The interplay between school, teacher, family and student factors and their relationships to reading literacy in Italy

Fabio Alivernini, National Institute for the Educational Evaluation of Instruction and Training (INVALSI), Italy, fabio.alivernini@invalsi.it
Fabio Lucidi, Department of Social and Developmental Psychology, University of Rome 'La Sapienza', Italy, fabio.lucidi@uniroma1.it
Sara Manganelli, National Institute for the Educational Evaluation of Instruction and Training (INVALSI), Italy, sara.manganelli@invalsi.it
Bruno Losito, Roma Tre University, Italy, losito@uniroma3.it

Abstract

PIRLS 2006 collected data about reading literacy and about factors connected to school, family and student context for Italian fourth grade students. The aim of the present study is to examine, in Italian data, the interplay between school, teacher, family and student factors, and their relationships to reading literacy. A structural equation model comprising school, teachers, parents, and pupils variables is tested. This model as a whole accounted for 37% of variance in reading literacy in Italian fourth grade pupils. Home variables accounted for 18% of variance, students' variables for 14% and school and teacher variables for 5% of variance. An important part of home variables effect is related to the direct and indirect influence (through other variables) of educational resources, whereas the importance of economic resources seems to be very small in total. Variables connected with students seem to strongly influence the effect of home variables. Finally as concerns school and teachers variables, material resources available in schools have a very small effect on reading literacy. The most important variable in this latter context proves to be the time spent by students in reading activities at school.

Keywords: *secondary analysis, reading achievement, structural equation modeling, PIRLS 2006, background indices*

Introduction

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) is a study conducted with the coordination of the International Association for the Evaluation of Education Achievement (IEA). It 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.

According to the multi-perspective approach of its conceptual framework (Mullis et. al., 2006), the aims of PIRLS 2006 were to conduct an innovative and comprehensive assessment of reading achievement. This involved large-scale international data collection (Gnaldi, Schagen, Twist, & Morrison, 2005), taking into account the influence of the various different contexts in which children learn to read, and attempting to identify the factors, or combinations of factors, associated with reading literacy scores (Papanastasiou, 2008). In order to provide a sufficient context for assessing and interpreting students' reading literacy, PIRLS collected an extensive range of test and questionnaire data from students as well as from their parents, teachers, and school principals (Mullis, Martin, Kennedy, & Foy, 2007). Questionnaire data from the PIRLS 2006 provided information on a number of factors measuring various elements of the educational context influencing reading achievement. These constructs refer to characteristics of school, teachers, parents, and pupils. Examples include:

- Availability of school resources (principals' reports of how much the school's capacity to provide instruction is affected by inadequacy of resources, such as qualified teaching staff, instructional materials, etc);
- Home–school involvement (principals' reports on parents' involvement in school's activities);
- Teacher career satisfaction (teachers' reports on satisfaction with their current position and career choice as a whole);
- Home educational resources (students' and parents' reports about the home environment and the extent to which it influences students' reading activities);
- Parents' attitudes towards reading (parents' agreement with statements such as: I read only if I have to, I like talking about books with other people, etc.);
- Early home literacy activities (parents' reports about engaging in early literacy activities with the students before they enter the primary school);
- Students' attitudes toward reading (students' agreement with statements such as: I read only if I have to, I think reading is boring);
- Students' reading self-concept (based on students' responses to statements such as:

reading is very easy for me, when I am reading by myself I understand almost everything I read, etc.).

The aim of the present study is to examine, by means of structural equation modeling, the interplay between school, teacher, family and student factors, and their relationships to reading literacy. Different models of how different factors affect reading literacy are tested, also considering their indirect effects.

Methodology

The choice of the variables used to measure school, teacher, family and student domains was based on four types of considerations:

1. the importance given to specific constructs in the theoretical framework in relation to the different domains (Mullis et. al., 2006);

2. the operationalization of the constructs that was elaborated in PIRLS 2006 (Martin, Mullis, & Kennedy, 2007);

3. the importance of the variables in the research on reading literacy;

4. the goodness of fit of the measurement model of the constructs in the Italian context.

Variables used in the structural model referring to home:

- **Early home literacy activities** (3 items–latent variable): Parents' reports about engaging in early literacy activities with the students before they began primary school (e.g. reading books, telling stories). The importance of early home literacy activities has been demonstrated by various studies (Gadsden, 2000; Leseman & de Jong, 2001; Snow & Tabors, 1996; Weinberger, 1996).

- **Home educational resources** (3 items–latent variable): Students' and parents' reports about the number of books in the home (e.g. *About how many books are there in your home? About how many children's books are there in your home?*) and the highest level of education completed by the parents. Various studies showed that the shortage of home educational resources could affect reading literacy (Aikins & Barbarin, 2008; Darling & Westberg, 2004; Senechal & LeFevre, 2002).

- **Home economic resources** (1 item–observed variable): Parents' responses to the question *"Compared with other families in <country>, how well-off do you think your family is financially?"* Research results often show a relationship between home economic

resources and children's scholastic and cognitive levels of achievement (Desimone, 1999; Duncan & Brooks-Gunn, 1997; Yeung, Linver & Brooks-Gunn, 2002).

- **Parents' attitudes toward reading** (3 items–latent variable): Parents' preferences for reading (e.g. *I like talking about books with other people; I like to spend my spare time reading*). Research has provided much evidence that parents convey their own beliefs and attitudes about reading that influence the ways children are exposed to and experience written texts (Baker & Scher, 2002, Baker, Afflerbach, & Reinking, 1996; Cramer & Castle, 1994). Moreover, parents can represent a model of literacy practices and can support reading development by expressing positive opinions about reading: parents who believe that reading is a source of entertainment have children with more positive views about reading (Baker, Scher & Mackler, 1997; Sonnenschein & Munsterman, 2002).

Variables used in the structural model referring to principals and teachers:

- **Presence of qualified teaching staff** (1 item–observed variable): Principals' reports of how much the school's capacity to provide instruction is affected by the presence of a qualified teaching staff. Various studies showed that teachers' quality and preparation are strongly correlated to student achievement (Darling-Hammond, 2000; Wayne & Youngs, 2003; Xu & Gulosino, 2006).

- **Availability of school material resources** (3 items–latent variable): Principals' reports of how much the school's capacity to provide instruction is affected by a shortage or inadequacy of tangible resources (e.g. instructional materials and supplies, furniture). Fourth grade students spend many hours at school and in the classroom, so the extent and quality of school resources may be critical. Resources such as adequate classroom space, comfortable furniture and surroundings and instructional materials all have an effect on reading literacy development (e.g., Mullis et al., 2006).

- **Frequency of reading homework** (1 item–observed variable): Teachers' responses to the question *"How often do you assign reading as part of homework (for any subject)?"* Homework is an important part of most children's daily routine. Several studies investigating the relationship between homework assignments and student achievement (e.g., Trautwein & Köller, 2003) found evidence of the positive influence of homework (e.g., Cooper, Robinson, & Patall, 2006).

- **Time spent by students in reading activities at school** (2 items–latent variable): Teachers' reports of time spent on language instruction or reading activities over the period of a week (e.g. *In a typical week, how much time do you spend on language instruction and/or activities with the students? 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 and/or activities with the students?). Time spent in reading activities at school is obviously important for the growth of children's reading skills and studies have shown that the amount of time spent on reading activities contributes significantly towards gains in students' reading achievement (e.g. Taylor, Frye, & Maruyama, 1990).

- **Teachers' career satisfaction** (3 items–latent variable): Teachers' reports of satisfaction with their current position and career choice (e.g. *I am satisfied with being a teacher at this school, I am content with my profession as a teacher*). Teachers, of course, are a very influential determinant of the classroom environment. Teachers' job satisfaction can have a positive influence on classroom climate, which in turn can affect student achievement (e.g., Mullis et al., 2006).

Variables used in the structural model referring to students:

- **Students' attitudes toward reading** (3 items–latent variable): Students' reading preferences (e.g. *I like talking about books with other people, I would be happy if someone gave me a book as a present*). A positive attitude toward reading has an important influence on the development of reading literacy. Children who have developed positive attitudes are more likely to choose reading for recreation. Such reading experiences may contribute to students' interests and confidence in reading (Mullis et. al., 2006, Wigfield & Guthrie, 1997). Moreover, the development of positive attitudes has been associated with sustained reading throughout the lifespan (Cullinan, 1987).

- **Students' reading self-concept** (2 items–latent variable): Students' perceptions of their own reading competencies compared with their classmates (e.g. *I do not read as well as other students in my class; I read slower than other students in my class*). Various studies showed a relationship between self-concept and achievement (e.g. Marsh, 1990; Peralta Sanchez & Sanchez Roda, 2003).

The tested model

In the present study, a model of factors influencing reading literacy was tested. This model, formulated according to the PIRLS' conceptual framework, takes environmental and personal factors into consideration and is illustrated in Figure 1.

[Please, insert Figure 1 about here]

In this model, home educational resources and home economic resources are correlated and

they directly predict parents' attitudes toward reading, early home literacy activities, students' reading self-concept, students' attitudes toward reading and reading literacy. Parents' attitudes toward reading and early home literacy activities have a direct impact on students' attitudes, as well as on reading literacy. Early home literacy activities also have a direct impact on students' reading self-concept.

As regards school factors, the availability of materials and resources at school is directly connected to reading literacy, to teacher career satisfaction and to the presence of qualified teaching staff. This factor also has a direct influence on teacher career satisfaction, the frequency with which reading tasks are assigned for homework and on the amount of time children are engaged in activities associated with reading at school.

All factors connected with teachers (i.e. teacher career satisfaction, the time spent by students in activities associated with reading at school, and the frequency of reading tasks which are assigned for homework), have a direct impact on students' reading self-concept, students' attitudes toward reading and on reading literacy. As regards as factors connected with students, students' reading self-concept and students' attitudes toward reading are correlated and they directly influence reading literacy.

Analysis

To develop and test structural equations model we used the strategy of randomly splitting the data file in two. To evaluate the extent to which the hypothesized structural model supports the observed data, we relied on multiple indices of fit such as the comparative fit index (CFI) (Bentler, 1990) the root mean square error of approximation (RMSEA) (Steiger, 1990), etc. We further tested the hypothesized model against a series of possible alternative models (Bentler, 1990). The hypothesized model can be considered as being nested within an alternative model to the extent that the alternative model includes an additional path (or paths) not included in the hypothesized model (e.g. a path linking teacher career satisfaction directly to students' reading self-concept).

Since the setting of the present study is a multilevel one, where students are nested in schools, the developed model has been additionally tested by means of multilevel structural equation modelling (Heck & Thomas, 2009). Separate models have been specified for the within and between covariance matrices (Muthén, 1994; Lee & Shi, 2001).

Finding and Discussion

Results indicate that developed model has goodness-of-fit indexes as follows: $\chi 2 = 3611$ (990

df) p = .01, TLI=.94, IFI=.95, CFI = .93, RMSEA= .03. The model as a whole explains 37% of variance of reading literacy in Italian fourth grade pupils (Figure 2).

[Please insert Figure 2 about here]

Home variables accounts for 18% of variance, students' variables for 14% and school and teacher variables for 5% of variance. The overall effect of home variables in producing designated levels of reading literacy was large. An important part of this effect is related to the direct and indirect influence (through other variables) of educational resources, whereas the importance of economic resources seems to be very small in total. As regards variables connected with students (students' attitudes toward reading and students' reading self-concept) they seem to strongly modulate the effect of home variables. It is also important to note that the addition of these two variables to the model, which are only partially explained by the variables they mediate, can help us to explain a substantial proportion of variance in the scores of reading literacy (14 %). Finally as concerns the school and teachers variables, they explain a small proportion of variance (5%). The material resources available in schools have a very small effect on reading literacy. In this context, the most important variable proves to be the time spent by students in reading activities at school which proves to have only an indirect effect on reading literacy, mediated by students attitudes toward reading and students' reading self-concept.

Conclusion and Implications

We can draw the following conclusions on the basis of the results of the model regarding the various different contexts considered. There is, as expected, a direct effect on reading literacy from the variables related to the structural features of the background of the families. This particularly regards educational resources (books present at the home and parents level of education): $\beta = .32$. The impact of early reading activities in the family is indirect ($\beta = .05$) and it is mediated by students' reading self-concept and attitudes toward reading.

As regards factors related to school, there is a direct effect upon reading literacy of variables related to the availability of tangible resources in schools (e.g. space, instructional materials). This effect ($\beta = .12$) nevertheless amounts to less than half that of the educational resources available to the family.

As regards teachers, tangible resources seem to be more effective only if they are accompanied by an increase in the school's capacity to attract qualified teachers who, in turn, increase the amount of time dedicated to activities connected to reading at school. The latter factor in fact has both a direct effect ($\beta = .15$) and an indirect effect ($\beta = .03$) on reading

literacy, through the mediation of the reading self-concept of the child and his/her attitude toward reading. The amount of homework time spent on reading activities and the level of satisfaction of teachers have no direct or indirect effect on reading literacy.

As regards the students it is clear that the impact of family and school variables is markedly modulated by two belief systems of the child: his/her image of himself/herself as a reader (β =. 39) and his/her motivational drive in terms of positive attitudes towards reading (β =.16).

A result that deserves attention is related to the low level of influence of school variables on the reading skills of students in their fourth year of schooling across Italy. How can we interpret this low degree of influence? It is likely that for students in their fourth year of school (mostly between 8 and 10 years of age) out-of-school variables (in particular those related to the socio-family context) have a strong influence on reading literacy (Park, 2008). This is also consistent with studies which have shown the particular importance of family as environmental factor in scholastic development for children of primary school (e.g. MCElvany & Van Steensel, 2009; Cooper, Jackson, Nye, & Lindsay, 2001; Hoover-Dempsey et al., 2001; Bailey, Silvern, Brabham & Ross, 2004). On the other hand, if one considers these results in a linear way one must admit that school is unable to change the differences of a socio-cultural nature between students and that it, therefore, cannot effectively intervene to compensate for their various performance levels. One might even suppose that the school system tends to reproduce and reinforce various differences based on students' different social and cultural backgrounds (e.g. Myrberg & Rosen, 2006; Yang-Hansen, 2008).

References

Aikins, N.L., & Barbarin, O. (2008). Socioeconomic differences in reading trajectories: The contribution of family, neighborhood, and school contexts. *Journal of Educational Psychology, 100*, 235-251.

Baker, L., Afflerbach, P., & Reinking, D. (1996). *Developing engaged readers in school and home communities.* Hillsdale, NJ: Erlbaum.

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.

Baker, L., Scher, D., Mackler, K. (1997). Home and Family Influences on Motivations for Reading. *Educational Psychologist, 32*(2), 69-82.

Bailey, L.B., Silvern, S.B., Brabham, E., & Ross, M. (2004). The effects of interactive reading homework and parent involvement on children's inference responses. *Early Childhood Education Journal, 32*(3), 173–178.

Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107,*

238-246.

Cooper, H., Jackson, K., Nye, B., & Lindsay, J.J. (2001). A model of homework on the performance evaluations of elementary school students. *The Journal of Experimental Education, 69*,181–199.

Cooper, H., Robinson, J.C., & Patall, E. 2006. Does Homework Improve Academic Achievement? A Synthesis of Research, 1987–2003. *Review of Educational Research Spring 2006, 76*(1), 1–62.

Cramer, E., & Castle, M. (Eds.). (1994). *Fostering the love of reading: The affective domain in reading education.* Newark, DE: International Reading Association.

Cullinan, B.W. (1987). *Children's literature in the reading program.* Newark, DE: International Reading Association.

Darling, S., & Westberg, L. (2004). Parental involvement in children's acquisition of reading. *The Reading Teacher, 57*(8), 774-776.

Darling-Hammond, L. (2000). How teacher education matters. *Journal of Teacher Education, 51*(3), 166-173.

Desimone L. (1999). Linking Parent Involvement With Student Achievement: Do Race and Income Matter?. *Journal of Educational Research, 93*(1), 11-30.

Duncan, G. J., & Brooks-Gunn, J. (eds.). (1997). *Consequences of growing up poor.* New York: Russell Sage Foundation.

Gadsden, V.L. (2000). Intergenerational literacy within families. In M.L. Kamil, P. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research (Vol.3)* (pp. 871-888). Mahwah, NJ: Lawrence Erlbaum Associates.

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.

Heck, R.H., & Thomas, S.L. (2009). *An Introduction to Multilevel Modeling Techniques.* New York: Routledge.

Hoover-Dempsey, K.V., Battiato, A.C., Walker, J.M.T., Reed, R.P., De Jong, J.M., & Jones, K.P. (2001). Parental involvement in homework. Educational Psychology, 36, 195–2009.

Lee, S.Y., & Shi, J.Q. (2001). Maximum likelihood estimation of two-level latent variable models with mixed continuous and polytomous data. *Biometrics, 57*, 787-794.

Leseman, P.P.M., & de Jong, P.F. (2001). How important is home literacy for acquiring literacy in school? In L. Verhoeven & C. Snow (Eds.), *Literacy and motivation: Reading engagement in individuals and groups* (pp. 71-94). Mahwah, NJ: Lawrence Erlbaum.

Marsh, H. W. (1990). The causal ordering of academic self-concept and academic achievement: A multiwave, longitudinal panel analysis. *Journal of Educational Psychology, 82*, 646-656.

Martin, M.O., Mullis, I.V.S., & Kennedy, A.M. (2007). *PIRLS 2006 Technical Report.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center Lynch School of Education, Boston College.

McElvany, N., & Van Steensel, R. (2009). Potentials and challenges of family literacy interventions: the

question of implementation quality. *European Educational Research Journal, 8* (3), 418-433.

Mullis, I.V.S., Kennedy, A.M., Martin, M.O., & Sainsbury, M. (2006). *PIRLS 2006 assessment framework and specifications (2nd ed.).* Chestnut Hill, MA: TIMSS & PIRLS 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: IEA's Progress in International Reading Literacy Study in Primary School on 40 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center Lynch School of Education, Boston College.

Muthén B.O. (1994). Multilevel Covariance Structure Analysis. *Sociological Methods & Research, 22(*3), 376-398.

Myrberg, E., & Rosen, 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.

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.

Peralta Sanchez, F.J. & Sanchez Roda M.D. (2003). Relationships between self–concept and academic achievement in primary students. *Electronic Journal of Research in Educational Psychology and Psychopedagogy, 1*(1), 95-120

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

Snow, C.E., & Tabors, P. (1996). Intergenerational transfer of literacy. In L.A. Benjamin, & J.E. Lord (Eds.), Family literacy: *Directions in research and implications for practice* (pp. 73-79). Washington, DC: U.S. Department of Education.

Sonnenschein, S., & Munsterman, K. (2002). The influence of home-based reading interactions on 5-year-olds' reading motivations and early literacy development. *Early Childhood Research Quarterly, 17*, 318-337.

Steiger, J. H. (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research, 25*(2), 173-180.

Taylor, B.M., Frye, B.J., & Maruyama, G.M. (1990). Time Spent Reading and Reading Growth. *American Educational Research Journal 27*(2), 351-362.

Trautwein, U., & Köller, O. (2003). The Relationship Between Homework and Achievement—Still Much of a Mystery. *Educational Psychology Review, 15*, (2), 115-145.

Wayne, A.J. & Youngs, P. (2003). Teacher Characteristics and Student Achievement Gains: A Review. *Review of Educational Research, 73* (1), 89–122.

Weinberger, J. (1996). A longitudinal study of children's early literacy experiences at home and later literacy development at home and school. *Journal of Research in Reading, 19,* 14-24.

Wigfield, A., & Guthrie, J. (1997). Relations of children's motivation for reading to the amount and breadth of their reading. *Journal of Educational Psychology, 89*(3), 420-432.

Xu, Z., & Gulosino, C.A. (2006). How Does Teacher Quality Matter? The Effect of Teacher-Parent Partnership on Early Childhood Performance in Public and Private Schools. *Education Economics, 14*(3), 345 - 367

Yang-Hansen, K. (2008). Ten-year trend in SES effects on reading achievement at school and individual levels: a cross-country comparison. *Educational Research and Evaluation, 14*(6), 521–537.

Yeung, W.J., Linver, M.R., Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family processes. *Child development 73*(6): 1861-1879.

Figure 1. The tested model

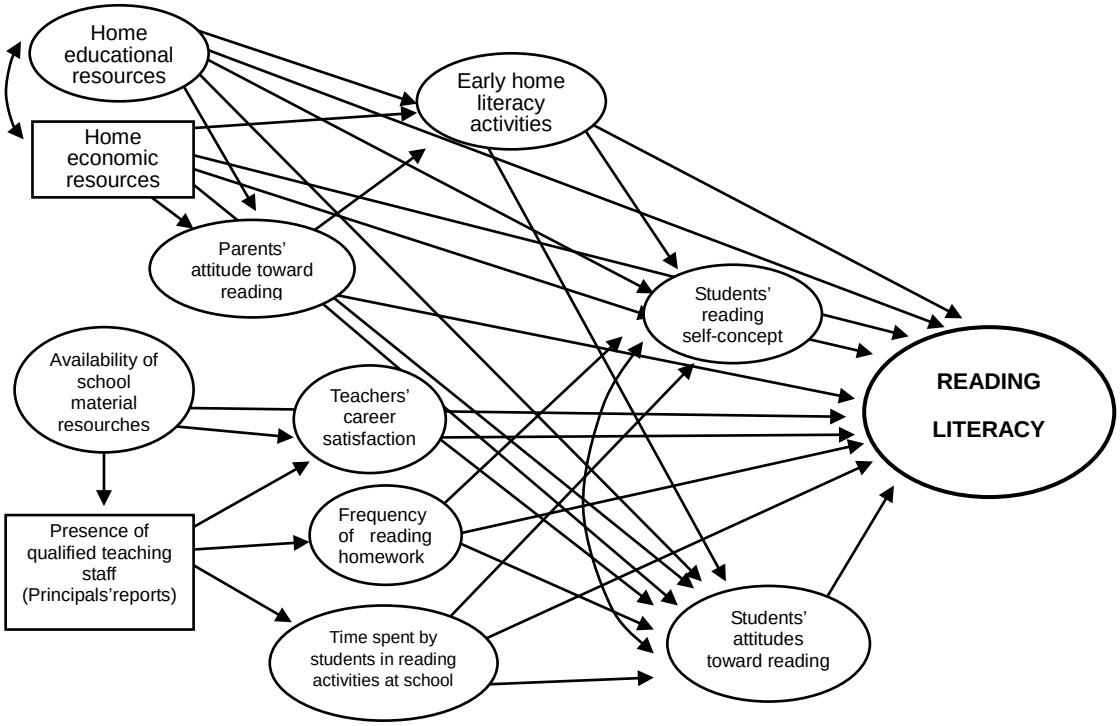

Figure 2. Results