MEMORANDUM

TO: Rebecca Tunstall

FROM: Larissa Campuzano and Alexander Persaud   **DATE:** 3/11/2011
                                                         ESVED-268

SUBJECT: Baseline Comparison of Administrative Data for the Middle
             School Strengthening Program

Executive Summary

This memo presents the baseline analyses of administrative data for the impact evaluation of the MCC-funded middle school strengthening activity in El Salvador. This memo complements our previous memo ESVED-231 (submitted March 31, 2010), in which we presented a student-level analysis of data from the 2009 Student Follow-up Survey (*Encuesta de Seguimiento de Estudiantes*). In this memo, we analyze school-level data from the Ministry of Education's initial and final enrollment censuses (*Censos de Matrícula Inicial y Final*) for the 2006, 2007, 2008, and 2009 school years. For key measures of enrollment, grade completion, continuation in school, and academic achievement, we find that the 20 schools selected for the middle school strengthening activity do not present statistically significant differences from the 20 schools in the comparison group. However, some differences between beneficiary schools and comparison schools are large in magnitude. Accordingly, our analysis of follow-up data will control for these differences.

A.   Background

Under the Formal Technical Education Sub-Activity of the Human Development project, MCC is funding efforts to strengthen 20 selected general and technical middle schools in key municipalities in the Northern Zone (hereafter referred to as the "strengthening activity"). Implemented by the Fondo del Milenio (FOMILENIO), this support includes improving the array of degree granting and non-degree granting vocational training and skills courses for youths; training teachers in the use of advanced instructional technologies; linking formal education with private sector needs; making capital improvements (including new or refurbished laboratories and workshops); and purchasing needed equipment. Over 9,000 students are expected to benefit from these activities, which will be implemented from 2009 to 2012. The intervention will benefit students from both the general and technical specializations offered by the middle school. These actions are intended to improve enrollment, continuation, and graduation rates in participating middle schools. The final goal of the intervention is to improve the incomes and employment opportunities of youths in the Northern Zone.

MCC has contracted Mathematica Policy Research to design and conduct the impact evaluation of the middle school strengthening activity. The objective of the evaluation is to answer the following research question: What is the impact of strengthening 20 technical middle schools on students' educational and labor market outcomes? Based on extensive consultations with MCC, FOMILENIO, and El Salvador's Ministry of Education (MINED), we chose a

matched comparison design as the final evaluation design for the strengthening activity. This is a quasi-experimental design in which the 20 middle schools selected for the intervention (or "treatment schools") were matched to 20 schools with similar demographic characteristics (or "comparison schools"). The impact of the middle school strengthening activity is defined as the difference in the outcomes of students who attended treatment schools versus the outcomes of students who attended comparison schools. In this memorandum, we use administrative data to verify that the 20 middle schools selected for the intervention are statistically similar to the 20 middle schools in the comparison group. This treatment-comparison equivalence is required of a rigorous impact evaluation.

B. Study Sample

Middle school education in El Salvador is equivalent to high school education in the US. To enter middle schools, students must have completed nine years of elementary education. Middle schools in El Salvador offer two types of degree programs: general (*bachillerato general*) and technical or vocational (*bachillerato técnico*). The *Bachillerato general* program starts in 10th grade and ends in 11th grade, and students graduate with a degree of *bachiller.* The *Bachillerato técnico* program starts in 10th grade and ends in 12th grade, and students graduate with the degree of *bachiller técnico*. In 2008 and 2009, technical middle schools could offer the following 17 specialties: (1) *Comercial Secretariado*, (2) *Comercial Contaduría*, (3) *Comercial Asistencia Administrativa*, (4) *Comercial Asistencia Contable*, (5) *Mecánica General*, (6) *Mecánica Automotriz*, (7) *Electrónica*, (8) *Electrotecnia*, (9) *Electromecánica*, (10) *Arquitectura*, (11) *Agrícola*, (12) *Salud*, (13) *Sistemas Informáticos*, (14) *Diseño Gráfico*, (15) *Logística de Aduanas*, (16) *Aeronáutica*, and (17) *Hotelería*.[1]

In 2008, MINED and FOMILENIO identified 75 middle schools in the Northern Zone that were eligible to receive the middle school intervention. FOMILENIO contracted the Consortium for International Development in Education (CIDE) to develop the criteria on which 20 of the 75 middle schools would be selected for the intervention. Once FOMILENIO, MINED, and CIDE agreed on the final criteria, CIDE constructed a ranking score for each of the 75 eligible schools. A high ranking score reflects that a school demonstrated a high level of need according to the selection criteria, while a low score reflects that a school demonstrated a low level of need. Once FOMILENIO selected the 20 middle schools that would receive the intervention, Mathematica used propensity score matching to identify a comparison group of 20 schools among the 55 schools not selected for the intervention. These 20 schools had characteristics that were most similar to those of the intervention group based on 2006 and 2007 data. The goal of this memo is

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[1] The technical programs offered in 2008 and 2009 slightly differ from the programs offered in 2006 and 2007. *Diseño Gráfico*, *Logística de Aduanas*, and *Aeronáutica* were not offered in 2007 and 2006; and *Hotelería y Turismo* was offered in 2006 and 2007, but not in 2008 and 2009.

to assess how similar these two groups are on school-level characteristics for the 2008 and 2009 academic years, and to look at changes in these characteristics over time.

In El Salvador, two types of educational institutions can offer middle school education: those that offer the two or three years of middle school education—called *Institutos Nacionales*—and those that offer all levels of education, from pre-school to middle school—called *Centros Educativos*.[2] Table 1 presents basic information on the schools included in the evaluation. Twenty schools were selected for the intervention group and twenty were selected for the comparison group. Four schools in the intervention group are *Complejos Educativos*, which cover all educational levels, and sixteen schools are *Institutos Nacionales,* which mostly cover middle school education. Similarly, three schools in the comparison group are *Complejos Educativos* and seventeen schools are *Institutos Nacionales*. Four schools in the intervention group offer only general degrees, one offers only technical degrees, and fifteen offer both general and technical degrees. Similarly, three schools in the intervention group offer only general degrees, one offers only technical degrees, and sixteen offer both degree types. In both intervention and comparison groups, the most common programs offered in the technical middle schools are *Comercial Secretariado* and *Comercial Contaduría*.

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[2] We should note that a few *Institutos Nacionales* also offer 7th, 8th, and 9th grades.

Table 1. Basic Information on the Study Sample of Middle Schools

No.	School Name	Treatment	General	Technical	Technical programs
1	Instituto Nacional de Jutiapa	Yes	No	Yes	Comercial Contaduria
2	Instituto Nacional Benjamin Estrada Valiente	Yes	Yes	Yes	Comercial Contaduria Comercial Asistencia Administrativa Comercial Asistencia Contable Mecánica General Electrotecnia
3	Complejo Educativo Santiago de la Frontera	Yes	Yes	No	NA
4	Instituto Nacional Doctor Francisco Martínez Suárez	Yes	Yes	Yes	Comercial Asistencia Administrativa Comercial Asistencia Contable Agrícola
5	Instituto Nacional General Juan Orlando Zepeda	Yes	Yes	Yes	Comercial Contaduria Salud
6	Instituto Nacional de la Palma	Yes	Yes	Yes	Comercial Contaduria
7	Instituto Nacional de la Reina	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
8	Instituto Nacional de Nueva Concepción	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
9	Instituto Nacional de San Ignacio	Yes	Yes	Yes	Comercial Contaduria
10	Instituto Nacional de Aguilares	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
	Instituto Nacional de la Palma	Yes	Yes	Yes	Comercial Contaduria
11	Complejo Educativo Canton El Tule	Yes	Yes	No	NA
12	Complejo Educativo Sotero Lainez	Yes	Yes	No	NA
13	Instituto Nacional de Carolina	Yes	Yes	No	NA
14	Instituto Nacional de Sesori	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
15	Complejo Educativo General Manuel Jose Arce	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
16	Instituto Nacional 14 de Julio de 1875	Yes	Yes	Yes	Comercial Asistencia Administrativa Comercial Asistencia Contable Mecánica Automotriz Agrícola Logística de Aduanas
17	Instituto Nacional de El Sauce	Yes Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
18	Instituto Nacional de Osicala	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
19	Instituto Nacional Anamoros	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
20	Instituto Nacional de Chapeltique	Yes	Yes	Yes	Comercial Secretariado Comercial Contaduria
21	Instituto Nacional de Yamabal	No No	Yes	Yes	Comercial Secretariado Comercial Contaduria

No.	School Name	Treatment	General	Technical	Technical programs
22	Instituto Nacional de Dulce Nombre de María	No	Yes	Yes	Comercial Contaduria
23	Instituto Nacional de El Paraíso	No	Yes	Yes	Comercial Contaduria
24	Instituto Nacional de San Antonio Los Ranchos	No	Yes	Yes	Comercial Contaduria
25	Complejo Educativo Caserio Las Americas Canton La Bermuda	No	Yes	No	NA
26	Instituto Nacional Republica de Italia	No	Yes	Yes	Comercial Contaduria
27	Instituto Católico San Pablo Apóstol	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
28	Instituto Nacional de Ilobasco	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
29	Instituto Nacional de Sensuntepeque	No	Yes	Yes	Comercial Contaduria Comercial Asistencia Administrativa Comercial Asistencia Contable Electrónica Electrotecnia
30	Instituto Nacional de Victoria	No	Yes	No	NA
31	Complejo Educativo Naciones Unidas	No	Yes	No	NA
32	Complejo Educativo Florinda de Juarez Aleman	No	No	Yes	Comercial Contaduria
33	Instituto Nacional Segundo Montes	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
34	Instituto Nacional de San Simón	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
35	Instituto Nacional Profesor Francisco Ventura Zelaya	No	Yes	Yes	Comercial Asistencia Administrativa Comercial Asistencia Contable Logística de Aduanas
36	Instituto Nacional de Nombre de Jesús	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
37	Instituto Nacional de Nueva Esparta	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
38	Instituto Nacional de Potónico	No	Yes	Yes	Comercial Contaduria
39	Instituto Nacional de La Laguna	No	Yes	Yes	Comercial Secretariado Comercial Contaduria
40	Instituto Nacional de Perquín	No	Yes	Yes	Comercial Secretariado Comercial Contaduria

MINED collects data on middle schools at the beginning of the school year with the *Censo de Matrícula Inicial*, and at the end of the year with the *Censo de Matrícula Final*. In addition, each year MINED administers an achievement test, the *Prueba de Aptitudes para Egresados de Educacion Media* (PAES), to all middle school students attending 11th grade. The baseline analysis presented in this memo is based on administrative data from these three data sources.

FOMILENIO's middle school intervention was scheduled to begin in 2009, but most of the activities completed during 2009 pertained to planning the intervention. As such, 2010 was the first year in which most improvements were implemented in the 20 selected middle schools.

Therefore, all the years before 2010 are considered the baseline period.[3] MINED provided us with school-level data for the 2006, 2007, 2008, and 2009 academic years, so our analysis covers these four baseline years.

Although the intervention is targeted at the school level, the goal is to improve outcomes at the student level. Therefore, the impact evaluation will use student-level data to construct outcome indicators. A limitation of the data from the *Censos Matricular Inicial* and *Final* is that this information is only available at the school level. As a result, baseline data for this evaluation will only be available at the school level.[4] Our statistical analysis will account for the fact that post-intervention data will be at the student level, but baseline data on enrollment, grade completion and other key outcomes is at the school level.

The key outcome indicators that we will build from administrative data are calculated as follows:

1. **Enrollment:** In the *Censo Matricular Inicial*, each school provides the number of students enrolled in each grade, disaggregated by gender. Based on these variables, we calculated the number of females enrolled in middle school grades, the number of males enrolled in middle school grades, the total number of students enrolled in middle school grades, the number of students enrolled in general degree programs, and the number of students enrolled in technical degree programs.

2. **Grade completion:** In the *Censo Matricular Final*, schools report the number of students that passed each grade, did not pass, or dropped out. However, this information is only available by grade for 2007 and 2008; it is not available for 2006 and is available only at the school level for 2009. Accordingly, we used the grade-level information available in 2007 and 2008 to construct grade completion rates. For each grade level in which data are available, the grade completion rate is calculated as the ratio of the number of students that passed each grade divided by the sum of the number of students that passed, the number of students that did not pass, and the number of students that dropped out. Similarly, the dropout rate is calculated as the

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[3] Our initial design did not include 2009 as a baseline year because we were concerned that part of the intervention was implemented in this year. However, our conversations with staff from FOMILENIO and MCC indicated that although some planning occurred in 2009, the students in these schools were not affected by those changes. Consequently, we include 2009 data in the baseline analysis.

[4] In our initial design, we proposed using student-level data for 2008 and 2009. However, data for these years are not available at the student level. Alternately, we will use school-level data.

number of students who dropped out in each grade divided by the sum of those that passed, those that did not pass, and those that dropped out.[5]

3. **Continuation in school:** This variable will ideally rely on student-level data, in which we could assess if a previously registered student registers in the following grade during the subsequent academic year. Since student-level data are not available, we will estimate continuation in school with what we call retention rates at the school level. These retention rates are calculated by dividing the number of students registered in grade X in a year by the number of students registered in grade X+1 in the following year. For example, the 2007 retention rate from 10th grade to 11th grade is the number of students registered in 10th grade in 2006, divided by the number of students registered in the 11th grade in 2007.

4. **Academic achievement:** To measure academic achievement, we will use scores from the PAES, which middle school students take during the 11th grade. This test includes sub-tests in language, mathematics, science, and social sciences. We will use schools' average scores for these sub-tests as well as the PAES global score for each school reported by MINED.

D. Findings

We start this section by summarizing our analysis to assess baseline equivalence between the treatment and comparison groups. Next, we briefly describe the findings. Then we discuss the key educational outcomes in both the treatment and comparison groups by domain of interest (enrollment, grade completion, continuation in school, and academic achievement) and describe the changes that occurred over the baseline period: the 2006, 2007, 2008, and 2009 school years.

Baseline equivalence. We should remember that in this evaluation, the comparison group is intended to represent what would have happened to the treatment group in absence of middle school strengthening activities. Therefore, our goal in this analysis is to provide evidence that the treatment and comparison groups were similar at baseline. In order to assess these similarities, we first conducted t-tests to assess statistically significant differences between the groups. Table 2, which appears at the end of this document, presents means, standard deviations, and sample sizes by treatment and comparison groups for the outcome variables we analyzed. In general, we

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[5] We also explored the option of defining grade completion rates by dividing the number of students that passed the grade, as reported in the *Censo Final*, by the total number of students registered in that grade, as reported in the *Censo Inicial*. When we calculated rates combining data from the *Censo Final* with data from the *Censo Inicial*, we frequently got rates of more than 100 percent. This could be due to students transferring into the schools at some point during the school year. Student-level data for the follow-up years will allow us to construct these rates more accurately.

found no statistical differences between treatment and comparison groups at the 5 percent level.[6] However, some treatment-comparison differences are large in magnitude.

To give a common magnitude measure across these differences, Table 2 presents effect sizes for each variable. Effect sizes are calculated as the difference in means divided by the pooled standard deviation of the variable of interest. Current systematic reviews of educational interventions use effect size measures (as opposed to tests of statistical significance) as the primary criterion for establishing baseline equivalence.[7] However, these guidelines are based on effect sizes calculated at the student level. Because our analysis uses school-level data, we do not follow this convention. Nevertheless, we do attempt to identify treatment-comparison differences that are large in magnitude.

Enrollment. In Figure 1, we find that differences in enrollment between the treatment and comparison groups are generally consistent throughout the four baseline years. For both general and technical degree programs, middle schools in the treatment group enroll more students than middle schools in the comparison group. There are between 60 and 80 more students enrolled in treatment schools than in comparison schools during the baseline years. However, none of these differences is statistically significant (Table 2). We also find that for both treatment and comparison groups, approximately 40 to 80 more students enroll in the technical degree program than in the general degree program across the baseline years. When comparing changes over time, we do not find high variation in enrollment rates across years in either group. For example, average enrollment in technical programs for the treatment group was within 220 and 240 students across the four baseline years, while average enrollment in the comparison group stayed at around 160 students in all four years. For general degree programs, the treatment group had enrollment between approximately 150 and 170 students across the four baseline years, while enrollment in the comparison group stayed between 100 and 120 students. Interestingly in Figure 2, we find that for both treatment and comparison groups, enrollment rates for females are higher than for males across all years. In the treatment group, we find that approximately 60 more females were enrolled than males, and this difference reduced to approximately 50 in 2009. In

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[6] We only found statistically significant differences in two variables, PAES language score in 2008 and the percent of students not passing grade at the school in 2008.

[7] WWC Procedures and Standards Handbook, Version 2.0, December 2008. http://ies.ed.gov/ncee/wwc/help/idocviewer/doc.aspx?docId=19&tocId=4. A common rule of thumb based on Cochran and Rubin (1973) and Cochran (1968) is to consider treatment and control/comparison groups balanced when the difference measured in effect size is smaller than 25.

the comparison group, approximately 40 more females were enrolled than males, and this difference reduced to approximately 25 in 2009.
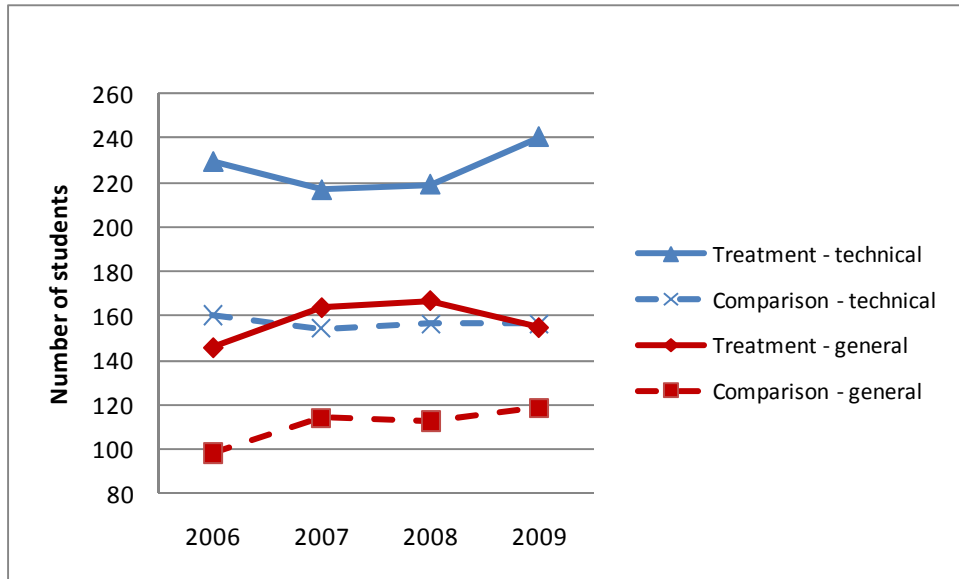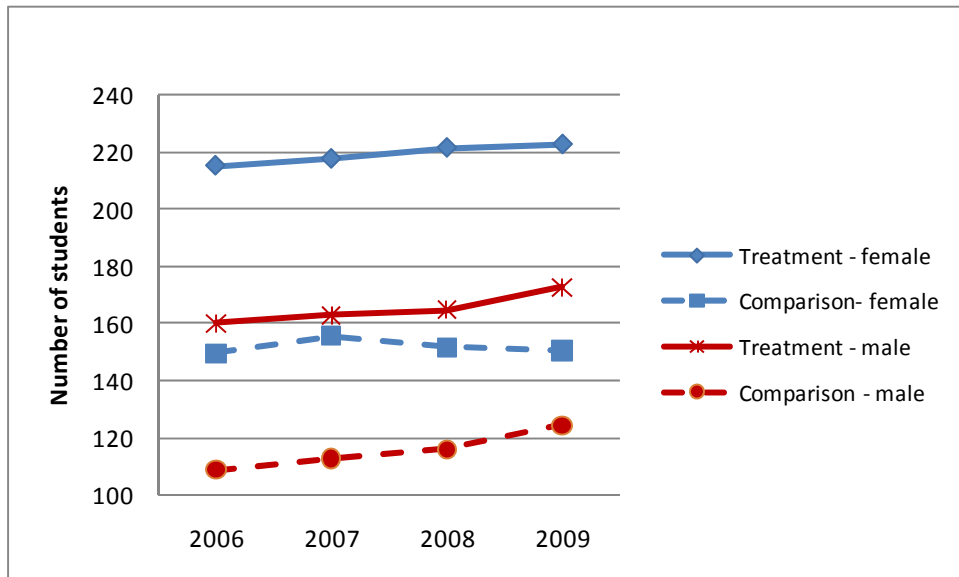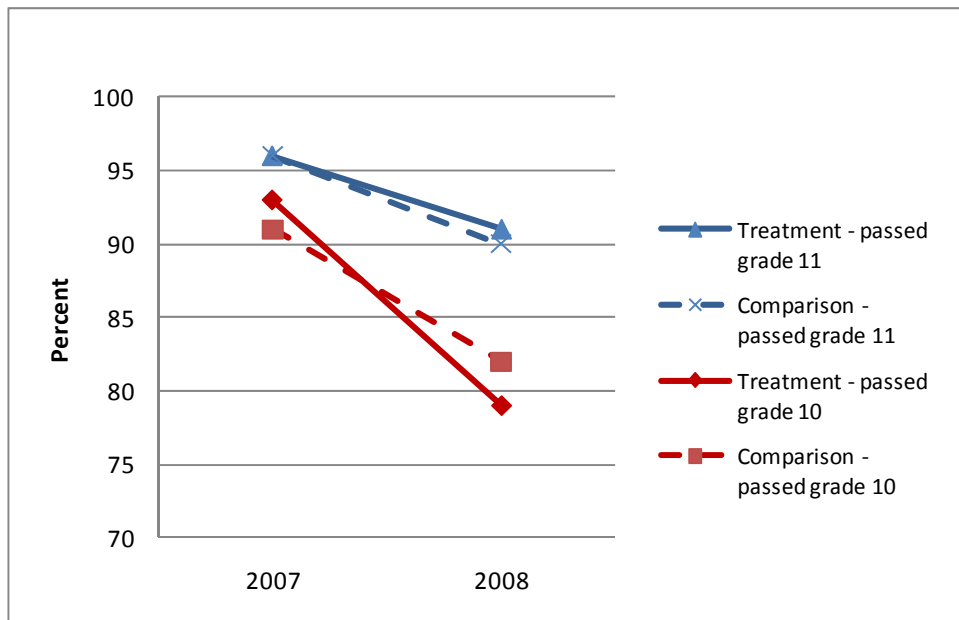
Figure 1
Enrollment by Degree Program

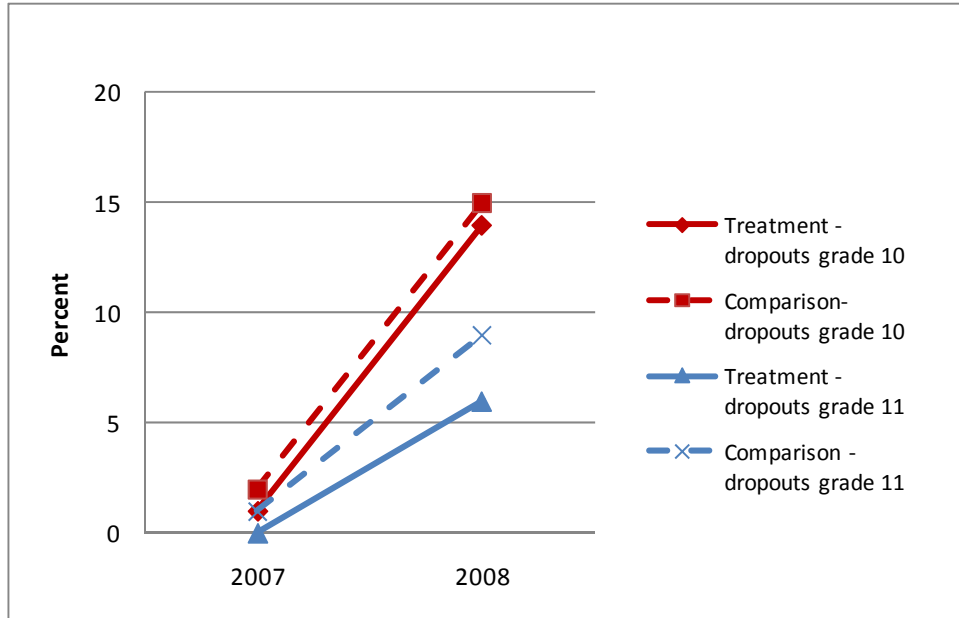**Figure 2**
Enrollment by Gender

Grade Completion. In Figure 3, we see that completion rates for the 11th grade are similar between treatment and comparison groups. Both groups have completion rates slightly above 95 percent in 2007, and this rate decreased to 90 percent in 2008. Similarly, completion rates for the 10th grade in 2007 were are slightly above 90 percent for both groups, but decreased to around 80 percent for both groups in 2008. We should note that completion rates for 10th grade are about 7 percentage points lower than completion rates for 11th grade. Therefore, it is important to analyze these grades separately. This evidence, corroborated by our conversations with middle school principals, suggests that students in the first year of middle school are more prone to negative educational outcomes than students in subsequent grades. The students that continue to the second or third year of middle school are a selected population (in terms of aptitude, motivation and/or resources), and hence are less likely to abandon their studies or fail a grade. Further evidence of this positive selection appears in Figure 4, which presents dropout rates for 2007 and 2008. While treatment and comparison groups have similar dropout rates, dropout rates for 2008 in both groups increased from 2007, but they increased more for the 10th grade. While we cannot offer an explanation of why dropout rates increased from 2007 to 2008, the result is that in 2008, students in 10th grade had a higher dropout risk than students who continued to 11th grade.

Figure 3
Completion Rates, by Grade

Figure 4
Dropout Rates, by Grade

Continuation in School. Figure 5 presents the school retention rates from 10th grade to 11th grade by general and technical degree programs. In schools offering general degrees, some differences between the treatment and comparison groups exist, especially in 2007. However, these differences are not statistically significant (Table 2). Treatment and comparison groups also have different patterns of change regarding continuation rates. While the rates for the treatment group offering general degrees started over 100 percent in 2007, they decreased to 85 percent in 2008, and then increased to 95 percent in 2009. In contrast, the rates for the comparison group steadily increased from 80 to almost 90 percent across these years. For schools offering technical degrees, fewer differences are found between the treatment and comparison groups. However, the trend across years is not consistent. From 2007 to 2008, rates slightly decreased for the treatment group and slightly increased for the comparison group. In contrast, from 2008 to 2009 both groups' rates increased to around 75 percent. We should also note that students in technical programs are less likely to continue studying than students in general programs. It will be interesting to determine if FOMILENIO's middle school program has an effect on reducing this difference.[8]

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[8] FOMILENIO also offers a scholarship program that targets students in technical degree programs. This program could also have a positive effect on reducing the difference in retention rates of technical versus general programs.

Figure 6 presents grade retention rates for technical middle schools by grade. In general, treatment and comparison schools have similar retention rates. However, there is a difference between grades among both treatment and comparison schools. Students in 10th grade are less likely to stay in school than students in 11th grade. In 2008 and 2009, retention rates from 11th and 12th grades are slightly higher than 100 percent. We hypothesize that this is due to a small number of students transferring into these schools during the last grade of the program. Our analysis of post-intervention data at the student level will shed light on this issue. In contrast, retention rates from 10th and 11th grades are between 65 and 75 percent across all baseline years. These findings are further evidence that the first year of middle school is when students are most at risk of abandoning their studies.

Figure 5
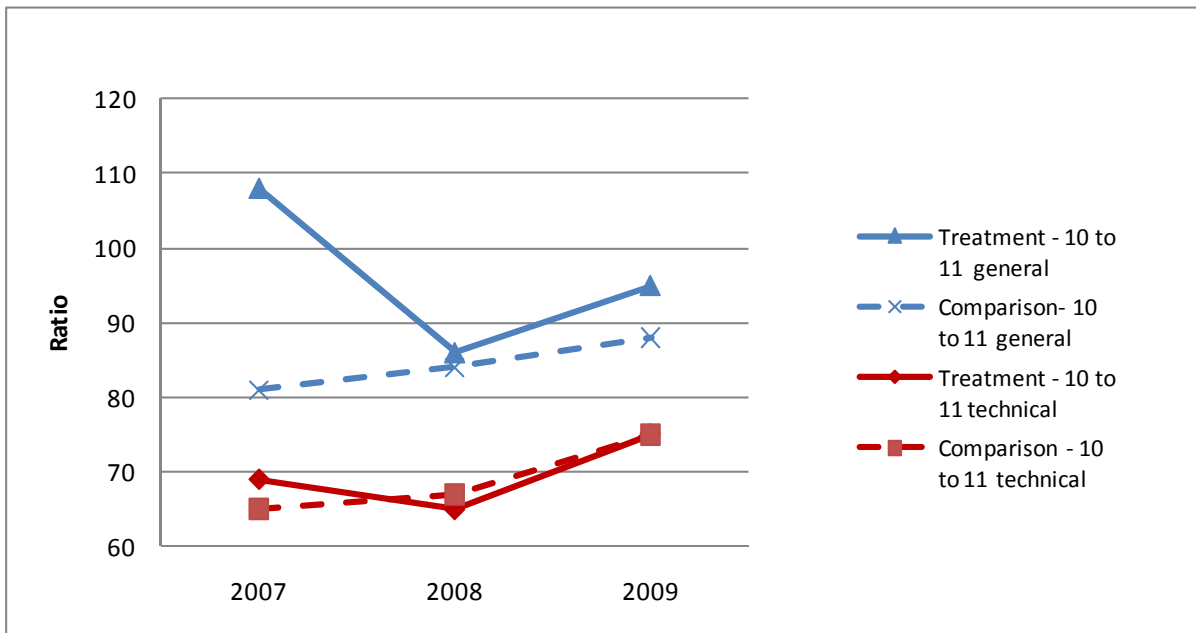**Retention from 10th Grade to 11th Grade, by Degree Program**

Figure 6
Retention in Technical Middle Schools, by Grade
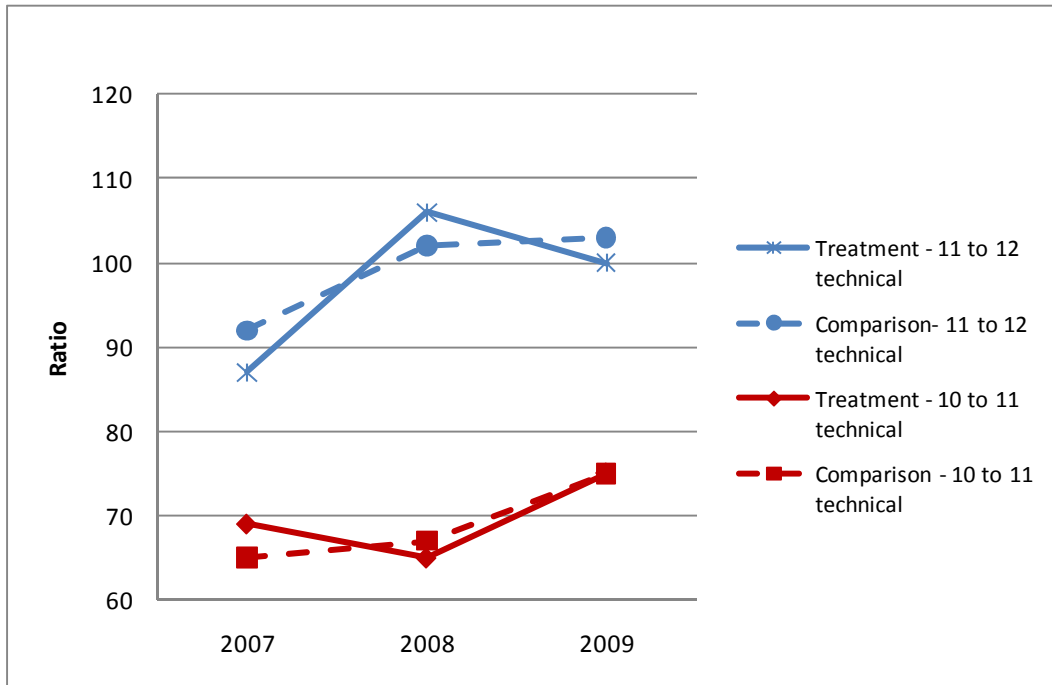
Academic Achievement. Figure 7 presents the schools' global PAES scores across baseline years. In general, the treatment and comparison have similar scores, and present the same changes in test scores across years. For both groups, the global PAES scores increased during 2007 and 2008, and sharply decreased in 2009. When we consider the scores by subtest, overall trends become less apparent and we find some differences between the groups. Figure 8 presents PAES scores for Math and Language subtests, and Figure 9 present scores for Science and Social Science subtests. For Math and Language scores, we find that the treatment group consistently performs better than the comparison group, on average. However, only one of these differences (the Language score in 2008) is statistically significant. We also see that from 2007 to 2008, the scores for both groups increased. In contrast, scores sharply decreased from 2008 and 2009. For Science and Social Science scores, we find fewer differences between the treatment and comparison groups. However, the changes across years follow a less clear pattern; we see improvement from 2007 to 2008, but scores decreased from 2008 to 2009. In future weeks, we will meet with MINED staff to discuss possible explanations for the large changes in scores over these years; for example, the test may have been modified in 2009. As shown in Figures 7, 8, and 9, treatment schools have better academic achievement than comparison schools. Our post-intervention analysis will account for these baseline differences.

Figure 7
PAES Global Score
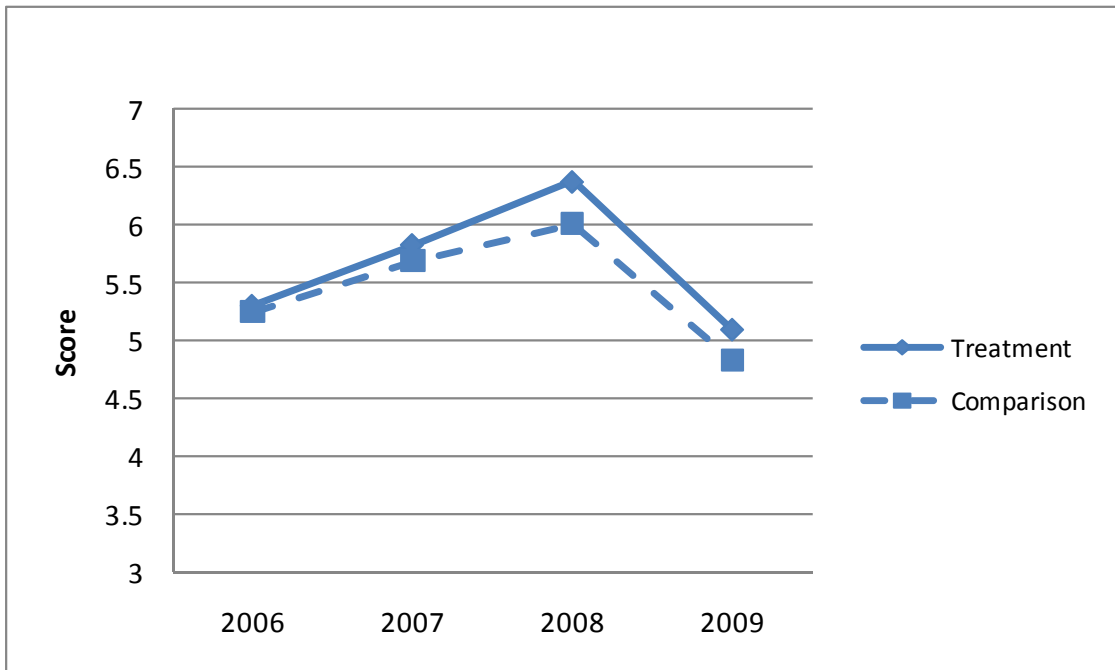
Figure 8
PAES Scores for Math and Language
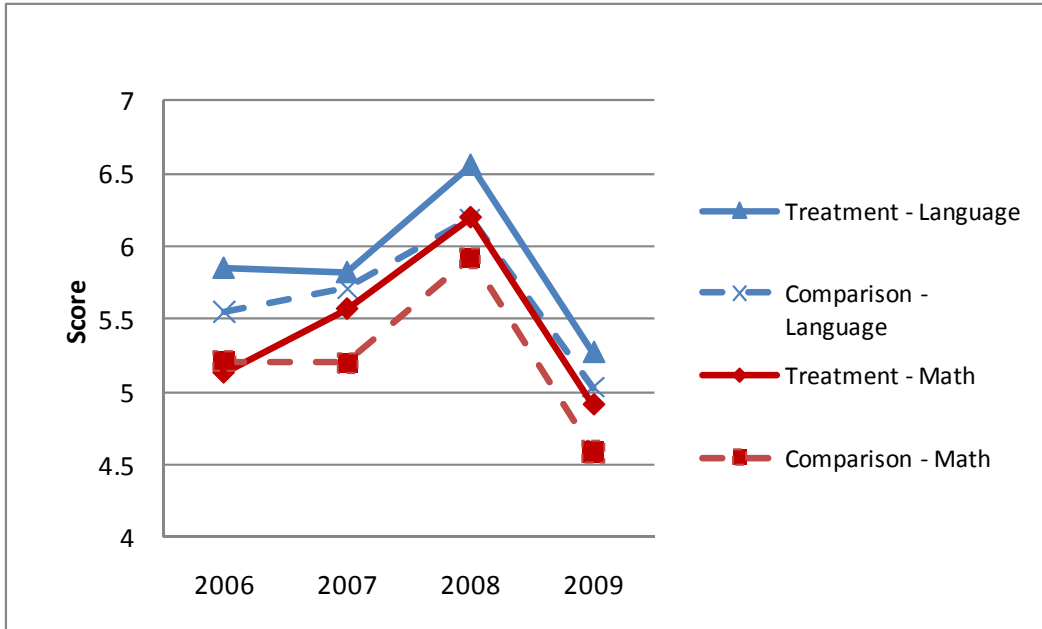
Figure 9
PAES Scores for Science and Social Science
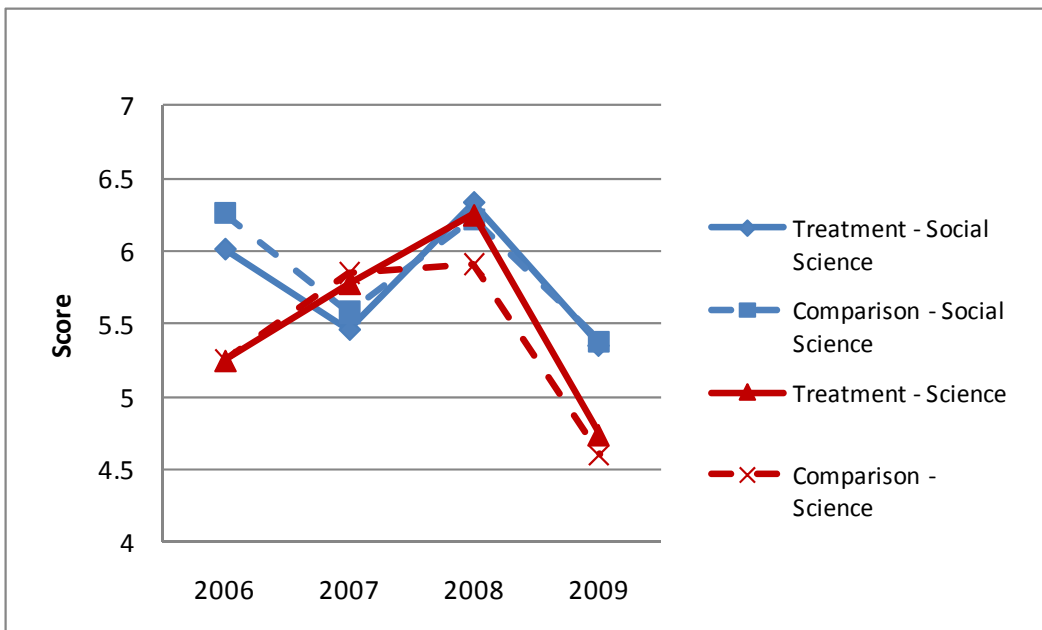
E. Discussion

As illustrated, the treatment and comparison groups exhibit minimal statistical differences across the evaluation's key educational measures. Given the small number of statistically significant differences between treatment and comparison schools, we can conclude that our matching procedures produced a valid comparison group. However, we acknowledge that statistical significance is only one factor in determining baseline equivalence. The other factor is the magnitude of these differences. Because some of the differences we find are substantial, we will account for them in our post-intervention analysis.

To facilitate higher statistical power, it important to obtain post-intervention data at the student level. In addition, using student-level data will allow us to calculate measures of continuation in school or grade completion more accurately than using school-level data. MINED has already provided most necessary student-level data for the 2010 school year, and we expect to get similar data for the 2011 and 2012 academic years. These student-level data will be analyzed to determine the impact of the middle school strengthening activity on students' enrollment, grade completion, continuation in school, and academic achievement.

Table 2. Key Education Outcomes by Treatment and Comparison groups

	Treatment			Comparison			Effect Size
	Mean	SD	N	Mean	SD	N	
Enrollment							
Total enrollment general 06	146	214.85	20	98.15	80.31	20	29.5
Total enrollment technical 06	229.2	240.43	20	160.25	204.49	20	30.9
Total enrollment 06	375.2	428.84	20	258.4	268.24	20	32.7
Total enrollment general 07	163.85	238.81	20	113.95	90.25	20	27.6
Total enrollment technical 07	216.6	236.26	20	154.35	208.44	20	27.9
Total enrollment 07	380.45	435.82	20	268.3	284.99	20	30.5
Total enrollment general 08	167	227.57	20	112.55	85.21	20	31.7
Total enrollment technical 08	219.1	245.37	20	156.45	212.88	20	27.3
Total enrollment 08	386.1	419.86	20	269	286.41	20	32.6
Total enrollment general 09	154.95	216.6	20	118.55	93.51	20	21.8
Total enrollment technical 09	240.35	256.07	20	156.4	209.27	20	35.9
Total enrollment 09	395.3	419.43	20	274.95	281.9	20	33.7
Female enrollment general 06	77.75	114.17	20	51.15	39.28	20	31.2
Male enrollment general 06	68.25	101.26	20	47	41.49	20	27.5
Female enrollment technical 06	137.4	138.93	20	98.5	127.86	20	29.1
Male enrollment technical 06	91.8	103.4	20	61.75	80.02	20	32.5
Female enrollment 06	215.15	239.36	20	149.65	159.75	20	32.2
Male enrollment 06	160.05	190.46	20	108.75	109.93	20	33
Female enrollment general 07	87.45	126.86	20	61.05	48.25	20	27.5
Male enrollment general 07	76.4	112.44	20	52.9	42.93	20	27.6
Female enrollment technical 07	130.1	133.56	20	94.6	126.75	20	27.3
Male enrollment technical 07	86.5	104.08	20	59.75	84.32	20	28.2
Female enrollment 07	217.55	239.3	20	155.65	167.47	20	30
Male enrollment 07	162.9	197.43	20	112.65	119.2	20	30.8
Female enrollment general 08	91	124.79	20	59.25	44.3	20	33.9
Male enrollment general 08	76	103.84	20	53.3	43.45	20	28.5

	Treatment			Comparison			Effect Size
	Mean	SD	N	Mean	SD	N	
Female enrollment technical 08	130.4	137.3	20	93.3	126.05	20	28.1
Male enrollment technical 08	88.7	109.59	20	63.15	88.74	20	25.6
Female enrollment 08	221.4	230.15	20	151.7	164.16	20	34.9
Male enrollment 08	164.7	191	20	116.05	122.71	20	30.3
Female enrollment general 09	82.65	115.09	20	60.65	45.88	20	25.1
Male enrollment general 09	72.3	102.15	20	57.9	48.97	20	18
Female enrollment technical 09	139.95	138.79	20	89.8	118.31	20	38.9
Male enrollment technical 09	100.4	119.53	20	66.6	93.55	20	31.5
Female enrollment 09	222.6	224.29	20	150.45	154.6	20	37.5
Male enrollment 09	172.7	197.12	20	124.5	128.68	20	29
Grade Completion and dropout							
Percent passed at school 07	95	0.05	20	95	0.05	20	0
Percent passed at school 08	86	0.06	20	87	0.06	20	-16.7
Percent passed at school 09	88	0.07	14	89	0.07	12	-14.3
Percent not passed at school 07	5	0.05	20	5	0.05	20	0
Percent not passed at school 08	5	0.04	20	2	0.02	20	94.9 **
Percent not passed at school 09	4	0.04	14	3	0.02	12	30.9
Percent dropout at school 07	0	0.01	20	1	0.02	20	-63.2
Percent dropout at school 08	9	0.04	20	11	0.05	20	-44.2
Percent dropout at school 09	8	0.04	14	8	0.05	12	0
Percent passed grade 10 07	93	0.07	20	93	0.08	20	0
Percent passed grade 10 08	79	0.1	20	81	0.06	20	-24.3
Percent passed grade 11 07	96	0.07	20	96	0.06	20	0
Percent passed grade 11 08	91	0.06	20	91	0.07	20	0
Percent not passed grade 10 07	7	0.07	20	7	0.07	20	0
Percent not passed grade 10 08	7	0.07	20	2	0.02	20	97.1
Percent not passed grade 11 07	4	0.07	20	4	0.06	20	0
Percent not passed grade 11 08	3	0.03	20	1	0.02	20	78.4
Percent dropout grade 10 07	1	0.02	17	1	0.03	17	0
Percent droput grade 10 08	14	0.06	20	16	0.06	20	-33.3
Percent droput grade 11 07	0	0.01	17	0	0.02	17	0
Percent dropout grade 11 08	6	0.06	20	8	0.06	20	-33.3
Continuation in School							
Retention 10 to 11 general 07	108	0.8	17	81	0.21	19	47.4
Retention 10 to 11 vocational 07	69	0.18	16	65	0.14	17	24.9
Retention 11 to 12 vocational 07	87	0.08	16	92	0.1	17	-55
Retention 10 to 11 general 08	86	0.27	17	84	0.17	19	9
Retention 10 to 11 vocational 08	65	0.28	16	67	0.18	16	-8.5
Retention 11 to 12 vocational 08	106	0.45	16	102	0.44	17	9
Retention 10 to 11 general 09	95	0.42	18	88	0.19	19	21.7
Retention 10 to 11 vocational 09	75	0.12	14	75	0.18	16	0
Retention 11 to 12 vocational 09	100	0.25	14	103	0.29	16	-11
Academic Achievement							
PAES Math 06	5.13	0.64	20	5.21	0.89	20	-10.3
PAES Social Sc 06	5.46	0.62	20	5.58	0.43	20	-22.5
PAES Language 06	5.85	1.01	20	5.55	0.67	20	35
PAES Science 06	5.25	0.58	20	5.25	0.55	20	0
PAES Global Score 06	5.3	0.81	20	5.25	0.7	20	6.6
PAES no. students tested 06	166.1	177.23	20	123.65	135.44	20	26.9
PAES Math 07	5.57	1.21	20	5.2	0.84	20	35.5
PAES Social Sc 07	6.01	0.39	20	6.26	0.63	20	-47.7

	Treatment			Comparison			Effect Size
	Mean	SD	N	Mean	SD	N	
PAES Language 07	5.82	0.4	20	5.71	0.48	20	24.9
PAES Science 07	5.78	0.86	20	5.85	0.72	20	-8.8
PAES Global Score 07	5.83	0.85	20	5.69	0.68	20	18.2
PAES no. students tested 07	105.15	122.12	20	76.95	83.73	20	26.9
PAES Math 08	6.2	1.14	20	5.92	0.95	20	26.7
PAES Social Sc 08	6.33	0.53	20	6.22	0.51	20	21.1
PAES Language 08	6.56	0.59	20	6.19	0.35	20	76.3 **
PAES Science 08	6.25	0.87	20	5.91	0.79	20	40.9
PAES Global Score 08	6.38	0.85	20	6.01	0.71	20	47.2
PAES Math 09	4.91	0.79	20	4.59	0.82	20	39.7
PAES Social Sc 09	5.35	0.78	20	5.38	0.65	20	-4.2
PAES Language 09	5.27	0.5	20	5.03	0.66	20	41
PAES Science 09	4.74	0.86	20	4.6	0.72	20	17.7
PAES Global Score 09	5.09	0.83	20	4.83	0.81	20	31.7

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 continuatuion in school are given in percent units.

Appendix

Total enrollment is an important variable that is monitored by FOMILENIO and MCC. Figure 10 presents a summary of total enrollment in all the middle schools in the treatment and in the comparsion groups for the baseline years. We can see that total enrollment in the treatment schools was around 7,500 students in 2006 and increased to 7,900 students in 2009. Total enrollment in the comparison schools is lower than total enrollment in the treatment schools for all baseline years, but it shows a similar increasing trend. In 2006, total enrollment in the comparison schools was almost 5,200 students and by 2009 it had increased to 5,500 students. Tables 3 and 4 present enrollment data in more detail. Table 3 presents enrollment data for each school in the treatment group for the baseline years and Table 4 presents the same data for the comparison schools.

Figure 10
Total Middle School Enrollment in the Intervention and Comparison Groups
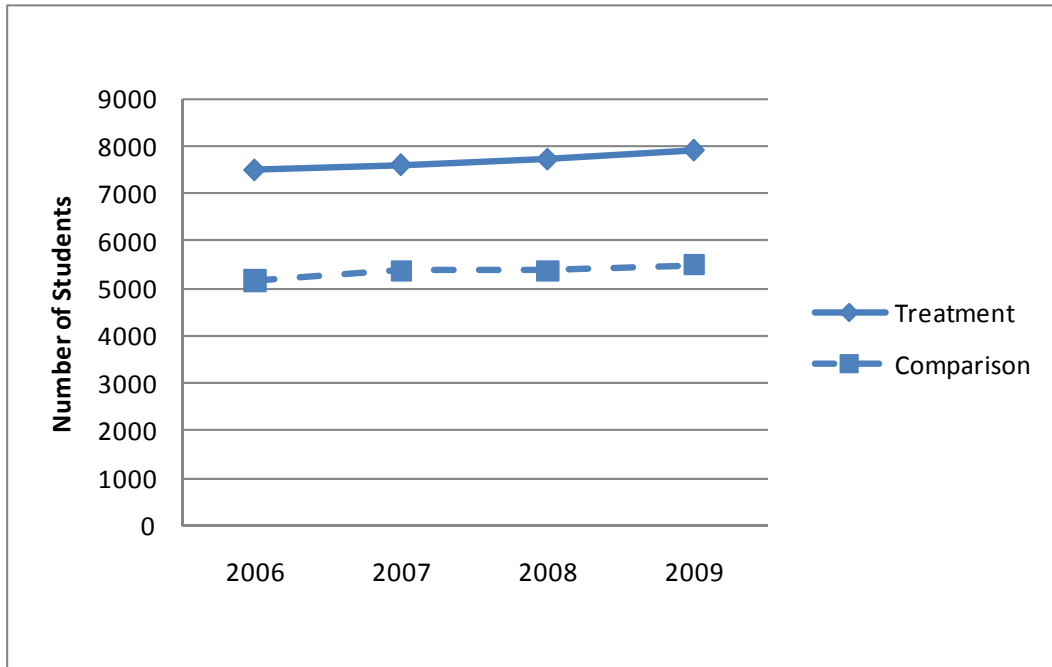
Table 3. Enrollment in General and Technical Programs in Treatment Schools from 2006 to 2009

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
Complejo Educativo Santiago de la Frontera	47	0	47	41	0	41	38	0	38	50	0	50
Instituto Nacional General Juan Orlando Zepeda	51	168	219	69	156	225	81	163	244	84	228	312
Instituto Nacional de San Ignacio	11	89	100	7	106	113	31	123	154	55	95	150
Instituto Nacional de Osicala	118	212	330	164	201	365	236	224	460	54	277	331
Instituto Nacional de Chapeltique	83	185	268	69	198	267	76	211	287	91	211	302
Instituto Nacional Benjamín Estrada Valiente	94	726	820	113	741	854	110	800	910	118	858	976
Instituto Nacional de la Reina	30	108	138	32	112	144	43	107	150	51	78	129
Instituto Nacional de El Sauce	49	147	196	52	121	173	56	143	199	53	185	238
Instituto Nacional 14 de Julio de 1875	626	753	1379	664	830	1494	603	839	1442	607	888	1495
Instituto Nacional de Aguilares	394	386	780	374	332	706	393	364	757	339	415	754
Instituto Nacional de Nueva Concepción	308	426	734	265	382	647	143	388	531	157	404	561

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
Instituto Nacional Anamoros	20	176	196	24	187	211	34	198	232	34	217	251
Instituto Nacional Doctor Francisco Martínez Suarez	776	669	1445	930	509	1439	909	460	1369	867	433	1300
Complejo Educativo General Manuel Jose Arce	0	48	48	0	45	45	28	24	52	0	60	60
Instituto Nacional de Carolina	84	0	84	99	0	99	65	0	65	72	0	72
Instituto Nacional de la Palma	69	225	294	86	215	301	81	222	303	90	228	318
Instituto Nacional de Jutiapa	0	66	66	0	80	80	0	84	84	0	84	84
Complejo Educativo Sotero Lainez	53	0	53	59	0	59	70	0	70	118	0	118
Instituto Nacional de Sesori	36	200	236	150	117	267	252	32	284	188	146	334
Complejo Educativo Cantón El Tule	71	0	71	79	0	79	91	0	91	71	0	71
TOTAL	**2920**	**4584**	**7504**	**3277**	**4332**	**7609**	**3340**	**4382**	**7722**	**3099**	**4807**	**7906**

Table 4. Enrollment in General and Technical Programs in Comparison Schools from 2006 to 2009

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
Instituto Nacional de Nueva Esparta	43	74	117	45	81	126	55	104	159	45	128	173
Instituto Católico San Pablo Apóstol	69	71	140	76	45	121	96	48	144	118	63	181
Instituto Nacional de Victoria	69	0	69	71	0	71	80	0	80	89	0	89
Instituto Nacional de Sensuntepeque	236	482	718	262	492	754	297	513	810	258	507	765
Instituto Nacional Profesor Francisco Ventura Zelaya	200	752	952	263	770	1033	253	787	1040	231	808	1039
Complejo Educativo Naciones Unidas	117	0	117	135	0	135	157	0	157	114	0	114
Instituto Nacional Segundo Montes	105	459	564	152	421	573	143	401	544	167	400	567
Instituto Nacional de San Simon	71	97	168	73	81	154	67	71	138	74	91	165
Instituto Nacional de El Paraíso	130	204	334	202	162	364	150	162	312	112	145	257
Complejo Educativo Florinda de Juarez Alemán	0	63	63	0	52	52	0	63	63	0	62	62
Instituto Nacional de Nombre de Jesús	101	49	150	106	40	146	115	47	162	139	56	195
Instituto Nacional de Perquín	122	88	210	156	94	250	117	97	214	95	113	208
Instituto Nacional de San Antonio Los Ranchos	56	38	94	57	27	84	81	7	88	108	0	108
Instituto Nacional de Ilobasco	319	432	751	305	450	755	303	467	770	399	389	788
Instituto Nacional de Dulce Nombre de María	40	87	127	37	76	113	49	61	110	46	73	119

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
Complejo Educativo Caserío Las Americas Cantón la Bermuda	39	0	39	33	0	33	36	0	36	51	0	51
Instituto Nacional República de Italia	156	132	288	189	126	315	106	118	224	184	110	294
Instituto Nacional de Yamabal	22	51	73	24	44	68	42	54	96	50	41	91
Instituto Nacional de la Laguna	59	76	135	73	79	152	74	75	149	53	98	151
Instituto Nacional de Potónico	9	50	59	20	47	67	30	54	84	38	44	82
TOTAL	**1963**	**3205**	**5168**	**2279**	**3087**	**5366**	**2251**	**3129**	**5380**	**2371**	**3128**	**5499**

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REFERENCES

Cochran, William G. 1968. "The effectiveness of adjustment by subclassification in removing bias in observational studies." *Biometrics* 24:295–313.

Cochran, William G., and Donald B. Rubin. 1973. "Controlling bias in observational studies: A review." *Sankhya: The Indian Journal of Statistics*, Series A 35 (Part 4): 417–66.

WWC Procedures and Standards Handbook, Version 2.0, December 2008. http://ies.ed.gov/ncee/wwc/help/idocviewer/doc.aspx?docId=19&tocId=4

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