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Mariana Alfonso  
Marina Bassi  
Christian Borja

## Can Non-Traditional Teachers Improve Math and Language Learning Outcomes?

**Summary:** Chile shows one of the largest achievement gaps between high and low income students. Enseña Chile, the first adaptation in Latin America of the successful Teach for America model, aims at eliminating educational inequality by enlisting the most outstanding young professionals to teach for two years in vulnerable schools. Enseña Chile partnered with the IDB (with the support of renowned local academic institutions) to design and implement a study that finds that the program can be associated to improved student academic performance in Math and Language. These findings are promising for policy making designed to reduce education gaps in Latin America.

### Highly Unequal Learning Outcomes

**Chile shows one of the largest achievement gaps between high and low income students.** Chile is among the countries in the OECD's Programme for International Student Assessment (PISA) with the highest between-school variation in student performance, and most of this between-school variance is explained by the students' socioeconomic background (PISA, 2010). The same result was found in TIMSS 2003, where Chile had among the largest differences in mathematics student achievement between students from high-resource and low-resource households. These results suggest a highly segregated educational system along socioeconomic lines.

### Enseña Chile Seeks to Reduce Education Inequities by Recruiting Top University Graduates in Vulnerable Schools

**Enseña Chile (ECh), the first adaptation of the Teach for America model in Latin America, has the objective of building a "movement to eliminate educational inequity by enlisting our nation's most promising future leaders in the effort" (Recart, 2009).** To achieve this goal, it seeks to attract human capital of the highest quality to place them for two years in the most vulnerable urban and rural schools in Chile. It follows a rigorous selection



process that allows for identification of college graduates with competencies to become not only great teachers, but also leaders and social entrepreneurs. The hypothesis behind this program is that when you place highly motivated professionals with leadership skills in the classrooms and provide them with focused training and ongoing support, students get more engaged, increase their motivations, and improve their learning outcomes. In 2010, the second year of its operation, ECh had 62 teachers placed in 37 primary and secondary schools that serve a high proportion of students from households with unmet basic needs.

## Enseña Chile Evaluation Design

The ECh evaluation involved the application of a battery of tests and questionnaires (to students, teachers and parents) to measure changes in learning outcomes in Spanish and Math, in intellectual and socio-emotional abilities, and to collect data about teachers and students' socioeconomic background. In 2010, the Inter-American Development Bank with its partners Enseña Chile, the Center for Public Policies (PP-UC) at the Catholic University of Chile, the Center for Measurement (MIDE-UC) at the same university, decided to improve the ECh evaluation design by focusing only on the first grade of secondary education, for which all tests were available.<sup>1</sup> In addition, the 2010 evaluation round increased significantly the size of the comparison group. Another improvement was that the comparison group at the school level was randomly selected. These improvements resulted in a total sample (both ECh participants and the comparison group) of 4,618 students in their first year of secondary school, 117 teachers and 57 schools.

The assignment of ECh teachers to schools and to classrooms within schools was not done at random. Thus, to generate a comparison sample, this analysis uses the propensity score matching methodology (PSM). In particular, PSM matches students that participated in the program with students that did not, in terms of observable characteristics (namely, socioeconomic background, and household and school characteristics).<sup>2</sup>

## Measuring Learning Outcomes in Math and Language

Standardized tests that allow for the computation of value added, called Pruebas SEPA, are used as the main outcomes to assess learning. The Spanish test measures learning in the areas of reading, comprehension, and communication. The Math test includes evaluation items for numbers and operations, algebra, and geometry. At baseline, both Spanish and Math tests measure knowledge that students should have acquired by the end of 8th grade. At follow up, the tests measure knowledge that students should have acquired during the 1st grade of secondary schooling. Baseline SEPA scores are below the national average for ECh benefited students and comparison students, indicating that ECh targets low performing schools.

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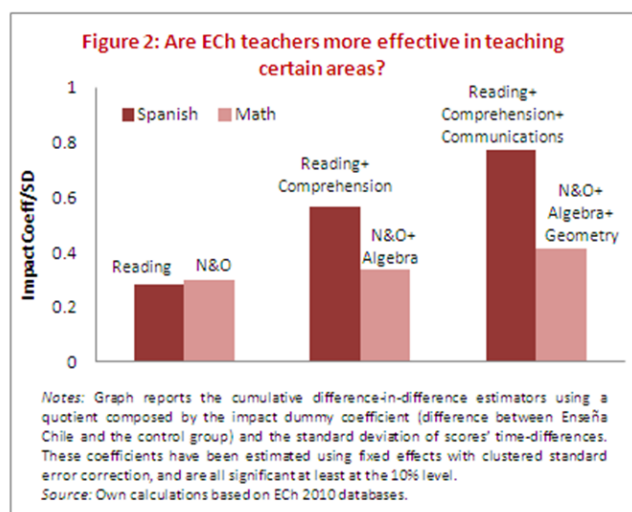
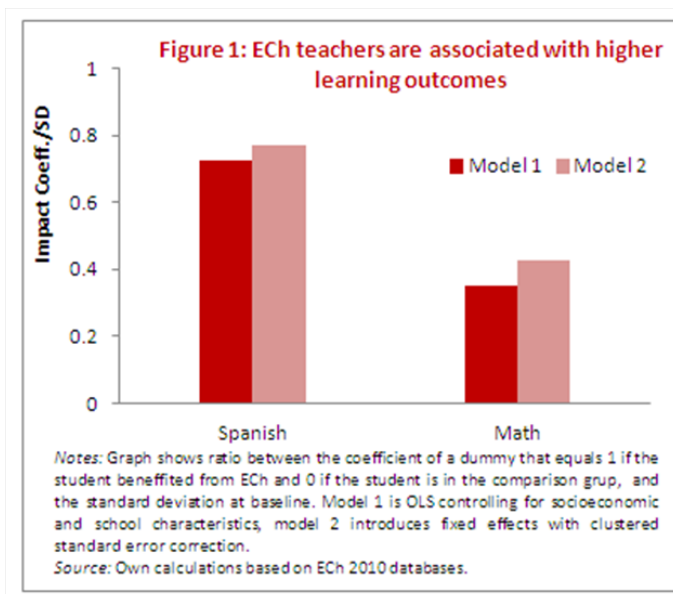
<sup>1</sup> Information was collected twice during the academic year, with the baseline conducted in May 2010 and the follow-up in November 2010.

<sup>2</sup> The Propensity Score is estimated using a probit model where the dependent variable is a dummy indicating if the student participated in the program or not. After estimating the student-level probability model, the probability of participating in the ECh program is computed for each student, matching comparison students using the nearest neighbor technique.

## Enseña Chile Teachers are Associated with Higher Learning Outcomes in Spanish and Math

ECh teachers are associated with significantly higher test scores in Spanish and Math. Using different models to control for observable characteristics and attrition in the sample, results indicate that within one school year students benefited by ECh scored 6.2 points higher in Spanish and 3.1 points higher in Math than comparison students. These are quite sizable effects, representing  $\frac{3}{4}$  and  $\frac{1}{3}$  of a standard deviation, respectively.<sup>3</sup>

Students who have an ECh teacher score significantly higher in all three Spanish subtests (reading, comprehension, and communication) than students who have traditional teachers. The reading section of the test adds  $\frac{1}{4}$  of a standard deviation, the comprehension section adds about  $\frac{1}{3}$  of a standard deviation, and the communications section adds another  $\frac{1}{5}$  of a standard deviation, for the overall impact of  $\frac{3}{4}$  of a standard deviation reported above.



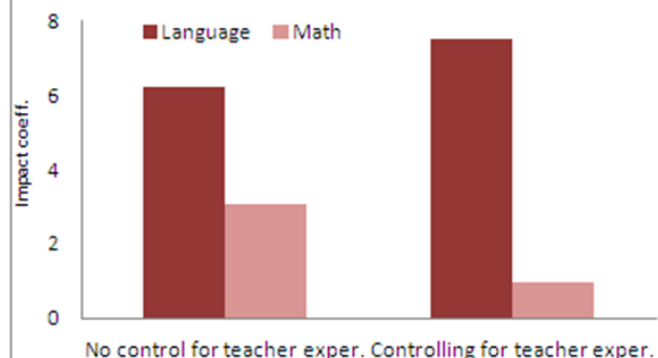
In the case of Math, findings suggest that ECh teachers are positively associated with improved student learning in the numbers and operations section, but their students score similarly in algebra and geometry than students with traditional teachers. The numbers and operations section of the test contributes with  $\frac{1}{4}$  of a standard deviation, the algebra section adds only  $\frac{1}{13}$  of a standard deviation, and the geometry section adds  $\frac{1}{11}$  of a standard deviation. This finding is signaling that ECh teachers are no more effective than traditional teachers in teaching algebra and geometry, areas that can require highly specialized content knowledge to be taught effectively. **Teacher skills and experience may play different roles depending on the subject they teach.** On

average, students with ECh teachers score 6.2 points higher in Spanish as compared to students

<sup>3</sup> In Math, the baseline score was 174.3 points and the standard deviation was 8.56. In Spanish, the baseline score was 175.6 points and the standard deviation was 8.81.

with traditional teachers. When teacher experience is added as a control variable<sup>4</sup>, the difference in the Spanish test score between ECh students and non-ECh students at the end of the school year increases to 7.4 points. This means that when we compare two novice teachers, one who has been traditionally trained in a teacher training institute and the other who has been recruited by ECh and has no formal teacher training besides the 4-week summer institute that ECh offers, the ECh teacher is associated with even higher learning outcomes in Spanish. For Math, the story is the opposite: when teacher experience is taken into account, the difference in math scores between ECh students and non-ECh students drop from 3.1 points to 0.9 points. This implies that ECh teachers appear to have no effect on Math learning outcomes in Math above and beyond that of a traditionally trained teacher with the same level of experience. The other interesting implication is that teaching experience appears to have a lesser effect on Math than on Spanish.

**Figure 3: Comparing teachers with similar experience**



*Notes:* Graph shows the coefficient of a dummy that equals 1 if the student benefitted from ECh and 0 if the student is in the comparison group on a regression where the dependent variable is the difference in scores between follow-up and baseline.  
*Source:* Own calculations based on ECh 2010 databases.

## Concluding Remarks and Perspectives

Chile and other Latin American countries face the challenge of reducing inequities in learning outcomes. Organizations from the civil society can help in this arduous task, as is the case with Enseña Chile. This note shows that ECh teachers are associated with higher student learning, particularly in Spanish, in a relatively short period of time. Still unresolved is whether these associations persist with time. Furthermore, the approach used by ECh of incorporating highly qualified professionals with limited pedagogical training needs to be tested at a national scale but seems promising for reducing some of the existing gaps in education.

## References

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## About the Authors

Mariana Alfonso and Marina Bassi are specialists in the Education Division at the Inter-American Development Bank (IDB). Christian Borja is a consultant for the Education Division of the IDB.

<sup>4</sup> Teacher experience is included with a dummy variable that equals 1 if the teacher has teaching experience prior to participating in the ECh program or if the traditional teacher declares to have at least one year of teaching experience.