Students' performance in the public education in the state of São Paulo, Brazil

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Abstract: This study analyses the variation of student performance and the way in which some factors affect student performance in the 8th grade of public education in the state of São Paulo. A regression analysis with the Hierarchical Database Model method on data from Prova Brasil and the School Census was performed. According to the results obtained, the variables which appeared to be associated with student performance were previous failure, initiation of studies in early childhood education, and level of parental education. Regarding schools, significant variables included school meals and average socio-economic status of the students; moreover, for teachers the variables included training, experience, working exclusively for one school, and correcting students' homework.

Keywords: elementary school; students' performance; public education.

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1 Introduction

The Development of Education Plan (PDE) of the Ministry of Education in Brazil sees in education 'a face of the dialectical process that aims at the construction of autonomy, that is, the formation of individuals able to take a critical and creative attitude towards the world' (Haddad, 2008). The importance of education for the formation of the individual and their development as critical citizens is undeniable.

In Brazil, education is deemed a social right, which is the common responsibility of the Union, states, and municipalities: 'Education is a right of all and duty of the State and the family, which will be promoted and encouraged with the cooperation of society, aiming at the full development of the person as well as his/her preparation for the exercise of citizenship and work qualification' (Brasil, 1988a; Brasil, 1988b; Brasil, 1988c).

Education is among the main topics of public administration due to the recognition of its concise role in the development of countries. Public schools have been considered as research objects in many other studies (e.g. Ahmed et al., 2014; Falch and Fischer, 2012). Kliksberg (1999) points out that at the end of the last century, education has been considered as a key strategy for economic growth and competitiveness against post-modern capitalism. Kliksberg (1997) adds that education is also considered to be the driving force of social development, socialisation of values, and equity.

This study is based on the evaluation of the SAEB (National Evaluation System of Basic Education), promoted by the Ministry of Education (MEC) through the National Institute for Educational Research and Study Anísio Teixeira (INEP). The assessment comprises two tests which differ in scope and the results published by them. The first is Prova Brasil; this is a census evaluation applied to students in 4th and 8th grades of public elementary schools that have at least 20 students in the grades to be evaluated. The second is called SAEB, and it differs from the former as it is applied through sampling (INEP, 2009).

Through these assessments, the Basic Education Development Index (IDEB) is calculated, from which the governmental institutions of public education define actions for correcting distortions and directing their technical and financial resources to priority areas, aiming at the development of the Brazilian educational system and reducing inequalities (INEP, 2009).

This study will include the results of Prova Brasil for the State of São Paulo in 2007. The aim of the research is to identify associated factors with student performance. Based on other studies previously conducted in this direction, the following assumptions were

adopted: (a) cultural, social, and economic variables related to students and their families are strongly associated with school performance; and (b) school infrastructure, motivation, commitment, and qualifications of teaching professionals can significantly influence the students' performance. The problems of this study have been identified as: how much can the students' performance be explained by the school they attend? Which are the most significant variables in this sense? Based on this, we aim to identify the factors from the students' school which explain their performance in public education in São Paulo, Brazil.

To achieve such an objective, the following steps were fulfilled: (a) creation of a database with information from Prova Brasil 2007 and the School Census 2007; (b) development of indexes to reduce the number of variables to be analysed; (c) quantifying the school effect on its students' performance; (d) analysis of the key variables that are associated with student productivity; and (e) verification of the effects found in smaller samples composed by schools with lower and higher average income.

The remainder of this paper is divided into: an introduction to the evolution of education in Brazil, explanation of the methodological aspects, data analysis, and final considerations.

2   Education in Brazil

The state of education in Brazil is still far from what is considered desirable, especially in terms of quality. Nevertheless, it is important to praise the progress made in education rates in the country in recent years: for example, the decline in illiterate populations; significant increases in enrolment rates for secondary and higher education; an increase in the average of the Brazilian school age; and the universalisation of primary education.

However, the problem regarding access to education persists, as evident by observing data from the National Household Survey (PNAD, 2009), according to which only 33.3% of the population have completed secondary education. Even worse is the situation in higher education: only 11.1% of young people aged 17–25 years are enrolled in a course at higher education (PNAD, 2009). Bearing in mind that the access to primary education, which has long been one of the main concerns in public educational policies, has been overcome, we still have the problem regarding the quality of this educational stage.

In addition to this scenario, Brazil faces poor education performance compared to other countries. In 2009, the Programme for International Student Assessment (PISA) coordinated by the Organisation for Economic Cooperation and Development (OECD), which evaluates the effectiveness through indicators of education systems of 57 countries by considering the average performance in all subjects, ranked Brazilian public schools in the 53rd position.

At the end of the 1970s, researchers found that school environment variables have a significant impact on student performance (Brookover, 1979). Even the socio-economic environment (where the school is located) affects student performance (Erdem et al., 2008). From this positioning comes the research line named 'Escola Eficaz' (Effective School) aimed at knowing and understanding the various social contexts: the various school features that can generate interference in student performance through school policies and practices. In this sense, it is clear today a more complex way of looking at educational issue, as analysis of the organisation of schoolwork process, including the study of working conditions; school management, considering teacher and curriculum

elaboration; and analysis of the systems and school units, is needed. All of this, without losing sight of the educational phenomenon, belongs to the broader social relations, such as the economic, social, cultural and political dynamics (Dourado et al., 2007).

Research conducted with data from Goiás' schools (a Middle-West State in Brazil) concluded that those endowed with adequate infrastructure showed differences in student performance, noting a positive relationship between good school structure and higher grades in educational assessments (Alves and Passador, 2011). Such structure involves the existence of computer labs, the presence of quality energy and sanitation at the school, and the offering of school meals, which are all important factors when considering low-income students (Collares, 1992). However, the relationship between the Socio-Economic Status (SES) of the students and the infrastructure of schools, especially for students of 8th grade and high school, the results showed that 'richer' students study in more structured schools (Alves and Passador, 2011). Thus, one should be cautious about the causal relationship between school infrastructure and the performance of their students.

2.1 Relation 1: school structure leads to higher student performance

Hypothesis 1a: The average socio-economic level of the school influences student performance.

Hypothesis 1b: The existence of computer labs in the school influences student performance.

Hypothesis 1c: The offering of lunch at school influences student performance.

Hypothesis 1d: The presence of proper energy and sanitation at school influences student performance.

Nevertheless, student engagement is influenced by the social reality of where they study (Grillo and Damacena, 2015). Under this assumption, teachers are essential for improving the quality of education as they are not only immediate agents in the teaching process but also act directly in the social environment where the learning process occurs. Teachers' characteristics influence student performance (Lucky and Yusoff, 2015). High levels of student performance usually occur in schools that comprise teachers with higher education degrees (Levine, 1996), thereby highlighting the importance of training and updating them with training initiatives and refreshment courses (Levine, 1996; Reynolds, 1996).

Additionally, a relationship with a closer presence of the teacher may affect student discipline performance. Teachers should be prepared to attend and teach a variety of students and create a productive and learning relationship with them (Barreto et al., 2013). Such a relationship might be further explained by the existence of class councils (Mattos, 2005), the conflicts between teacher and students (Pianta and Stuhlman, 2004), teachers' stability in the school, and what enables long-standing relationships between themselves and the students (Rubie-Davies et al., 2014). Lastly, students' behavioural issues during classes may be something that negatively affects their performance (Rathel et al., 2008).

2.2   Relation 2: students' personal relationships affect their performance

Hypothesis 2a: The existence of a class council stimulates student performance.

Hypothesis 2b: Problems with teachers negatively influence student performance.

Hypothesis 2c: Teachers' stability at school influences student performance.

Hypothesis 2d: Students' behavioural issues negatively influence student performance.

Another important variable that influences student performance in elementary school is the educational background of the parents (Martins and Veiga, 2010; Menezes-Filho, 2007). It is assumed that parents with a higher level of education may, in turn, influence their children to study more often. Moreover, parents who possessed a higher degree of education may believe that education is an important asset for an individual and they might opt to establish higher support for their children's education, which would have a direct influence on their grade performance. Based on this statement, the following hypotheses were formulated.

2.3   Relation 3: parents' level of education influences student performance

Hypothesis 3a: The fact that a student's mother has completed elementary school influences student performance.

Hypothesis 3b: The fact that a student's mother has completed high school influences student performance.

Hypothesis 3c: The fact that a student's mother has completed college influences student performance.

Hypothesis 3d: The fact that a student's father has completed elementary school influences student performance.

Moreover, students' previous personal experiences may also influence their current performance. For example, students who have attended preschool education programs present better performance in elementary schools (Entwisle and Alexander, 1998); moreover, students who have failed in some discipline might have a negative influence on their performance (Menezes-Filho, 2007). A student's past influences their current performance. Moreover, their current experiences, including how much they enjoy a particular discipline (Núñez-Peña et al., 2015) or the support that they receive from their teachers when their exercises and homework are corrected (Torrecilla et al., 2013), are also believed to influence performance. Based on this, the following hypotheses were formulated.

2.4   Relation 4: students' experiences influence their performance

Hypothesis 4a: When students have attended childhood education programs, they show better school performance.

Hypothesis 4b: When students have faced failures in previous disciplines, their performance is negatively affected.

Hypothesis 4c: When students enjoy a particular discipline, they show better performance.

Hypothesis 4d: The fact that teachers correct exercises and homework influences student performance.

Figure 1 represents the relationships that we intend to test in this study.

Figure 1 Research framework
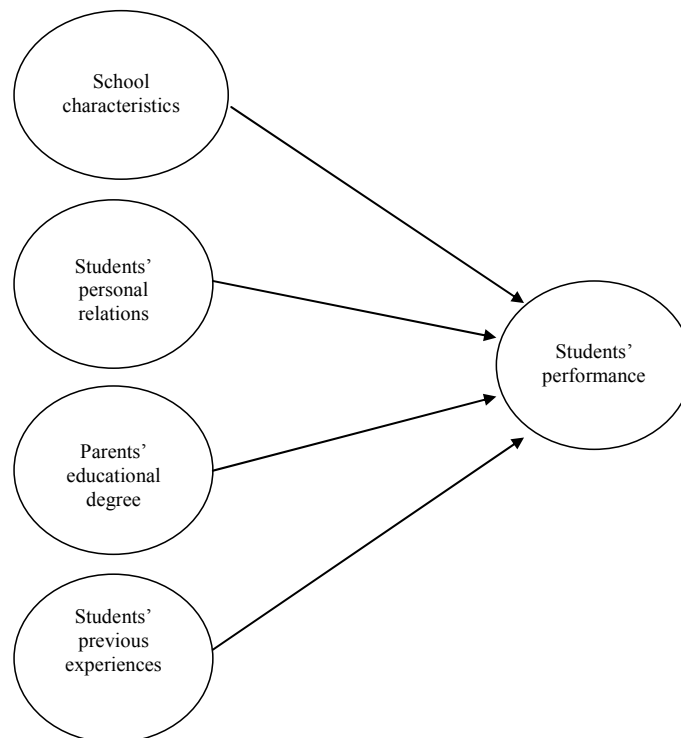
Source: Elaborated by authors

3 Methods

3.1 Research approach and data analysis

This research has a quantitative approach and used a multilevel multiple regression. Recently, the use of methods which consider the hierarchical structure of education data has gained strength (Goldstein, 1999). It is understood that there is a hierarchical structure when there are units grouped at different levels. In the case of studies with educational data, students are clustered into groups, which in turn are grouped by schools.

Suitable methods to the hierarchical structure of the data offer advantages to the researcher who is able to explore the extent of the differences in average educational outcomes between schools. Specifically, it takes into consideration the school's structure and its management or the characteristics of students who attend these schools (Goldstein, 1999). This instrument, therefore, provides additional information to indicate how much of the variance between students' grades is due to the variance between the characteristics of the property or the variance between school characteristics.

3.1.1 Data collection

For the application of this analysis model, secondary data from Prova Brasil and the School Census, both from 2007, were used. Prova Brasil is a biennial evaluation applied by the Brazilian government in the 4th and 8th grades of elementary schools in the public schools of the country. Apart from the results of the tests given to students, Prova Brasil generates a set of socio-economic information about students and school management from questionnaires given to teachers and principals of schools assessed in addition to the students themselves.

To complete the data set, information obtained from the School Census, which is characterised by the set of annual information collected from all of the country's schools through standardised questionnaires containing questions related to school infrastructure, teachers, enrolment, school day, school income, and movement, was also used. Only the information concerning the schools infrastructure was used from this data set, since all other information was extracted from the Prova Brasil data set. Considering both data sets were originally collected to evaluate the Brazilian elementary schools and student performance, the context and proposal for which such data was gathered was coherent with the actual research objectives, allowing their usage in the current inquiry (Carneiro-da-Cunha et al., 2013).

As sample delimitation, the analysis was conducted with students in the 8th grade of elementary school from the state of São Paulo. This specific state was chosen because São Paulo has the greatest amount of public education investment in Brazil. For example, in 2013, São Paulo state had more than four million students enrolled in public education and more than R\$24 billion (approximately US\$6.8 billion in exchange currency of April 2016) in educational public investment (Terra, 2014).

The intention of this research was also to compare the importance between high- and low-performing schools, taking as subsamples schools among the 25% worst and those among the top 25% considering the average performance of their students on a Portuguese test. Such comparison allowed us to identify if the significant variables to explain students' performance were in fact significant in both high-performance and in low-performance schools.

In the state of São Paulo, there are 27,249 schools listed in the School Census (public and private/urban and rural schools). By adding the information of students, teachers, and principals of Prova Brasil, which was gathered only for urban public schools, a total of 4410 schools with 8th grade classes were found in both sources (School Census and Prova Brasil). Based on this data set, all variables from the framework model were collected related to the 4410 observations. The answers in the data set were transformed from categorical answers into binary variables (dummies).

Knowing the importance of the socio-economic characteristics of students to explain their performance, we used the following variables to characterise the student sample: gender, ethnicity, SES, parental education, if the student works in addition to attending school, if they began studies in early childhood education, if she/he has failed previous classes, if they do the homework and if the teacher corrects it, and if they have indicated whether they like the discipline or not (Portuguese language, in this case). Except for the SES index of the student, all variables are binary. The SES index was created from the questions regarding the ownership of durable goods using the method of analysis of the main components.

3.1.2 Research procedures

First, a null model of the determinants of school performance was estimated, which received this name because there is no addition of variables that are proposed to explain the performance. The importance of this model lies in the fact that it allows one to discover the distribution of the total variance of the performance by the two levels of grouping variable, students, and schools, without which any of these variations with the 'determinants' proposed could not be explained (students variables, schools, teachers, and principals). As a result, it makes a comparison using the ratio between the variance and the total variance schools, extracting a ratio between them. The value serves as a basis for comparison to confirm the setting of the following models. This index cannot be interpreted in isolation but must be interpreted the magnitude of the difference between its value and found from the following model.

The index measures how much of the total variation stems from differences between schools (groups). Thus, it follows that a percentage of 8.1 varying performance among students is explained by the variance of the average performance between schools. Then, when the same calculation is conducted for the two quartiles in analysis, it extracted the following values: 0.7% in the worst-performing schools, 2.13% for the best performance schools.

Despite the fact that a decline in this index was expected to be applied in quartiles (which features a reduced number of observations, focusing less heterogeneous groups), the decrease was still very high and we can also add the fact that in the worst-performing schools this proportion is much lower. Understanding these results reveals that the assigned school variation is small and even smaller in the worst-performing schools. This highlights the fact that many other characteristics among students better explain the difference in the performance than the actual variation between schools.

Subsequently, the socio-economic variable is added to build Model 1. It was added to identify how much it can explain the variation in performance of students, which is explained by schools. Thus, the percentage of the average variation on students' performance, which is explained by schools, falls from 8.1% to 5.0% in the full sample. That said 3.11% of the 8.1% of the performance variation between schools is due to the composition of the students of these schools in terms of SES.

The same analysis at best and at worst quartile has the following values: 0.5% and 0.0%, respectively. Therefore, in addition a great part of the variation is explained by the difference between students when it includes the differences between the average socio-economic levels, there remains very little of the variation explained exclusively to the difference between schools.

Finally, the last model is built with the addition of other variables related to other characteristics of the schools, the characteristics of teachers/class and student characteristics. By adding this set of variables, the proportion of variance between schools is reduced from 5.0% to 3.9% in the total sample. This result consolidates the idea built with Model 1 in which the school SES is the most representative factor to explain the difference in the performance, representing a variation of 3.1%, while adding all other variables leads to a decrease of 1.1% in the unexplained variance between schools, meaning that these account for 1.1% of the variance between schools in terms of performance.

4   Data analysis

4.1   School performance

The first regression was made based on school performance data. Table 1 presents the synthesis of results.

Table 1   Variables regression

	Total	*First quartile*	*Fourth quartile*
School average socio-economic level	⋙	≪	≫
Computer lab	⋘	NS	⋘
School lunch	⋙	NS	NS
Energy and sanitation	NS	NS	NS

Note: ⋙: The effect found for the variable is positively highly significant ($p < 0.01$).

⋘: The effect found for the variable is negatively highly significant ($p < 0.01$).

≫: Highly positively significant effect ($p < 0.05$).

≪: Highly negatively significant effect ($p < 0.05$).

>: Effect found is little positively significant ($p < 0.10$).

<: Effect found is little negatively significant ($p < 0.10$).

NS: The effect of the variable is not significant.

As shown in Table 1, the school average SES level in the sample is very significant, as expected, and is associated with a higher average performance of 16.7 points in the SAEB for each additional unit of that index. In quartiles it is a distinct effect. In the first and fourth quartiles, this variable is significant at a p-value less than 0.05 but has opposite effects. In the first quartile, its increase generates an average decrease of 2.3 in student performance and, in the fourth quartile, it increases by 2.1.

This means that in the best schools, there is the effect of school average SES level; however, it is much lower, thus indicating a possible presence of a positive effect of the heterogeneity of the students in these schools. Although more homogeneous than the

total of schools, there is still a number of public schools with these socio-economic differences, and this difference is attributed to a lower increase in performance than occurs in the other.

However, the reverse effect in the worst-performing schools means that when increasing the school average SES level it results in a decrease of an average of 2.3 points in student performance. This may show that for this group of schools, there may be other factors that combine to worsen the performance because many schools with better socio-economic indexes have worse performance than others with lower rates.

Regarding the computer lab presence in schools, we obtained a curious result, which is very significant, of negative correlation in the whole sample and in the best quartile. There has been a decrease of 2.7 on average in the presence of computer lab when analysing all schools, and a decrease of 4.5 in the better-performing schools. In view of these results, we might question the usefulness of computer labs, leaving further investigation in this regard. In addition to serving as a means of digital inclusion, laboratories should assist in the teaching-learning process and present a positive correlation with student performance, not negative, as was found in our results. The data in the worst quartile showed no significant results.

On the other hand, the relationship to school lunch quality is positive. This result is present only in the analysis of all schools, and insignificant in others. The quality of the meals generates an increase on average of 4.0 in student performance, reflecting the opinion of the student in relation to school and improving his/her disposition for the study.

Such results demonstrate that schools with higher performance face a different reality from the lower-performing ones. Although school structure does not seem to be significant to explain students' performance in lower-performance schools, as other studies demonstrated (Alves and Passador, 2011), it might be explained because these public schools with lower results might have been facing other relational issues that jeopardise students' performance. The socio-economic variable defends our argument demonstrating that the only relational variable is the one that has any effect on student performance. For lower-performance schools, what affects students' performance seems to be relational issues and not structural ones. School structure seems to be supporting higher-performance schools.

4.2   Students' personal relationships

The next analysis was based on the construct of students' personal relationships.

Another unexpected result concerns the presence of class councils. In the analysis of the whole sample, schools that use class councils have worse performance (note: 2.3 below those who did not use). It would be beneficial to conduct further research regarding the practical purpose being assigned to counsel, if they are being used as a means of palliative measure in an attempt to problem solve, or are giving advice in reference to organisational functions, planning and greater participation.

In regards to teachers, their level of stability at school was analysed. Schools with more than 50% of teachers with a stable affiliation are compared with the schools with 50% or less. Interestingly, in the overall sample, students who study in schools with greater teacher stability have, on average, a performance of 2.3 points lower than that of students in schools with lower teacher stability. This may show a lack of motivation of

teachers who perceive stability in their position, strengthening a new idea of career enhancement programs and a structured career plan. In schools with best performance, the effect was not significant, but in schools with lower performance, there was a reverse effect, it means that in those schools stability increases student performance an average 0.8 points. This can be explained by a high turnover faced by schools with many problems compared to schools with more teacher stability.

Table 2   Variables regression

	Total	*First quartile*	*Fourth quartile*
Class council	≪≪	NS	<
Problems with teachers	<	NS	NS
Teachers stability	≪≪	≫	NS
Students' behavioural issues	≪≪	<	NS

Note: ≫: The effect found for the variable is positively highly significant ($p < 0.01$).

≪≪: The effect found for the variable is negatively highly significant

($p < 0.01$).

≫: Highly positively significant effect ($p < 0.05$).

≪: Highly negatively significant effect ($p < 0.05$).

>: Effect found is little positively significant ($p < 0.10$).

<: Effect found is little negatively significant ($p < 0.10$).

NS: The effect of the variable is not significant.

A point discussed in relation to the director refers to the fact that serious student discipline problems were evident compared with schools that did not have representative problems. As expected, this variable proved to be significant in the full group in reducing student performance an average of 0.4 points in schools with discipline problems. As in the worst quartile, this effect proved to be less statistically significant, but of greater magnitude because it reduces performance by an average of 0.9 points for schoolchildren with these kinds of problems. Finally, the best schools indicated no significance for this variable. Schools that already face greater difficulties are the most affected by discipline issues.

One of the main issues that affect performance appears to be teacher training. The results highlighted a very significant relationship with the index of teacher training in the sample of all schools, increasing performance scores an average of 2.3 points in the proficiency of students who have teachers with better training rates. On the other hand, the same result has been obtained in the analysis performed in quartiles. Even so, the results obtained in the full sample stress on the importance of continuing education and strengthen the idea of experience as a positive element in student performance.

Further in relation to the teacher, the results show a negative relationship in the three analyses of lack of teacher's exclusivity in relation to their school. Students who have dedicated teachers to only one school have an average performance of 0.9 higher, which is a very significant difference in the analysis of all schools. The same is observed in the

group of worst schools, demonstrating that this relationship benefits students by an average of 0.9 points. Finally, in the group of the best schools, this effect was not significant.

The final factor related to the teacher examined the timeliness of delivery of textbooks. Where the delivery occurred on-time, there was on average a higher performance 2.1 and specifically within the group of the worst schools, an average gain of 1.6 was also noted. In the group of the best schools, such difference was not observed and was neither significant. There is no doubt that the non-presence of textbooks for all students greatly impairs the progress of the class, discourages students and teachers, and becomes a critical factor in the learning process.

Such results from all schools demonstrate a negative association with students' performance. In essence, issues in students' personal relationships lead to lower performance and reiterate the presented theory from Relation 2 (Mattos, 2005; Pianta and Stuhlman, 2004; Rathel et al., 2008; Rubie-Davies et al., 2014).

Finally, there is the relationship verified by the analysis of variables related to the characteristics of students. The first concerns the SES of the student, a factor that has a positive relationship with a high level of significance in the sample with all schools and in the group of the best. It shows a positive average increase of 0.7 in the grade at each point in this index increased to the full group and an increase of 1.0 for the best quartile. The observed average increase is larger because in the analysis of this variable, we already have control of the effect of school average SES level. In schools with the worst quartile, the results were not significant and had a low coefficient, showing that other variables have the greatest influence on the performance of students in these schools. This difference could justify a differentiated and own policy groups like this.

As for the gender differentiation, the Portuguese discipline domain is higher among girls (girls have results 12.7 higher than boys). When it comes to ethnicity, there is a great difference between Caucasians and Asians towards Africans, Latins and Indians increased from 6 to 7 points in three samples. This provides evidence of social inequality in historically disadvantaged groups.

4.3 Parents' educational degree

Table 3 presents data from the parents' educational degree.

Regarding the mother's education, there is a strong association between this variable with respect to student performance. Taking as a basis of comparison students with mothers only completed elementary school to the first stage, it will be possible to check that the effect is higher as the mother's education level increases. If the mother has only completed elementary school, the average student performance increases 1.8 overall, 1.8 in the group of the worst schools and 2.8 in the group of the best schools, all with high significance. Standing out is the highest relative score in the best quartile, evincing the potentiation of the effect in most of the well-prepared schools. In the case of mothers with high school education, there are even greater results. In the full group, an increase of 8.6 points and, in the worst schools, an increase of 8.8 and 8.5, in the best schools, is seen.

Table 3   Variables regression

	Total	*First quartile*	*Fourth quartile*
Mother – elementary school	⋙	⋙	⋙
Mother – high school	⋙	⋙	⋙
Mother – high education	⋙	⋙	⋙
Father – elementary school	⋙	>	⋙

Note: ⋙: The effect found for the variable is positively highly significant ($p < 0.01$).

⋘: The effect found for the variable is negatively highly significant ($p < 0.01$).

≫: Highly positively significant effect ($p < 0.05$).

≪: Highly negatively significant effect ($p < 0.05$).

>: Effect found is little positively significant ($p < 0.10$).

<: Effect found is little negatively significant ($p < 0.10$).

NS: The effect of the variable is not significant.

Interestingly, given the observed increase in the previous variable, it was expected that a further increase in student performance with mothers with higher education would be found. However, this did not occur. The relative increase in student performance is high (increases of 6.0 in the group, 7.3 in the best and 3.0 the worst) but not in the expected proportions. In the group of the worst schools, the gain is much lower than in the others, and in this group there may be a distinct relationship capable of better observations.

When compared to the father's schooling the difference is very similar. The observed average increase of students with fathers with primary school is 1.2 in the full sample, 2.3 the group of the best, with a high level of significance 0.73 and the worst with significance. Again, we can see a greater increase in the best schools group and a much lower gain in the group of the worst schools. With respect to parents with high school, it has similar results (increase of 7.2 in the sample, the best 8.0 and 6.9 in the worst). Finally, the difference of students with parents with higher education is 3.4 in the full sample, 6.8 in the group with the best schools and in the group of the worst, there is no significant relationship, having one to negative correlation.

What is surprising about the degree of parental education is the issue of greatest gain resides in students with parents with high school education. One possible interpretation is the possibility of parents with high school education is the ones who are dedicated and care about the school progress of their children.

Another point that stands out is the difference in the effect of the variables which show significant difference between the groups of the best schools over the worst. For example, the comparison between students whose father has higher education does not show better performances on average versus those students whose father only completed elementary school. This factor could be subject to further investigation to find justifications for this difference.

On the other hand, a variable, which greatly impairs the average school performance of students in the 8th grade, refers to students working in addition to attending school. Specifically, performance falls 7.9 points in the full sample, 7.7 in the worst group and 7.5 in the best group. This result more than justifies social policies that replace the adolescents' work of compulsory school age, and it should curb the existence of people with an average of 14 or 15 years old from working.

Such results that demonstrate that parents' previous educational background influence students' performance, as other studies have already demonstrated (e.g. Martins and Veiga, 2010; Menezes-Filho, 2007). This means that the home environment where parents influence their children and value the educational background is something significant to students' performance.

4.4 Students' experiences

Table 4 presents the synthesis of the results from the students' experience variables.

Table 4 Variables regression

	Total	*First quartile*	*Fourth quartile*
Childhood education	⋙	⋙	⋙
Failure	⋘	⋘	⋘
Enjoy discipline	⋘	NS	⋘
Do the homework and teacher corrects it	⋙	⋙	⋙

Note: ⋙: The effect found for the variable is positively highly significant ($p < 0.01$).

⋘: The effect found for the variable is negatively highly significant ($p < 0.01$).

≫: Highly positively significant effect ($p < 0.05$).

≪: Highly negatively significant effect ($p < 0.05$).

>: Effect found is little positively significant ($p < 0.10$).

<: Effect found is little negatively significant ($p < 0.10$).

NS: The effect of the variable is not significant.

In regards to having attended an early childhood education program, there are positive effects seen on student performance, presenting gains higher than 6.5 in all samples. This result corroborates other studies that verified that this previous elementary education supports further higher results (Entwisle and Alexander, 1998). Therefore, it would be appropriate to establish public policies incentivising the offer of vacancies in childhood education. Although it is pedagogically acclaimed, there are evidences of further performance benefits.

One factor with a very strong negative effect on student performance is if she/he has been failed previously, decreasing an average of 20 points in the test score. What is in evidence here is not whether the fact that if they failed is bad or harmful to themselves, but the fact that students who failed already have a lower performance than expected, and

compared this group with students on average, it is possible to realise a difference on the average of the grades. This effect is very high given the selectivity that this variable provides and it reiterates other results (Menezes-Filho, 2007).

A curious relationship observed in this analysis is the negative and significant correlation of students who answered in their questionnaires that they like the Portuguese discipline, reaching lower on average 2.6 in the best schools. There are two hypotheses that may explain this effect: the first is that students may not have been honest about their response or showing that, on average, those who like the discipline have more difficulty with it. This is the explanation why such results are different from other studies (Núñez-Peña et al., 2015).

Finally, the analysis of the variable that students complete their homework and if the teacher corrects it, agrees with other study findings (Torrecilla et al., 2013). The association attributed to this question is extremely significant and positive, generating gains on average up to nine points in student performance. Herein, the objective side, which highlights this question, may be the fact that teachers who also encourage and take part in the correction of exercises are those who are typically more involved with their students and more engaged in their profession.

5   Discussions

It should be perceived that lower results are evident among the variables and the performance shown in the sample of schools with lower average income compared with the analysis of the full sample and a greater difference when compared to the best-performing schools.

We believe that schools having poor performers have a larger set of problems in differentiating itself from other schools. Such schools, which are attended by students with lower socio-economic levels, suffer losses by problems with infrastructure, school environment, teacher dedication, and training, as well as characteristics, such as parental interest, student's necessity to work, and student's previous attendance in the preschool education.

As for theoretical contribution, we argue that the main variables that influence school performance are related to the students' previous experiences and teacher's relationship with him/her. Those containing a higher coefficient had the fact that the student has previously failed, has attended kindergarten, has been working, the level of parental education, whether they do homework and if the teacher corrects it, and finally receiving the textbook at the beginning of the year.

On the other hand, the variables related to school can highlight the quality of school lunch and the school average SES level. As for the variables referring to the teacher, they highlight the training content, whether the teacher works in more than one school and the fact that he/she corrects the exercises in the class.

As an unexpected result, we can highlight the negative effect of school councils, the presence of computer labs and greater stability of teachers and the least effect of parents with higher education, particularly in worst-performing schools.

Such results have some implications related to what policy-makers could do to influence students' performance. We argue that policy-makers should conduct specific training oriented to teachers in order to improve their ability to relate with students. It would be a way to improve students' performance. Further, results demonstrate that

students' previous experiences are also an important influence on their performance. We believe that policy-makers should direct their policies to actions oriented to the students. It is important to guarantee the basic principles to students before attempting to evaluate them during the 8th grade. Hence, it is important to provide a high-quality childhood education, to create initiatives to stimulate students to enjoy school disciplines and to incentivise their learning process, and, at last, to ensure teachers' proximity and feedback on students' activities. Policy-makers should invest in improving students' early experiences in order to prepare them for further learning. Hence, basic and elementary school actions should not be avoided but encouraged by such public agents.

Finally, the following questions are raised for further study into more specific issues: further study in the worst-performing schools if possible over the years and analyse them more broadly, allowing for the consideration of the composition of classes (most heterogeneous or more homogeneous, in performance or in age). This would help to determine the 'peer' effect on the performance of students, which means having good students as colleagues can increase their performance.

5.1 Research limitations

As research limitations, we point out the following items: (1) this study was conducted in the specific context of the São Paulo state, in Brazil. Although such results are important to contribute to theory, they should not be generalised to other Brazilian states or other countries. (2) The results are also related to public urban schools, without considering rural schools. Such rural schools have an important role in spreading education across the country; however, they were not included in the current research. (3) Some variables were treated as dummies (e.g. gender, principal's efficiency), which may not acquire a high discrepancy among the research observations. (4) As for the Parents' educational degree analysis, we considered mothers' elementary education, high school, and higher education; however, for the father's educational background, we only considered the elementary school education. Such difference is explained by the data availability as well as the fact that some students may belong to single-mother families.

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