions of school environment (PPSE)	0.55	0.17
Reading for homework (RFH)	0.14	0.00
Availability of school resources (ASR)	0.84	0.14
Home-school involvement (HSI)	0.41	0.14
Principal's perception of school climate (PPSC)	0.76	0.14
Principals' perception of school safety (PPSS)	0.92	0.17
Teacher career satisfaction (TCS)	0.69	0.10
Student safety in school (SSS)	0.68	0.14
Students' attitudes toward reading (SATR)	0.69	0.32
Students' reading self-concept (SRSC)	0.53	0.35

Additionally, the estimate of covariance between intercepts and slopes was negative and significant ($p < 0.01$), that is, schools with high reading achievement scores and schools with low reading achievement scores differ in the relationship between reading achievement scores and teacher career satisfaction.

Therefore, the final model replicated in the second random sample included the effects of the indices at home/student level which were detected at stage 2 and, at school/teacher level, teacher career satisfaction. Table 3 lists the indices included in the final model at home/student and at school/teacher level. All the effects of the final model were repeated as significant in the second random sample used in stage 4 of the analysis.

Table 3 Statistically significant effects at home/student level and at school/teacher level

Index	Home/student level	School/teacher level
Gender of the student	N.S.	
Early home literacy activities (EHLA)	N.S.	
Home educational resources (HER)	*	N.S.
Parents' attitudes toward reading (PATR)	*	
Parents' perceptions of school environment (PPSE)	N.S.	
Availability of school resources (ASR)	N.S.	N.S.
Principal's perception of school climate (PPSC)	N.S.	N.S.
Principals' perception of school safety (PPSS)	N.S.	N.S.
Teacher career satisfaction (TCS)	N.S.	*
Student safety in school (SSS)	N.S.	
Students' attitudes toward reading (SATR)	*	
Students' reading self-concept (SRSC)	*	

Notes: Empty cell=the effect was not modelled; N.S.=not statistically significant at $p=0.01$; *=statistically significant effect at $p=0.01$.

4. Discussion and conclusion

Despite the explorative nature of the analysis, the authors can examine various general factors that seem to contribute towards reading achievement in 4th graders in Italy. The only relevant factor at school/teacher level is teacher career satisfaction, which is based on teachers' reports of satisfaction with their current teaching role and their career as a whole.

This means that motivational factors concerning teachers could be the most important variable in the context of Italian schools, being more important than the availability of various other kinds of resources. Furthermore, the multilevel analysis showed that the schools with low reading literacy scores are more affected by the level of teacher satisfaction than the schools with high reading literacy scores.

The results at home/student level confirm the importance of home educational resources for students. It is interesting to note that students' perceptions of their own reading skills, their attitudes towards reading and their parents' attitudes towards reading were all variables significantly correlated to student performances.

These findings can be read in the light of the self-determination theory (SDT, Deci & Ryan, 2002), which proposes a conceptual framework for understanding the antecedents and consequences of student motivation.

According to the SDT, self-determination is a central aspect of student motivation. It is considered essential for encouraging students to have an interest in learning, giving them an idea of the importance of studying, and a feeling of confidence in their own abilities and personal characteristics. According to the SDT, self-determined students experience a sense of freedom in doing what they consider as interesting, personally important and closely corresponding to their individual values and choices (Deci & Ryan, 2002). The authors of the SDT claim that students have a psychological need for self-determination (i.e., the perception of being the source of one's own behaviour, Deci & Ryan, 2002) and point out that there are different types of regulation for academic motivation in students, which reflect differences in their degrees of self-determination. These types of regulation can be placed along a self-determination continuum ranging from motivation to intrinsic motivation and with extrinsic motivation in the centre (Ryan & Deci, 2000). According to the STD, intrinsic motivation leads to the most self-determined forms of behaviour. This type of regulation refers to: "doing an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000, p. 3). Intrinsic motivation consists of doing something because it is interesting, pleasant and satisfying in itself (Ryan & Deci, 2000): An intrinsically motivated person therefore undertakes an activity because he knows that he will enjoy it.

As regards the consequences of self-determined motivation, empirical studies (Deci & Ryan, 2002) have shown that differences in styles of regulation have implications for school achievement, such that the higher the level of self-determination is, the better the results will be (Grolnick, Ryan & Deci, 1991; Miserandino, 1996; Soenens & Vansteenkiste, 2005).

Considering the content of indices which proved to be significantly related to reading literacy, that is students' attitudes toward reading (e.g., "I enjoy reading"), parents' attitudes toward reading (e.g., "I like to spend my spare time reading") and teacher career satisfaction (e.g., "I had more enthusiasm when I began teaching than I have now"—reverse coding), one can see that these issues are close to the concept of self-determination proposed in the SDT.

To sum up, this secondary study shows that, apart from exclusively external and objective factors such as home educational resources, every variable which proved to be significantly related to reading literacy is closely connected with the SDT theoretical model and therefore tends to support it.

References:

- Deci, E. L. & Ryan, R. M. (Eds.). (2002). *Handbook of self-determination research*. New York: University of Rochester Press.
- Geske, A. & Ozola, A. (2009). Different influence of contextual educational factors on boys' and girls' reading achievement. *US-China Education Review*, 6(4), 38-44.
- Gnaldi, M., Schagen, I., Twist, L. & Morrison, J. (2005). Attitude items and low ability students: The need for a cautious approach to interpretation. *Educational Studies*, 31(2), 103-113.
- Grolnick, W. S., Ryan, R. M. & Deci, E. L. (1991). The inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, 83, 508-517.
- Gustafsson, J. E. & Rosén, M. (2006). The dimensional structure of reading assessment tasks in the IEA reading literacy study 1991 and the progress in international reading literacy study 2001. *Educational Research and Evaluation*, 12(5), 445-468.
- Hardre, P. L. & Reeve, J. (2003). A motivational model of rural students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology*, 95(2), 347-356.
- Hox, J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Erlbaum.
- Livingston, K. & Jim McCall, J. (2005). Evaluation: Judgmental or developmental? *European Journal of Teacher Education*, 28(2), 165-178.
- Martin, M. O., Mullis, I. V. S. & Kennedy, A. M. (2007). *PIRLS 2006 technical report*. Chestnut Hill, MA: Boston College.
- Miserandino, M. (1996). Children who do well in school: Individual differences in perceived competence and autonomy in above-average children. *Journal of Educational Psychology*, 88, 203-214.
- Mullis, I. V. S., Kennedy, A. M., Martin, M. O. & Sainsbury, M. (2006). *PIRLS 2006 assessment framework and specifications (2nd ed.)*. Chestnut Hill, MA: Boston College.
- Mullis, I. V. S., Martin, M. O., Gonzalez, E. J. & Kennedy, A. M. (2003). *PIRLS 2001 international report: IEA's study of reading literacy achievement in primary schools in 35 countries*. Chestnut Hill, MA: Boston College.
- Mullis, I. V. S., Martin, M. O., Kennedy, A. M. & Foy, P. (2007). *PIRLS 2006 international report: IEA's progress in international reading literacy study in primary school on 40 countries*. Chestnut Hill, MA: Boston College.
- Myrberg, E. & Rosén, M. (2006). Reading achievement and social selection in independent schools in Sweden: Results from IEA PIRLS 2001. *Scandinavian Journal of Educational Research*, 50(2), 185-205.
- Myrberg, E. & Rosén, M. (2008). A path model with mediating factors of parents' education on students' reading achievement in seven countries. *Educational Research and Evaluation*, 14(6), 507-520.
- Papanastasiou, C. (2008). Factors distinguishing most and least effective schools in terms of reading achievement: A residual approach. *Educational Research and Evaluation*, 14(6), 539-549.
- Park, H. (2008). Home literacy environments and children's reading performance: A comparative study of 25 countries. *Educational Research and Evaluation*, 14(6), 489-505.
- Ryan, R. M. & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.
- Soenens, B. & Vansteenkiste, M. (2005). Antecedents and outcomes of self-determination in 3 life domains: The role of parents' and teachers' autonomy support. *Journal of Youth and Adolescence*, 34(6), 589-564.
- SPSS 15.0.1. (2006). *SPSS advanced models*. Chicago IL: author.
- United Nations Educational, Scientific, and Cultural Organization. (1997). *International standard classification of education: ISCED*. Paris: UNESCO.

(Edited by Nicole and Lily)