Impact of the Distribution of Non-Instructional Time of Primary-School Teachers on Student Learning

Incidencia de la distribución del tiempo no lectivo de los docentes en Educación Primaria en el aprendizaje de sus estudiantes

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Abstract

This research aims to determine the incidence of the percentage of time that Latin American teachers of Primary Education allocated to different no teaching related tasks on the academic achievement of students in Mathematics and Language. We have conducted a study with 256 teachers from 9 countries in Latin America and 5,610 students. The information was collected from the teachers' distribution time as well as the characteristics of students and their environment, and performance in Mathematics and Language through validated tests for all countries at the beginning and at the end the course. Using Multilevel Models with four levels of analysis (student, classroom, school and country), it has been found that an increased focus on three tasks significantly improves student achievement: the lesson preparation, correction of assessments, and work with families. And, conversely, a greater emphasis on administrative tasks lowers achieving students. With these results, empirical evidence is provided on the need for teachers to have suitable working conditions to adequately perform their jobs. Thus, it is necessary to consider that the work of teachers is not only being with the group, you also have to let time and prepare appropriate spaces for their work in the classroom. Similarly, whatever is minimizing administrative tasks performed by teachers result in greater student learning, probably because teachers are devoted "to the important".

Keywords: Teaching effectiveness, Teacher' time, Academic Performance, Multilevel Analysis, Iberoamerica.

Resumen

Esta investigación busca determinar la incidencia del porcentaje de tiempo que los docentes iberoamericanos de Educación Primaria destinan a las diferentes tareas no lectivas sobre el logro académico de sus estudiantes en Matemáticas y en Lectura. Para ello se ha realizado un estudio con 256 docentes de 9 países de Iberoamérica y sus 5.610 estudiantes. Concretamente se ha recogido información de la distribución del tiempo de los docentes, así como de las características de los estudiantes y su entorno, y de su rendimiento en Matemáticas y en Lectura, mediante pruebas previamente validadas para todos los países, al principio y al final del curso. Utilizando Modelos Multinivel de cuatro niveles de análisis (estudiante, aula, escuela y país), se ha encontrado que una mayor dedicación a tres tareas mejora significativamente el logro de los estudiantes: la preparación de las clases, la corrección de evaluaciones y el trabajo con familias. Y, por el contrario, una mayor dedicación a tareas administrativas hace que disminuya el logro de los estudiantes. Con estos resultados se aportan evidencias empíricas acerca de la necesidad de que los docentes tengan unas condiciones laborales adecuadas para desempeñar adecuadamente su trabajo. Así, es necesario considerar que el trabajo de los docentes no es solo estar frente al grupo, también hay que dejarles tiempo y espacios apropiados para que prepararen su trabajo en el aula. Igualmente, minimizar las tareas administrativas a realizar por los docentes redundará en un mayor aprendizaje de los estudiantes, seguramente porque los docentes se dedicarán "a lo importante".

Palabras clave: Enseñanza Eficaz, Tiempo de los docentes, Rendimiento Académico, Análisis Multinivel, Iberoamérica

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Teachers all around the world are oversaturated and working at schools under severe pressure for intra- and extra-curricular reasons. In addition to their teaching duties, Primary and Secondary Education teachers must plan lessons, prepare and correct tests and exercises, take students outside the classroom on excursions, meet with families, keep working on their professional development as teachers, collaborate with the other teachers, attend other school activities, do administrative tasks ... In fact, it is not surprising that teachers are experiencing major cases of stress and job burnout (Kyriacou, 1987; Vandenberghe & Huberman, 1999). However, it seems clear that not all tasks are equally important, the time spent preparing the lessons or the time spent completing bureaucratic requirements will not affect student learning in the same way.

Considering that teachers and their work at schools are key elements to the smooth operation of the education system including improving the development of students, it seems necessary to consider how to improve teachers working conditions. Which means, find the way to promote the realization of the most useful activities and minimizing the time spent doing other kinds of activities that seem to have less of an impact on the development of the students.

There is a fruitful line of research that seeks to determine how teachers spend their time at school and especially what the tasks are that have the largest impact on the development of the students (Husman, Duggan & Fishman, 2014; Lavy, 2011; Pennings et al, 2014; Shidler, 2009; Vannest, Hagan-Burke & Parker, 2006).

In Latin America one in three teachers combines teaching with other work activity (Murillo & Roman, 2012). Generally, there has been an interest in improving teacher performance using external assessments, rather than on improving their working conditions, (even knowing that favorable working conditions are fundamental to enable a teacher

to do a good job). Perhaps because of this, there is little research about what tasks Latin American teachers do and how to distribute them; there is even less information about how these activities impact on student development.

This research seeks to establish what non-teaching tasks teachers engage in that have a greater impact on the development of the students and to estimate their contribution. To achieve that purpose, the researchers have conducted an ex-post-facto study with the data of 256 teachers, from nine Latin American countries. The data collected was analyzed through a multilevel methodological strategy following an approach of value-add, which means that we have measured the improvement of the student's performance, discounting the contribution made by other variables such as prior performance, socioeconomic and cultural situation of their families, the socioeconomic status of the neighborhood where the school is located, gender of students, their origin and mother tongue. These variables were controlled to determine the actual influence of the explanatory variables (percentage of time that teachers spend doing one or other activity at school).

Traditionally we can organize the distribution of time of teachers into four types of activities: a) direct teaching in the classroom, b) lesson planning, c) teamwork with their peers, and d) others, such as meetings with parents, tutorials with students, and administrative tasks. The distribution of time between the above tasks is very different from one country to another. Thus, in Europe (Eurydice, 2013), the teaching hours of non-university teachers vary between 12 and 36 hours per week from one country to another. Overall, the number of teaching hours decreases with education level, from kindergarten until high school. In the European Union the average hours of direct teaching are 60.2% in Kindergarten; 47.9% Primary; 41.6% in Lower Secondary and 40.1% in Upper Secondary. In Latin America

there are large differences between countries too. Gajardo (2002) found that the time spent teaching does not exceed 30% of the total in Mexico, while for Chile and Ecuador, teaching time varies between 51% and 67%.

The researchers note the work of Gibon relating teacher's time distribution to student learning. Gibson (1984) conducted one of the most important research investigations. He studied how teachers distributed their tasks and time and whether their students learnt more or less than was expected. Gibson established differences between high and low efficiency tasks according to the amount of time that those tasks required and according to how much time teachers needed to do them. His results found that the most effective teachers spend less time doing lesson activities than less effective teachers (234 minutes versus 271 minutes, respectively); secondly, that teachers whose students learn more, spend twice as much time planning lessons (39.5 minutes per day versus 16.3). These results suggest that the activity most associated with student learning is planning lessons.

Other studies have found that it is important to know how much time teachers spend in the preparation of lessons (Hall & Harding, 2003; Hiebert, Morris, & Spitzer, 2009; Husman, Duggan & Fishman, 2014; Martínez-Garrido, 2015; Pennings et al., 2014. Shidler, 2009; Vannest, Hagan-Burke & Parker, 2006). These research studies are mostly from North-America or Europe, very little work has been done in Latin America (Albornoz, 1996, Gajardo, 2002). The study done by Gran, Hindman and Stronge (2010) notes that 52% of success (or failure) achieved by students in Maths depends on the time that the teacher dedicated to preparing the lessons; and the research done by Nye, Konstantopoulos and Hedges (2004) shows that the effectiveness of teachers in planning and organization of the lessons increases by 0.5 typical deviations, the performance of the students throughout the year.

In Latin America few investigations have focused on analyzing the influence that teacher's time distribution has on the academic achievement of students (Gajardo, 2002). We can highlight the work developed in Chile by Carlos Concha (1996). Their results show that the difference between successful and unsuccessful schools are due to the availability of time that the teacher has to plan the lessons and manage the progress of the students, as well as to the time available to teach in class. Innovation capacity and improving schools, according to Montecinos (2003), depends on teachers having efficient ways to address diversity, and managing the time with their students. According to the "International Study on Teaching and Learning 2013" OECD (2013) estimates that 47% of Mexican teachers and 25% of Chilean teachers said that a priority is to have time for professional development. And, on average, 22% of teachers in Latin America suggest that it is a necessity. LLECE (2010) shows that the academic performance of students can decrease by 3% if their teachers do not have enough time to prepare their lessons and evaluate student work. The results of the Iberoamerican School Effectiveness Research suggest that the time for "preparing lessons" is a variable that has a significant impact on the development of students (Murillo, 2007).

This research seeks to "determine the percentage of time that Latin American Primary-School teachers spend on non-teaching related tasks and the impact this has on the academic achievement of their students".

Method

This study is an ex post facto study using multilevel models with four levels of analysis: student, classroom, school and country. A value-added approach was used, which is controlling product variables by adjusting variables such as prior performance of the students, socio-economic and cultural situation of their families, to study the real influence of the explanatory variables (Miñano & Castejón, 2011).

Variables

In this research three types of variables were used: product variables (performance of the student); adjustment variables (context variables) and explanatory variables (the percentage of time that teachers spend on different tasks).

a) Product variables:

- Performance in Math and Reading. Both estimated using Item Response Theory (IRT) and scaled with a mean of 250 and a standard deviation of 50.

b) Contextual variables:

- Prior performance in Reading and Math: both estimated by IRT, with an average of 250 and a standard deviation of 50.

- Socioeconomic status of the family, variable obtained from the information about: the profession of parents and family possessions, standardized variable.

- Cultural level of the family, obtained as average maximum degree achieved by both parents, standardized variable.

- Socioeconomic status of the neighborhood where the school is located, from the opinion of the Principal of the school, standardized variable.

- Sex of the student, dummy variable.

- Origin of the student, native-immigrant, dummy variable.

- Student's mother tongue, Spanish or another, dummy variable.

- Sex of the teacher, dummy variable.

- Age of teachers, continuous variable, centered at mode.

- Teaching experience of the teacher, years of experience the teacher has as a teacher, continuous variable.

- Years at the school, the number of years' the teacher has been working at the current school, continuous variable.

c) Explanatory variables, all raw scores are presented as focusing on the average.

- Percentage of time spent planning lessons.

- Percentage of time spent preparing exams.

- Percentage of time spent correcting exercises.

- Percentage of time spent tutoring students.

- Percentage of time spent on meetings with parents.

- Percentage of time for professional development.

- Percentage of time spent on administrative tasks.

- Percentage of time spent on teamwork with other teachers.

- Percentage of time spent attending other school activities.

Sample

The sample consisted of 5,610 students from 256 classrooms of the third year of Primary School, attending at 97 schools located in 9 countries in Latin America (Bolivia, Chile, Colombia, Cuba, Ecuador, Panama, Peru, Spain, and Venezuela). The sample was selected so that it was possible to verify if previous EER studies were generalizable once the variables related to the classroom were taken into account.

The approach was to select certain cases, such that: a) they fulfilled the methodological requirements of the research (for example, different cases of each level were organized hierarchically); b) they worked with maximum experimental variability c) the centers were also representative of a variety of neighborhoods in the country. The data from the countries of South America, Central America, the Caribbean, and Europe, as well as the diversity of the social, economic and educational status of the nine countries involved, allowed us to assert that the model elaborated from this sample will closely approximate to the reality of Latin America as a whole.

As a general criterion, it was decided to study ten public schools in each country.

However, the following selection of schools was achieved in: Chile data was obtained from seven schools, nine schools in Venezuela and 11 in Ecuador. Peru, meanwhile, decided to expand the number of schools to 20 in order to have more data to make their own calculations. Previously, analysis conducted indicated that this expansion of the sample in Peru did not alter the results. Finally, 97 schools from 9 countries participated (Table 1).

Table 1. Sample of the study: number of schools, teachers and students

	SCHOOLS	TEACHERS	STUDENTS
Bolivia	10	30	662
Chile	7	18	409
Colombia	10	21	466
Cuba	10	38	694
Ecuador	11	26	662
Spain	10	21	328
Panama	10	29	470
Peru	20	48	1565
Venezuela	9	25	354
Total	*97*	*256*	*5,610*

For the selection of schools within each country, we used two hierarchical criteria: first, four schools were chosen whose students achieved results well above the expected achievement taking into account the socioeconomic and cultural situation of families, three whose students had results much lower than expected, and the remaining three whose students achieved average results for each country. Given the impossibility of having, a priori, an estimate of the performance of schools, the researchers started with results obtained by national or international evaluations and from the expert opinions of Educational Inspectors. For ecological representativeness, three criteria were used: geographic region, the selected schools reflect the regional diversity of each country; habitat of the town where they were located, megacity (more than one million inhabitants), urban area (between one million and 25,000 inhabitants) and rural areas (under 25,000); and size of the schools, large, medium and small schools were analyzed, based on the average size of schools in each country. The final aim was to be representative of the diversity of Public Schools. Regarding the classrooms, it was decided to study Third Grade classes of Primary / Basic Education (students of 8/9 years of age). In each selected class the researchers worked with the data of all students, their families and teachers.

Finally, the researchers obtained the information of 7,428 children and 262 teachers. The final sample reviewed 5,610 students from 256 classrooms located in 97 schools in 9 countries.

The sample of students had the following characteristics:

- 54.8% of them were girls and 45.2% boys (3,074 and 2,536, respectively).

- 89.1% of students were 8 or 9 years old. 3.2% less than that age and the remaining 7.7% more.

- 92.7% of students had Spanish as their mother tongue and 7.3% other indigenous languages (5,194 and 409 students respectively).

- 95.9% of students were native, and 4.1% were immigrants.

The sample of teachers participating in the study had the following characteristics:

- 78% were women and 22% men.

- 33% were under 40 years of age, 43% were between 40 and 50 years, and 24% were more than 50 years.

- According to the years of teaching experience, 54% had up to 15 years of teaching experience, compared with 46% who had more than 16 years of experience.

- According to years of working in the school, 25% had less than 2 years in the school, another 25% had up to 5 years; 28% between 6 and 10 years, and 22% had been working in the school more than 10 years.

The analysis of the distribution of time spent by teachers showed that:

- Planning the lessons was the task requiring more time 17.2% (3h). Correcting student's exercises required more than 2 and a half hours, or 15% of teacher's time. The professional development and teamwork required 13.2% and 11.5% respectively. On the bottom of the ranking in terms of time spent, performing administrative tasks (1.2h week) and time for tutoring the students (teachers spent just over one hour) (table 2).

Table 2. Distribution of time per week

	MEAN (IN HOURS)	SD	%
Planning lessons	3.0	1.5	17.2
Prepare exams	2.1	1.3	12
Correct exercises	2.6	1.6	14.9
Tutoring students	1.1	1.1	6.3
Meetings with parents	1.4	1.0	8.0
Professional development	2.3	1.8	13.2
Administrative tasks	1.2	1.4	6.9
Teamwork with other teachers	2.0	1.5	11.5
Attend other school activities	1.7	1.5	9.8

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Instruments

Two kinds of instruments were used for collecting the data:

a) Mathematics and Reading Achievement Tests

We used the test developed by the Latin American Laboratory for Assessment of Quality of Education for their first international study (LLECE, 2001). There are two equivalent tests for each subject (called tests A and B). The tests were designed and edited using Item Response Theory (Rasch Model). The two Mathematics tests are composed of 31 four alternative choice items. The reliability of these tests in Mathematics achievement is Cronbach's alpha, $\alpha = 0.89$ for both Test A (prior performance) and test B (final performance).

The two tests of Reading performance, were composed of 19 questions with four possible alternatives and open-ended questions. The reliability of the text is α = 0.92 (test A), and α = 0.93 (test B).

b) Questionnaires

We used three different questionnaires: Questionnaire for teachers in the classroom, General student questionnaire, and Questionnaire for the families.

Questionnaire for classroom teachers, was composed of 195 items with closed response: Likert Scale or numerical answer. This questionnaire has a battery of questions related to the Distribution of teacher's time at schools. Cronbach's alpha is α = 0.85.

Questionnaire for students, had 35 closed questions, in most of the cases the items has five answer choices. This questionnaire gave us information about personal characteristics of the student. This questionnaire has a reliability of α = 0.79.

Questionnaire for families, had 41 closed questions. They included questions about family possessions, profession of the father and mother, or maximum level of educational attainment for each parent. Its reliability is α = 0.84.

All instruments, performance tests and questionnaires, were applied in Spanish because it is the mother tongue in all the schools that participated in the research.

Data collection

The data was collected by a specialist team of researchers in each country. The data was collected at two points, at the beginning of the school year the research team in each country collected the data from the Mathematics and Reading Achievement Tests, both tests were considered as prior performance of the students. Finally, data was collected at the end of the school year, when the rest of the instruments (final performance test, and all questionnaires) were completed.

Data analysis

Multilevel analysis was used with four levels of analysis (student, classroom, school and country) as an analysis strategy. The use of Multilevel analysis is common in previous research which used data from different levels of analysis (p.e. Creemers, Kyriakides & Sammons, 2010; Goldstein, 2011; Martínez-Garrido & Murillo, 2014). Dependent variables and adjustment variables corresponded to the student level; explanatory variables came from the classroom level.

The data analysis was conducted using the following process:

a) Estimate the null model (Model 1), only with the product variable.

b) Calculate the model with the adjustment variables (Model 2).

c) Include independently the variables referring to the Time Distribution in Model 2 (Model 3).

d) Estimate the final model using only those explanatory variables that make a significant contribution to the model for each product variable (Model 4).

Estimates of two multilevel models were made, one for each product variable. All of them were analogous to the following:

$$y_{ijkl} = \beta_{0jkl} + \beta_{11}SEC\_sch_{kl} + \beta_{2jkl}LCult_{ijkl} + \beta_{3jkl}SEC_{ijkl} + \beta_{4jkl}Sex_{ijkl} + \beta_{5jkl}Prior\_perf_{ijkl} +$$
$$\beta_{6jkl}Origin_{ijkl} + \beta_{7jkl}Mother\_tongue_{ijkl} + \beta_{8kl}Sex\_teach_{jkl} + \beta_{9kl}Age\_teach_{jkl} + \beta_{10kl}$$
$$Teaching\_exp\_teach_{jkl} + \beta_{11kl}Years\_sch\_teach_{jkl} + \beta_{12kl}VTime\_distribution1_{jkl} + \ldots.$$
$$+ \beta_{20kl}VTime\_distribution9_{jkl} + \varepsilon_{ijkl}$$

$\beta_{0jkl} = \beta_0 + \varphi_{0l} + \nu_{0kl} + \mu_{0jkl}$

$\beta_{11} = \beta_1 + \varphi_{11}$

$\beta_{2jkl} = \beta_2 + \varphi_{2l} + \nu_{2kl} + \mu_{2jkl} \ldots \beta_{7jkl} = \beta_7 + \varphi_{7l} + \nu_{7kl} + \mu_{7jkl}$

$\beta_{8kl} = \beta_8 + \varphi_{8l} + \nu_{8kl} \ldots \beta_{16kl} = \beta_{20} + \varphi_{20l} + \nu_{20kl}$

With:

$[\varepsilon_{0ijkl}] \sim N(0,\Omega_\varepsilon) : \Omega_\varepsilon = [\sigma^2 \varepsilon_0]$

$[\mu_{0jkl}] \sim N(0,\Omega_\mu) : \Omega_\mu = [\sigma^2 \mu_0]$

$[\nu_{0kl}] \sim N(0,\Omega_\nu) : \Omega_\nu = [\sigma^2 \nu_0]$

$[\varphi_{0l}] \sim N(0,\Omega_\varphi) : \Omega_\varphi = [\sigma^2 \varphi_0]$

Where:

y_{ijkl}, are different measures of student achievement: Achievement in Mathematics, Achievement in Reading.

SEC_sch_{kl}, socioeconomic status of the neighborhood where the school is located,

$LCult_{ijkl}$, cultural level of the family,

SEC_{ijkl}, socioeconomic status of the family,

Sex_{ijkl}, if the student is male or female

$Prior\_perf_{ijkl}$, prior performance in Mathematics and Reading

$Origin_{ijkl}$, if the student is native or immigrant,

$Mother\_tongue_{ijkl}$, if the student has a mother tongue other than Spanish,

Sex_teach_{jkl}, if the teacher is male or female,

Age_teach_{jkl}, the age of the teacher,

$Teaching\_exp\_teach_{jkl}$, number of years of experience the teacher has as a teacher. continuous variable.

$Years\_sch\_teach_{jkl}$, number of years' teacher has been working at the current school.

$Time\_Distribution_{jkl}$, the percentage of time those teachers spend in nine different tasks at school:

- Percentage of time spent planning lessons.
- Percentage of time spent preparing exams.
- Percentage of time spent correcting exercises.
- Percentage of time spent tutoring students.
- Percentage of time spent on meetings with parents.
- Percentage of time for professional development.
- Percentage of time spent on teamwork with other teachers.
- Percentage of time spent on administrative tasks.
- Percentage of time spent attending other school activities.

Results

The aim of this study was to assess the impact of the percentage of time that Latin American teachers spent on each of the tasks, on the academic performance of students in primary education.

In order to verify the relationship between the different explanatory variables and the two product variables, a correlation analysis was conducted between the variables involved (table 3). As expected, all variables correlated with both performance measures of the students.

Table 3. Correlation coefficient between the explanatory variables and product variables

	READING	MATHS	I	II	III	IV	V	VI	VII	VIII
I. Planning lessons	.256*	.233*								
II. Prepare exams	.224*	.188*	.559*							
III. Correct exercises	.175*	.162*	.429*	.466*						
IV. Tutoring students	.136*	.121*	.304*	.354*	.216*					
V. Meetings with parents	.11*	.028*	.115*	.088*	.113*	.253*				
VI. Professional development	.118*	.104*	.264*	.247*	.166*	.291*	.288*			
VII. Administrative tasks	-.073*	-.106*	.071*	.154*	.116*	.169*	.195*	.379*		
VIII. Teamwork	.060*	.063*	.220*	224*	.170*	.263*	.215*	.392*	.280*	
IX. Attend other sch. activ.	-.085*	-.056*	.026	.047*	.016	.190*	.301*	.385*	.307*	.306*

Note: * significant $\alpha = 0.01$

Considering that the teacher variables (gender, age, years of experience as a teacher, and years at the school) could have an influence on the independent variable (time distribution), the relationship between these variables was analyzed. Table 4 shows that teacher variables are not correlated with Time distribution. In addition, the T-Student test for independent groups indicates that teacher sex influences how teachers distribute their non-instructional time at school.

Table 4. Relationship between teacher variables and the explanatory variables

	CORRELATION			T-STUDENT
	AGE	EXPERIENCE	YEARS IN THE SCHOOL	SEX
Planning lessons	-.186**	-.077**	-.029*	-9.367**
Prepare exams	-.055**	.025	.092**	-15.338**
Correct exercises	-.049**	.030*	.070**	-6.886**
Tutoring students	-.005	.002	.065**	-11.533**
Meetings with parents	.037**	-.036**	.009	-4.049**
Professional development	-.128**	-.105**	-.079**	-14.418**
Administrative tasks	.088**	.025	.042**	-3.339**
Teamwork	-.036**	-.054**	.034*	-11.594**
Attend other sch. activ.	-.065**	-.102**	-.024	-12.35**

Note: * $\alpha = 0.05$; ** $\alpha = 0.01$.

To achieve the stated aim of the research, two multilevel models were implemented with four levels of analysis (student, classroom, school and country). First, the null model was estimated (Model 1), only with the product variable. Second, the variables referring to the Time Distribution were included in Model 2 – nine models were obtained (Model 3). Finally, the final model was estimated using only those explanatory variables that made a significant contribution to the model for each product variable (Model 4).

The Model 1 and Model 2 for each product variable are shown in Table 5 and Table 6. The results of Model 2 offer some interesting facts which, although not being directly related to the research aims, interesting to discuss. Among these "collateral" results the researchers mention the following:

- Socioeconomic status of the family impacts on the academic performance of students. Specifically, the data shows that for each standard deviation that the socio-economic status of the family increases, the performance in Reading of the student

increased 1.92 points, and 2.67 points in Mathematics (these variables are measures with an average of 250 and a standard deviation of 50).

- For each standard deviation that the cultural level of the family increases, performance in Reading increases 1.5 points and 3.5 points in Math.

- Socioeconomic status of the neighborhood where the school is located has a significant effect on student performance. For each standard deviation that the socioeconomic level of the school increases, students earn 6 points in both Reading and Math performance.

- Student sex is associated with their performance, but in a different way for each subject. According to our results, male

children score higher in Mathematics (3 points) and girls in Reading (3.5 points).

- Being immigrant significantly affects the student's performance in Mathematics, 8 points less.

- Students whose mother tongue was different from Spanish got 4 points less in Reading. The mother tongue appears to have no a significant impact on student achievement in Mathematics.

- Prior performance significantly impacts on the final performance (0.41 and 0.39 points in Mathematics and Reading, respectively).

- Teacher variables: sex, age, years of experience teaching and years at the school does not make a statistically significant contribution to the models.

Table 5. Modeling process for product variable: Reading performance

	MODEL 1		**MODEL 2**		**MODEL 3**	
	B	SD	B	SD	B	SD
Fixed effects						
Intercept	276.64	7.80	176.77	4.83		
SEC school			6.08[*]	1.73		
Cultural level of the family			1.49[*]	0.48		
SEC family			1.94[*]	0.52		
Sex (male/female)			3.50[*]	0.81		
Prior performance			0.39[*]	0.01		
Mother tongue			-4.32[**]	2.09		
Native/Inmigrant			NS			
Teacher sex (male/female)			NS			
Teacher age			NS			
Teacher experience			NS			
Years at the school			NS			
% time Planning lessons					2.37**	1.08
% time Prepare exams					3.61*	1.09
% time Correct exercises					1.78**	0.88
% time Tutoring students					1.21+	0.89
% time Meetings with parents					0.35+	1.13
% time Professional development					0.24+	0.69
% time Administrative tasks					-1.29***	0.77
% time Teamwork					1.67**	0.84
% time Attend other sch. activ.					-1.04+	0.72
Random effects						
Among countries	510.08	257.90	126.86	66.10		
Among schools	293.51	56.86	67.06	20.594		
Among classrooms	118.50	19.03	108.66	16.645		
Among students	1026.65	19.83	830.15	16.03		

Note: * α = 0.01; * α = 0.05; *** α = 0.1; NS: no significant; +: no significant. Elaborated by the authors.

Table 6. Modeling process for product variable: Mathematics performance

	MODEL 1		MODEL 2		MODEL 3	
	B	SD	B	SD	B	SD
Fixed effects						
Intercept	266.45	9.21	164.24	6.49		
SEC school			6.41*	2.42		
Cultural level of the family			3.50*	0.54		
SEC family			2.67*	0.59		
Sex (male/female)			-3.09*	0.92		
Prior performance			0.41*	0.01		
Mother tongue			NS			
Native/Inmigrant			-8.27**	3.65		
Teacher sex (male/female)			NS			
Teacher age			NS			
Teacher experience			NS			
Years at the school			NS			
% time Planning lessons					2.73***	1.60
% time Prepare exams					3.17**	1.62
% time Correct exercises					1.42+	1.30
% time Tutoring students					-0.45+	1.34
% time Meetings with parents					2.85***	1.68
% time Professional development					0.05+	1.03
% time Administrative tasks					-0.94+	1.11
% time Teamwork					0.58+	1.23
% time Attend other sch. activ.					-0.59+	1.03
Random effects						
Among countries	709.18	360.65	242.85	126.46		
Among schools	395.76	85.04	110.21	41.23		
Among classrooms	283.23	38.85	306.13	39.82		
Among students	1261.93	24.39	1064.16	20.56		

Note: * α = 0.01; * α = 0.05; *** α = 0.1; NS: no significant; +: no significant.

The results show that six of the nine tasks studied in which teachers spend their time have a significant coefficient in the model: planning lessons, preparing exams, correcting exercises, meeting with parents, teamwork and administrative tasks.

- The "percentage of time that teachers spend planning their lessons" impacts on the academic performance of students. For every point that the percentage of time spent planning lessons increases (or decreases), the student performance increases (or decreases) in Mathematics 2.7 points and 2.3 points in Reading.

- The "percentage of time that teachers spend preparing exams" makes a significant contribution to the Reading and Mathematics Models. Performance in Reading increased 3.6 points and 3.1 points in Mathematics for every point that the percentage of time spent preparing exams increased.

- Performance in Reading increases 1.8 points when the "percentage of time spent on correcting exercises" is increased. According to these results, this explanatory variable seems not to have an impact on the product variable: performance in Mathematics.

- The "percentage of time spent meeting with parents" has a significant impact on the adjusted model in the case of Mathematics. For each point that this percentage of time

increases, Math performance increases 2.8 points.

- For every percentage point that the "time spent on teamwork" increases, the student performance in Reading increased 1.6 points.

- The impact of the variable "percentage of time spent on administrative tasks" is negative (1.3 points in Reading)

- According to these results, the variables "percentage of time spent tutoring students", "percentage of time spent on

professional development" and "percentage of time spent attending other school activities" do not have a significant impact on the models.

The final model was estimated using only those explanatory variables that made a significant contribution to the model for each product variable (Table 7).

Table 7. Final Model: performance in Reading and performance in Mathematics

	READING		MATHEMATICS	
	B	SD	B	SD
Fixed effects				
Intercept	176.86	4.70	163.45	6.46
SEC school	4.79[*]	1.68	5.41[*]	2.45
Cultural level of the family	1.50[*]	0.48	3.49[*]	0.54
SEC family	1.96[*]	0.52	2.65[*]	0.59
Sex (male/female)	3.50[*]	0.81	-3.10[*]	0.92
Prior performance	0.39[*]	0.01	0.41[*]	0.01
Mother tongue	-4.08[**]	2.08	-	
Native/Inmigrant	-		-8.22[**]	3.65
% time Planning lessons	2.11[**]	1.07	2.45[**]	1.23
% time Prepare exams	3.32[**]	1.33	2.91[**]	1.45
% time Meetings with parents	-		2.38[***]	1.20
% time Administrative tasks	-1.25[**]	0.63	-	
Random effects				
Among countries	119.29	61.85	240.19	124.85
Among schools	56.28	18.49	112.61	40.69
Among classrooms	102.92	15.97	289.07	37.98
Among students	830.15	16.03	1064.74	20.57

Note: * $\alpha = 0.01$; ** $\alpha = 0.05$; *** $\alpha = 0.1$; –: indicate that the variable is not included into the model because its no significant impact. The variables are: Teacher sex, Teacher age, Teacher experience, Years at the school, % of time spent Correct exercises, % of time spent Tutoring students, % of time spent Teamwork with other teachers, % of time for Professional development, % of time spent Attend other school activities.

Discussion and Conclusions

This research indicates that the higher the amount of time that teachers spend on: planning lessons, preparing exams, and arranging meetings with parents, the greater student achievement in Reading and Mathematics. On the other hand, according to the research results, the more time teachers

spend doing administrative tasks, the poorer the student results in Reading and Mathematics.

These results are consistent with those found by Gran, Hindman and Stronge (2010), Nonis, Philhours and Hudson (2006), or Walberg and Paik (2000), among others. For example, the study by Nye, Konstantopoulos

and Hedges (2004) found that for every standard deviation that increases the amount of time planning lessons, the student performance increases 0.5. Hindman and Stronge (2010) found that 52% of success (or failure) achieved by students in Mathematics, depends directly on how the teacher has planned the lessons.

There is much research on teacher-family relationships (e.g., Castro, et al, 2015; De Carvalho, 2014, Niia et al., 2015). The results of these previous studies confirm that it is "imperative" that families know the educational status of their children and cooperate with teachers in their education. The results of this research confirm this fact, and also shows how the time that teachers spend meeting with parents has an impact on student performance. Teachers spend 8% of their time meeting with parents, for every percentage point that teachers increase this time, the performance of students in Mathematics increases almost 3 points. These results are consistent with those found in the meta-analysis of Castro et al. (2015).

Teachers spend an average of 1.2 hours a week doing administrative tasks. These research results are consistent with those provided by Moya (2001) who noted that the administrative tasks involved 0.7% of the amount of time that teachers have at the school. The data from this study suggests that "administrative tasks" are counterproductive to improving student performance. The analyzed data from 5,610 students from 9 Latin American countries confirms that student performance in Reading decreases 1.3 points for every percentage point of time that the administrative tasks increase. These results are consistent with those provided by DeStefano and Miksic (2007), who found that schools where teachers have to do the most administrative tasks, offer 26% fewer opportunities for students to learn.

One of the biggest criticisms that have been made of the EER is that they use a restricted group of variables, not including process variables related to social and cultural life of classrooms and schools (Scheerens, 1999; Martinic & Pardo, 2003). Although it may be a limitation in this study, the researchers have included a total of eleven adjustment variables related to the characteristics of students, families, teachers and school.

The results obtained have an immediate practical application, both for educational administration and management of schools, and for teachers themselves.

For the administration and Principals of the schools, it is important to remember that if you want teachers to do better, it is necessary to support them and to facilitate good working conditions. The job of a teacher is not only to teach, there are other tasks as well. The data of this research shows, that depending on the amount of time that teachers have available to do these other tasks, the student performance can improve. It is necessary that the time made available for preparing lessons, correcting exams, and the time to meet with the families of the students be paid. Teachers also need suitable places at the school for team working, where they can be undisturbed. Also, it is necessary to limit the amount of time that teachers spend doing administrative tasks. Teachers need time to spend on those tasks that are really important to student performance.

Teachers should know that the time spent preparing lessons and assessments is the best way to spend their time. Whether it is the first time, or they have been teaching for more than 20 years, the data is clear: The more time spent on preparing lessons the better. It is important to highlight the significance of taking time to spend with families. With teacher-family collaboration, it is possible to maximize the development of the students.

According to the results of this study, future research lines could be: to study the evolution of the distribution of time in the last years, and see what the impact on the academic performance of the student is, to analyze how teachers are organizing their own pedagogic strategies during the school year. This is a really important research line in Latin

America, known as the most unequal region in the world. A second research line is to study how time is distributed in Secondary Education schools, and how this distribution of time impacts on the academic achievement of the students.

We all agree that high quality teachers lead to a high quality of the whole educational system. However, there are so many teachers' assessments to determine their knowledge, what they are doing…but there are too few teachers' assessments to evaluate teachers' opinions about their working conditions, school infrastructure, resources, and their feelings about teacher benefit packages, bonuses, and salary…

Teachers are the key element of educational systems, we need to trust them and provide them all the help they need to do their jobs.

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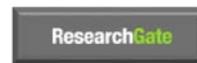
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