

MEMORANDUM

TO: Rebecca Tunstall

FROM: Randall Blair and Larissa Campuzano

DATE: 3/18/2011
ESVED-269

SUBJECT: Evaluation Design for the Instituto Tecnológico de Chalatenango (ITCHA) Intervention

1. Summary and Recommendations

This memorandum presents the final evaluation design for MCC-funded improvements to the Instituto Tecnológico de Chalatenango (ITCHA). It builds on memoranda we prepared in May 2008 (ESVED-073) and August 2008 (ESVED-106) describing potential evaluation designs for the ITCHA intervention and the limitations and feasibility of an impact evaluation. Based on these memoranda and input from key stakeholders during our latest visit to El Salvador in March 2011, we have chosen to document the transformation of ITCHA into a Modelo Educativo Gradual de Aprendizaje Técnico y Tecnológico (MEGATEC), or advanced post-secondary technical institute. This transformation includes the following components: construction of a new facility and all relevant school improvements, including new computers and didactic materials; all recent teacher training related to the ITCHA/MEGATEC; and the introduction of two new MEGATEC superior technical degree programs. In this memorandum, we describe the intervention, state the key research question, and describe our recommended evaluation design: **a case study of the process of transformation of ITCHA into a MEGATEC.**

2. Description of the Intervention

The ITCHA strengthening activity is centered upon adapting the ITCHA's curriculum to fit the MEGATEC educational model developed by the Salvadoran Ministry of Education (MINED). The MEGATEC model is based on the premise that technical education should be tailored to regional economies' labor market demands, and designed to build competencies required of professionals in each degree program's relevant fields. Using this premise, FOMILENIO contracted the Consortium (CIDE) to analyze the labor market demands in the Northern Zone and develop new degree programs that responded directly to these demands. CIDE recommended and developed two MEGATEC degree programs—civil engineering and alternative tourism—to complement ITCHA's four existing technical programs. These two new programs, each two years in length, were first made available to students during the 2010 school year.

Table 1 illustrates student enrollment in ITCHA's degree programs in the 2010 school year. In addition to the two new MEGATEC degree programs in alternative tourism and civil engineering, the ITCHA offers non-MEGATEC degrees in computer programming, computer

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maintenance, marketing, and software development.¹ As illustrated, the most popular programs in 2010 were marketing, computer programming, alternative tourism, and computer maintenance. Each of these programs had over 70 students enrolled in the first year of study, and most had over 50 students enrolled in the second year of study. In 2010, a total of 661 students were enrolled in one of the school's six superior technical degree programs (CIDE 2011).

Table 1. 2010 ITCHA/MEGATEC Enrollment

Degree Program	First Year			Second Year			Total Enrollment
	Male	Female	Total	Male	Female	Total	
Alternative Tourism*	20	53	73	19	34	53	126
Civil Engineering*	50	9	59	31	5	36	95
Computer Programming	39	38	77	25	39	64	141
Computer Maintenance	44	29	73	42	24	66	139
Marketing	14	70	84	8	31	39	123
Software Development	21	16	37	0	0	0	37
Total	188	215	403	125	133	258	661

Source: Glenda Lemus, CIDE

* MEGATEC degree program

Partnerships and links between middle schools, superior technical schools, and universities are central to the MEGATEC model. Four middle schools in Chalatenango with technical programs will serve as feeder schools to the MEGATEC: the Instituto Nacional Benjamín Estrada Valiente and the Instituto Nacional de Aguilares both offer technical middle school degrees in civil engineering, and the Instituto Nacional de La Palma and the Instituto Nacional de San Ignacio offer technical middle school degrees in alternative tourism. Graduates of these three-year middle school programs can advance directly to the second year of superior technical studies in civil engineering and tourism at the MEGATEC (see Figure 1). In contrast, students with a general middle school degree or a technical middle school degree in another area can earn a superior technical degree in civil engineering and tourism after two years of study at the MEGATEC.

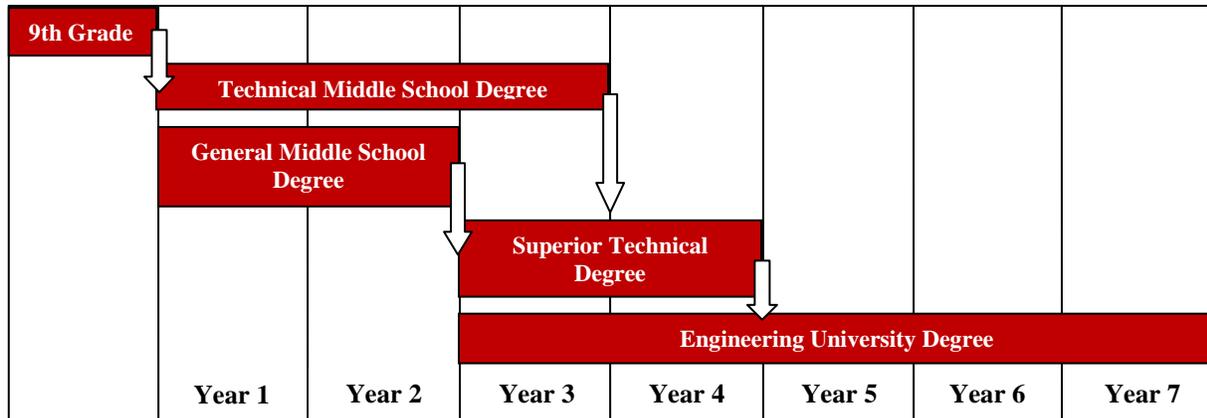
The MEGATEC model is also designed to facilitate students' enrollment in university-level programs. With a superior technical degree in tourism or civil engineering from the MEGATEC, graduates can earn a university degree from a technical university after completing three years of

¹ Non-MEGATEC degrees are degrees that are not a product of the MEGATEC methodology of identifying and building capabilities to meet the demands of technical jobs in the region.

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study—less years than would be required if they earned a superior technical degree from a non-recognized institute (see Figure 1).

Figure 1. Illustration of Students’ Progression through the MEGATEC System



Source: Fundamentos de la Educación Media Técnica y Superior Tecnológico. MINED, 2008.

FOMILENIO and MCC have invested nearly \$9 million in the new MEGATEC, which is scheduled to be fully operational in April 2011. The MEGATEC intervention has three primary components: (a) construction of a new facility and school improvements, (b) teacher training, and (c) implementation of two new degree programs:

- A. Construction of a new facility and school improvements.** Beginning in April 2011, the ITCHA will relocate to a large new complex outside of the city of Chalatenango. The MEGATEC will have nine classrooms, four computer labs, ten technical labs, and a large multi-use auditorium. In addition, the school will be equipped with new computers, textbooks, and other didactic materials that will enhance instruction for all degree programs.
- B. Teacher training.** In 2009 and 2010, CIDE staff and other educational experts trained ITCHA personnel on a wide range of educational topics. Training consisted of formal instruction, monthly monitoring visits to schools, and classroom observation. Throughout these training activities, ITCHA administrators learned the necessary skills to manage all degree programs; track their schools’ budgets, programs, and human resources; and achieve institutional self-sustainability. In addition, ITCHA teachers—including teachers of both MEGATEC and non-MEGATEC degree programs—learned a new teaching model that emphasizes productive employment among graduates and core competencies; new teaching methods and strategies to engage students; and new evaluation measures to improve the quality of instruction.²

² Administrators and teachers from ITCHA’s four feeder technical middle schools also received similar training in introducing a curriculum based on core competencies.

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C. Implementation of two new degree programs. Starting in 2010, the ITCHA offered two new MEGATEC degree programs: civil engineering and alternative tourism. Below we summarize core competencies and requirements of each of these academic degree programs.

Civil engineering. This superior technical degree program will train students to design and build structures, roads, and other key infrastructure project. Civil engineering graduates should be able to analyze soil and materials, design and build infrastructure, manage construction projects and budgets, and inspect public works.

Alternative tourism. This degree program develops professionals in the industries of tourism and ecotourism, who can create touristic services and products at a minor scale. Upon completion of the program, graduates will be trained to identify potential tourist attractions, create quality services and products, lead tours and coordinate touristic activities, and create and maintain ecotourism sites.

In 2009 and 2010, CIDE staff and ITCHA teachers and administrators participated in 7 workshops to develop new lesson plans and didactic materials for these two technical programs.³ During workshops and subsequent meetings, teachers also received targeted training to equip them to teach courses in these programs during the 2010 school year. Both degree programs had an enrollment of over 50 students in the 2010 school year (see Table 1).

As illustrated in the logic model (Figure 2), the three primary components of the MEGATEC intervention are designed to achieve multiple objectives. Primary objectives of the intervention are to increase the number of superior technical degrees offered and granted to students in the Northern Zone, as well as increase the quality of instruction and the value of each technical degree. In addition, the intervention is designed to increase employment and university enrollment among MEGATEC graduates, as well as meet the demands of employers in the region for skilled technical professionals.

3. Related Interventions

Also relevant to the MEGATEC intervention, in 2010, FOMILENIO issued \$1,500 annual scholarships to 200 students enrolled at the ITCHA. This includes 47 students in ITCHA's computer programming degree program, 42 students in the computer maintenance program, 42 students in the alternative tourism program, 33 students in the civil engineering program, and 36 students in the marketing program. These scholarships can be renewed during each subsequent

³ In total, the 7 workshops spanned nine months and represented 136 hours of formal meetings.

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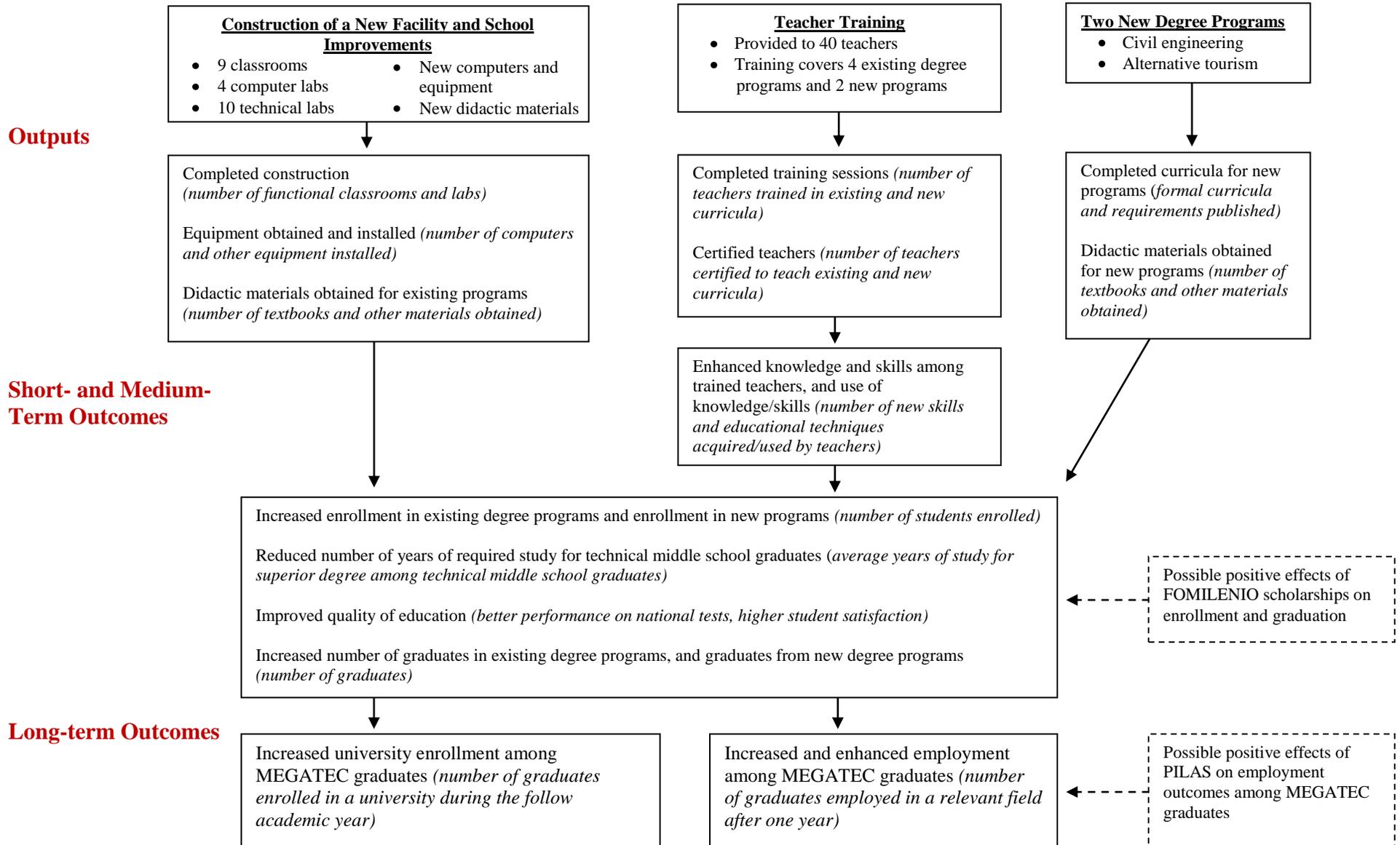
year in which students are enrolled and in good academic standing. The objective of the scholarships is to finance students' transportation and other school-related costs, thus increasing student enrollment and facilitating students' studies throughout the program's two years. The offer of scholarships—in tandem with MEGATEC improvements and new degree programs—could motivate students to enroll in these programs, continue their studies into the second year, and eventually graduate with a superior technical degree (see dotted line in Figure 2).

In addition, FOMILENIO is currently in the process of establishing the *Programa de Inserción Laboral Sostenible* (PILAS) to support productive employment for students in the Northern Zone that have benefited from FOMILENIO's Human Development Program. Under PILAS, FOMILENIO staff will take measures to increase the number of formal and non-formal accreditations among beneficiaries, link beneficiaries with potential employers, and provide beneficiaries with incentives to engage in entrepreneurial activities. In combination with MEGATEC improvements and new degree programs, PILAS activities could potentially improve employment outcomes and incomes of students who graduate from MEGATEC with a superior technical degree (see dotted line in Figure 2).

Figure 2. Logic Model of MEGATEC Conversion

(Items in parentheses indicate potential output and outcome measures. Outputs are usually tangible, immediate products of investments, whereas outcomes are positive changes in knowledge, skills, employment, and educational attainment resulting from initial investments and beneficiaries' efforts.)

Intervention Components



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4. Study Design and Key Research Questions

In a previous memo, we discussed that an impact evaluation of the transformation from ITCHA to a MEGATEC would be infeasible. Specifically, we stated that an impact evaluation would require information on an alternate institution to which ITCHA could be compared—for example, a similar technological center that will not be transformed into a MEGATEC. However, finding suitable comparison schools is likely to be very difficult because technical institutes in El Salvador offer a different mix of technical degrees and serve different student populations across the country (not only in the Northern Zone). Furthermore, an important technical limitation of an impact evaluation using a matched-comparison group design is that factors outside the intervention could simultaneously influence outcomes at ITCHA, but comparing only two institutions would not allow us to isolate the impact of the intervention from all other factors influencing the outcomes of interest. Moreover, a quasi-experimental design would not allow us to disentangle the impact of multiple concurrent changes on student and teacher outcomes, such as offering scholarships to students (as part of FOMILENIO’s scholarship activity), improving training for teachers (as part of FOMILENIO’s strengthening of technical middle schools), and improving the school’s infrastructure. As a result, a feasible impact evaluation of converting ITCHA into a MEGATEC would only allow us to estimate the *combined* effect of all interventions, not the *marginal* benefit of each component, which is what matters to policy makers.

Based on our experience in education research, we recognize that the success of an education reform, such as the intervention described above, is dependent on successful implementation. Furthermore, given the infeasibility of conducting a rigorous impact evaluation, we recommend a case study of the intervention’s implementation. Case studies are typically used to answer the “how” and “why” of research questions by providing great depth and detail of information. The proposed approach will allow us to understand the process of ITCHA’s transformation, the main actors involved in the process, the barriers and facilitators to transforming the institute, and the changes in ITCHA’s capacity to address the local market needs for skilled workers. The case study will also document the links between the intervention and student outcomes, such as completion of a technical degree and employment, as well as teacher outcomes, such as changes in instruction techniques and courses taught.

In the case study, we propose to address the following six key research questions:

1. **How were planning and outreach for the MEGATEC conversion conducted? How was funding secured?** What were the primary goals of the intervention, as defined by MINED, CIDE, FOMILENIO, and ITCHA administrators? What role did each of these parties (or others) play in designing, planning, funding and community outreach? What were barriers to, and facilitators of, successful designing, planning, funding, and community outreach?

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2. **How did construction and improvements proceed?** What was the original timeline for completing the new facility? Did actual completion deviate from this deadline? What were stakeholders' goals and expectations for the new facility? Were these goals and expectations met? What were the planned and actual final products of construction and improvements, in terms of completed classrooms, labs, and other amenities? What were barriers to, and facilitators of, successful and prompt construction?
3. **How were teachers trained? Did teachers apply what they learned in training?** How were training units designed and who designed them? What were stakeholders' goals and expectations for the teacher training sessions included in the intervention? Were these goals and expectations met? What were the planned and actual results of teacher training in terms of the number of teachers trained/certified and the skills and knowledge learned by teachers? How did training differ by degree program? What was the profile of teachers that participated in training? What were barriers to, and facilitators of, successful teacher training? Did teachers use the skills and techniques they learned in training?
4. **How were new degree programs designed and introduced?** What were stakeholders' goals and expectations for the two new degree programs? Were these goals and expectations met? What subjects do the programs cover, and what didactic materials are used? What were barriers to, and facilitators of, introducing the new degree programs? How did the link between feeder middle schools and the MEGATEC work?
5. **Did student enrollment, achievement, and graduation meet expectations?** What were stakeholders' goals and expectations for students' enrollment, achievement, and graduation? Were these goals and expectations met? How many students entered new and existing programs, how many students skipped the first year of study? How many students graduated? What were the academic profiles of students that enrolled versus graduated? Did enrollment and graduation numbers meet or exceed pre-planned targets? Was the ITCHA/MEGATEC adequately staffed to serve all students that enrolled? Did students learn and apply the core competencies defined in the program curricula? Were students and parents satisfied with the new degree programs and their teachers? What were barriers to, and facilitators of, student enrollment, achievement, and graduation? Did FOMILENIO scholarships play a role in motivating youths to enroll in MEGATEC?
6. **Did MEGATEC degree programs prepare students for employment and university classes?** What were stakeholders' goals and expectations for employment and university education following students' completion of the technical degree? Were these goals and expectations met? How many students found related employment within a year of graduating from MEGATEC? How many students enrolled in a university the following academic year? Did these numbers meet pre-planned targets? Did the MEGATEC adequately prepare students for employment

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and university enrollment? What were barriers to, and facilitators of, student enrollment and graduation? Were there any additional factors that affected employment and university enrollment, particularly MINED's PILAS program?

5. Data Collection and Analysis

Data Sources. The centerpiece of the case study will consist of semi-structured, in-person interviews with key stakeholders: (1) ITCHA administrators, (2) MINED and MEGATEC leaders, including the principals of middle schools with linkages to the MEGATEC, (3) teachers, (4) parents and students, and (5) potential and actual employers of MEGATEC graduates in the surrounding area. Table 2 illustrates which of the case study's six research questions will be posed to each of the stakeholders mentioned above.

While the interviews will be the major data source for addressing the study's research question, secondary data sources, such as socioeconomic data available from the 2010 Encuesta de Hogares de Propósitos Múltiples (EHPM), could be useful for documenting the level of education, income and employment experience of teenagers and young adults in ITCHA's market area. Likewise, we may rely on administrative records collected by MINED, for MEGATECs, or from ITCHA itself, to describe the characteristics of teachers and students. Furthermore, and if feasible, we would like to examine test scores, graduation rates, and employment rates from ITCHA students. Both primary and secondary data will allow us triangulate findings—that is, the measurement of the same phenomenon from more than one perspective and their comparison to more accurately describe the phenomenon. We may also rely on software, such as ATLAS.ti to manage and analyze the qualitative data collected from the site visit interviews to facilitate the comparison of themes across stakeholders.

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Table 2. Research Topics and Data Collection Sources: MEGATEC Case Study

Research Topics	MINED, CIDE, and FOMILENIO	ITCHA Administrators	Teachers	Parents and Students	Potential Employers
<i>1. Planning, Funding, and Outreach</i>					
Primary goals of the intervention: implementation goals and ultimate educational/employment goals	X	X	X		
Roles played by MINED, CIDE, FOMILENIO, and ITCHA administrators in designing, planning, funding, and outreach	X	X	X		
Barriers and facilitators to successful designing, planning, funding, and outreach	X	X	X		
<i>2. Construction and Improvements</i>					
Original timeline versus actual timeline	X	X	X		
Goals/expectations of new facility and fulfillment of goals/expectations	X	X	X	X	
Barriers and facilitators to successful construction and improvements	X	X	X	X	
<i>3. Teacher Training</i>					
Goals/expectations of training and fulfillment of goals/expectations	X	X	X	X	
Barriers and facilitators to successful training	X	X	X	X	
Application of skills/techniques learned in training	X	X	X	X	
<i>4. New Degree Programs</i>					
Goals/expectations for new programs and fulfillment of goals/expectations	X	X	X	X	
Barriers and facilitators to introducing new degree programs	X	X	X	X	
<i>5. Student Enrollment, Achievement and Graduation</i>					
Enrollment, achievement, and graduation goals/expectations and fulfillment of goals/expectations	X	X	X	X	
Barriers and facilitators to enrollment, achievement, and graduation	X	X	X	X	
Additional factors affecting enrollment and graduation, including scholarships	X	X	X	X	
<i>6. Employment and University Enrollment</i>					
Goals/expectations for students' employment and university education, and fulfillment of goals/expectations	X	X	X	X	X
Adequacy of MEGATEC in preparing students for employment and university enrollment	X	X	X	X	X
Barriers and facilitators to successful employment and educational outcomes	X	X	X	X	X
Additional factors affecting employment and university enrollment, including PILAS	X	X	X	X	X

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Data Collection. Ideally, we will conduct the interviews with the stakeholders listed above during a weeklong site visit to Chalatenango and its surrounding area. Initially, we propose two rounds of visits. In the first round of visits, planned for August 2011 (roughly five months after students and teachers begin classes at the new MEGATEC facility), we will observe the changes made following the intervention’s full implementation. This includes all changes related to school construction and improvements, teacher training, and the introduction of the new curricula (research topics 1, 2, 3, and 4 in Table 2). Interviews will target two groups of students: students in their first year of MEGATEC degree programs, and students in their second year of MEGATEC degree programs (who completed their first year at the ITCHA; see Table 3). We will ask students in their first year of the program about their educational experience at the MEGATEC. In contrast, we will ask students in their second year of the program to compare their experience at the new MEGATEC with their first year of classes at the ITCHA facilities. Student and parent interviews will primarily target students in the two new degree programs, but will also include students in the four non-MEGATEC degree programs that were previously offered at the ITCHA.

Topics for discussion for a second round of site visits, ideally in June 2013, will build on those presented above. However, for the latter round of interviews, our discussion would focus primarily on the intervention’s key outcomes of achievement, graduation, employment, and enrollment in university programs (research topics 5 and 6 in Table 2). To document employment and university enrollment outcomes shortly after graduation, we will interview graduates from the first class of MEGATEC students who spent two years at the new facility. These students will graduate in December 2012, so second-round interviews will take place roughly six months after students’ graduation. To document employment and university enrollment outcomes more than one year after graduation, we will also interview graduates from the previous class of MEGATEC students who graduated in December 2011. These interviews will take place about 1.5 years after students’ graduation. As with the first round of data collection, student and parent interviews will primarily target students in the two new degree programs, but will also include students in the four non-MEGATEC degree programs that were previously offered at the ITCHA.

Table 3. Schedule of Key Dates for the Chalatenango MEGATEC

2010-2013	January to December: MEGATEC classes in session (3 trimesters each year) January to November: Non-MEGATEC classes in session (2 semesters each year)
2010	December: First year of MEGATEC classes (offered at ITCHA facility)
2011	December: First MEGATEC graduating class (students who spent one year at the ITCHA and one year at the new facility)
2012	December: MEGATEC graduating class—students who spent two years at the new facility
2013	December: MEGATEC graduating class—students who began MEGATEC technical middle school degrees in 2010, the first year that new degrees were offered

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Analysis and Reports. In June and July 2011, Mathematica will produce and refine a master protocol for interviews with beneficiaries and key staff. The master protocol will be structured around our six primary research questions; each primary question will be accompanied by several specific questions that explore different aspects of the question's central theme.

In late 2011, Mathematica will analyze data from first-round interviews. To facilitate the analysis of qualitative data—including beneficiaries' reported activities and investments—we will create and employ codes to identify common themes that emerge across beneficiaries and projects. Qualitative and quantitative findings will be organized and synthesized according to our framework of six primary research questions.

In late 2011, Mathematica will produce and submit our interim report to MCC. In the first chapter of the report, we will include a discussion of the MEGATEC intervention's original budget, scope, and timeline, as well as program modifications that have taken place during implementation. The chapter will also feature an updated logic model that details the inputs, outputs, and expected outcomes of the MEGATEC intervention. In the next chapter of the report, we will present our analysis of the fidelity of program implementation, or whether key program components were executed according to the compact and original implementation plan. The chapter will end with a discussion of facilitators and barriers to efficient and effective implementation of the MEGATEC intervention. In the next chapter of the report, we will describe students', teachers', and administrators' experiences with the new MEGATEC facility and curricula, as well as students' achievement at the MEGATEC. The chapter will end with a discussion of enrollment rates, as well as an analysis of factors that may have contributed to student's enrollment and continuation in school.

In late 2013, Mathematica will submit its final report for the case study. The report will synthesize implementation findings from the interim report with implementation findings from the second round of data collection. The main focus of the final report, however, will be to discuss beneficiaries' reported medium-term changes in educational attainment, income and employment, as well as perceived changes in the supply of trained professionals in the local economy as a result of MEGATEC degree programs.

5. Next Steps

Following final comments from MCC and FOMILENIO, Mathematica staff will compose interview protocols in June and July. The first round of qualitative interviews will take place in late August. Larissa Campuzano is scheduled to lead this first round of interviews.

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