



Determining the Parental Variables That Explain Students' Reading Success by Using CHAID Analysis

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Abstract

The importance of reading skills both in daily life and in other courses, the fact that PISA 2009 parent questionnaire was not conducted in Turkey and that the relationship between parental variables and reading skills was not investigated within the framework of this questionnaire necessitate this study. The purpose of this study is to determine the parental variables that explain the reading skills success scores of the students with the information gathered from the parent questionnaire and students' answers to the selected items of the PISA 2009 reading literacy test. Using the correlational model, this study has been carried out with 170 10th graders in Ankara and their parents. Data consists of information gathered from the parent questionnaire and the responses students give to the selected items of the PISA 2009 reading literacy test. Explanatory variables of the reading skills of the students have been determined with one of the decision trees methods, CHAID analysis. According to the findings of the study, it was found that the students whose parents think that most of the teachers in their school are qualified in their field and devoted to their work have higher scores in terms of reading success.

Keywords

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Introduction

Continuous developments in science and technology affect education, which is one of the most important indicators of economical and social growth (Milli Eğitim Bakanlığı [MEB], 2005). Education is successful only insofar as the students are able to transfer the knowledge and skills they have been taught at school to daily life (Berberoğlu, 2006). The success of students is a significant reflection of the education system in countries and it is important to identify what the system lacks and to meet the deficiency. In this respect, measurement and evaluation instruments used in defining the success of students become important as well (MEB, 2010). One of these instruments of measurement and evaluation is PISA (Programme for International Student Assessment) organized by The Organisation for Economic Co-operation and Development - OECD. PISA is a large-scale test that measures the level of knowledge and skills necessary to handle everyday issues among 15 year-olds in OECD countries and other participating countries in fields of mathematics, science and reading skills conducted every three years (MEB, 2010).

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PISA studies include cognitive skills tests (mathematics, science and reading) meaning to measure the academic success of students and student, parent and school questionnaires prepared in an attempt to evaluate the student as a whole. Turkey has not participated in some of the optional questionnaires in different PISA studies. For instance, Turkey participated in only PISA 2006 parent questionnaire (MEB, 2010). Participating countries respond to items regarding the education the child receives and the contribution the family makes to the education, the reading habits and patterns of the family, list of accessible resources and the reading activities family has with their kids, parents' level of education and the annual income of the family, family's thoughts on school and their participation in school activities, and the reasons for the parents' choice of school as a part of the study.

PISA 2009 study identifies, through information gathered from success tests and questionnaires, whether there is a correlation between qualities of students, schools and parents, and the academic success of students; and what needs to be done by the students, parents, schools principles and the teachers in order to increase the students' success. There are many national research conducted with regards to PISA reading success (Aydın, Erdağ & Taş, 2011; Bahadır, 2012; Coşguner, 2013; Gürsakal, 2012; Güzle-Kayır, 2012; Şengül, 2011; Yıldırım, 2012; Yılmaz, 2009). While Aydın, Erdağ and Taş's study (2011) examines the education level of the family and their socio-economic state, Bahadır's study (2012) examines the education level of parents, and Yıldırım's study (2012) examines the social and cultural state of the family. Many other studies (Coşguner, 2013; Gürsakal, 2012; Güzle-Kayır, 2012; Şengül, 2011; Yılmaz, 2009), on the other hand, do not pair the reading success of the student with characteristics of the family. Many research conducted abroad (Burgess, Hecht & Lonigan, 2002; Griffin & Morrison, 1997; Hampden-Thompson, 2004; Nonoyama, 2006; Park, 2008; Schmitt, Simpson & Friend, 2011; Tarelli & Stubbe, 2010; Xu, 2006) has found that the reading environment at home is related to the reading success. In this respect, the significance of reading success and the family factors affecting reading success, the fact that PISA 2009 parent questionnaire has not been practiced in Turkey, and that the correlation between family factors and reading success has not been researched within the scope of this questionnaire, it was necessary to identify the variables that affect the reading success of students.

Purpose of Research

The aim of this study is to determine the parental variables that explain the reading skills success scores of the students with the information gathered from the parent questionnaire and students' answers to the selected items of the PISA 2009 reading literacy test.

In accordance with the identified aim, answers to these questions are searched:

1. What is the variable that explains the students' reading skills success scores the best?
2. What are the variables that explain the students' reading skills success scores respectively?

Method

Research Model

As the parental factor affecting the reading skills of the students is identified, the research is in correlational model.

Study Group

Study group has been constructed considering the age group participating PISA as PISA 2009 reading literacy test was made on these students. Students between the ages of 15 and 16 participate in PISA (MEB, 2010). 68% of the students participating in PISA 2009 in Turkey are at 10th grade. For this reason, the study group of this research consists of 170 10th grade students and their parents studying at Ankara during 2012-2013 academic year. Within the scope of this study, 245 students and their parents have been approached, yet the parent participation rate was low and students whose parents responded to the questionnaire were not included in the research. Distribution of students and parents who participated in the research by schools is given in Table 1.

Table 1. Distribution of students and parents who participated in the research by schools

School	Number of Students		Respondent			
	n	%	Mother		Father	
			n	%	n	%
Rauf Denктаş Anatolian High School	62	37	44	71	18	29
Fatih Sultan Mehmet High School	67	39	51	76	16	24
Toplu Konut İdaresi Anatolian High School	41	24	25	61	16	39

Examining Table 1, it is seen that rate of students participating in the research is approximate and parents responding the questionnaire are mostly mothers in all the schools.

Data Collection Tool

Instruments used in research are the 11-item achievement test, seven of which are multiple choice and four are open-ended, and PISA 2009 parent questionnaire directed at the parents of the students participating in this achievement test. Achievement test has been accessed via the website of the Ministry of Education Research and Development Chairmanship (MEB, 2010). 11 items included in the achievement test vary in difficulty level. There are seven levels of competence (1a, 1b, 2, 3, 4, 5, 6) identifying the reading skills in PISA. Four of the items are level 1a, one is level 1b, two are level 2, two are level 3, one is level 4 and one is level 6. Two of the texts selected are descriptive, one is discussion and one is narrative. In terms of textual approach, three of the items take "Colligating information and interpretation: developing a general understanding" approach, two of them take "Deducing information and remembering it: remembering information" approach, three of them take "Reflecting personal thoughts and evaluating the text: evaluating the form of a text and reflecting personal thoughts" approach, and three of them take "Colligating information and interpreting: developing interpretation skills" approach. After the obtaining of necessary permissions, achievement test was carried out for the duration of a period at schools.

Maximum score students can get out of this achievement test is 11 and the minimum score is zero. Scoring of achievement tests is arranged over the rubric published in accordance with PISA. For the reliability of the scoring, interrater and cross-rater agreement coefficient is calculated. For these calculations, below quoted equation (Tavşancıl & Aslan, 2001) is used:

$$Reliability = \frac{Agreement\ Count}{Agreement\ Count + Disagreement\ Count}$$

When the equation given is used, the agreement rate between the first and last evaluation of the same items for both researchers has been found to be 100%. This shows that the scoring researchers are consistent within themselves. In addition to this, agreement rate calculated after the scoring of the same item by two different researchers is also found to be 100%. On that note, it has been found that interrater and cross-rater scoring is consistent, and that the reliability in terms of consistency and agreement is achieved.

Parent - student pairing was done before questionnaire and achievement tests by enumeration. PISA 2009 parent questionnaire was not carried out in Turkey. For this reason, the questionnaire was first translated to Turkish and then four academicians', two of whom were linguists, opinions were received, and statements were rephrased. After the pre-practice regarding the legibility of the questionnaire, the main questionnaire was given. For this, parent questionnaire was handed out to students participating in the achievement test. Four schools with different socio-economic levels were approached with permission from MEB, yet one of the schools did not consented. Data was gathered during the second half of the 2012 - 2013 academic year. Achievement test and the parent questionnaire were given to 245 students in total. Parent questionnaire was collected by the researchers one, two and three days after the achievement test but it was seen that only 170 parents answered the questionnaire.

In countries participating in PISA 2009 parent questionnaire, questions directed at the parents of the students and the variety of activities parents have with the kids during the first year of primary school were focused. In addition to these, questions regarding the activities parents have with their kids when they are 15 were also included (OECD, 2011a). PISA 2009 parent questionnaire was accessed from OECD's PISA website (OECD, 2011b). Parent questionnaire consists of seven chapters, "Fundamental Characteristics of the Family, Former Reading Patterns of Your Child, Reading Patterns of the Family, Reading Sources at Home, Family Background, Parents' Perception and Participation at School, School Choice" and 17 items. Items are categorized as binary and fours.

Analysis of Data

In this research, variables explaining the reading skills of the students are identified through responses parents give to parent questionnaire using the data-mining method CHAID (Chi-squared Automatic Interaction Detection) analysis, which is one of "Decision Trees" methods. CHAID is used to identify the relationship between one dependent variable and more than one independent variables (Diepen & Franses, 2005; Doğan & Özdamar, 2003). All independent variables are compared and the variable that explains the dependent variable the best is selected and the data set is divided to sub-groups in accordance with this independent variable selected. These sub-groups keep creating new sub-groups for each significant independent variable (Kass, 1980).

Thanks to its mathematically strong algorithms, CHAID analysis does not require assumptions such as a normal and vertical distribution of the data and the homogeneity of the variants from parametrical statistic techniques (Horner, Fireman & Wang, 2010; Kayri & Boysan, 2007). CHAID is a powerful statistics technique in that it analyzes data gathered from interval, ratio and ordinal scales simultaneously; it displays the relationship between the independent and dependent variables on a schema covering every possible hierarchy in detail (Üngüren & Doğan, 2010).

Results

Findings from this part of the research are provided in the same order as the research questions. Diagram 1 shows the results of CHAID analysis.

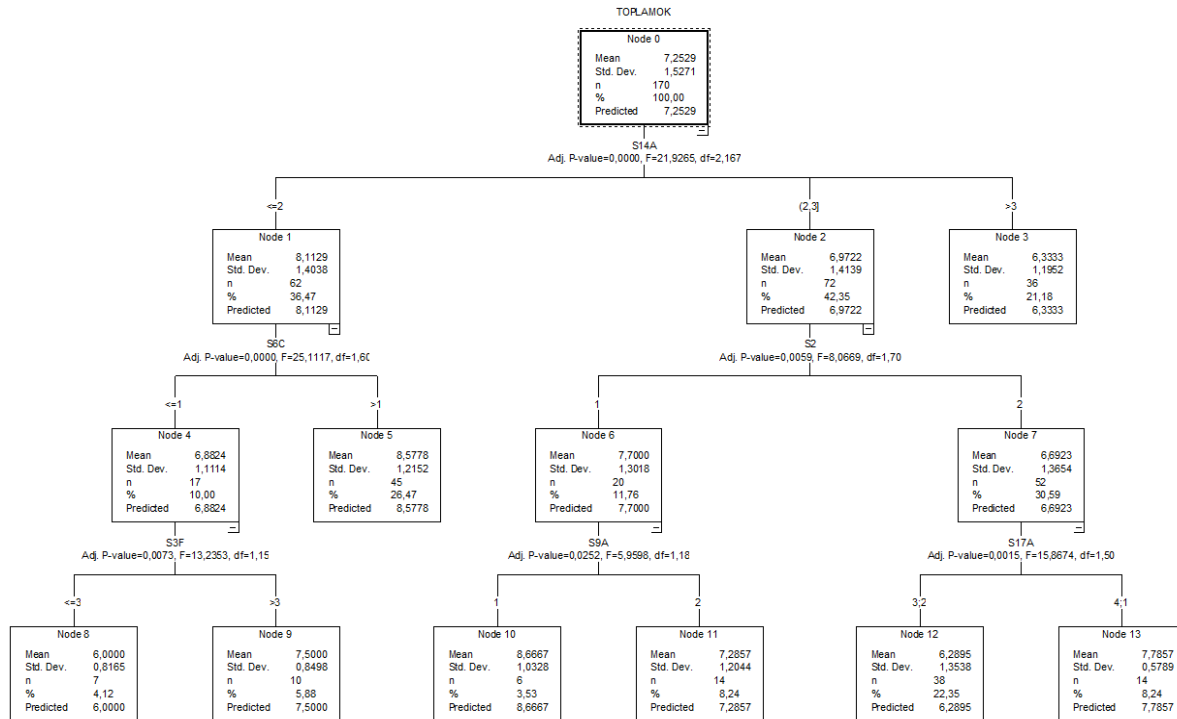


Diagram 1. Parental Factors That Explain the Reading Skill Success of Students

As a result of CHAID analysis carried out as seen in Diagram 1, it is seen that the average for the reading skills success of students is 7,253. Considering the maximum (11) and minimum (0) scores that students can get from the achievement test, it is possible to say that students have medium-level of achievement. The parental factor that explains the reading skills of the students participating in the research the best is found to be “majority of the teachers at my child’s school are competent in their field and are devoted to their job”, which is one of the items presented with regards to the perception of the parents and their participation at school ($F(2, 167)=21.926$; $p<.05$). Responses given to this item are categorized in three different nodes as disagreeing, agreeing and strongly agreeing.

Average success score of the students whose parents disagreed is 8,113. 62 students in this section constitute 36.47% of the data set. The parental factor that explains the reading skill success of these students in this node is the item “reading is a waste of time”, which is presented as one regarding the reading patterns of the parents ($F(1, 60)=25.112$; $p<.05$). Based on the results of the analysis, those who strongly agreed are clustered under one node, and those who agreed, disagreed and strongly agreed are clustered under a different node. Reading skill success of students whose parents thought reading is a waste of time is 6,882 and the number of students in this section is 17 (10% of all data set). Reading skill success of students in the other node is 8,578 and the number of students in this section is 45 (26.47% of all data set). Based on the results of this CHAID analysis, children of parent who do not consider reading as a waste of time are more successful. Moreover, CHAID analysis re-analyzed the node that strongly considered reading as a waste of time, and explained the reading skill success scores of the students in this node through the item “talking about what you read”, an item presented with regards to the former reading patterns of the child ($F(1, 15)=13.235$; $p<.05$). Based on the results of CHAID analysis, those who “never or not so often”, “once or twice a month” and “once or twice a week” talk about what students read are clustered under one node, and those

who talk about it “everyday or almost everyday” are clustered under another node. Children whose parents talk to them once or twice a week have a reading skill success score of 6 and the number of students in this section is seven (4.12% of all data set). Children whose parents talk to them “everyday or almost everyday” have a reading skill success score of 7,5 and the number of students in this section is 10 (5.88 of all data set). According to the results of the analysis, parents’ talking to students about what they read increases the students’ reading skill success score. A research OECD (2011) has conducted on PISA 2009 data also indicates similar findings. This research shows that there is a crucial correlation between the reading performance of students and parent-child activities. For instance, students whose parents talk to them about politics or social issues every week or everyday have a reading score 28 points higher than those whose parents talk about these less or never.

Reading skill success score of students whose parents agreed with the item “majority of the teachers at my child’s school are competent in their field and are devoted to their job” is 6,972. The number of students in this node is 72 and constitutes 42.35% of all data set. Another parental factor that explains the the reading skills of the students in this node is the item “Did your child attending educational institutions like nursery school before preschool education?”, one of the items presented with regards to the former reading patterns of the student ($F_{(1, 70)}=8.067$; $p<.05$). Those who answered “yes” to this item were clustered under one node and those who answered “no” were clustered under another. Number of students who had a nursery school education is 20 and they constitute 11,76% of all data set. The reading skill success score of these students is 7,7. The number of students who did not receive a nursery school education is 52 and they constitute 30,59% of all data set. The reading skill success score of these students is 6,692. According to the results of CHAID analysis, students’ attending educational institutions like nursery school before preschool education enhances their reading skills. This might be the end result of the high level of financial potential of the family and a working mother.

CHAID analysis re-analyzed the nodes with those who received a nursery school education and those who did not. Parental factor that explains the reading skill success score of students that received a nursery school education is the item that is presented with regards to the parental background, particularly with regards to the education level of the father “whether the father is a graduate/postgraduate or not” ($F_{(1, 18)}=5.959$; $p<.05$). The number of students in the node who responded “yes” to this item is 6. These students constitute 3.53% of all data set. The reading skills success score of them is 8,667. Students whose fathers were not graduate or postgraduate are clustered under another node. The number of students in this node is 14 and they constitute 8,24% of all data set. The reading skill success score of these students is 7,286. According to the results of CHAID analysis, the reading skill success score of students whose fathers are graduates or postgraduates are higher.

Parental factor that explains the reading skill success score of students that did not receive a nursery school education before preschool education is the item “school’s being close to home”, an item presented with regards to the choice of school ($F_{(1, 50)}=15.867$; $p<.05$). Those who answered “it is a little important” and “it is important” to this item are clustered under one node and those who answered “it is not important” and “it is very important” are clustered under another node. Number of students whose parents considered school’s being close to home as “a little important” and “important” is 38 and these students constitute 22.35% of all data set. Reading skill success score of these students is 6,290. The number students whose parents consider school’s being close to home as “not important” and “very important” is 14 (8,24 of all data set) and the reading skill success score of these students is 7,786).

Discussion, Conclusion and Suggestions

With this research, it is seen that the reading success of the students whose parents think that the majority of the teachers at their child's school are competent in their field and are devoted to their job is high. Eke's (2010) research conducted with the data gathered from PISA 2006 parent questionnaire presents a similar finding. This finding could be interpreted as parents give importance to the communication with teachers and most of them support teachers' educational activities. This situation not only indicates that reading success of the children of parents who consider teacher qualifications in school choice is higher but it can also result from the possibility that the students who are successful in reading may have preferred schools which have competent teachers.

Reading skills success scores of the students whose parents don't consider reading as a waste of time and talk to their children about what they have read are higher. A study by Park (2005) PISA 2000 regarding the reading success of students, it is found that the communication between the child and the parents contribute positively to the success. It is also seen that the reading skill success score of the students who attended education institutions such as nursery school before preschool education is higher. This may be the result of the high level of financial potential of the family and a working mother. In his study, Gürsakal (2012) has pointed that students' success level decreases as their schooling age increases. The parental factor that explains the reading skills of the students who attended educational institutions like nursery school before preschool education is the item "whether the father is a graduate/ postgraduate or not". Reading skills of the students whose fathers are graduate or postgraduate are found to be higher than those whose fathers are not graduate or postgraduate. In parallel with this finding, there are lots of studies supporting that students' success increases as the educational level of parents increases in both Turkey (Anıl, 2008; Anıl, 2009; Aslanoglu, 2007; Gelbal, 2008; Gürsakal, 2012; Keklik, 2011; Özer, 2009; Ziya, 2008) and abroad (Karip 2007; Marks, Cresswell & Ainly 2006; Nonoyama, 2006; UNESCO, 2007; Willms, 2000) in the literature. The parental factor that explains the reading skills of the students whose fathers are not graduate or postgraduate is the item "the school's being close to home". Reading skills success scores of children whose parents don't consider school's being close to home and who think that it is very important are higher.

According to the results of the CHAID analysis, it has been found that children whose parents think that the majority of the teachers in their school are competent in their field and devoted to their job; and who don't consider reading as a waste of time are the most successful students. Moreover, it has been found that children whose parents think that most of the teachers are not competent in their field and are not devoted to their job have the lowest level of reading skills. Based on the results of this study, it is suggested that special attention is given to teacher qualification issues with in-service and pre-school teacher education programs. It is also suggested that parents talk about the texts they read with their children. It is considered that parents' taking the time off to read will present a good model for their children and will contribute their personal development. Activities such as seminars and parents' meetings can be organized to inform parents accordingly.

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