

The Effect of Parental Characteristics and Home Resources on Reading Performance of 15-Year Old Students in the Philippines

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Abstract

This paper examines the effects of parental characteristics and home resources on reading performance of 15-year-old Filipino students using the 2018 International Assessment Program (PISA) Philippine dataset. Results revealed that the multiple linear regression model statistically significantly predicted reading performance. Parental education, parental occupational status, home educational resources, cultural possessions, and home ICT resources were found to be significant predictors of reading performance. With the Philippines ranking lowest on PISA reading performance, the results show that family variables are essential factors to consider. This study also provides empirical evidence of cultural capital importance in examining variations in educational outcomes.

Key words: parental characteristics, home resources, reading performance

Introduction

The 2018 PISA results revealed that the Philippines scored 353 in Mathematics, 357 in Science, and 340 in Reading, all below the OECD participating countries' average (OECD, 2018). In reading, which was the main domain assessed in this PISA cycle, both boys and girls in the Philippines ranked lowest among all countries. The Philippines had an average reading score of 340, more than 100 points less than the OECD average of 487.

Various factors can be considered in analyzing the determinants of academic outcomes. One important factor is the effect of family variables, such as education, occupation, income, and home resources. These factors, which Bourdieu refers to as cultural capital, reinforce social advantage, especially in the children's education. Parents who are more educated are more likely to have higher occupational status and might influence educational decisions and invest more in educating their children.

As a result of the current pandemic situation, the Department of Education announced that schooling in the current academic year would take the form of remote learning. Many parents in the Philippines must provide access to online education to their children or assume responsibility for teaching them. The so-called "digital divide" or the gap in access to modern information and communications technology (ICT) has primarily affected parent's choice of modality. Those who have access to computers and the internet chose the online modality while those without access chose the purely modular/printed materials modality. Parents found themselves questioning their capacity to assist their children with schoolwork and whether they have sufficient resources at home to facilitate conducive learning.

Problem of Research

This study aims to assess the effects of family variables – parental characteristics and home resources on their children's reading performance. Parental characteristics are explored as well as the home as a learning environment. Availability of home educational resources, cultural possessions and ICT resources are examined and the way they have influence on reading performance.

Research Focus

The idea of cultural capital by Bourdieu (1973) refers to the set of symbolic elements that one acquires from being part of a specific social class. In Bourdieu's thesis on cultural reproduction, cultural capital essentially works to reproduce social advantage (van de Werfhorst, 2010). According to Bourdieu (1986), „the transmission of cultural capital is no doubt the best hidden form of hereditary transmission of capital, and it, therefore, receives disproportionately greater weight in the system of reproduction strategies, as the direct, visible forms of transmission tend to be more strongly censored and controlled” (p. 246).

Parental education, occupational status, material resources, which are indicators of cultural capital contributes to school outcomes. Several studies have examined the effects of parental education, occupational status, and income on

their children's educational achievement (Nicholas-Omeregbe 2010, van de Werfhorst 2010). Chevalier and Lanot (2002) found that pupils from poorer families are less likely to invest in education. Blanden (2004) found that there are some substantial connections between family income and educational success and that these connections have improved over time in their intergenerational study of UK children. Thomson (2011) claimed that a significant level of educational disadvantage related to socio-economic backgrounds could be equivalent to up to three years of schooling. Differences in home learning environments with children having access to resources at home have also been found to be significant for the development of children.

The home learning space, with books as an indicator, also affects student achievement. Evans et.al (2010) found in their 20 year-study that the size of home library affects educational achievement even if the educational level of the parent, father's occupation and other family background characteristics are accounted for. They called this „scholarly culture” because it encourages family discussion and for children to read for pleasure. Van Dergen et.al (2017) reported that the availability and number of books found at home predicted child reading fluency even after parental reading fluency was controlled. Sikora, et. al. (2019) emphasized the importance of home books during childhood and adolescence. These are good predictors of student cognitive abilities, which could later lead to educational and job success.

The positive effects of computers and the internet can also be found in the literature. Selwin (2013) claimed that the internet promotes a “new learning culture.” Schmitt and Wadsworth (2006) found a significant positive association between home computer availability and British school exam performance. Fiorini (2010) found evidence of a positive relationship between computer use and childhood cognitive skills.

These studies have shown that parental characteristics and home have an impact on academic performance.

Methodology

General Background of Research

This paper uses data collection from the 2018 International Student Assessment Program (PISA) of the Organization for Economic Co-operation and Development (OECD). PISA investigates the degree to which 15-year-old students have acquired the key knowledge and skills needed for full participation in modern

societies near the end of their compulsory education, focusing on how well students can deduce and apply knowledge in new contexts, both in and outside of school” (OECD, 2018). PISA 2018 is the seventh PISA cycle in which about 600,000 15-year-old students from 79 OECD and partner countries have participated. Reading Literacy, which is the main domain of 2018, and Mathematical Literacy and Scientific Literacy as the minor domains were examined. The Philippines took part in this assessment for the first time.

Sample of Research

A two-stage stratified random sampling design was used to draw the sample schools and learners in the Philippines. One hundred eighty-eight schools were randomly chosen from 17 regions in the first level. The probability of a sampled school is proportional to its estimated PISA population size. In the second level, 42 PISA students were sampled using the PISA within-school sampling program, KeyQuest, from each randomly selected school. A total of 7,233 15-year-old students from all regions in the country were included.

Instruments and Procedures

This paper used the variables derived from the PISA Student Questionnaire (STQ). The STQ asked about the “students themselves, their attitudes, dispositions and beliefs, their homes, and their school and learning experiences” (OECD, 2019). SPSS version 23 was used to run the statistical analyses in this paper.

Data Analysis

Dependent Variable: Reading Performance

The PISA 2018 computed ten plausible values (PVs) to measure student performance in the different domains obtained from Item Response Theory models generated through multiple imputations based upon pupils’ answers to the sub-set of test questions (OECD, 2018). None of these ten values are the actual student scores but representatives of 10 random values drawn from the posterior distribution of students’ scores (OECD, 2018).

This paper followed the OECD recommendations in dealing with plausible values by considering all 10 PVs to obtain unbiased and stable estimates. In performing the regression analysis, the same regression model was run ten times, once for each plausible value of the reading scores (PV1Read to PV10Read) and compute the unbiased estimates and their standard based on these ten sets of estimates. The estimates generated by the ten regression models were almost identical. Due to this

and for the sake of simplicity, the estimates for the first plausible value (PV1) were used in this paper. The same approach was used by Spieza (2011) in his analysis of the effects of computer use on educational achievement.

Independent Variables: Parental and Home Variables

This study included five independent variables or regressors. These variables are scale indices constructed through the scaling of multiple items. The indices were scaled, and the index values correspond to Warm likelihood estimates or WLEs (OECD, 2018). The first two variables measure parental characteristics. The index of parental education (PAREDINT) is the index of the estimated number of years of education generated from HISCED, the higher ISCED (International Standard Classification of Education) level of either parent. The second variable, the index of highest parental occupational status (HISEI) corresponds to the higher ISEI (Index of Socio-Economic Index) score of either parent or the only available parent's ISEI score. The next three variables measure household resources. Cultural possessions at home (CULTPOSS) include the availability of books of poetry, classic literature, and other works of art. Home educational resources (HEDRES) are composed of various school items such as the availability of a quiet place to study, study desk, technical reference books, dictionary, and other books. ICT resources (ICTRES) consists of items on internet access, computers, and other electronic gadgets and educational software.

Results and Discussion

Descriptive Statistics

This section will explore the present parental characteristics and availability of home resources – physical learning space at home, availability of books, educational resources, technology access and ICT resources.

Parental Characteristics

The International Standard Classification of Education (ISCED) was used to categorize the educational attainment of parents. The survey showed that 62% of the mothers and 61% of the learners' fathers have at least ISCED level 3 or secondary education, while 20% of both mothers and fathers are college-educated. In terms of those with low educational attainment, 10% of the fathers, and 6% of the mothers reported they were not able to finish primary school.

Home Learning Environment

Based on the abovementioned variables, we can create a home learning environment profile of our 15-year old learners as they embark on remote learning. Online delivery mode is one popular option for parents, especially those who may not have the capability or time to teach their children.

Table 1. Availability of Study Place, Books and Cultural Possessions at Home

In your home, do you have the following?	Yes	No	Total
A quiet place to study (n= 6913)	68.8	31.2	100
A room of your own (n= 6935)	49.5	50.5	100
A desk to study at (n= 6977)	75.4	24.6	100
Books to help with your schoolwork (n= 6942)	87	13	100
Technical reference books (n= 6874)	54	46	100
A dictionary (n= 6974)	88.4	11.6	100
Classic Literature (n=6860)	39.3	60.7	100
Books on art, music, design (n=6893)	64.4	35.6	100
Works of Art (n=6841)	41.3	58.78	100

Note: Total number of cases (n) varies due to missing values

Table 1 presents the availability of conducive learning space at home for the students. Data show that 68.8 percent of the 15-year old learners have a quiet place to study, 50% have a room of their own, and 75% have a study desk. It shows that there are more who have access to a place for study, but more than 30% of the students still face the situation of having no personal space. It also shows the availability of other support learning materials. A great majority (87%) claimed that they have books at home. In terms of technical reference books, only 54% reported that these are available in their homes, while 88% said that they have a dictionary available for use.

Cultural possessions were also reported with fewer students having resources for the classics and arts. Although 64% said that they have books on arts, music, and design, only 39% reported that they have classical literature, and only 41% have works of art at home.

A separate question was asked about the number of books found in the students' homes. A little over half (53%) of the students reported that they have at least ten

books in their house, while only 5.7 reported having over a hundred books. These books may vary in terms of genre, but it may reflect the scholarly culture at home.

Table 2. Number of Books Available at Home

	Frequency	Percent	Cumulative Percent
0–10 books	3782	53.0	53.0
11–25 books	1949	27.3	80.4
26–100 books	995	14.0	94.3
101–200 books	235	3.3	97.6
201–500 books	97	1.4	99.0
More than 500 books	72	1.0	100.0
Total	7130	100.0	

Technology Access

Table 3 presents student access to home computers, educational software, and the internet. More than half of students (60%) reported not having a computer for schoolwork, while only 44% of students have access to educational software. More students (51.4 percent) have no internet connectivity at home.

Table 3. Computer and Internet Access at Home

	Yes	No	Total
A computer you can use for schoolwork (n= 6899)	40.1	59.9	100
Educational software (n= 6852)	43.6	56.4	100
A link to the Internet (n=6880)	48.6	51.4	100

Note: Total number of cases (n) varies due to missing values

With respect to other digital devices, students were asked to identify how many they have at home – not necessarily for personal use. In online learning, a digital device and internet access are a “must”. Table 4 shows that some students do not have access to any digital device at home and this includes 52% who do not have computers – desktop computer or laptop, 14% who do not have smartphones with internet access, 70% who do not have tablet computers and 72% who do not have E-book readers. Only 30% of the students reported that they have at least one computer, 27% have at least one cellphone, 22% have tablet computers and 20% have E-book readers. Cellphone with internet access is most common in their homes but these may be personally owned or shared with parents and other family members.

Table 4. Availability of Digital Devices at Home

How many of the following are in your home?	None	One	Two	Three or more	Total
Cell phones with Internet access (e.g. smartphones) (n=7085)	14	27.1	14.2	44.7	100
Computers (desktop computer, portable laptop, or notebook) (n= 7068)	51.8	29.5	10.1	8.6	100
Tablet computers (e.g. iPad, BlackBerry PlayBook) (n= 7022)	69.8	22.4	4.7	3.2	100
E-book readers (e.g. Kindle, Kobo, Bookeen) (n= 7021)	71.6	20.2	3.3	4.9	100

Note: Total number of cases (n) varies due to missing values

Multiple Linear Regression Modelling

Multiple regression assesses the effects, separately and in combination, of more than one independent variable on the dependent variable (Healey, 2016, p 365). Multiple regression was run to predict Reading Performance from parental education, parental occupational status, cultural possessions, home educational resources, and ICT resources. The Multiple Linear Regression Model is:

$$y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \varepsilon$$

where

y refers to the dependent variable PV1Read (Reading Performance)

β_0 refers to the intercept

β_p refers to the partial regression coefficient of the independent variable which gauges the unit change in the dependent variable per unit increase in the factors on the condition that the rest of the factors remain unchanged.

X_1 = PAREDINT

X_2 = HISEI

X_3 = CULTPOSS

X_4 = HEDRES

X_5 = ICTRES

ε refers to the error term.

Before proceeding with the regression modeling, the data were checked if they satisfy the assumptions of multiple regression (Laerd Statistics, 2015). There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. The Durbin-Watson statistic value of 1.723 indicated that residuals were independent. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. Checking for outliers, leverage, and influential points, the studentized deleted residuals revealed 15 values greater than ± 3 standard deviations but since there were no leverage values greater than 0.2, and the values for Cook's distance is above 1 which means that none of the cases are influential, no case was dropped from the analysis. The assumption of normality was also met, as assessed by a Q-Q Plot. After satisfying the basic requirements for multiple regression, the next step was fitting the multiple regression model.

The multiple regression model statistically significantly predicted PV1Read, $F(5, 6482) = 358.879$, $p < .001$, adj. $R^2 = .217$. All five variables statistically significantly predicted the dependent variable, $p < .05$. Regression coefficients and standard errors can be found in Table 5.

Table 5. Multiple Regression Results for PV1Read

PV1Read Model	B	95% CI for B		SE B	β	R^2	ΔR^2
		LL	UL				
Constant	321.767***	313.456	330.078	4.240		.217	.216
PAREDINT	.770**	.226	1.315	.278	.033**		
HISEI	1.127***	1.030	1.223	.049	.285***		
CULTPOSS	3.117**	.977	5.256	1.092	.035**		
HEDRES	3.800***	1.885	5.715	.977	.055***		
ICTRES	13.235***	11.289	15.180	.993	.196***		

Note. Model = "Enter" method in SPSS statistics; B = unstandardized regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; SE B = standard error of the coefficient; β = standardized coefficient; R^2 = coefficient of determination; ΔR^2 = Adjusted R^2

* $p < .05$. ** $p < .01$. *** $p < .0001$

The multiple correlation coefficient, R indicates the scores predicted by the regression model and the actual values of the dependent variable. A value of 0.466 indicates a moderate level of association between PV1Read and the predictors – PAREDINT, HISEI, CULTPOSS, HEDRES AND ICTRES. Adjusted R^2 for the

overall model is 21.6%, which means that the addition of all the five independent variables into a regression model explained 21.6% ($0.216 \times 100 = 21.6\%$) of the variability of our dependent variable. Adjusted R^2 is used as it corrects for this positive bias in order to provide a value that would be expected *in the population as compared to R^2 which is based on the sample* and is considered a positively-biased estimate of the proportion of the variance of the dependent variable accounted for by the regression model (Laerd Statistics, 2015).

The regression equation can be expressed in the following form:

$$\text{Predicted Reading Performance (PV1Read)} = 321.767 + .770 \text{ PAREDINT} \\ + 1.127 \text{ HISEI} + 3.117 \text{ CULTPOSS} + 3.800 \text{ HEDRES} + 13.235 \text{ ICTRES}$$

The coefficient for parental education (PAREDINT) is +.770. The slope coefficient represents the change in the dependent variable for a one-unit change in the independent variable. As such, an increase in the index of parental education is associated with an increase in reading performance scores. An increase in parental occupational status (HISEI) also results in a 1.127 increase in reading performance. Cultural possessions (CULTPOSS) increase reading performance by 3.117, home educational resources (HEDRES) by 3.8, and ICT resources (ICTRES) by 13.235. The multiple regression equation predicts that the higher the index of parental education and occupation and home resources, the higher the students' reading performance. It is important to note that this increase in reading performance for each increase in the parental and home WLEs occurs after controlling or holding all independent variables constant.

The 95% confidence intervals indicate the 95% of the true value of the slope coefficient; that is, with 95% confidence, the true value of the slope coefficient of PAREDINT is between .226 to 1.315. HISEI is between 1.0030 to 1.223, CULTPOSS is between .977 to 5.256, HEDRES is between 1.885 to 5.715, and ICTRES is between 11.289 to 15.180.

All the p-values of the slope coefficients are less than .05, which means that they are all statistically significant and that there is a linear relationship in the population. The standardized beta coefficient that compares the strength of each independent variable's effect on the dependent variable revealed that the index of parental occupational status (HISEI) has the strongest effect on reading scores, followed by ICT resources (ICTRES). Interestingly, index of parental education (PAREDINT) has the lowest beta coefficient among the five independent variables.

Conclusion

Learning at home during this time of the pandemic poses challenges to both the learners and their families. Family and home characteristics play a crucial role in providing the necessary cultural capital to ensure successful learning. The results of this study are consistent with existing literature, which identifies family background variables as significant predictors of educational achievement. This study provides evidence that parental education and occupational status have positive effects on reading performance. The reason might be that the more educated the parents are, the more likely they will invest in educational resources for their children. Cultural possessions, home educational, and ICT resources also have positive impact on reading performance. The availability of books, which is an indicator of scholarly culture, study space, computer and internet connection and even cultural possessions such as works of arts at home, fosters an environment conducive to learning. Remote learning during the time of the pandemic in this kind of home learning environment would be ideal. However, the reality is, not all learners are equipped with this kind of cultural capital.

This study reflects the Philippines' gap in education. The significant relationship between the predictors and dependent variables highlights the divide between learners who have parents with a high level of education and occupational status, and those who do not, and those who have material resources, and those who do not. Because of lack of access, some students will engage in remote learning in more convenient or engaging ways. However, even those who might initially have access now find themselves in a problematic situation. Many parents experience loss of jobs, closure of business, or even the burden of contracting the disease. As of July 2020, the Department of Education reported a 27.3% decline in national enrollment (Agoncillo, 2020), and a significant number of learners opted to enroll in public schools over private schools. The decline in private school enrollment is a clear indicator of how the pandemic has taken its toll on parents' educational decisions.

Therefore, it is interesting to find out if the same effect goes for other PISA assessment domains. By identifying the significant contribution of family variables, it is relevant to note that an improvement in the educational and occupational status of parents, as well as access to home resources, would result in improved academic outcomes. School factors might be identified as crucial factors in existing literature, but family factors cannot be disregarded. These characteristics and resources are a function of a family's social status. The social status of the learner's family and their parents, who are primary socializing agents, influences

their ability to access and develop cultural capital. In this study, it is evident that it affects educational performance, and in the long run, might have an impact on social mobility.

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