
MEMORANDUM

TO: Rebecca Goldsmith and Lola Hermosillo

FROM: Larissa Campuzano, Seth Morgan, and Randall Blair

SUBJECT: Impact Evaluation of the Secondary School Strengthening Intervention: Interim Results, 2010 to 2011

DATE: 5/31/2013
ESVED2-31rev

Executive Summary

This memorandum presents interim results regarding the impact of FOMILENIO's secondary school strengthening intervention on enrollment, grade completion, and continuation in secondary school¹. In Sections A, B, and C we describe the strengthening intervention, its implementation, and the evaluation design used to determine the intervention's impact, respectively. In Sections D and E, we present the evaluation's outcome indicators and data sources, and discuss the impact estimation method, respectively. In Section F, we discuss the study sample and in Section G, we present and discuss impacts of FOMILENIO's secondary school strengthening intervention. In Section H, we present a summary of the intervention's impact.

Key Findings. We find statistically significant positive effects of the secondary school strengthening intervention on 10th grade enrollment in technical programs in 2010. This seems reasonable given that the intervention focused on technical improvements, and scholarships were disproportionately offered to 10th grade technical students versus general students in schools that received improvements. We also find negative and statistically significant effects of the strengthening intervention on 11th grade enrollment in general programs in 2010. This seems to be a consequence of lower enrollment in 10th grade general programs in 2009 at treatment schools versus comparison schools. However, the mechanism through which the intervention may have reduced enrollment in general programs is unclear. In addition, we find no impact of the strengthening intervention on other key outcomes of grade completion, dropout rates, test scores, or re-enrollment rates.

¹ In El Salvador, secondary school includes grades 10 and 11 for general programs and grades 10, 11, and 12 for technical programs. Note that these schools are called *escuelas medias* in Spanish so in previous documents this term had been translated as middle schools. However, we use the term secondary schools to avoid confusion with traditional middle schools in the US which include different grades than in El Salvador.

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A. DESCRIPTION OF THE INTERVENTION

The Human Development Project is one of three large-scale projects financed under the 2006 compact between the Millennium Challenge Corporation (MCC) and the Government of El Salvador.² The project consists of two activities: (1) The Education and Training Activity, which will invest nearly \$28 million (U.S. dollars) to expand the quality of, and access to, vocational and technical education and training in El Salvador's Northern Zone; and (2) the Community Development Activity, which will invest over \$67 million to increase the coverage of water supply, sanitation facilities, electricity, and community infrastructure in the Northern Zone.

Budgeted at \$19.8 million over five years (from 2007 to 2012), the largest of the three sub-activities of the Education and Training Activity is the Formal Technical Education Sub-Activity. The goal of this sub-activity is to strengthen technical and vocational educational institutions in the Northern Zone, "so that more youth can gain marketable skills and thereby increase their opportunities for employment and income generation."³ As with other sub-activities of the Education and Training Activity, the Formal Technical Education Sub-Activity was designed to directly address human development constraints in the Northern Zone, particularly youths' limited educational attainment. According to the compact, "The average number of years of formal education in the Northern Zone stands at 3.7 years, compared to 5.6 years in the rest of the country." By improving schools and offering scholarships, the sub-activity's goal is to finance efforts to increase youths' access to high-quality technical education in the region, thus increasing their achievement levels, secondary (and post-secondary) school graduation rates, and prospects for gainful employment. Updated in 2011, the MCC-FOMILENIO monitoring and evaluation plan cites goals of a 71 percent secondary school graduation rate, a 66 percent employment rate among these graduates, and 42 percent increase in these graduates' income as a result of the sub-activity's investments.

By 2012, the Formal Technical Education Sub-Activity was scheduled to spend \$3.8 million in scholarships for students enrolled in secondary and post-secondary technical schools in the Northern Zone. According to a preliminary budget, the sub-activity would also provide \$9 million to improve 20 technical secondary schools in the Northern Zone with infrastructure investments and additional teacher training programs. In addition, the sub-activity was scheduled

² The other two projects funded by the compact are the Productive Development Project (with a budget of \$87 million), and the Connectivity Project (with a budget of \$234 million). The Productive Development Project funds material and technical assistance to agricultural producers and artisans in the Northern Zone, and the Connectivity Project funds the construction of a transnational highway and tertiary roads linking 57 municipal capitals in El Salvador.

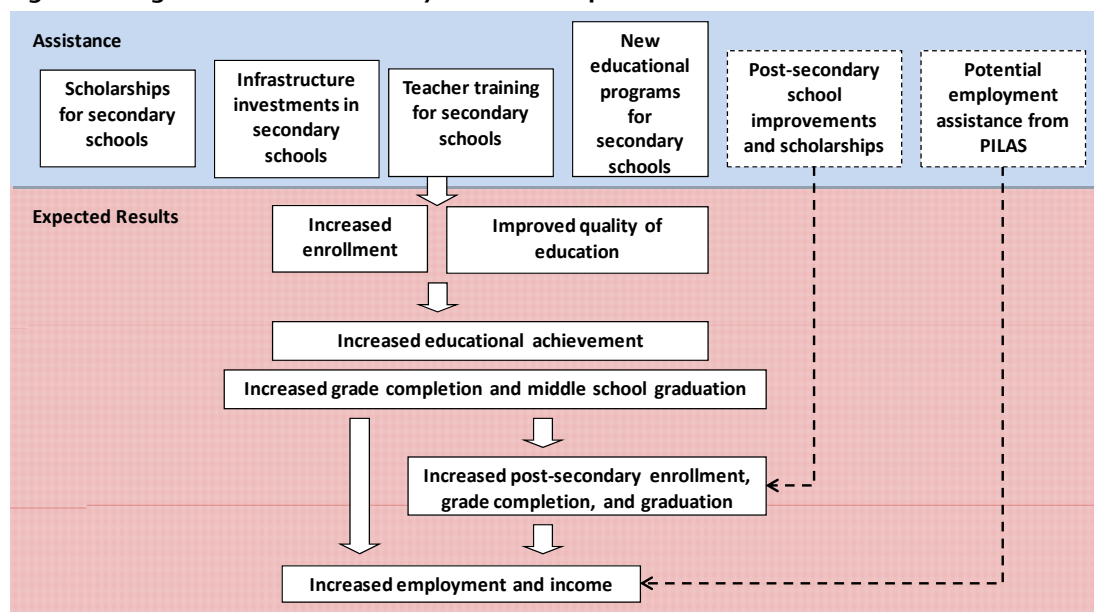
³ Compact between MCC and the Government of El Salvador.

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to invest \$7 million to strengthen the Chalatenango Technical Institute (known as ITCHA for its initials in Spanish), an existing post-secondary institute in the Northern Zone. As part of the ITCHA intervention, two new technical degree programs would be established at ITCHA as well as its four linked secondary schools under the Gradual Educational Model of Technical and Technological Learning (known as MEGATEC for its initials in Spanish) implemented by MINED. In addition, the Formal Technical Education Sub-activity would finance a labor insertion program known as PILAS (Programa de Inserción Laboral Sostenible) to help recent technical school graduates (and non-formal education program participants) obtain employment.

Figure 1 provides a summary of how scholarships, secondary school improvements, teacher training sessions, new technical programs, improvements at ITCHA, and PILAS were intended to generate improved employment outcomes among secondary school students. Secondary school scholarships, infrastructure improvements, and new technical degrees would motivate students to enroll in secondary school programs—particularly technical programs. In addition, teacher training sessions would improve the quality of technical and general education in secondary schools, as well as students' achievement levels. Increased enrollment and better instruction would generate higher graduation rates, as well as increased employment and income among secondary school graduates. Furthermore, post-secondary scholarships and ITCHA improvements would increase enrollment and completion of post-secondary technical education. Potential employment assistance from PILAS could also support recent secondary school and post-secondary school graduates in finding salaried employment or starting their own business.

Figure 1. Logic Model of Secondary School Components of Formal Technical Education Sub-Activity



Source: CIDE and FOMILENIO operations manuals.

Note: Dotted lines represent the influence of Formal Technical Education Sub-Activity investments that are not directly related to secondary school investments.

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The Salvadoran Ministry of Education (MINED) was designated as the principal implementing entity for the Formal Technical Education Sub-Activity. In addition, the Millennium Fund (known as FOMILENIO in Spanish) was established as the entity responsible for the oversight and management of the sub-activity (as well as all other activities and sub-activities outlined in the compact). The Consortium for International Development in Education (CIDE) was the primary entity contracted to provide technical support for the sub-activity, including designing FOMILENIO's scholarship intervention, developing architectural plans for school improvements, designing new curricula, and training all teachers at the ITCHA and the 20 secondary schools receiving assistance.

B. IMPLEMENTATION OF SECONDARY SCHOOL STRENGTHENING INTERVENTION AND OTHER RELATED INTERVENTIONS

CIDE, as the technical contractor, was responsible for the initial design of the secondary school strengthening intervention. MINED identified 75 secondary schools in the Northern Zone that were eligible to receive the intervention. CIDE also conducted a needs assessment of all 75 schools to determine the criteria for school selection and to design the strengthening intervention. In the second quarter of 2008, CIDE developed the criteria on which 20 of the 75 eligible secondary schools would be selected for the intervention. Once FOMILENIO, MINED, and CIDE agreed on the final selection criteria, CIDE constructed a ranking score for each of the 75 eligible schools.⁴ Because stakeholders wanted to attain a wide geographic distribution of the intervention throughout the Northern Zone, the three implementing organizations decided to select the two schools that ranked with highest need, as defined by the selection criteria, in each of the 11 micro-regions of the Northern Zone. Given that this procedure would have selected 22 schools, an adjustment was made by which two micro regions had only one school selected for the intervention (and nine micro regions had two schools selected for the intervention). Through this procedure, wide geographic distribution was attained and preference was given to schools that scored highest on the selection criteria in each micro region. A list of the 20 schools selected for the strengthening intervention is provided in the appendix.

After the school selection process, CIDE visited the 20 selected institutions for an in-depth assessment of their infrastructure, programming, resources, and sustainability. Using these assessments, CIDE developed proposals for improving each school's infrastructure and educational programs. These proposals were discussed with MINED, FOMILENIO, and each

⁴ CIDE's Deliverable #17, August 2008, describes the selection criteria and the construction of ranking scores. The five main criteria used to select the schools were poor students' access to the school, infrastructure to deliver technical education, leadership and communication with the community, economic development of the area, and psychosocial risk of the community.

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selected secondary school's administrative committee.⁵ Together, stakeholders made a final decision on the infrastructure and curriculum improvements that each secondary school would undergo. In August 2009, FOMILENIO staff signed contracts to improve the infrastructure of the 20 selected secondary schools, and construction began shortly after these contracts were executed. Although specific infrastructure improvements varied by school, all 20 of the selected secondary schools underwent substantial improvements. As a result of the sub-activity, these schools received 49 new classrooms (39 of which were additions and 10 replaced existing classrooms), 15 new laboratories, 8 new computer labs, and 124 new bathrooms (Table 1 and Table A.10). All infrastructure improvements were completed before the 2010 school year started. During the first semester of 2010, FOMILENIO also provided computers, software licenses, and furniture for computer labs in the 20 secondary schools. Similar donations continued until mid 2012. By early 2012, payments to contractors related to secondary school infrastructure and equipment improvements totaled around \$4 million.

Related to secondary school strengthening efforts, two new degree programs were created at ITCHA and four linked secondary schools, and seven new certificate programs—or short-term non-degree courses devoted to specific subjects—were implemented at strengthened secondary schools. These programs were chosen based on CIDE's labor needs assessment in each micro-region. First, as part of the ITCHA intervention, CIDE, MINED, and FOMILENIO chose two new degrees—civil engineering and alternative tourism—to be developed as MEGATEC degree programs at ITCHA and four secondary schools that would be linked to these new programs. The new MEGATEC programs would be based on a competency-based educational approach that would prioritize what learners are expected to do rather than on what they are expected to learn. Secondary schools were selected for the two new degree programs due to their geographic proximity to ITCHA, as well as their potential for employment related to the new programs. Two secondary schools, Aguilares and Benjamín Estrada Valiente, were selected to offer the civil engineering technical secondary school degree program, and two schools, San Ignacio and La Palma, were selected to offer the alternative tourism technical secondary school degree program.⁶ These linked secondary schools would provide students with the opportunity to transfer to ITCHA as second-year post-secondary students upon their completion of a technical secondary school degree.

As the intervention's primary technical contractor, CIDE developed the curricula for these two new degree programs and trained all newly hired ITCHA and secondary school teachers who

⁵ The educational system in El Salvador is decentralized and schools are administered by a committee formed of school administrators, parents, teachers, and students.

⁶ In El Salvador, middle schools can offer two types of degrees: technical (or vocational) middle school degrees, which are completed in three years (grades 10, 11, and 12), and general middle school degrees, which are completed in two years (grades 10 and 11).

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would teach these programs. Throughout 2009, CIDE staff worked with various stakeholders to develop and refine the programs' core competencies and teaching modules. From November 2009 to August 2010, CIDE conducted MEGATEC training for ITCHA staff, as well as teachers and principals at the four linked secondary schools. Training featured 7 workshops totaling 136 hours (Table 1). Starting in January 2010, civil engineering and alternative tourism technical degrees were offered at ITCHA's four linked secondary schools.

Table 1. Secondary School Improvement Outputs

Secondary School Improvements		
	New Infrastructure	Improved Infrastructure
Classrooms	49 classrooms in 14 schools	18 classrooms in 2 schools
Laboratories	15 laboratories in 12 schools and 8 computer labs in 8 schools	1 laboratory in one school and 3 computer labs in 3 schools
Sanitary Services	124 sanitary services in 19 schools	26 bathrooms in 2 schools
Teacher Training		
Number of MEGATEC workshops conducted	7 workshops totaling 136 hours, and 9 months of follow-up training and support from 2009 to 2010	
Number of teachers trained in MEGATEC workshops	11 teachers participated in nearly all workshops and sessions (4 ITCHA teachers and 7 secondary school teachers)	
Number of stakeholders trained in additional secondary school workshops	540 teachers, administrators, parents, MINED staff, and other stakeholders as of September 2011	
Scholarships		
Secondary school students	3,409 scholarships awarded (150 in 2009, 921 in 2010, 1,197 in 2011, and 1,141 in 2012)	

Source: CIDE administrative data.

Second, with the objective of diversifying the course options offered by some of the improved schools, CIDE developed seven certificate programs (referred to as *diplomados* in Spanish) in areas with potential for economic development in each school's locality.⁷ Ten secondary schools were selected to implement these programs: five schools implemented one of the certificate programs as part of their general secondary school degrees and five schools implemented these programs as part of their technical secondary school degrees (mostly under Business Accounting, see Table 2). These certificate programs were also developed under the

⁷ The certificate programs are the following: Agroforestry, Milk Production, Solid and Organic Waste Management, Fair Trade Assessment, Financial Accounting, Organic and Hydroponic Crops, and Community Organizing.

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competency-based educational approach, which focuses on mastery of specific knowledge and skills.

Table 2. New Certificate Programs by School

Secondary School	Certificate Program	Degree Program Under Which Certificate was Offered
Jutiapa	Financial Accounting	Technical: Business Accounting
General Juan Orlando Zepeda	Community Organizing	Technical: Health
La Reina	Milk Production	General
Nueva Concepción	Organic and Hydroponic Crops	General
Carolina	Organic and Hydroponic Crops	General
Sesorí	Fair Trade Assessment	Technical: Business Accounting
El Sauce	Solid and Organic Waste Management	Technical: Business Accounting
	Solid and Organic Waste Management	General
Osicala	Community Organizing	Technical: Secretarial Studies
	Community Organizing	Technical: Business Accounting
Anamoros	Milk Production	General
Chapeltique	Agroforestry	General

Source: CIDE administrative records.

As part of secondary school strengthening efforts, CIDE staff also administered training to 540 secondary school teachers, administrators, parents, MINED staff, and other stakeholders from 2009 to 2011. These less intensive training sessions were designed to introduce stakeholders to the competency-based approach and help them develop lesson plans, educational charts, and assessment materials needed to teach courses. Since 2011, secondary school teacher training has focused on covering the topics most requested by the teachers and administrators.

Under the scholarship intervention of the Formal Technical Education Sub-Activity, FOMILENIO awarded 3,409 first-year secondary school scholarships to students in 17 of the 20 schools selected for improvements under the secondary school strengthening intervention. The secondary school scholarship amount was \$400 per year. Scholarships were awarded in students' first year (10th grade) and could be renewed in additional years if students were in good academic standing. Because the length of general secondary school programs is two years (10th and 11th grade), and the length of technical secondary school programs is three years (10th through 12th grade), general secondary school students could renew their scholarships for the subsequent school year, and technical secondary school students could renew their scholarships for two subsequent school years. As a counterpart contribution, MINED agreed to finance and administer 50 percent of scholarships that would be renewed for second-year secondary school students (both for general and technical degrees) starting in 2011, and 100 percent of scholarships that would be renewed for third-year secondary school students in technical

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programs starting in 2012. The secondary school scholarships in 2010 were paid on time, but MINED had difficulties completing second- and third-year secondary school scholarship disbursements in a timely manner during subsequent years.⁸

C. EVALUATION DESIGN

MCC contracted with Mathematica in 2007 to design and conduct an evaluation of the Formal Technical Education Sub-Activity of the Human Development Project. Given MCC's goal of evaluating interventions with the most rigorous methods available, Mathematica examined the three interventions under this sub-activity (strengthening 20 technical secondary schools, scholarships, and ITCHA improvements) and determined that a rigorous evaluation of FOMILENIO's secondary school strengthening intervention was feasible.⁹ Developed and refined by Mathematica, MCC, FOMILENIO, and other stakeholders, the evaluation of the secondary school strengthening intervention uses a matched comparison group design, which allows us to assess the impact of the intervention on students' educational and labor outcomes. This is a quasi-experimental design in which the 20 secondary schools selected for the intervention (or "treatment schools") were matched to 20 schools with similar student demographic characteristics (or "comparison schools"). Furthermore, the evaluation focuses on students who attended the study schools in 2010 (the first year of the intervention) through 2012 (the third year of the intervention), regardless of the grade in which they were enrolled.

The purpose of the impact evaluation is to determine whether or not students in the strengthened secondary schools are better off than they would have been without the intervention. Specifically, the evaluation answers the following research question:

- What is the impact of FOMILENIO's strengthening secondary school intervention on students' education and labor market outcomes, including secondary school enrollment, grade completion, graduation, employment, and income?

As described in the previous section, the 20 schools to be strengthened by FOMILENIO were selected based on the ranking CIDE developed and on geographic location. CIDE ranked the 75 eligible schools accounting for all the criteria defined by stakeholders and selected the two schools with the highest ranking in each of the nine micro-regions (and the highest ranked school

⁸ Note that scholarships for post-secondary education were also granted from 2009 to 2011. Post-secondary scholarships were \$1,500 a year, and could be renewed for the second year of post-secondary study.

⁹ The scholarship program is evaluated using a randomized control design, and is discussed in a separate memo. The improvement of ITCHA has been evaluated with a case study design and is discussed in a separate report.

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in two micro-regions).¹⁰ The 55 schools that were eligible for the intervention, but were not selected to receive it, were candidates for the evaluation's comparison group. Mathematica used propensity score matching methods to identify 20 comparison schools with observable characteristics similar to those of the 20 treatment schools before the intervention. Data for school selection came from the Censo Matricular collected in 2006 and 2007, as well as the data collected by CIDE for the selection of the intervention schools.¹¹ Figure A.1 shows a map with the location of the treatment and comparison schools.

Using this design, the difference between the observed outcomes in the treatment group and the observed outcomes in the selected comparison group is the impact estimate. Propensity score matching allowed us to identify a comparison group with observable characteristics similar to those of the treatment group before the intervention, at least on characteristics used in the matching procedure. The limitation of this method, as with any quasi-experimental method, is that we cannot guarantee that the intervention and the comparison groups are similar on unobserved characteristics at baseline. In order to account for this potential bias, we collected data from the 2008 and 2009 Censos Matricular and conducted equivalence tests between the treatment and comparison groups described in Section F.¹² In addition, as we will explain below, in 2009, we also collected data on the students that finished secondary school in 2008 and verified equivalence among treatment and comparison groups at baseline.

We should also mention that our analysis compares students in schools where the strengthening intervention and the scholarships intervention were implemented by FOMILENIO versus students in schools without these two interventions. For this reason, the impacts we will estimate cannot separate the effect of the strengthening intervention from the effect of scholarships intervention. As a result, this evaluation measures the combined effect of secondary school infrastructure improvements, teacher training sessions, new technical degree and certificate programs, and scholarships on students' educational and labor market outcomes.

D. OUTCOME MEASURES AND DATA SOURCES

The outcome indicators for the impact evaluation are constructed from data from administrative databases and survey sources. Although the intervention was delivered at the school level, the goal of secondary school strengthening is to improve outcomes at the student

¹⁰ CIDE's Deliverable #17, August 2008, describes the selection criteria and the construction of the ranking score.

¹¹ See Final Impact Evaluation Design for Technical Middle School Activity memo dated October 14, 2009 for a detailed explanation on the comparison group selection.

¹² Conducted by the Ministry of Education, the Censo Matricular is a census of all schools in El Salvador.

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level. Therefore, the impact evaluation uses both school-level data and student-level data from administrative records to construct educational outcome measures such as enrollment, continuation, and progression in school. In a future analysis, we will use student survey data to construct labor market outcomes such as employment, income, and continuation to post-secondary education.

School-level data from administrative records. MINED collects data on all the schools in El Salvador through the Censo Matricular. Data are collected at the beginning of each school year with the Censo de Matrícula Inicial and at the end of each school year with the Censo de Matrícula Final. The main evaluation outcomes constructed from the data are enrollment at the beginning of the school year, completion rates at the end of the school year, fail rates at the end of the school year, and dropout rates at the end of the school year. Table 2 describes the outcomes in detail. We used data from 2006, 2007, 2008, and 2009 Censos as baseline data and data from the 2010 Censo as follow-up data for the first year of the intervention. In 2011, MINED did not collect data from the Censo due to logistical problems. Therefore, for 2011, we used student-level data to construct educational outcome measures (as explained below).

Student-level data from administrative records. MINED collects data on all students in El Salvador through its Accreditation Office. Each school principal is responsible for uploading basic information on each enrolled student to a centralized database. In addition, principals are responsible for updating the database when students' status changes, for example when students transfer to another school or drop out. We used these student-level data from 2010 and 2011 to construct student-level outcomes such as enrollment in 2010, passing or failing in 2010, and re-enrollment in 2011.¹³

Student-level survey data. Administrative data collected by MINED do not include outcome indicators for post-secondary education and labor market outcomes. Thus, we collected these data through the Encuesta de Seguimiento de Estudiantes (ESE).¹⁴ The main outcome indicators that will be constructed with these data are secondary school graduation, employment, income, and post-secondary education. The baseline ESE was conducted in December of 2009, which was administered to students who had been registered in the 40 schools in the evaluation

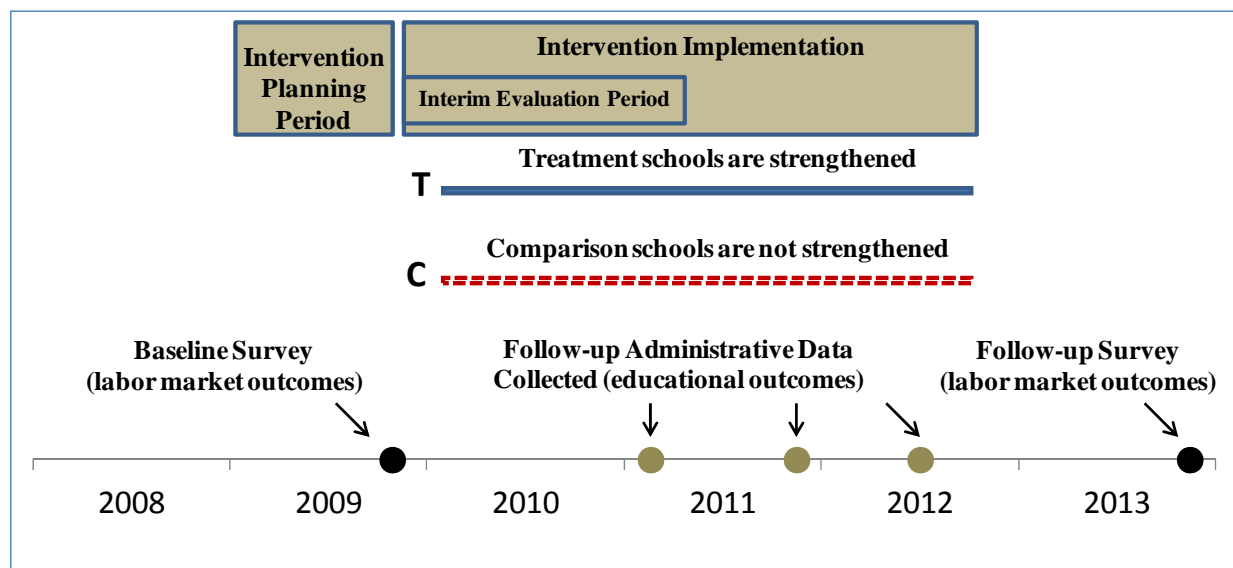
¹³ We attempted to use the database's student status at the end of 2011, but the data seemed unreliable with more than 60 percent of the students reported as failing the grade. Data from all previous years generate fail rates that are at most 10 percent, so a failure rate of 60 percent is anomalous and likely unreliable. Table 2 describes these outcomes in more detail. Tables A.8 and A.9 present enrollment rates by school in 2010, according to the CENSO and according to Accreditation, for a comparison. Note that there exist many differences across these data sets therefore we focus on the school level data. We will collect school records to verify student level data and once that verification is done we will update the student level results.

¹⁴ The specifications for this survey were provided to MCC in a separate memorandum, ESVED-076.

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during their last secondary school year in 2008 (i.e., students in the 12th grade of a technical program and students in 11th grade of a general program). During the 2009 ESE, we collected data on student outcomes approximately one year after they should have completed their secondary school education. The follow-up ESE will be conducted in 2013, which will be administered to students who registered in the 40 evaluation schools in their last year of secondary school in 2012 (Figure 2).

Figure 2. Secondary School Evaluation Data Collection Schedule, 2009-2013



Although the evaluation focuses on two types of outcome measures: educational outcomes and labor market, only educational outcomes are the reported in this interim report, as students in the analysis sample should be attending secondary schools in this period. We will analyze labor market outcomes after the follow-up ESE in 2013 when students should have finished their secondary school education. Table 3 provides a definition of the educational outcomes measured in this interim analysis.

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Table 3. Definitions of Educational Outcomes for the Interim Results of the Secondary School Impact Evaluation

Measure	Definition
School-Level Outcomes	
Enrollment in school (2006, 2007, 2008, 2009, and 2010)	Number of students enrolled in each secondary school as reported by the Censo Matricular Inicial. The measure can be disaggregated by program (general-grades 10 and 11 or technical-grades 10, 11, and 12), by grade (10, 11, and 12), and by gender (female or male).
Passed grade, percent (2006, 2007, 2008, 2009, and 2010)	Percent of students reported as passing the grade among those reported by the Censo Matricular Final. The measure can be disaggregated by program (general or technical) and by grade (10, 11, and 12).
Failed grade, percent (2006, 2007, 2008, 2009, and 2010)	Percent of students reported as failing the grade among those reported by the Censo Matricular Final. The measure can be disaggregated by program (general or technical) and by grade (10, 11, and 12).
Dropped out during the school year, percent (2007, 2008, 2009, and 2010)	Percent of students that dropped out of school during the year among those reported by the Censo Matricular Final.
Aptitude Test for Secondary School Graduates (PAES for its initials in Spanish) scores (2006, 2007, 2008, 2009, and 2010)	School average of PAES test scores among students registered in 11 th grade. A global score is reported, as well as sub-scores in Math, Language, Social Science, and Science.
Student-Level Outcomes	
Passed grade in 2010.	Binary measure of whether a student is reported as having passed a grade in 2010 by MINED's Office of Accreditation (among students enrolled in 2010).
Re-enrolled in the next grade in 2011	Binary measure of whether a student enrolled in 2010 re-enrolled in the next corresponding grade in 2011. This variable is defined only for students who in 2010 were enrolled in a grade where continuation was expected for at least one more year.

E. ESTIMATING IMPACTS

The impact estimates for the school-level outcomes are estimated with a regression specification that compares outcomes of schools strengthened by FOMILENIO (treatment group) with outcomes of schools that received no services from FOMILENIO (comparison group), controlling for baseline characteristics. The basic model in an ordinary least squares regression that can be expressed as follows:

$$(1) y_s = \alpha + \beta x_s + \lambda T_s + \eta_s$$

where y_s is the outcome of interest for school s ; x_s is a vector of baseline characteristics of school s ; T_s is an indicator equal to one if school s was in the treatment group and zero if it was in the comparison group; and η_s is a random error for school s . We used data from 2006, 2007, and

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2008 for baseline controls. We will report 2009 outcomes to provide a full assessment of time trends from 2006 to 2010, but 2009 outcomes are not used as controls in the regression. Schools were notified at the end of 2008 that they had been selected for the intervention, so they could have modified their behavior in 2009 in response to the implementation of the intervention. Data from 2009 are not included in the regression to avoid including any anticipatory effects of the intervention in control variables.¹⁵ The parameter estimate for λ is the estimated impact of the intervention on the outcome of interest.

For student-level data, the regression specification uses students as the unit of analysis. This model compares outcomes of students who were enrolled in the schools that were strengthened by FOMILENIO (treatment group) with outcomes of students who were enrolled in the schools that were not strengthened by FOMILENIO (comparison group), controlling for baseline characteristics and accounting for clustering of students in schools. A random effects specification that allows us to account for the clustering of students in schools and assess standard errors correctly is used. The basic model can be expressed as follows:

$$(2) y_{is} = \alpha + \beta x_s + \lambda T_s + \eta_s + \varepsilon_{is}$$

where y_{is} is the outcome of interest for student i in school s ; x_s is a vector of baseline characteristics of school s (baseline data comes from school-level data from the Censo Matricular 2006, 2006, and 2008); T_s is an indicator equal to one if school s was in the treatment group and zero if it was in the comparison group; η_s is a random error term for school s (random effect); and ε_{is} is a random error term for student i in school s .¹⁶ The parameter estimate for λ is the estimated impact of the intervention on the outcome of interest.¹⁷

F. STUDY SAMPLE

Baseline Equivalence. Because of the quasi-experimental design, we tested whether the treatment group was equivalent to the comparison group on several baseline characteristics. The memorandum “Baseline Comparison of Administrative Data for the Secondary School Strengthening Intervention” which was submitted to MCC on March 11, 2011 discussed the baseline equivalence analysis using data from the Censos Matriculares 2006 to 2009. Table A.1 in the appendix presents comparisons on key educational outcomes such as enrollment,

¹⁵ However, we will do sensitivity analysis using 2009 as covariate in the regression models.

¹⁶ Note that the variable of interest, treatment, does not vary within schools. As such, we cannot treat schools as fixed effects in our regression model.

¹⁷ When calculating effects by sub-group, for example effects on students in a specific grade or program, we simply restrict the sample to that sub-group.

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promotion, dropout, and academic achievement. We found that the 20 schools selected for the secondary school strengthening activity were, on average, similar to the 20 schools in the comparison group. In general, we found no statistical differences between treatment and comparison groups at the 5 percent level.¹⁸ However, there were a few large differences between beneficiary schools and comparison schools. For this reason, our impact analysis controls for these variables.

Differences due to data sources. As we have described before, the data for the school-level analysis comes from the Censo Matricular. The data for the student-level analysis comes from MINED's Office of Accreditation. Tables A.4 and A.5 in the appendix present the enrollment numbers for treatment and control schools respectively. The data source for years 2006 to 2010 is the Censo Matricular. For 2011, we aggregated the student-level data from the Office of Accreditation in order to obtain school level enrollment for 2011. It should be noted that these two sources have some key differences (see Tables A.6 and A.7 for a comparison of these two data sets in 2010, the only year for which both data sources are available to us). We find that enrollment numbers reported by the Censo are larger than enrollment reported by Accreditation in 2010. Some possible reasons for these differences are the following. First, the Censo data aggregated data of students attending both the traditional school system and a more flexible system named "EDUCAME," while data from Accreditation's Office only includes students in the traditional school system. Second, Censo data include counts of all students in the school regardless of whether they are formally registered. (A student with a missing document cannot be properly registered, but in many cases the school allows them to attend and registers them only internally.) In contrast, Accreditation's Office data includes only students who were formally registered. Third, the Accreditation Office's data were incomplete for one school and we were unable to obtain these missing records. Because of these issues, FOMILENIO and MCC contracted with the Dirección General de Estadística y Censos (DIGESTYC) in El Salvador to verify student-level educational. *Because this verification is not final, the student level analysis presented here should be considered preliminary and will be updated once the verified data are available.*

G. IMPACTS OF SECONDARY SCHOOL STRENGTHENING INTERVENTION USING SCHOOL-LEVEL DATA

In this section, we present the impact of the secondary school strengthening intervention on enrollment, grade completion, drop-out rates, and academic achievement. All impacts presented in this section were generated using school-level data provided by the Censo Matricular.

¹⁸ Please refer to the March 2011 memo for details. We only found statistically significant differences in two variables, PAES language score in 2008 and the percent of students failing the grade at the school in 2008.

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Before we present these findings, it is important to discuss how the strengthening intervention was expected to affect student outcomes during this interim period of the evaluation. This analysis focuses on the first year of the intervention (2010) and the first semester of the second implementation year (2011). The main short-term outcomes we would expect to be affected by the intervention during this period are enrollment, grade completion, pass rates, and re-enrollment. The mechanisms by which we would expect an effect are the following: First, on the supply side, as part of the secondary school intervention, 39 new classrooms were constructed in 14 schools. These additional classrooms could allow treatment schools to enroll more students than were possible in previous years. On the demand side, improved infrastructure and new curricula could also increase students' interest in secondary school and hence increase enrollment. Most importantly, in 2010, 921 scholarships were available for 10th graders in 17 of the 20 treatment schools. Largely as a result of additional classrooms, new curricula, and scholarships, we would expect increased enrollment in treatment schools in 2010, especially among 10th graders.

However, it is unclear what type of students would decide to enroll in treatment schools as a result of the intervention. If a substantial portion of newly enrolled students decided to enroll solely based on the availability of a scholarship, for example, newly enrolled students at treatment schools could have lower motivation or academic abilities, on average, than students at comparison schools. These students could potentially negatively impact educational outcomes such as grade completion, pass rates, and re-enrollment in treatment schools versus comparison schools. These potential negative effects related to the composition of incoming students could outweigh the positive effects on educational outcomes expected from better curricula, new infrastructure, and scholarships. Because the composition of incoming student cohorts could be altered by the intervention, it is unclear whether the intervention would have a positive, negative, or negligible effect on grade completion, pass rates, and re-enrollment at treatment schools.

We should mention that enrollment is the primary short-term outcome of interest for MCC related to the secondary school strengthening intervention, based on the economic model used to design the intervention. This model projected a significant increase in enrollment as a result of the strengthening intervention, but no specific changes to the other outcomes presented here, such as dropout rates and achievement levels.

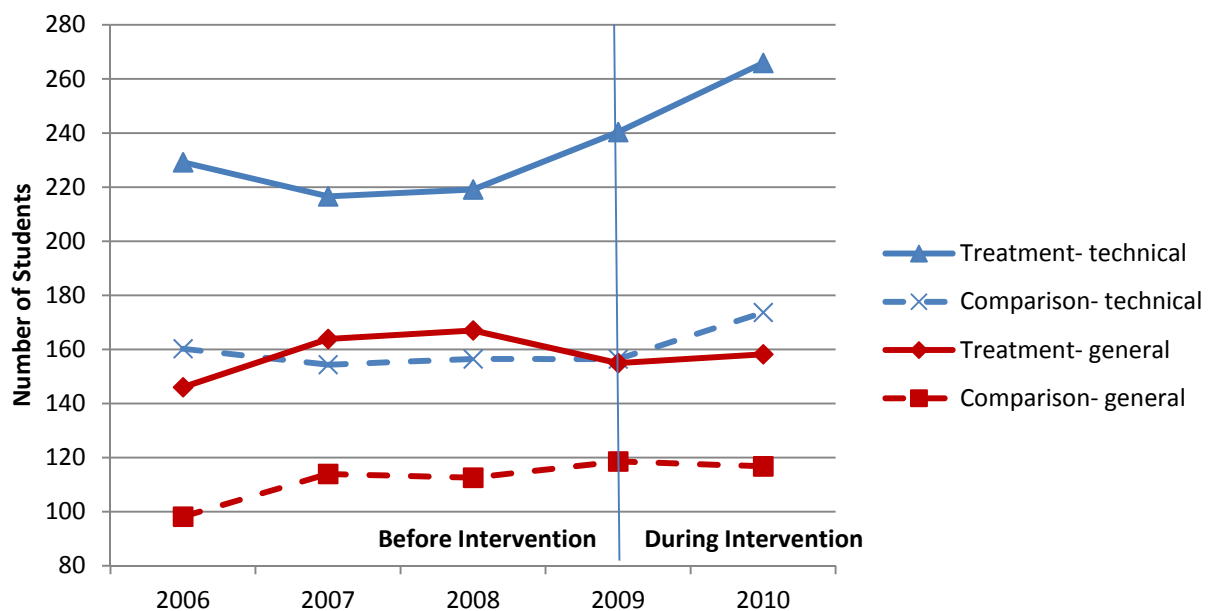
1. Impact on School-Level Outcomes

Enrollment. Given that the main goal of the intervention was to increase enrollment in the strengthened secondary schools, enrollment is the main indicator of this impact analysis. Enrollment trends from 2006 to 2010 are similar across treatment and comparison groups (Figure 3). However, treatment schools have more students than comparison schools. For both general and technical degree programs, secondary schools in the treatment group enroll more students than secondary schools in the comparison group. Also for both treatment and comparison groups, more students are enrolled in technical programs than in general programs—largely due to the fact that technical programs consist of three years of study versus two years of

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study in general programs. For each year, none of the differences between treatment and comparison groups are statistically significant, but some are large in magnitude (Table A.1). The impact estimates for 2010 that are presented below (Table 4) control for these differences in enrollment during the baseline years (2006, 2007, and 2008). In addition, because enrollment patterns are different across general and technical programs, we will estimate impacts on enrollment for each program separately.

Figure 3. Secondary School Enrollment, by Degree Program

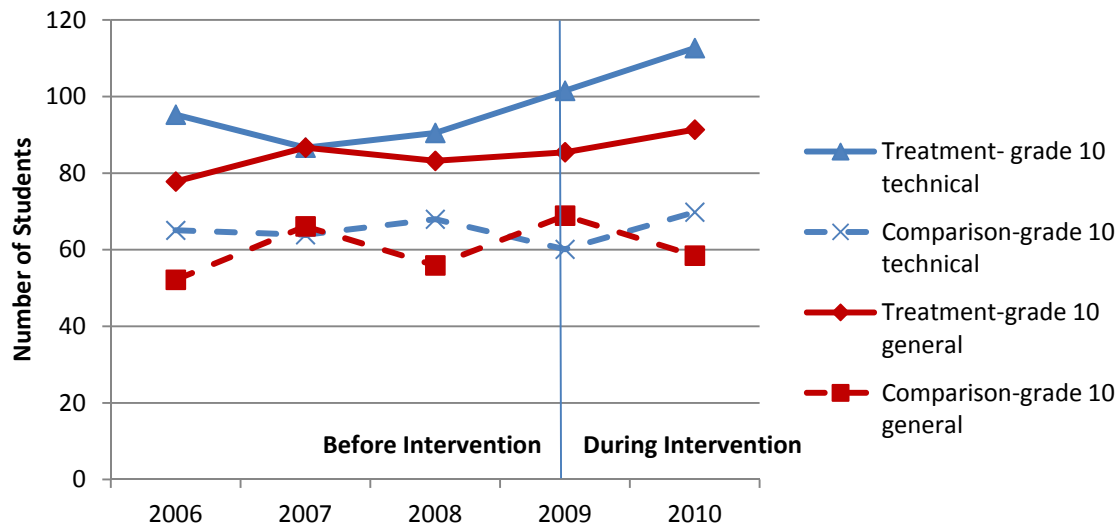


Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Figure 4 presents secondary school enrollment trends from 2006 to 2010 for 10th grade, as the secondary school strengthening activity would be most likely to generate positive impacts on 10th grade enrollment in 2010 (as opposed to 11th grade enrollment in the same year). Although no clear pattern for enrollment in 10th grade programs emerges for comparison schools, it is interesting to note that when enrollment in general programs decreases, enrollment in technical programs increases (and vice versa). This could indicate that limited resources—particularly a fixed number of classrooms—may keep total enrollment constant in comparison schools from 2006 to 2009. Enrollment in technical and general programs in treatment schools does not present a clear trend in 10th grade enrollment from 2006 to 2008. Starting in 2009, however, enrollment for both programs increases in treatment schools. Enrollment in technical programs increases substantially, whereas enrollment in general programs increases only slightly.

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Figure 4. Secondary School Enrollment in 10th grade, by Degree Program



Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

In 2008, the government of El Salvador introduced a policy that made secondary education free (previously students had to pay registration and monthly fees). It is important to control for enrollment in 2008 since an increase in enrollment from 2007 to 2008 could reflect this new policy. We should note the impact estimates present next (Table 4) represent the difference between enrollments in treatment schools and enrollment in the comparison schools, controlling for enrollment prior to the intervention (2006 to 2008). If both treatment and comparison schools were similarly affected by the new availability of a free secondary education in 2008, the estimated impact of the strengthening intervention is not affected by this new policy.

Table 4 presents regression-adjusted impact estimates of the strengthening activity on secondary school enrollment. For 2010, we do not find statistically significant differences at the 5 percent level between treatment and comparison schools in total enrollment, enrollment in general programs, or enrollment in technical programs. However, when we look at treatment-comparison differences in enrollment by grade and educational program, we find statistically significant treatment-comparison differences for 10th grade enrollment in technical programs. After controlling for various baseline characteristics, a treatment group school had, on average, around 18 more 10th grade students enrolled in technical programs than a comparison group school. Hence, across the 20 treatment schools, around 360 more 10th graders enrolled in technical programs than in the 20 comparison schools. This can be interpreted as a positive effect of the secondary school strengthening program. As we have mentioned before, the scholarships could have also contributed to this enrollment increase in technical programs.

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Table 4. Impacts of Secondary School Strengthening on Enrollment in 2010 (Number of Students)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
All Grades								
Total Enrollment	306	443	20	290	284	20	15	0.26
Enrollment in General Programs	108	232	20	117	82	20	-9	0.52
Enrollment in Technical Programs	197	261	20	174	225	20	23	0.10
10 th Grade								
Enrollment in 10 th grade (General)	65	131	20	58	43	20	6	0.53
Enrollment in 10 th grade (Technical)	88	99	20	70	86	20	18	0.02
11 th Grade								
Enrollment in 11 th grade (General)	47	103	20	58	42	20	-11	0.04
Enrollment in 11 th grade (Technical)	59	92	20	53	72	20	6	0.31

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted. Some adjusted differences do not equal treatment means minus comparison means due to rounding.

Another significant difference found is that in 2010, 11th grade enrollment in general programs was lower in the treatment group than in the comparison group. After controlling for enrollment in 11th grade in baseline years, the treatment group had around 11 fewer students in the second year of general programs than the comparison group. It is unclear why the intervention would reduce 11th grade enrollment in general programs relative to comparison schools. According to Censo data, comparison schools experienced a sizable increase in 11th grade enrollment in general programs in 2010, whereas treatment schools experienced no sizable increase or decrease. To further explore this finding, we examined differences in enrollment in 10th grade general programs in 2009 and found a negative but not statistically significant treatment-comparison difference. In other words, in 2009, comparison schools experienced larger enrolment in 10th grade general programs than treatment schools. This is likely driving the

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significant treatment-comparison difference in 11th grade general enrollment in 2010.¹⁹ Follow-up conversations with secondary school principals could help explain the sizable increase in enrollment in general programs among comparison schools in 2009, and the absence of such an increase in treatment schools during the same year.

Pass Rates. Although the main goal of the strengthening intervention was not to increase pass rates, we include it as a secondary indicator of our analysis because strengthened schools could feasibly increase students' motivation to continue studying. From 2007 to 2010, we see a similar pattern in pass rates between treatment and comparison groups (Figure 5). However, the pattern differs between grades, with pass rates for the 10th grade being lower than pass rates for the 11th grade. In 2009 and 2010, both treatment and comparison groups had 10th grade pass rates that were slightly lower than 85 percent. For both groups, however, 11th grade pass rates were above 90 percent during 2009 and 2010. This higher 11th grade pass rate is likely due to the fact that a more highly motivated and skilled population of students enrolled in the 11th grade than the 10th grade, as the cohort's less motivated and skilled students were less likely to complete 10th grade. Due to these pass rate differences across grades, we will estimate the impact of the strengthening activity on pass rates of 10th and 11th grade separately.

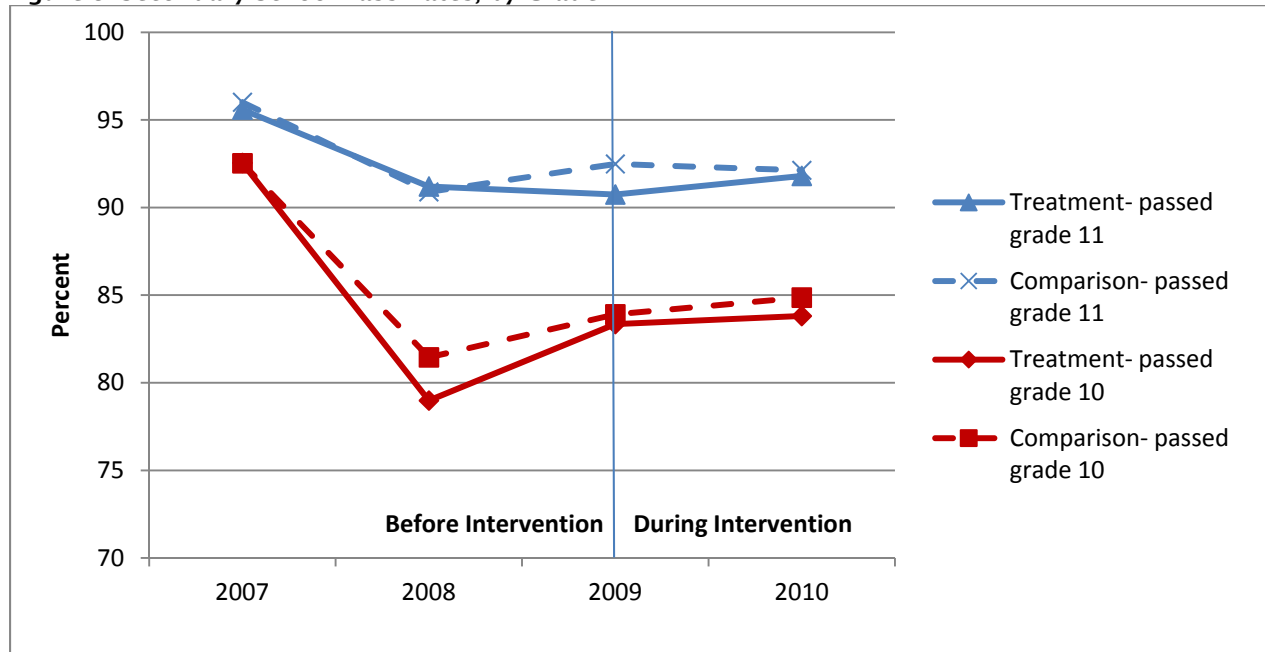
Table 5 presents regression-adjusted impact estimates for 2010. We do not find statistically significant differences at the 5 percent level between treatment and comparison schools in pass rates for 10th or 11th grade. As such, we cannot conclude with any certainty that the secondary school strengthening intervention affected secondary school pass rates.

Dropout Rates. Similar to pass rates, reducing dropout rates was not the main goal of the strengthening intervention. However, we include dropout rates as a secondary indicator because the strengthening intervention could feasibly motivate students to stay in school. The trends in dropout rates are similar between treatment and comparison groups, but these trends differ by grade. Figure 6 shows that for 10th grade students, dropout rates are higher in the treatment group than in the comparison group; however, none of these differences were significantly different (Table A.1). However, dropout rates for 10th grade are higher for both groups than dropout rates for 11th grade. In 2009 and 2010, both treatment and comparison groups had 10th grade dropout rates of approximately 10 percentage points (slightly higher for treatment). In contrast, 10th grade dropout rates were around 5 percent during 2009 and 2010 for treatment and comparison schools. As in the case of pass rates, this could be due to a more select population enrolling in 11th grade. Due to these differences across grades, we differentiate impacts on dropout rates by grade.

¹⁹ We conducted sensitivity tests that included data for 2009 as baseline controls. We still found a negative and significant effect on enrollment in 11th grade general and we found a positive but not significant impact for enrollment in 10th grade technical. The reason why enrollment in 10th grade technical becomes insignificant is that the upward trend in the treatment schools starts in 2009 (Figure 4). After including that information in the regression, the difference between treatment and comparison schools is smaller.

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Figure 5. Secondary School Pass Rates, by Grade



Source: Censo Matricular Inicial 2007, 2008, 2009, and 2010.

Table 5. Impacts of Secondary School Strengthening on Pass Rates in 2010, Percentage

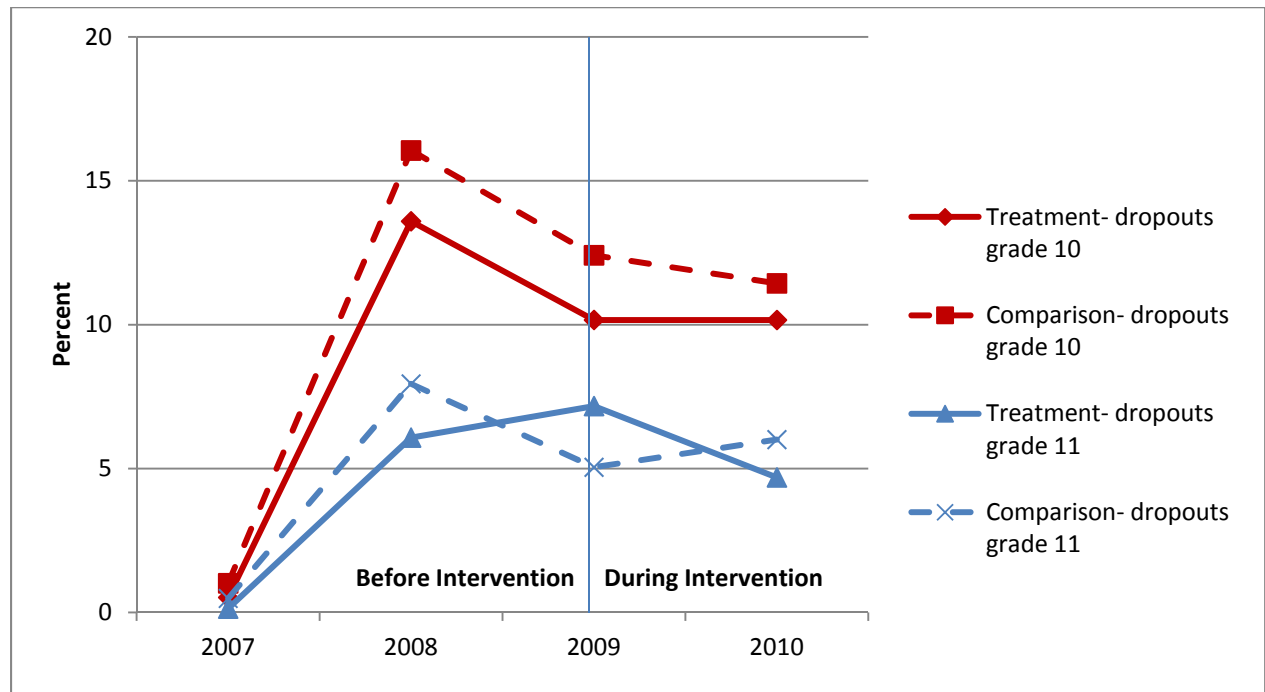
Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
All Grades								
Passed Grade	89	5	20	90	5	20	-1	0.65
10 th Grade								
Passed 10 th grade (General)	84	14	18	83	11	19	1	0.80
Passed 10 th grade (Technical)	84	8	16	88	11	16	-4	0.30
11 th Grade								
Passed 11 th grade (General)	91	8	18	91	6	19	0	0.93
Passed 11 th grade (Technical)	91	5	16	93	5	16	-2	0.26

Source: Censo Matricular Inicial 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2007, and 2008). Comparison means are unadjusted. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program).

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Figure 6. Secondary School Dropout Rates, by Grade



Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Table 6 presents impact estimation results comparing treatment and comparison groups after adjusting for initial differences. For 2010, we do not find statistically significant differences at the 5 percent level between treatment and comparison schools in school dropout in grades 10 or 11. Similar to pass rates findings, we cannot conclude that the strengthening intervention influenced secondary school dropout rates.

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Table 6. Impacts of Secondary School Strengthening on School Dropout Rates in 2010 (Percentage)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
All Grades								
Dropped out of school in 2010	8	4	20	8	4	20	0	0.83
10 th Grade								
Dropped out of 10 th grade (General)	13	10	18	14	11	19	-1	0.65
Dropped out of 10 th grade (Technical)	11	6	16	8	7	16	3	0.29
11 th Grade								
Dropped out of 11 th grade (General)	5	6	18	7	6	19	-2	0.38
Dropped out of 11 th grade (Technical)	5	5	16	5	6	16	0	0.95

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

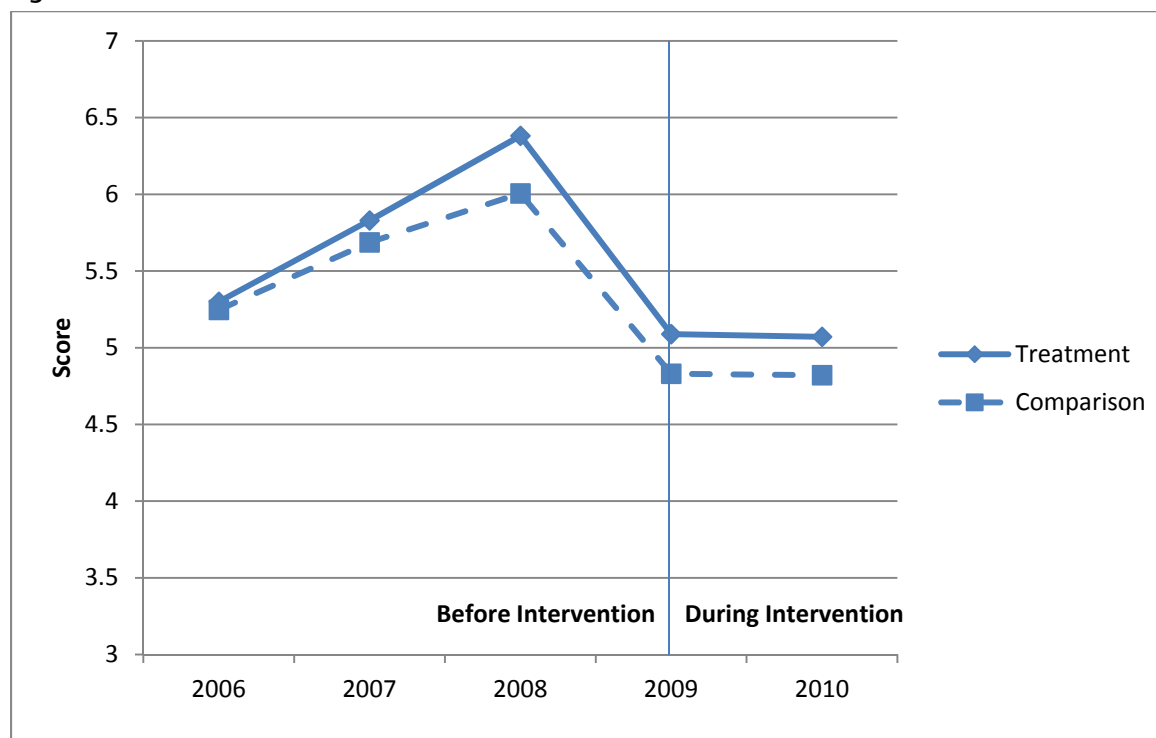
Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program). Some adjusted differences do not equal treatment means minus comparison means due to rounding.

Academic Achievement. Although the main goal of the strengthening intervention was not to increase academic achievement in math, language, social science, and science, we present PAES test scores to give a complete picture of academic achievement in the study schools. Figure 7 presents secondary schools' global PAES scores across years. The test and test scoring have experienced changes in questions and scoring procedures through the years that could in part explain why we see substantial changes in average scores from 2006 to 2010. In general, the treatment and comparison schools have similar average scores, and present similar changes across years (Table A.1). For all years, treatment group scores were slightly higher than comparison group scores, but these differences were not statistically significant. The analysis also presents impacts of the strengthening activity on PAES sub-scores.

Table 7 presents impact estimates comparing treatment and comparison groups after adjusting for initial differences. For 2010, the first year of the intervention, we do not find statistically significant differences at the 5 percent level between treatment and comparison schools in PAES scores for each of the subjects tested. However, the treatment-comparison difference for the Language subtest is approaching statistical significance ($p=0.06$) and is large in magnitude at 0.48 effect sizes, which considered a large effect in education research.

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Figure 7. PAES Global Score



Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Table 7. Impacts of Secondary School Strengthening on Academic Achievement in 2010 (Test Scores, Scale 0 to 10 Points)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
PAES Global	5.0	0.6	20	4.8	0.7	20	0.1	0.43
PAES Math	4.7	0.8	20	4.7	0.8	20	-0.1	0.83
PAES Language	5.1	0.7	20	4.9	0.5	20	0.3	0.06
PAES Social Science	5.6	0.6	20	5.6	0.5	20	-0.0	0.92
PAES Science	5.0	0.6	20	4.8	0.6	20	0.2	0.31

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted, and some adjusted differences do not equal treatment means minus comparison means due to rounding.

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2. Impacts on Student-Level Outcomes

In the previous section we discussed impacts using school-level outcomes, but some outcomes such as pass rates (or re-enrollment rates) are better defined at the student level. For example, a student-level re-enrollment measure reflects whether a student registered in the next grade in 2011 at the same school at which he/she had been registered in 2010. With school-level data, identification of this outcome is not possible because we only know the number of students registered in 2010 in each grade, but we do not know which of these students re-enrolled in the next grade in 2011. In addition, because the number of students (as well as the number of schools) is taken into account in a student-level analysis, the statistical power increases and allows for the detection of smaller impacts than would be possible with school-level data. In this section, we present the impact of the strengthening intervention on outcomes of pass rates in 2010, re-enrollment rates in 2011, and total enrollment in 2011 using student-level data provided by the Office of Accreditation.

Pass rates. We first examined the effects of the strengthening intervention on pass rates for all students who were enrolled in 2010 in all grades in the 40 schools in our evaluation. Using these student-level data, we find no statistically significant differences in pass rates between students in treatment schools and students in comparison schools (Table 8).²⁰

²⁰ Pass rates obtained with the student-level data are lower than the rates obtained with Censo data. This in part is due to the way in which information at the student level is reported. In the student level data, a student's status at the end of the year can be passed, failed, or credits pending. Our understanding is that principals consider a student to have passed if only one credit is pending. If more than one credit is pending, they will be considered to have failed. Because student-level data does not report the number of credits pending, we cannot classify the students into passed, failed, or dropped out, as done in the Censo. As a result, students with credits pending were not considered to have passed their grade in our measure calculated with student-level data.

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Table 8. Impacts of Secondary School Strengthening on Pass Rates in 2010 (Percentages)

Characteristic	Treatment			Comparison			Difference	p-value
	Mean	Number of Schools	Number of Students	Mean	Number of Schools	Number of Students		
All Grades								
Passed grade in 2010	81	20	7,032	83	20	5,266	-2	0.55
10 th Grade								
Passed 10 th grade	78	20	3,400	80	20	2,287	-2	0.53
Passed 10 th grade (General)	75	18	1,533	78	19	893	-3	0.59
Passed 10 th grade (Technical)	77	16	1,867	81	15	1,394	-4	0.45
11 th Grade								
Passed 11 th grade	80	20	2,479	81	20	1,986	-1	0.73
Passed 11 th grade (General)	77	38	1,119	80	19	937	-3	0.59
Passed 11 th grade (Technical)	79	15	1,360	80	15	1,049	-1	0.74

Source: Student level data from the Office of Accreditation at MINED.

Note: Results are adjusted for students clustered within schools. No baseline characteristics are used because student level data at baseline are not available. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program).

Re-enrollment Rates. We also study the strengthening intervention's impact on re-enrollment on the sample of students who were enrolled in 2010 in the 40 schools in our evaluation in grades where re-enrollment the next school year was expected (this is, among students who originally enrolled in the 10th grade in a general program, 10th grade in a technical program, and 11th grade in a technical program). We found no statistically significant differences in re-enrollment between the students in schools in the treatment group and the students in comparison group schools (Table 9).

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Table 9. Impacts of Secondary School Strengthening on Re-enrollment Rates in 2011

Characteristic	Treatment			Comparison			Difference	p-value
	Mean	Number of Schools	Number of Students	Mean	Number of Schools	Number of Students		
All Grades								
Percent re-enrolled from 2010 to 2011	75	20	4,760	73	20	3,336	2	0.72
10 th Grade								
Percent re-enrolled following 10 th grade	73	20	3,400	70	20	2,287	3	0.62
Percent re-enrolled following 10 th grade (General)	75	18	1,533	78	19	893	-3	0.59
Percent re-enrolled following 10 th grade (Technical)	77	16	1,867	81	15	1,394	-4	0.45
11 th Grade								
Percent re-enrolled following 11 th grade (Technical)	79	16	1,360	80	15	1,049	-1	0.74

Source: Student level data from the Office of Accreditation at MINED.

Note: Results are adjusted for students clustered within schools. No baseline characteristics are used because student level data at baseline are not available. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program).

Additional Enrollment. Because Censo data were unavailable for 2011, we aggregated 2011 student-level enrollment data by school to calculate the impact of the strengthening intervention on total 2011 enrollment, in addition to 2011 enrollment in general and technical programs. We found that although technical school enrollment in 10th and 11th grade technical programs was higher among treatment schools, none of these differences were statistically significant (Table 10). As a result, we cannot conclude that the strengthening intervention affected 2011 enrollment rates in the 20 participating secondary schools.²¹

²¹ We should note that this outcome measures enrollment for all students enrolled in 2011 unlike the re-enrollment outcome presented above that focuses on a sub-sample of students enrolled in 2010.

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Table 10. Impacts of Secondary School Strengthening on Enrollment in 2011 (Number of Students)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
All Grades								
Total Enrollment 2011	291	314	20	272	277	20	19	0.64
Enrollment General 2011	105	151	20	96	78	20	9	0.59
Enrollment Technical 2011	182	227	20	176	237	20	6	0.87
10 th Grade								
Enrollment grade 10 general	56	78	20	56	48	20	0	0.97
Enrollment grade 10 technical	82	97	20	73	98	20	9	0.58
11 th Grade								
Enrollment grade 11 general	51	73	20	40	31	20	11	0.13
Enrollment grade 11 technical	54	68	20	54	73	20	0	0.98

Source: MINED's Office of Accreditation.

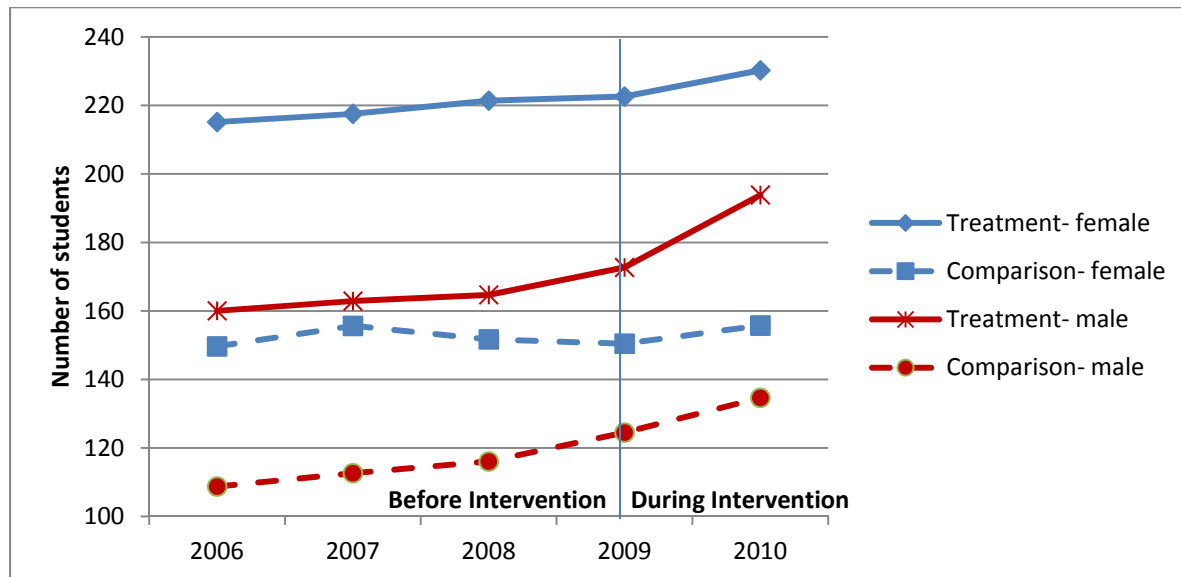
Note: Enrollment estimates were obtained by aggregating student-level data by school. Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted.

3. Gender Subgroup Analysis

MCC and FOMILENIO are interested in examining potential differences in impacts among male and female students. Therefore, we also conducted a subgroup gender analysis for the school level outcomes. In this section, we present the results for the main indicator, enrollment. We present results on secondary outcomes in the appendix. Figure 8 presents enrollment trends by gender. For all the years in which data is available, enrollment for females is higher than enrollment for males in both treatment and comparison groups. Despite some increase in male enrollment in 2009 and 2010, overall fewer male students were enrolled as compared to females. For both males and females, we find that enrollment is higher in the treatment group than in the comparison group. Although these differences are not statistically significant in baseline years, they are large in magnitude; therefore, our impact analysis will control for these initial differences. We will also examine differential gender impacts across grades and educational programs.

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Figure 8. Enrollment Trends by Gender



Source: Censo Matricular Inicial 2007, 2008, 2009, and 2010.

Enrollment Impacts for Females. Table 11 presents regression-adjusted impact estimates comparing female enrollment in treatment and comparison groups after adjusting for initial differences. For 2010, the only statistically significant difference at the 5 percent level between treatment and comparison groups is female enrollment in technical programs. We estimate that a treatment school has on average 16 more females enrolled in all grades of technical programs than a comparison school, after controlling for initial differences. This could be related to the fact that FOMILENIO's strengthening intervention focused on technical programs and to the availability of scholarships.

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Table 11. Impacts of Secondary School Strengthening on Female Enrollment (Number of Students)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
Total Enrollment 2010	166	234	20	156	156	20	11	0.21
Enrollment in General Program 2010	53	116	20	58	41	20	-5	0.51
Enrollment in Technical Programs 2010	113	143	20	97	126	20	16	0.05
Enrollment 10 th grade (General)	30	61	20	28	22	20	2	0.64
Enrollment 10 th grade (Technical)	48	55	20	39	47	20	9	0.09
Enrollment 11 th grade (General)	25	55	20	30	21	20	-5	0.18
Enrollment 11 th grade (Technical)	36	48	20	30	41	20	6	0.07

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted.

Enrollment Impacts for Males: Table 12 presents impact estimation results comparing enrollment among males in treatment and comparison groups after adjusting for initial differences. For 2010, we find two statistically significant differences at the 5 percent level between treatment and comparison groups. First, we estimate that a treatment school has on average 9 more males enrolled in 10th grade of technical programs than a comparison school, after controlling for initial differences. Second, male enrollment in 11th grade general programs is lower in treatment schools than in comparison schools by about 7 students. As these are the same effects we found for the whole sample, it appears that males are driving these impacts.

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Table 12. Impacts for Male Enrollment (Number of Students)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
Total Enrollment 2010	139	210	20	135	130	20	4	0.51
Enrollment in General Program 2010	55	117	20	59	42	20	-4	0.63
Enrollment in Technical Programs 2010	84	121	20	76	101	20	8	0.34
Enrollment 10 th grade (General)	35	70	20	30	22	20	5	0.46
Enrollment 10 th grade (Technical)	40	46	20	31	39	20	9	0.02
Enrollment 11 th grade (General)	21	48	20	28	22	20	-7	0.01
Enrollment 11 th grade (Technical)	24	45	20	23	32	20	1	0.69

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted.

H. SUMMARY

In summary, we find statistically significant positive effects of the secondary school strengthening intervention on 10th grade enrollment in technical programs in 2010. We estimate that on average, a treatment school enrolled 18 more 10th grade students in technical programs than a comparison school, controlling for initial differences. Therefore, we estimate that the 20 treatment schools had, in total, 360 more students enrolled in technical programs than comparison schools as a result of the intervention. This is reasonable, given that the intervention focused on technical improvements and scholarships were disproportionately offered to 10th grade technical students versus general students in schools that received improvements. Estimating impacts by gender, we find positive effects on male enrollment in 10th grade technical programs. For females, we find positive effects on female enrollment only when we examine enrollment in all grades of technical programs.

We also find negative and statistically significant effects of the strengthening intervention on 11th grade enrollment in general programs in 2010. We estimate that, on average, a treatment school enrolled 11 less 11th grade students in general programs than a comparison schools, controlling for initial differences. It seems that this effect is due to lower enrollment in 10th grade general programs in 2009 that carried over into 11th grade in 2010. However, the mechanism through which the program may have reduced enrollment in general programs is

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unclear. We find similar effects for males as for the full sample, but we do not find the same effects for females.

In addition, we find no impact of the strengthening intervention on other key outcomes of pass rates, dropout rates, test scores, or re-enrollment rates. In Table 13, we provide a summary of these findings.

Table 13. Summary of Impact Findings for the Secondary School Strengthening Intervention

Measure	Findings
Main Outcomes	
Enrollment	We find significant positive effects of the strengthening intervention on 10 th grade enrollment in technical programs in 2010. We also find negative and statistically significant effects on 11 th grade enrollment in general programs in 2010. We find similar results for males but not for females, hence males seem to be driving the effects.
Secondary Outcomes	
Pass Rates	With both data sources (school-level Censo data and student-level data from the Accreditation Office), we found no significant treatment-comparison differences in pass rates in 2010.
Dropout Rates	Using data from the Censo, we do not find statistically significant treatment-comparison differences in dropout rates in 2010.
PAES Scores	Using school-level data, we do not find statistically significant treatment-comparison differences in PAES test scores for Math, Science, or Social Studies in 2010. Effects of the strengthening intervention on Language scores are approaching statistical significance.
Re-enrollment	When using student-level data, we can define re-enrollment in 2011 as both progression and continuation in the same school. We found no significant treatment-comparison differences in re-enrollment in 2011 by grade or educational program.

I. NEXT STEPS

In July 2012, DIGESTYC verified the student level data from 2010, 2011, and 2012. The results from the analysis of these data are scheduled to be submitted to MCC in 2013. At the end of 2013, data collectors will complete the third follow-up survey, which will collect outcomes for students one year after they will have completed technical secondary school. Due in November

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2014, the final report for the technical secondary school evaluation will examine the impact of the intervention on labor market outcomes one year after secondary school completion.²²

²² The date of this final report is not yet final.

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APPENDIX A

Table A.1. Key Education Outcomes by Treatment and Comparison Groups

	Treatment			Comparison			Effect Size
	Mean	SD	N	Mean	SD	N	
Enrollment							
Total enrollment general in 2006	146	214.85	20	98.15	80.31	20	0.30
Total enrollment technical in 2006	229.2	240.43	20	160.25	204.49	20	0.31
Total enrollment in 2006	375.2	428.84	20	258.4	268.24	20	0.33
Total enrollment general in 2007	163.85	238.81	20	113.95	90.25	20	0.28
Total enrollment technical in 2007	216.6	236.26	20	154.35	208.44	20	0.28
Total enrollment in 2007	380.45	435.82	20	268.3	284.99	20	0.31
Total enrollment general in 2008	167	227.57	20	112.55	85.21	20	0.32
Total enrollment technical in 2008	219.1	245.37	20	156.45	212.88	20	0.27
Total enrollment in 2008	386.1	419.86	20	269	286.41	20	0.33
Total enrollment general in 2009	154.95	216.6	20	118.55	93.51	20	0.22
Total enrollment technical in 2009	240.35	256.07	20	156.4	209.27	20	0.36
Total enrollment in 2009	395.3	419.43	20	274.95	281.9	20	0.34
Total enrollment general in 2010	158.2	232.78	20	116.75	81.82	20	0.24
Total enrollment technical in 2010	265.9	260.99	20	173.65	224.95	20	0.38
Total enrollment in 2010	424.10	443.11	20	290.4	284.44	20	0.36
Pass Rates and Dropout (Percent)							
Pass grade in 2007	95	0.05	20	95	0.05	20	0.00
Pass grade in 2008	86	0.06	20	87	0.06	20	-0.17
Pass grade in 2009	88	0.07	14	89	0.07	12	-0.14
Pass grade in 2010	89	0.06	20	90	.06	20	-.021
Failed grade 2007	5	0.05	20	5	0.05	20	0.00
Failed grade 2008	5	0.04	20	2	0.02	20	0.95**
Failed grade in 2009	4	0.04	14	3	0.02	12	0.31
Failed grade in 2010	4	0.04	20	3	.02	20	0.56
Dropout in 2007	0	0.01	20	1	0.02	20	-0.63
Dropout in 2008	9	0.04	20	11	0.05	20	-0.44
Dropout in 2009	8	0.04	14	8	0.05	12	0.00
Dropout in 2010	7	0.04	20	8	.05	20	-0.13
Passed 10th grade in 2007	93	0.07	20	93	0.08	20	0.00
Passed 10th grade in 2008	79	.1	20	81	0.06	20	-0.24
Passed 10th grade in 2009	83	0.11	20	84	.09	20	-0.05
Passed 10th grade in 2010	84	0.09	20	85	.08	20	-0.12
Passed 11th grade in 2007	96	0.07	20	96	0.06	20	0.00
Passed 11th grade in 2008	91	0.06	20	91	0.07	20	0.00
Passed 11th grade in 2009	91	0.06	20	92	.07	20	-0.28
Passed 11th grade in 2010	92	0.04	20	92	.04	20	-0.08
Failed 10th grade in 2007	7	0.07	20	7	0.07	20	0.00
Failed 10th grade in 2008	7	0.07	20	2	0.02	20	0.97
Failed 10th grade in 2009	6	.06	20	4	.04	20	0.54
Failed 10th grade in 2010	6	.06	20	4	.03	20	0.48
Failed 11th grade in 2007	4	0.07	20	4	0.06	20	0.00
Failed 11th grade in 2008	3	0.03	20	1	0.02	20	0.78
Failed 11th grade in 2009	2	.03	20	2	.04	20	-0.11
Failed 11th grade in 2010	4	.04	20	2	.02	20	0.55
Dropout from 10th grade in 2007	1	0.02	17	1	0.03	17	0.00
Dropout from 10th grade in 2008	14	0.06	20	16	0.06	20	-0.33
Dropout from 10th grade in 2009	10	.06	20	12	.08	20	-0.32
Dropout from 10th grade in 2010	10	.06	20	11	.07	20	-0.20
Dropout from 11th grade in 2007	0	0.01	17	0	0.02	17	0.00
Dropout from 11th grade in 2008	6	0.06	20	8	0.06	20	-0.33
Dropout from 11th grade in 2009	7	.05	20	5	.04	20	0.45
Dropout from 11th grade in 2010	5	.04	20	6	.04	20	-0.35
Academic Achievement							
PAES Math 2006	5.13	0.64	20	5.21	0.89	20	-0.10
PAES Social Sc 2006	5.46	0.62	20	5.58	0.43	20	-0.23
PAES Language 2006	5.85	1.01	20	5.55	0.67	20	0.35
PAES Science 2006	5.25	0.58	20	5.25	0.55	20	0.00
PAES Global Score 2006	5.3	0.81	20	5.25	0.7	20	0.07

Table A.1 (continued)

	Treatment			Comparison			Effect Size
	Mean	SD	N	Mean	SD	N	
PAES Math 2007	5.57	1.21	20	5.2	0.84	20	0.36
PAES Social Sc 2007	6.01	0.39	20	6.26	0.63	20	-0.48
PAES Language 2007	5.82	0.4	20	5.71	0.48	20	0.25
PAES Science 2007	5.78	0.86	20	5.85	0.72	20	-0.09
PAES Global Score 2007	5.83	0.85	20	5.69	0.68	20	0.18
PAES Math 2008	6.2	1.14	20	5.92	0.95	20	0.27
PAES Social Sc 2008	6.33	0.53	20	6.22	0.51	20	0.21
PAES Language 2008	6.56	0.59	20	6.19	0.35	20	0.76**
PAES Science 2008	6.25	0.87	20	5.91	0.79	20	0.41
PAES Global Score 2008	6.38	0.85	20	6.01	0.71	20	0.47
PAES Math 2009	4.91	0.79	20	4.59	0.82	20	0.40
PAES Social Sc 2009	5.35	0.78	20	5.38	0.65	20	-0.04
PAES Language 2009	5.27	0.5	20	5.03	0.66	20	0.41
PAES Science 2009	4.74	0.86	20	4.6	0.72	20	0.18
PAES Global Score 2009	5.09	0.83	20	4.83	0.81	20	0.32
PAES Math 2010	4.80	.77	20	4.74	0.83	20	0.07
PAES Social Sc 2010	5.59	.64	20	5.57	0.53	20	0.03
PAES Language 2010	5.23	.66	20	4.86	0.47	20	0.66**
PAES Science 2010	5.04	.55	20	4.79	0.64	20	0.42
PAES Global Score 2010	5.07	.62	20	4.82	0.71	20	0.38
Enrollment by Subgroup							
Female enrollment general 2006	77.75	114.17	20	51.15	39.28	20	0.31
Male enrollment general 2006	68.25	101.26	20	47	41.49	20	0.28
Female enrollment technical 2006	137.4	138.93	20	98.5	127.86	20	0.29
Male enrollment technical 2006	91.8	103.4	20	61.75	80.02	20	0.33
Female enrollment 2006	215.15	239.36	20	149.65	159.75	20	0.32
Male enrollment 2006	160.05	190.46	20	108.75	109.93	20	0.33
Female enrollment general 2007	87.45	126.86	20	61.05	48.25	20	0.28
Male enrollment general 2007	76.4	112.44	20	52.9	42.93	20	0.28
Female enrollment technical 2007	130.1	133.56	20	94.6	126.75	20	0.27
Male enrollment technical 2007	86.5	104.08	20	59.75	84.32	20	0.28
Female enrollment 2007	217.55	239.3	20	155.65	167.47	20	0.30
Male enrollment 2007	162.9	197.43	20	112.65	119.2	20	0.31
Female enrollment general 2008	91	124.79	20	59.25	44.3	20	0.34
Male enrollment general 2008	76	103.84	20	53.3	43.45	20	0.29
Female enrollment technical 2008	130.4	137.3	20	93.3	126.05	20	0.28
Male enrollment technical 2008	88.7	109.59	20	63.15	88.74	20	0.26
Female enrollment 2008	221.4	230.15	20	151.7	164.16	20	0.35
Male enrollment 2008	164.7	191	20	116.05	122.71	20	0.30
Female enrollment general 2009	82.65	115.09	20	60.65	45.88	20	0.25
Male enrollment general 2009	72.3	102.15	20	57.9	48.97	20	0.18
Female enrollment technical 2009	139.95	138.79	20	89.8	118.31	20	0.39
Male enrollment technical 2009	100.4	119.53	20	66.6	93.55	20	0.32
Female enrollment 2009	222.6	224.29	20	150.45	154.6	20	0.38
Male enrollment 2009	172.7	197.12	20	124.5	128.68	20	0.29
Female enrollment general 2010	79.5	115.8	20	58.3	41.44	20	0.24
Male enrollment general 2010	78.7	117.33	20	58.45	42.25	20	0.23
Female enrollment technical 2010	150.75	142.61	20	97.45	125.48	20	0.40
Male enrollment technical 2010	115.15	121	20	76.20	100.53	20	0.35
Female enrollment 2010	230.25	234.46	20	155.75	155.51	20	0.37
Male enrollment 2010	193.85	210	20	134.65	129.90	20	0.34

Sources: Censo Matricular Inicial, Censo Matricular Final, and PAES test scores for school years 2006, 2007, 2008, and 2009.

Notes: ** Statistically significant different at the 0.05 level. Retention rates for continuation in school are given in percent units.

Gender Subgroup Analysis on Secondary Outcomes

Table A.2 presents impact estimation results comparing female pass rates and dropout in treatment and comparison groups after adjusting for initial differences. For 2010, we find a statistically significant difference at the 5 percent level between treatment and comparison groups' pass rates for females. We estimate that females in treatment schools have, on average, pass rates in 11th grade technical programs that are 4 percentage points lower than comparison schools. It is unclear why females would have lower pass rates in treatment schools. However, we should note that when we estimate the same impacts for males, we do not find significant treatment-comparison differences in pass rates for 11th grade technical programs.

Table A.2. Impacts of Secondary School Strengthening on Female Pass Rates and Dropout (Percentage)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
Passed grade in 2010	91	5	20	93	4	20	-2	0.22
Passed 10 th grade (General)	85	12	18	88	10	19	-3	0.44
Passed 10 th grade (Technical)	85	10	16	90	9	16	-5	0.17
Passed 11 th grade (General)	93	7	18	93	5	19	0	0.92
Passed 11 th grade (Technical)	93	5	16	97	3	16	-4	0.00
Dropped out of school in 2010	7	4	20	6	3	20	1	0.57
Dropped out of 10 th grade (General)	10	8	18	9	9	19	1	0.61
Dropped out of 10 th grade (Technical)	9	7	16	6	5	16	3	0.25
Dropped out of 11 th grade (General)	4	5	18	6	5	19	-2	0.28
Dropped out of 11 th grade (Technical)	4	5	16	2	3	16	2	0.10

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program).

Enrollment Impacts for Males: Table A.3 presents impact estimation results comparing male pass and dropout rates in treatment and comparison groups after adjusting for initial differences. For 2010, we find no statistically significant differences at the 5 percent level between treatment and comparison groups. We interpret this finding to mean that the strengthening intervention did not have an impact on males' pass and dropout rates.

Table A.3 Impacts on Male Grade Completion and Dropout (Percentage)

Characteristic	Treatment			Comparison			Adjusted Difference	p-value
	Adjusted Mean	SD	N	Mean	SD	N		
Passed grade in 2010	87	7	20	86	6	20	1	0.75
Passed 10 th grade (General)	81	16	18	77	16	19	4	0.48
Passed 10 th grade (Technical)	81	9	16	84	14	16	-3	0.46
Passed 11 th grade (General)	89	11	18	89	10	19	0	0.90
Passed 11 th grade (Technical)	90	8	16	89	11	16	1	0.83
Dropped out of school in 2010	9	5	20	11	5	20	-2	0.16
Dropped out of 10 th grade (General)	13	13	18	18	14	19	-5	0.26
Dropped out of 10 th grade (Technical)	12	6	16	10	11	16	2	0.42
Dropped out of 11 th grade (General)	6	8	18	8	8	19	-2	0.50
Dropped out of 11 th grade (Technical)	5	6	16	9	12	16	-4	0.24

Source: Censo Matricular Inicial 2006, 2007, 2008, and 2010.

Note: Treatment means are regression adjusted using ordinary least squares to account for the average enrollment across the baseline years (2006, 2007, and 2008). Comparison means are unadjusted. Note that not all schools offer both general and technical degree options so the sample sizes refer to the number of schools offering that option (or program).

Table A.4 Enrollment in General and Technical Programs in Treatment Schools from 2006 to 2011

School Name	General Degree Students, 2006	Technical Degree Students, 2006	Total Students, 2006	General Degree Students, 2007	Technical Degree Students, 2007	Total Students, 2007	General Degree Students, 2008	Technical Degree Students, 2008	Total Students, 2008	General Degree Students, 2009	Technical Degree Students, 2009	Total Students, 2009	General Degree Students, 2010	Technical Degree Students, 2010	Total Students, 2010	General Degree Students, 2011	Technical Degree Students, 2011	Total Students, 2011
Complejo Educativo Santiago de la Frontera	47	0	47	41	0	41	38	0	38	50	0	50	49	0	49	52	0	52
Instituto Nacional General Juan Orlando Zepeda	51	168	219	69	156	225	81	163	244	84	228	312	86	264	350	84	281	365
Instituto Nacional de San Ignacio	11	89	100	7	106	113	31	123	154	55	95	150	35	141	176	35	166	201
Instituto Nacional de Osicala	118	212	330	164	201	365	236	224	460	54	277	331	55	311	366	57	348	405
Instituto Nacional de Chapeltique	83	185	268	69	198	267	76	211	287	91	211	302	137	235	372	173	225	398
Instituto Nacional Benjamín Estrada Valiente	94	726	820	113	741	854	110	800	910	118	858	976	110	841	951	116	929	1045
Instituto Nacional de la Reina	30	108	138	32	112	144	43	107	150	51	78	129	66	69	135	68	79	147
Instituto Nacional de El Sauce	49	147	196	52	121	173	56	143	199	53	185	238	60	218	278	57	232	289
Instituto Nacional 14 de Julio de 1875	626	753	1379	664	830	1494	603	839	1442	607	888	1495	602	981	1583	489	151	640
Instituto Nacional de Aguilar	394	386	780	374	332	706	393	364	757	339	415	754	348	402	750	223	390	613
Instituto Nacional de Nueva Concepción	308	426	734	265	382	647	143	388	531	157	404	561	222	386	608	231	406	637
Instituto Nacional Anamoros	20	176	196	24	187	211	34	198	232	34	217	251	97	203	300	149	217	366
Instituto Nacional Doctor Francisco Martínez Suarez	776	669	1445	930	509	1439	909	460	1369	867	433	1300	951	500	1451	581	602	1183

Table A.4 (continued)

School Name	General Degree Students, 2006	Technical Degree Students, 2006	Total Students, 2006	General Degree Students, 2007	Technical Degree Students, 2007	Total Students, 2007	General Degree Students, 2008	Technical Degree Students, 2008	Total Students, 2008	General Degree Students, 2009	Technical Degree Students, 2009	Total Students, 2009	General Degree Students, 2010	Technical Degree Students, 2010	Total Students, 2010	General Degree Students, 2011	Technical Degree Students, 2011	Total Students, 2011
Complejo Educativo General Manuel Jose Arce	0	48	48	0	45	45	28	24	52	0	60	60	0	76	76	0	82	82
Instituto Nacional de Carolina	84	0	84	99	0	99	65	0	65	72	0	72	0	111	111	153	0	153
Instituto Nacional de la Palma	69	225	294	86	215	301	81	222	303	90	228	318	96	258	354	94	264	358
Instituto Nacional de Jutiapa	0	66	66	0	80	80	0	84	84	0	84	84	0	104	104	0	153	153
Complejo Educativo Sotero Lainez	53	0	53	59	0	59	70	0	70	118	0	118	85	0	85	65	0	65
Instituto Nacional de Sesori	36	200	236	150	117	267	252	32	284	188	146	334	99	218	317	33	252	285
Complejo Educativo Cantón El Tule	71	0	71	79	0	79	91	0	91	71	0	71	66	0	66	75	0	75
Total	2,920	4,584	7,504	3,277	4,332	7,609	3,340	4,382	7,722	3,099	4,807	7,906	3,164	5,318	8,482	2,735	4,777	7,512

Source: Data from 2006 through 2010 is from Censo Matricular, data from 2011 is from MINED's Office of Accreditation.

Table A.5 Enrollment in General and Technical Programs in Comparison Schools from 2006 to 2011

School Name	General Degree Students, 2006	Technical Degree Students, 2006	Total Students, 2006	General Degree Students, 2007	Technical Degree Students, 2007	Total Students, 2007	General Degree Students, 2008	Technical Degree Students, 2008	Total Students, 2008	General Degree Students, 2009	Technical Degree Students, 2009	Total Students, 2009	General Degree Students, 2010	Technical Degree Students, 2010	Total Students, 2010	General Degree Students, 2011	Technical Degree Students, 2011	Total Students, 2011
Instituto Nacional de Nueva Esparta	43	74	117	45	81	126	55	104	159	45	128	173	47	151	198	40	154	194
Instituto Católico San Pablo Apóstol	69	71	140	76	45	121	96	48	144	118	63	181	116	97	213	122	126	248
Instituto Nacional de Victoria	69	0	69	71	0	71	80	0	80	89	0	89	87	0	87	86	0	86
Instituto Nacional de Sensuntepeque	236	482	718	262	492	754	297	513	810	258	507	765	168	534	702	126	498	624
Instituto Nacional Profesor Francisco Ventura Zelaya	200	752	952	263	770	1033	253	787	1040	231	808	1039	234	855	1089	90	928	1018
Complejo Educativo Naciones Unidas	117	0	117	135	0	135	157	0	157	114	0	114	99	0	99	80	0	80
Instituto Nacional Segundo Montes	105	459	564	152	421	573	143	401	544	167	400	567	160	405	565	86	385	471
Instituto Nacional de San Simón	71	97	168	73	81	154	67	71	138	74	91	165	91	108	199	114	119	233
Instituto Nacional de El Paraíso	130	204	334	202	162	364	150	162	312	112	145	257	191	151	342	131	124	255
Complejo Educativo Florinda de Juárez Alemán	0	63	63	0	52	52	0	63	63	0	62	62	0	86	86	6	73	79
Instituto Nacional de Nombre de Jesús	101	49	150	106	40	146	115	47	162	139	56	195	126	54	180	83	44	127
Instituto Nacional de Perquín	122	88	210	156	94	250	117	97	214	95	113	208	115	117	232	79	110	189
Instituto Nacional de San Antonio Los Ranchos	56	38	94	57	27	84	81	7	88	108	0	108	130	0	130	141	0	141
Instituto Nacional de Ilobasco	319	432	751	305	450	755	303	467	770	399	389	788	322	504	826	390	548	938

Table A.5 (continued)

School Name	General Degree Students, 2006	Technical Degree Students, 2006	Total Students, 2006	General Degree Students, 2007	Technical Degree Students, 2007	Total Students, 2007	General Degree Students, 2008	Technical Degree Students, 2008	Total Students, 2008	General Degree Students, 2009	Technical Degree Students, 2009	Total Students, 2009	General Degree Students, 2010	Technical Degree Students, 2010	Total Students, 2010	General Degree Students, 2011	Technical Degree Students, 2011	Total Students, 2011
Instituto Nacional de Dulce Nombre de María	40	87	127	37	76	113	49	61	110	46	73	119	41	104	145	49	110	159
Complejo Educativo Caserio Las Americas Cantón la Bermuda	39	0	39	33	0	33	36	0	36	51	0	51	59	0	59	56	0	56
Instituto Nacional República de Italia	156	132	288	189	126	315	106	118	224	184	110	294	232	99	331	108	103	211
Instituto Nacional de Yamabal	22	51	73	24	44	68	42	54	96	50	41	91	45	34	79	65	46	111
Instituto Nacional de la Laguna	59	76	135	73	79	152	74	75	149	53	98	151	44	124	168	48	113	161
Instituto Nacional de Potónico	9	50	59	20	47	67	30	54	84	38	44	82	28	50	78	32	35	67
Total	1,963	3,205	5,168	2,279	3,087	5,366	2,251	3,129	5,380	2,371	3,128	5,499	2,335	3,473	5,808	1,932	3,516	5,448

Source: Data from 2006 through 2010 is from Censo Matricular, data from 2011 is from MINED's Office of Accreditation.

Table A.6 Enrollment in General and Technical Programs in Treatment Schools from 2010 Censo and from 2010 and 2011 Accreditation Data

School name	CENSO General degree students, 2010	CENSO Technical degree students, 2010	CENSO Total students, 2010	Accreditation General degree students, 2010	Accreditation Technical degree students, 2010	Accreditation Total students, 2010	Accreditation General degree students, 2011	Accreditation Technical degree students, 2011	Accreditation Total students, 2011
Complejo Educativo Santiago de la Frontera	49	0	49	49	0	49	52	0	52
Instituto Nacional General Juan Orlando Zepeda	86	264	350	87	271	358	84	281	365
Instituto Nacional de San Ignacio	35	141	176	35	141	176	35	166	201
Instituto Nacional de Osicala	55	311	366	54	308	362	57	348	405
Instituto Nacional de Chapeltique	137	235	372	140	237	377	173	225	398
Instituto Nacional Benjamín Estrada Valiente	110	841	951	114	874	988	116	929	1045
Instituto Nacional de la Reina	66	69	135	66	68	134	68	79	147
Instituto Nacional de El Sauce	60	218	278	60	221	281	57	232	289
Instituto Nacional 14 de Julio de 1875	602	981	1583	448	132	580	489	151	640
Instituto Nacional de Aguilares	348	402	750	261	398	659	223	390	613
Instituto Nacional de Nueva Concepción	222	386	608	218	385	603	231	406	637

Table A.6 (continued)

School name	CENSO General degree students, 2010	CENSO Technical degree students, 2010	CENSO Total students, 2010	Accreditation General degree students, 2010	Accreditation Technical degree students, 2010	Accreditation Total students, 2010	Accreditation General degree students, 2011	Accreditation Technical degree students, 2011	Accreditation Total students, 2011
Instituto Nacional Anamoros	97	203	300	97	209	306	149	217	366
Instituto Nacional Doctor Francisco Martinez Suarez	951	500	1451	634	478	1112	581	602	1183
Complejo Educativo General Manuel Jose Arce	0	76	76	0	76	76	0	82	82
Instituto Nacional de Carolina	0	111	111	113	0	113	153	0	153
Instituto Nacional de la Palma	96	258	354	97	259	356	94	264	358
Instituto Nacional de Jutiapa	0	104	104	0	106	106	0	153	153
Complejo Educativo Sotero Lainez	85	0	85	66	0	66	65	0	65
Instituto Nacional de Sesori	99	218	317	47	219	266	33	252	285
Complejo Educativo Cantón El Tule	66	0	66	66	0	66	75	0	75
TOTAL	3,164	5,318	8,482	2,652	4,382	7,034	2,735	4,777	7,512

Source: Data from 2010 is from Censo Matricular and data from 2010 and 2011 is from MINED's Office of Accreditation

Table A.7 Enrollment in General and Technical Programs in Comparison Schools from 2010 Censo and from 2010 and 2011 Accreditation Data

School name	CENSO General degree students, 2010	CENSO Technical degree students, 2010	CENSO Total students, 2010	General degree students, 2010	Technical degree students, 2010	Total students, 2010	General degree students, 2011	Technical degree students, 2011	Total students, 2011
Instituto Nacional de Nueva Esparta	47	151	198	48	151	199	40	154	194
Instituto Católico San Pablo Apóstol	116	97	213	111	95	206	122	126	248
Instituto Nacional de Victoria	87	0	87	89	0	89	86	0	86
Instituto Nacional de Sensuntepeque	168	534	702	179	495	674	126	498	624
Instituto Nacional Profesor Francisco Ventura Zelaya	234	855	1089	100	873	973	90	928	1018
Complejo Educativo Naciones Unidas	99	0	99	76	0	76	80	0	80
Instituto Nacional Segundo Montes	160	405	565	90	405	495	86	385	471
Instituto Nacional de San Simón	91	108	199	91	108	199	114	119	233
Instituto Nacional de El Paraíso	191	151	342	111	143	254	131	124	255
Complejo Educativo Florinda de Juárez Alemán	0	86	86	0	85	85	6	73	79
Instituto Nacional de Nombre de Jesús	126	54	180	73	53	126	83	44	127
Instituto Nacional de Perquín	115	117	232	70	118	188	79	110	189
Instituto Nacional de San Antonio Los Ranchos	130	0	130	130	0	130	141	0	141
Instituto Nacional de Ilobasco	322	504	826	325	509	834	390	548	938
Instituto Nacional de Dulce Nombre de María	41	104	145	40	100	140	49	110	159
Complejo Educativo Caserio Las Americas Cantón la Bermuda	59	0	59	59	0	59	56	0	56
Instituto Nacional República de Italia	232	99	331	123	94	217	108	103	211
Instituto Nacional de	45	34	79	45	34	79	65	46	111

Table A.7 (continued)

School name	CENSO General degree students, 2010	CENSO Technical degree students, 2010	CENSO Total students, 2010	General degree students, 2010	Technical degree students, 2010	Total students, 2010	General degree students, 2011	Technical degree students, 2011	Total students, 2011
Yamabal									
Instituto Nacional de la Laguna	44	124	168	43	123	166	48	113	161
Instituto Nacional de Potónico	28	50	78	26	49	75	32	35	67
TOTAL	2,335	3,473	5,808	1,829	3,435	5,264	1,932	3,516	5,448

Source: Data from 2010 is from Censo Matricular, and data from 2010 and 2011 is from MINED's Office of Accreditation

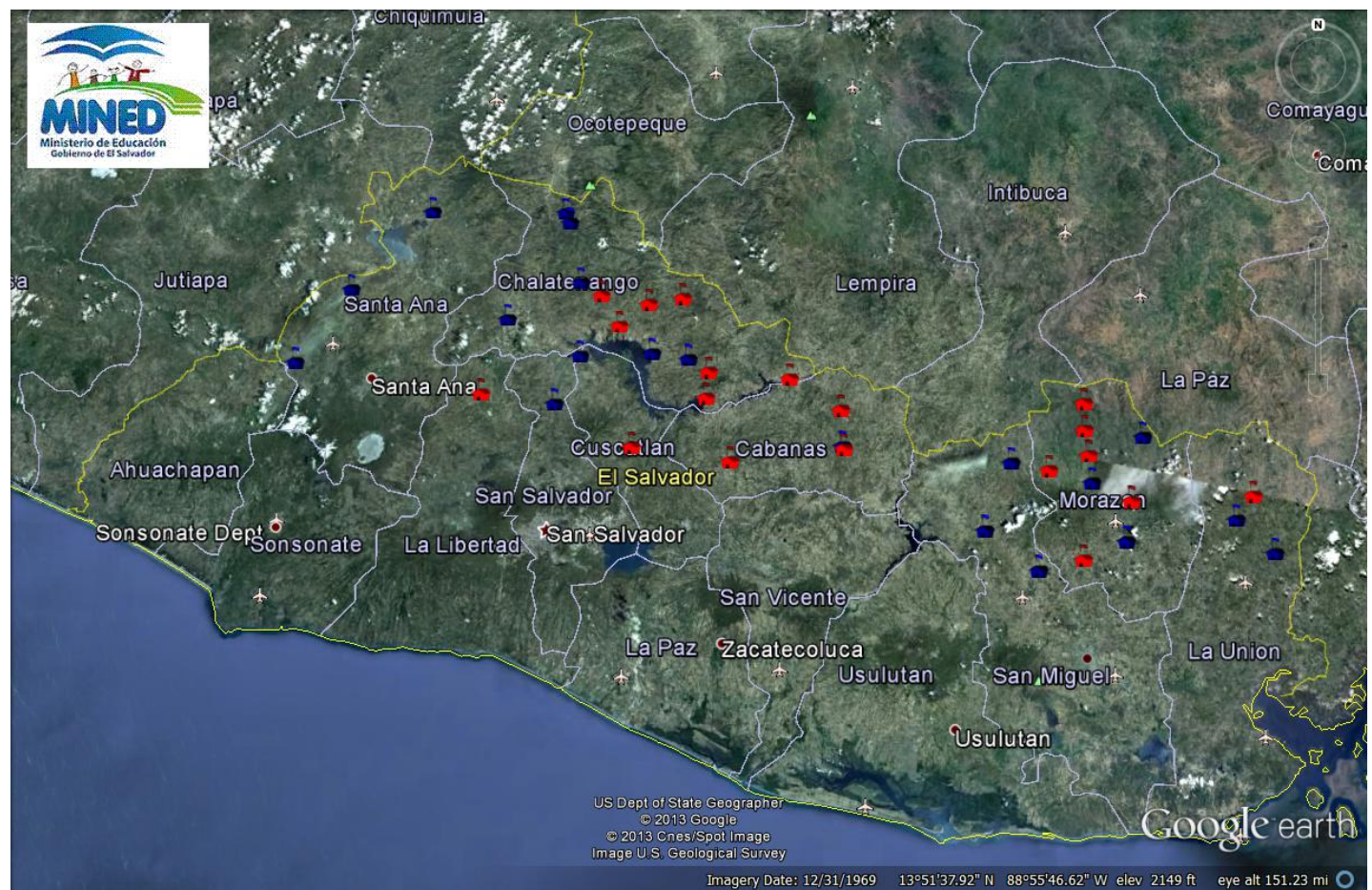
Table A.8 Key Additional Infrastructure Built by FOMILENIO per School

School Name	Classroom	Laboratory	Computer	Library
Instituto Nacional de Jutiapa	0	0	0	0
Instituto Nacional Benjamín Estrada Valiente	0	2	0	0
Complejo Educativo Santiago de la Frontera	0	1	0	0
Instituto Nacional Doctor Francisco Martínez Suárez	0	0	0	0
Instituto Nacional General Juan Orlando Zepeda	3	1	1	0
Instituto Nacional de La Palma	2	0	0	1
Instituto Nacional de la Reina	0	1	0	0
Instituto Nacional de Nueva Concepción	3	0	1	1
Instituto Nacional de San Ignacio	4	1	1	0
Instituto Nacional de Aguilares	4	2	1	0
Complejo Educativo Cantón El Tule	1	1	0	0
Complejo Educativo Sotero Laínez	2	1	0	0
Instituto Nacional de Carolina	1	1	1	0
Instituto Nacional de Sesori	1	0	1	0
Complejo Educativo General Manuel José Arce	3	0	0	0
Instituto Nacional 14 de Julio de 1875	0	0	0	0
Instituto Nacional de El Sauce	6	1	1	0
Instituto Nacional de Osicala	4	1	0	0
Instituto Nacional Anamorós	2	2	0	1
Instituto Nacional de Chapeltique	3	0	1	0
TOTAL	39	15	8	3

Source: CIDE reports

Note: The list is not a complete description of the infrastructure projects implemented.

Figure A.1 Location of Treatment Schools (Blue) and Comparison Schools (Red)



Source: MINED Geo-Referenced Information System