

The College of William and Mary

W&M

Report to Millennium Challenge Corporation

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El Salvador

**Best Practices in
Technical and Vocational
Training and Education**



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Executive Summary

Why this report has been prepared:

On November 9th, 2006, the Millennium Challenge Corporation (MCC) signed a \$461 million compact with El Salvador in order to improve the lives of El Salvadorans in the Northern Zone through strategic investments. In particular, \$20 million was set-aside for Formal Technical Vocational Education and Training programs (TVET). The compact entered into force on September of 2007 and is now entering its second year of the five-year strategic plan.

William and Mary's policy group has been tasked to reevaluate the original Economic Rate of Return Analysis (ERR) and budget for El Salvador developed in 2006. To do so, 'best practices' from past vocational technical education investment programs are applied to MCC's current compact with El Salvador. The aim has been to provide the tools necessary to improve the effectiveness of the TVET program in El Salvador and future impact assessments by MCC.

El Salvador Best Practices in Technical and Vocational Training and Education

What this report has found:

In this report, policy recommendations are developed for future investments in El Salvador's Technical and Vocational Education and Training (TVET) activities and impact evaluations of these projects.

In Chapter One the Human Capital Investment Theory is developed and its correlation to MCC's involvement with El Salvador's Formal Technical Vocational Education and Training programs. MCC's five-year financial plan has allocated \$20 million to formal education and training activities. The focus is on strengthening 20 middle technical schools in the Northern Zone to increase the number of degree tracks provided, train teachers, improve facilities and link education to private sector needs. Investment in human capital has shifted from supply driven to demand driven meaning that TVET programs must adapt to provide integrated training with a broad based education and continued lifelong learning. Investment in human capital will result in economic development and improved social wellbeing.

In Chapter Two a review the literature on past TVET programs is conducted with a focus on effectiveness of investment in scholarships, faculty training and facility improvement.

The majority of studies measured student achievement based on job placement rates. TVET program must be based on “demand driven” training. One policy option is the development of “dual approach” training programs that link public training programs to private institutions through apprenticeships. In order to be effective, the recommended policy option is tax subsidies for firms that train workers. Also, strict standards for training and accreditation is needed in order to ensure legitimacy among the labor and business sectors. Literature on scholarships found that scholarships are essential in getting more students into schools and therefore educating more individuals. However, increased scholarship availability increases the risk of high drop out rates and it is important to ensure the selection process remains competitive and efficient. The literature has found a significant relationship between faculty investment and student achievement. Successful programs place priority on strengthening management capability, increasing the opportunities for staff training and standardized curriculum and resources, and providing these resources in a cost-effective way. Training, supervision, and resources need an element of flexibility in content, methods and delivery in order to be effective. This flexibility allows for adaptation to a growing and possibly unstable labor market. There need to be facilities for TVET students to learn. However, in large part, these can be shared with other schools and industries. Classrooms in existing TVET or even traditional schools can be used. More important is the use of industry facilities to foster relationships and allow students to use the most relevant and up-to-date facilities in the country. This report recognizes that in El Salvador, many industries are small consisting of four or five employees. An alternative recommendation to the above proposal that if it is found to be too costly to foster private-public relations, then the schools should buy the equipment and rent out the facilities to the small industries during non-school hours.

Chapter Three summarizes the data included in the Ministry of Education’s (MINED) middle technical school database. The Northern Zone’s TVET programs have much poorer student statistics and lack the resources other TVET programs enjoy throughout the country. On average, the schools in the Northern Zone have lower enrollment, higher dropout rates, lower test scores, and poorer available teaching facilities. Universally, the number of accredited teachers and years of experience range from 20% to over 90% less than in other areas of El Salvador. Also, when analyzing the 20 schools selected for intervention, the enrollment is approximately double in the selected schools. There are approximately two more teachers in the selected schools per grade and they have approximately 2 more years of experience teaching. To determine the significance of the differences, a probit test was conducted on variables that indicated level of need. The facilities score is negatively significant at the 10% level and the number of teachers is positively significant at the 5% level. The lower the facilities score and the higher number of teachers a school has, the more likely they were selected for intervention. The final analysis is conducted on Chalatenango, the selected model school for formal vocational education and training. This institute has high approval rates and low dropout rates. Its facilities include internal pipes, installed electricity, multiple classrooms for various uses but no laboratory or workshop facilities for technical training.

Chapters Four and Five review and update El Salvador's economic rate of return (ERR) and budget for Formal Vocational Education programs. When the budget was updated, it was found that the total exceeded the \$20 million threshold by \$4.36 million. This was due to an increase in scholarship prices. From the literature review, it was determined that less money should be allocated towards facilities and more money be allocated towards administrative services to facilitate private-public relations as well as towards faculty training and scholarship amounts. This was compensated for by reducing the building and equipment costs for the Middle technical schools. The final recommended ERR resulted in a rate of return of 12% over 15 years and 15% over 25 years. This includes the added benefit stream of increased productivity enjoyed by the company that resulted in overall increased output.

In Chapter Six policy options and recommendations were identified. Government needs to pro-actively campaign in order to raise the public's awareness of the benefits of cooperative training. Tangible incentives for private sector investment in TVET may include tax deduction for training expenses and training-related donations, subsidies for capital expenses to improve training facilities, collective or individual agreements to insert training clauses into the labor contracts of trainees. Incentives should also be attractive and performance measures reliable. Counseling can help students succeed in the program and be successful in finding employment. Monitoring of the faculty is critical in identifying problems in the system early on and to adjust training as areas needing improvement are identified.

In the Conclusions section the pros and cons of using the ERR to make investment decisions during implementation is analyzed. The ERR is the preferred method for policy makers, it is a quantifiable starting point for any forthcoming project. The advantage of being a quantitative analysis of a program is also an ERR's weakness. The investment in vocational schools in Northern El Salvador can have many benefits beyond simply raising wages or anything else monetary. A better educational system can have effects that range from a decrease in crime to an increase in civic participation to overall stability. In the case of El Salvador, consistently updating the ERR could prove to be very useful, especially in terms of scholarship allocations.

The central theme of this paper is that, if invested in properly, scholarships, faculty training and improved facilities in these TVET programs play a central role in achieving these policy objectives.

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Abbreviations

1B – 3B	1 st , 2 nd and 3 rd grade levels in General Bachillerato
1V – 4V	1 st , 2 nd , 3 rd and 4 th grade levels in Vocational Bachillerato
CADERH	Centro Asesor para el Desarrollo de los Recursos Humanos (Honduran Advisory Council for Human Resource Development)
CIDE	Consortium International de Développement en Education
ERR	Economic Rate of Return
MCC	Millennium Challenge Corporation
NZ	Northern Zone of El Salvador
PAES	Prueba de Aptitudes para Egresados de Educacion Media (Aptitude Test)
TVET	Technical and Vocational Education and Training
USAID	United States Agency for International Development

Chapter I: MCC and Human Capital Investment

The Millennium Challenge Corporation (MCC) was created in January of 2004 in order to help reduce poverty through sustainable economic growth. MCC partners with eligible countries to identify barriers to development, develop a compact, and eventually implement the compact. MCC provides funding for a period of five years in which time the terms of the compact should be met. These programs are developed to ensure sustainability once the commitment is complete.

El Salvador signed a \$461 million compact with MCC in June of 2006. This compact is aimed to improve the lives of Salvadorans through investment in education, public services, agricultural production, rural business development and transportation infrastructure. Millennium Challenge Corporation has formal vocational training components in its compact with El Salvador. In its multi-year financial plan, the compact has allocated \$20 million to formal education and training activities. Specifically, the formal training activity will be composed of strengthening 20 middle technical schools in the Northern Zone and improve the existing post-secondary institute of Chalatenango. The funds will go toward increasing the number of degree tracks provided in each school, train teachers in instructional technology, link education to private sector needs and improve physical facilities. In addition, Chalatenango will become the hub of advanced training and a repository for resources in more than thirty career fields.¹

In order for El Salvador to reach its economic potential after years of civil war, it must increase its stock of human capital. In the past, educational opportunities have been too costly or unavailable, and most individuals who were educated emigrated during the period of intense instability.² After the conflict, 70,000 lives had been lost and two-thirds of the population was left in poverty. Hit particularly hard was the northern region of El Salvador (the Northern Zone) due to its mountainous terrain that was the center of the conflict zone. Because of this increased violence and instability, stagnation has been difficult to overcome. In 1996, 70% of the labor force was unskilled and 23% had no formal education³.

The intention of implementing TVET programs in El Salvador is to invest in the human capital of the country. Capital is defined in *Webster's Dictionary* (2007) as the wealth of a country that can be used for a particular purpose. The definition is certainly broad, but it applies to the MCC compact in El Salvador. According to Robert Reich (1990), investment must be made in people in order to increase the competitive performance of the economy. He also states that competitiveness is equal to the ability to add value to an economy and, in turn, gain a higher standard of living without increasing the debt of the country.⁴ MCC is investing in various improvements for El Salvador, including factory improvements, which are viewed as a more classical form of capital.

¹ Millennium Challenge Compact between the United States of America acting through the Millennium Challenge Corporation and the government of the Republic of El Salvador. November 29, 2006.

² Jamaica (1983-89) had a similar emigration problem during their project. Instructors were upgraded but not all of those that participated in the program remained in the system or even in the country.

³ Winter, Carolyn. World Bank. April 1999. "Secondary Education in El Salvador: Education Reform in Progress."

⁴ Reich, Robert B. 1990. "Who is Us?" *Harvard Business Review*.

The improvement of factories is an increase in capital because it results in an increase in production capacity.

Human capital, however, is an investment in the people who are part of the given economy. Through its investments, MCC intends to send more students to better schools, which should increase the capabilities of those students. Those students should then be able to contribute more to their economy. More formally, human capital may be defined as the following:

“The knowledge, skills, competencies and other attributes embodied in individuals that are relevant to economic activity.”⁵

Human capital is thus an intangible asset, and unlike factories it is difficult to measure, but extremely important to the success of an economy. The human capital theory is based on the understanding that a knowledgeable workforce will attract investment, local and foreign, which will lead to increased job availability and continued training; forming an upward spiral towards economic growth.

Effects of Increasing Human Capital

Investment in human capital will bring about two kinds of positive effects: economic and social. Economic improvement is a more visible improvement because more qualified workers will result in an increase of output for an economy. Workers who have been educated are skilled workers, capable of producing secondary or tertiary products. An economy with an unskilled labor force is forced to depend on primary industries, such as resource extraction. As an economy is able to grow its human capital, it is capable of using educated workers to manufacture secondary goods such as steel or fabric. Ideally, large amounts of human capital will result in an economy's ability to produce tertiary goods, such as toys or tables.

Social benefits are just as important to emerging economies across the world. Many developing countries are characterized by large disparities in income, high unemployment and low wages;⁶ all of which human capital investment helps defeat. Increasing an individual's skill level results in higher employability and increases in wages. These attributes help to close the income disparity within a society. Although increased wages and decreased unemployment rates can be viewed as economic benefits, they are critical to the social wellbeing of developing countries.⁷

Some authors even contend that social benefits are more significant than economic benefits. Social benefits of education include more governmental efficacy, a healthier population, lower crime rates and due to all of these benefits, a happier population.⁸ These unquantifiable benefits are important to consider when considering implementing education programs because they will not fit into an ERR, but are possibly more important than any numbers an ERR can produce. Moretti (2004) contends that returns to education not only provide private benefits to the individual graduates but also

⁵ Organisation for Economic Co-operation and Development. 1998. “Human Capital Investment: An International Comparison.” Page 8.

⁶ Weil, David N. 2004. *Economic Growth*. New York: Addison-Wesley Longman,

⁷ Organisation for Economic Co-operation and Development. 1998. “Human Capital Investment: An International Comparison.” Page 8.

⁸ Moretti, Enrico. 2005. "Social Returns to Human Capital." National Bureau of Economic Research.

increases the wages for all workers in the area. This can be because an increased supply of graduates can lead to increased knowledge sharing and also because of productivity increases from the uneducated workers due to the imperfect substitution of educated and uneducated workers. It is important to note that spillovers from education, the increased benefits that uneducated workers receive due to the increased education of others can lead to market failures (this is commonly known as the free-rider effect).⁹

Human Capital Investment and El Salvador

Knowing the importance of human capital investment is of primary concern to a project such as TVET in El Salvador. The northern areas of El Salvador are characterized by poverty, unemployment and the problem of “brain drain.”¹⁰ As stated earlier, more educated Salvadorans, especially in technical matters, will provide more educated minds for the economy as well as fight unemployment and low wages. Therefore, an effective TVET program in the Northern Zone of El Salvador should be a very effective tool for combating poverty, encouraging equality and fostering development.

⁹ Moretti, Enrico. 2004. “Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data.” *Journal of Econometrics*.

¹⁰ Fund for Peace. 13 Jan. 2009. "The Fund for Peace - El Salvador."

Chapter II: Literature Review

In developing countries, particularly in the Caribbean Region, the rapidly increasing population growth coupled with a lagging economy and need for employment has increased demand for formal technical vocational education programs.¹¹ However, critics have questioned the effectiveness of these specialized training programs and have criticized their use as a tool to eradicate poverty and create growth—especially when the cost of specialized equipment is so great and it has the potential to become outdated in only a few years. Some suggest reliance purely on the private sector to train workers in the needed occupations rather than using government investment for vocational education.¹² Others note that complex technical training coupled with inadequate infrastructure results in a slow maturation process that assistance programs do not always realize.¹³ Investment intensity must be high and results tend to be minimal as compared to the size of the needs of the country.¹⁴

The table below represents the recent shift in society’s view towards Technical and Vocational Education and Training. This shift has required TVET programs to adapt from industry specific skill training to a broader, decentralized education with continued learning throughout an individual’s lifetime. In order to improve the economy and the lives of El Salvadorans, Technical and Vocational Training and Education must be: *effective* by “offering meaningful, quality skills development that avoid time-serving and irrelevant training”, *efficient, competitive* “to counter supply-driven training tendencies,” *flexible* and *responsive*.¹⁵

Old paradigm	New paradigm
Supply-driven approach	Search for demand-driven approaches
Training for employment	Learning for employability
In-service training	Concept of continuing life-long learning
Training and focus on the teacher/trainer	Self-learning and focus on the learner
Education and training separated	Education and training integrated (a sound general education and broad-based initial training are essential bases for life-long

¹¹ Herschbach, D., et al. USAID. 1992. “Vocational Education and Training: Review of Experience, Latin America and the Caribbean.”

¹² Psacharopoulos, George. 2005. “Linking Vocational Education and Training Research, Policy and Practice: a personal view.” *Vocational Training – European Journal*, 36(3): 69-73.

¹³ The Jamaica project (1983-89) was too complex for its 5-year time frame and had unrealistic expectations (Blank, 1988. Kelly and Kenneke 1989). The Jordan project (1979-82) was originally set to take 21 months, but needed a 28-month extension (a total of 45 months) for completion (Abdullah).

¹⁴ The Dominican Republic project (1983-88) did not meet objectives; only 20.4% graduated and found work (Saavedra and O’Neil, 1985). The Jamaica project (1978-82) was a failure; manpower selection, training, and placement were less effective after the project than before (Johnson and Taggart, 1984). Both countries had needs that could not be met by the projects.

¹⁵ Ziderman, A. World Bank. 2001. “Financing Vocational Training to Meet Policy Objectives: Sub-Saharan Africa.”

Education and training separated	Education and training integrated (a sound general education and broad-based initial training are essential bases for life-long continuing learning)
Skill recognition based on training period and examination	Recognition based on competency and prior learning
Focus on formal sector	Recognition of the need to focus both on formal and informal sectors
Centralized system	Decentralized system requiring both strong national and decentralized institutions

Is the TVET process efficient and effective in attaining the goals of economic development? Jamaica's vocational training program, the Heart Trust/National Training Agency, is an example of an efficient, sustainable institution. The program mostly trains individual in the public training centers but also offers a month long internship experience for students to work at a firm while in school. It also collects a 3% levy on all wages.¹⁶ Labor and business associations participate in board activities of the Heart Trust creating legitimacy among the labor and business markets.

Werum (2003) evaluated past TVET programs and argued that in order to be efficient, TVET programs must be dynamic and responsive in order to respond to changing demand and skill expectations.¹⁷ Public institutions have a "public servant mentality" that is not dynamic or responsive and can hinder efficiency. In the Caribbean; Barbados, Bahamas, Suriname, and Guyana offer vocational training primarily in the public sector. Trinidad and Tobago offer public and private training centers. Studies have found that private training is more efficient but when training is offered in the public institutions, budgetary incentives should be provided based on performance.¹⁸

As can be seen in the table above, an effective TVET program must be based on "demand driven" training. In the Caribbean and Latin America, the state used to project demand for different sectors and skill levels. Some countries also used surveys to assess the needs in the market.¹⁹ The institutions would then develop their courses based on these projections. A new method to meet demand is to provide theory in the institutions and the practical experience from the firms (a "dual approach" method), similar to Jamaica's program discussed above. Trinidad and Tobago, Barbados and Bahamas also offer internship programs. On-the-job training was used in the Caribbean regional

¹⁶ Cortazar, Rene. Inter-American Development Bank. June 2007. "Labor Market Institutions in the Caribbean." *Economic and Sector Study Series*. Page 23.

¹⁷ Werum, Regina. Inter-American Development Bank. 2003. "Trinidad and Tobago's Post-Secondary Education System: Bottlenecks in Technical Training Programs."

¹⁸ Banco Interamericano de Desarrollo. March 2001. "Capacitación profesional y técnica: una estrategia del BID."

Dolton, P., G. Makepeace and J. Treble. 1994. "Public and private-sector training of young people in Britain" In *Training and the Private Sector: International Comparisons*, edited by Lynch, L.

¹⁹ Trinidad and Tobago have used surveys from the National Training Agency since 2002. Cortazar, Rene. Inter-American Development Bank. June 2007. "Labor Market Institutions in the Caribbean." *Economic and Sector Study Series*. Page 25.

project (1982-87), which had an 82.2% job placement rate and in Honduras (1984-92), where they saw a 90% job placement rate. 5,500 out of 6,500 (84.6%) received in-plant training from firms. This approach requires high standards of instructional quality, requires less investment in equipment at the institutions, and provides a direct link between firms, training programs, and students entering the workforce.

One policy option is the development of “dual approach” training programs that link public training programs to private institutions through apprenticeships.

In order to also be effective, TVET programs must produce potential workers as a public good that benefits firms in order to encourage outside investment. Underinvestment occurs because firms do not experience all the benefits from vocational training, due to the fact that workers can transfer between employers or not enter the industry at all.²⁰ Most of Latin America uses tax subsidies for firms that train workers in order to combat this problem. Subsidies are an equity tool that aid in training the poorer sections of workers. Trinidad and Tobago offer a subsidy totaling approximately 12% of their spending, although studies believe this may be too low. A subsidy is driven by spending and demand for services and can therefore be an effective solution. In the Bahamas, there are no income taxes and therefore another solution would be to provide subsidies to cover the cost of training. In order to measure the training as a public good, there must be rigid standards of training that provide certifications or accreditation. This standardization allows for firms to know what skills they are hiring and if they are meeting their needs.

In order to be effective, the recommended policy option is tax subsidies for firms that train workers. Also, strict standards for training and accreditation is needed in order to ensure legitimacy among the labor and business sectors.

How does the past literature translate student achievement to income?

The majority of studies measured student achievement based on job placement rates. Specific income figures were not calculated into achievement rates of programs. These studies also did not follow students' progress, income variation or migration tendency after they found a job.

The main focus in this literature review is on the effectiveness of investment in scholarships, faculty training and facility improvement. The Millennium Challenge Corporation has chosen these three areas to center their efforts in formal vocational training programs.

²⁰ Ibid. Page 27.

Scholarships

In his book, *One Economics Many Recipes*, Dani Rodrik describes El Salvador as a country that has low investments due to low returns to capital.²¹ The lack of investment is not because of low availability of savings, but rather because the country does not find productive investments for which to deploy and mobilize its resources. The country has high unemployment and at the same time around 90% of businesses have four people or less, resulting in limited returns for investment. One of El Salvador's best resources is its workforce, which it can mobilize with training through scholarships.

The literature on scholarships and their effectiveness, as measured by employment for Central America is limited. Most of the past studies that have tried to measure the outcome of scholarship programs have failed due to high dropout rates.²² The high dropout rates were due to problems at home, insufficient scholarships as well as low employment perspectives. When students are not financially invested in an institution, they are not as concerned about getting a return on their investment. They may drop out of school because they have not spent any of their money on the experience. Economically, goods that are free are not efficient. Also, when schools are funded by public money, through scholarships, they become a part of the bureaucratic process and the needs of the students become second. When student's needs are not being met, it is more likely that they will drop out of the system.²³ The literature tends to emphasize the overall picture of TVET in terms of after-program employability rates and the high costs of training.

In "Paper N:16," published by the World Bank in June 2007, it was found that government funds in countries such as Bangladesh, India and other South Asian countries were used to finance public sector institutions and to provide subsidies to private providers at the vocational education level.²⁴ Students also contributed to TVET financing by paying tuition and examination fees. However, student fees in public institutions were usually not substantial sources of institutional funding and were largely offset by the fact that students received stipends and scholarships. The study points out that the unit cost for vocational training in Bangladesh, for example, was around \$250 per person, which was three times higher than general education. The high costs could be attributed to a number of factors, which included low student to teacher ratios, the large fixed and recurrent costs of machinery, the continued need for consumables and a stipend/scholarship scheme provided to the large majority of students. Scholarships are given to around 70% of the student population in most countries. "Paper N:16" went on to say that this stipend/scholarship was usually awarded on the basis of academic merit (measured at the time of entry) and had no income or means tests applied. The

²¹ Rodrik, Dani. 2008. *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*.

²² In a review of the USAID program in the Dominican Republic, Dore, Girling, and Reichmann (1983) state high dropout rates to be one of the main problems. Buesing, Shea, and Lamb (1980) also said high dropout rates were a problem with the USAID program in Ecuador.

²³ Eicher, J., and Chevalier, T. 1993. "Rethinking the finance of post-compulsory education." *International Journal of Educational Research*, 19.

²⁴ World Bank. June 2007. "Learning for Job Opportunities: An Assessment of the Vocational Education and Training in Bangladesh." *Bangladesh Development Series, Paper No. 16*.

conclusion of the study was that scholarship incentives are necessary for student participation.

Canagarajah (2002), measured scholarship effectiveness through internal and external efficiency. This method was intended to show what the drop out and retention rate was (internal efficiency) and how many students were employed afterward (external efficiency).²⁵ The study conducted a survey of over 300 public and private TVET institutions in East Asia and showed that in “both vocational education as well as vocational training, close to half of the student capacity is unutilized.” Inefficiency is indicated as a loss to the overall effectiveness of VTEC programs. External efficiency is, in this case, measured by the ability of graduates to enter the labor market following the completion of education. The results of the tracer study, which tracked the students after graduation, indicated that the expansion of the TVET system has not resulted in considerable improvement in labor market outcomes for its graduates. The overall conclusion in regards to scholarship funding is that even though scholarships give access to education, the retention rate is unstable and the after-training job opportunities are limited. Therefore, the programs are effective in getting people to school but ineffective in retaining them or finding them jobs afterward.

Trimming cost is important as suggested by programs conducted in Mongolia²⁶ and Cambodia.²⁷ In these TVET programs, the unit cost per student was lowered by improving the student to teacher ratios by increasing the optimal number of students per teacher, as well as through better monitoring of the students prior to admission and during studies. As a result, these programs had high graduation rates (80-90%). By reducing the unit cost the programs were able to offer the scholarships to more people and thus meet the program goals.

Scholarships provide access to education for the poor and theoretically employment after graduation. However, in order for the scholarships to be effective, the government needs to address the high dropout rates and the after-training job availability.

Student training without job perspectives will make the training wasteful. Scholarship efficiency should also be considered, which is related to lowering the costs. This is important as suggested by a couple of similar programs conducted in Mongolia and Cambodia. In these TVET programs, the unit cost per student was lowered by improving the student to teacher ratios as well as through better monitoring of the students prior admission and during studies. As a result these programs had high graduation rates (80-90%). By reducing the unit cost the programs were able to offer the scholarships to more people and thus meet the program goals.

²⁵ Canagarajah, S., Dar, R., and D. Raju. World Bank: Social Protection Unit, Human Development Network. September 2002. “Effectiveness of Lending for Vocational Education and Training: Lessons from World Bank Experience.” *Social Protection Discussion Paper Series, No. 0222*.

²⁶ Ridao-Cano, Cristóbal. World Bank. June 2007. “Mongolia: Building the Skills for the New Economy.”

²⁷ Canagarajah, S., Dar, R., and D. Raju. World Bank: Social Protection Unit, Human Development Network. September 2002. “Effectiveness of Lending for Vocational Education and Training: Lessons from World Bank Experience.” *Social Protection Discussion Paper Series, No. 0222*.

Faculty

Internal efficiency is critical in the development of formal vocational technical education programs. The components that affect the sustainability and effectiveness of these programs include management development, selection training and supervision of instructional staff and availability to teaching resources.

Effective management is the first step in the implementation of vocational programs. In a previous literature review of 24 USAID programs, 21 had management problems. When vocational programs are implemented on the ground, it is sometimes assumed that management skills will develop with practice. However, of USAID's programs, 15 had management problems severe enough to result in failure to achieve key objectives. Management can account for up to 30% in the variance of school achievement.²⁸ Poor performance and delays can occur because of poor management on all levels. Formal programs are not effective when enrollment is down and dropout rates are high (Bowels 1988, Moock and Bellew 1988).²⁹

The most successful programs incorporate well-defined and coordinated management objectives.³⁰ Management in vocational training programs is a complex process that requires the maintenance of physical resources, the provision of support systems and maintaining the links with business and industry. If objectives and training are poorly established and not developed on every level of staff, then physical deterioration of resources could occur and links between the school and the community lost. However, failure can still occur when program administrators are not qualified. Herschbach (1992) found that the best training for management is through internships with exemplary programs. Improved management also saves costs with physical resources that are not wasted.

The second component in internal efficiency is the development of instructional staff. "Successful educational change is built on effective teacher training".³¹ It has been found that students who learn from the best teachers can achieve up to one grade higher than those who learn from poorer teachers.³² An integral part of vocational programs is short and long term staff development, which includes the selection of the most qualified instructors based on objective criteria, pre and in-service training and monitoring and supervision focused on the immediate problems on the operational level (Herschbach 1992).³³

²⁸ Herschbach, D., et al. USAID. 1992. "Vocational Education and Training: Review of Experience, Latin America and the Caribbean."

²⁹ Bowels, W. U.S. Agency for International Development. 1988. *A.I.D.'s Experience with Selected Employment Generation Projects*.

Moock, P., and Rosemary Bellew. World Bank. 1988. "Vocational and Technical Education in Peru."

³⁰ The 3 most successful programs were Caribbean Regional, Honduras, and Paraguay. Honduras had a 90% job placement rate and stated that long-term commitment and management consensus and continuity all were key factors.

³¹ Verspoor, Adriaan. World Bank. 1989. "Pathways to Change: Improving the Quality of Education in Developing Countries."

³² Glassman, N. 1984. "Student Achievement and the School Principal." *Education and Policy Analysis*.

³³ In a review of the USAID program in the Dominican Republic, Dore, Girling, and Reichmann (1983) state high dropout rates to be one of the main problems. Buesing, Shea, and Lamb (1980) also said high dropout rates were a problem with the USAID program in Ecuador. The 3 most successful programs were Caribbean Regional, Honduras, and Paraguay. Caribbean regional had 82.2% job placement and said

In regards to teacher selection, the most cost-effective method of recruitment was found to be from industry rather than academia. Instructors coming from the industry need to be trained on instructional skills and classroom management. Such an arrangement is more cost effective than having to teach an individual industry technology, which can take as long as two years. Verspoor (1989) recommended this method.

Research also identified suitable student-teacher ratios being approximately 30:1 for TVET programs. This ratio was confirmed by several studies similar to the TVET in El Salvador project. For instance, the Asian Development Bank in 2005 studied ratio issues for the country of Cambodia. With a ratio of 30:1, administrators enjoyed almost 100% retention rate, an 85-90% graduation rate and around a 70% employment rate. A USAID 2006 study for Indonesian TVET programs had similar success with a ratio of 28:1.

Having a good student-teacher ratio is important because it is likely to increase the efficacy and be efficient in terms of per student unit costs. A policy option for the TVET in El Salvador is 30 students per teacher.

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This recommendation is based on estimates for other similar projects and what has worked for other countries may not work specifically for El Salvador. This is because some stages of various programs may require smaller group training, particularly for more sophisticated equipment. Currently the class sizes in El Salvador are approximately fifteen students per teacher, meaning classrooms and teachers are underutilized.

The Honduran Advisory Council for Human Resource Development (CADERH) was developed to serve as an independent board to provide standardized training materials and identify training needs based on employers. The training centers that participated in the program showed a productivity increase of 15%, a decrease in instruction time needed to cover the same materials by 50%, a retention rate of 80% and a placement rate of 70%. The cost per person per hour of instruction was \$0.25 (Herschbach 1992).

The third component of internal efficiency is through effective teaching materials.³⁴ In Nepal, technical training was found to be seven times more expensive than general education due to low student-teacher ratios as well as the expense of machines, equipment and buildings (Belbase 1984). The expense of machines also makes it difficult to upgrade equipment when technology changes. In the case of Nepal, textbooks were found to be the most cost effective resource available to

There is a significant relationship between the achievement of students and the number of courses an instructor completes (Fuller 1985).

careful training of instructors enhanced ability to teach, which led to success. Paraguay had 90% of grads working in the field in which they were trained, due in part to improved curriculum and teaching plans.

³⁴ In Honduras (1984-1992), the project was a success with a job placement rate of 90%, part of the success was due to over 200,000 training modules and audiovisual units that were produced and distributed to training centers, firms, and individuals.

students and teachers. They have a statistically positive relationship with achievement (Herschbach 1992). They also provide more technical and comprehensive information than many instructors. Textbooks can also provide updated information for instructors. Textbooks can be three or four times more cost effective than additional teacher training (Lockheed, Vail and Fuller 1986).

A second successful resource opportunity is a cooperative arrangement with industries to share equipment, technology and instructors. It is the most effective way to stay up to date with technology and share the costs of machinery. In addition, resource sharing should extend to placement components built into training programs. Placement assistance is a necessary component in vocational development (Herschbach 1992).³⁵

Successful programs place priority on strengthening management capability, increasing the opportunities for staff training and standardized curriculum and resources, and providing these resources in a cost-effective way. Training, supervision, and resources need an element of flexibility in content, methods and delivery in order to be effective. This flexibility allows for adaptation to a growing and possibly unstable labor market.

³⁵ Honduras (1984-1992) is an example of success due to use of outside training programs. The project had an overall job placement rate of 90% and 5,500 out of 6,500 (84.6%) participants received in-plant training from firms outside of the school. (McNeil and Milbrath; Paredes, Tucker and Gloetzner).

Facilities

There have been multiple attempts by governments and other organizations to improve the performance of their vocational students by improving the quality of the facilities in which they study. This method, however, is shown to have high costs. The question begs: is refurbishing classrooms and adding workshops the most efficient way to spend funds? Several authors cite the same conclusion: facilities should not be the primary focus of funding.

TVET schools should be maintained and have reasonable classrooms to provide an adequate learning environment. However, appearance or state-of-the-art classrooms should not be of concern. Also, expansion of existing facilities is not of primary importance for developing countries. The literature points to the use of textbooks as one of the only direct investments that should be made under the context of facilities. Textbooks serve as a teaching resource for faculty and students and are easier to update as technology changes than physical laboratories and equipment. Investment failure can then result from poor and outdated curricula (McMahon 1988).

Several authors cite the same conclusion: facilities should not be the primary focus of funding.

Having close partnerships with local industries is an effective method for proper TVET and real world application while also keeping down costs.³⁶ The more advanced training that is required can be done on-site with company partners. Most required education could be done in simple classrooms and inexpensive facilities. When the need arises for more advanced and specialized training, rather than building expensive facilities, it is much more cost-effective to train with professionals who have the most up to date technology.³⁷ Further, companies will be more willing to hire graduates with first hand experience, especially if this experience was gained at their own facilities. Also, if companies are more involved, their worker demands will be more apparent, making TVET schools responsive on both the supply and demand sides. Finally, these close partnerships are logical because it means that students will not be over-trained for local industries or trained for industries that do not exist locally.³⁸ Overall TVET will be more flexible, because training can easily shift between the industries depending on the market demand for products/services from a particular industry.

It could be the case that advanced educational facilities are built, and the equipment is more advanced than what the local industries are using. This is most likely prevalent when a large influx of investment is concentrated at one point in time to update vocational schools. Eventually, the equipment may become standard, but then with the next technology change, it will become obsolete. If industry equipment is used, students

³⁶ Dyankov, A. UNESCO. April 1996. "Current Issues and Trends in Technical and Vocational Education." *Section for Technical and Vocational Training*.

³⁷ Caribbean regional project (1982-87) was successful with an 82.2% job placement rate and they used on-site training with firms to train students (Comings, Girling, Rawlings, Saavedra, 1987). Honduras project (1984-92) was successful with a 90% job placement rate, and 5,500 out of 6,500 (84.6%) received in-plant training from firms (McNeil, Milbrath, and Paredes; Tucker and Gloetzner).

³⁸ A problem with the project in Ecuador (1979-1982) was a failure to set up links with potential employers and to organize the planned on-the-job training, which led to difficulty in job placement upon completion of the program (Lamb, 1980).

learn exactly what they need at far lower costs to educators. Employers are willing to participate in these programs because they are able to hire well-trained individuals.

Omari cited studies that found many TVET schools that operate well under capacity.^{39,40} This is very likely due to the inherent fluctuations in enrollment that come with developing countries. Therefore, focus should be placed upon encouraging and enabling students to attend TVET. For instance, Dyankov mentioned many countries where primary facility improvement included transportation improvement.⁴¹ This means enabling people without cars to more easily attend school.

Cantor described the Japanese system, which has proven to be quite successful.⁴² In Japan, corporations work very closely with TVET institutions to ensure employers are receiving graduates who are prepared to immediately function in the labor force. Further, these companies are willing to let TVET students use their facilities to gain first hand knowledge. In Japan, the country is quite developed, so many of the schools already have adequate facilities. A lesson can be learned, however, about the close relationships between employers and institutions, and the crossover use of facilities.

The trend away from using aid to simply make buildings with the most up to date technology and facilities is not new. Tilak's 1988 research concerning the shift of aid use from 'hardware to software' shows that facilities have been thought of for two decades as secondary in importance.

There need to be facilities for TVET students to learn. However, in large part, these can be shared with other schools and industries. Classrooms in existing TVET or even traditional schools can be used. More important is the use of industry facilities to foster relationships and allow students to use the most relevant and up-to-date facilities in the country.

This report recognizes that in El Salvador, many industries are small consisting of four or five employees. An alternative recommendation to the above proposal that if it is found to be too costly to foster private-public relations, then the schools should buy the equipment and rent out the facilities to the small industries during non-school hours. This would help mitigate the cost of the equipment and maintain vital private connections to ensure future student job placement.

³⁹ In Egypt (1980-1984), the target output was 200 students in the first year (1980) and 540 in each following year. Actual output was 85 students for the entire 4 year duration of the project (Shigetomi and Wilburn, 1984).

⁴⁰ Omari, I.M. 1991. "Innovation and Change in Higher Education in Developing Countries: Experiences from Tanzania." *Comparative Education*.

⁴¹ Dyankov, A. UNESCO. April 1996. "Current Issues and Trends in Technical and Vocational Education." *Section for Technical and Vocational Training*.

⁴² Cantor, Leonard. 1985. "Vocational Education and Training: The Japanese Approach." *Comparative Education*.

Study	Scholarships	Faculty	Facility	Level of achievement	Intensity per student
Caribbean regional 1982-1987 World Bank		Careful training of instructors enhanced ability to teach	On-site training was effective	-82.2% placed in jobs -Cost per employed grad: \$1,252	\$1,794
Dominican Republic 1980-1983 World Bank		Coordinators needed more training		-46% of registered women were working (not very successful) -Grant to provide training to women in counseling, human development, skills training -Lack of credit for the target group was a problem; high dropout rates	
Dominican Republic 1983-1988 World Bank	Student loans efficiently disbursed, but no certainty that it was in priority areas. No institutional sub-loans provided.	No faculty training provided—financially impossible due to devaluation of peso	Project ineffective in strengthening training institutions	-Not meeting objectives: only 20.4% graduated and found work -1,934 total in study, 394 graduated -Most failures in the project were because INFOTEP dropped out of the project at the last minute, so data is lacking and project did not meet objectives	\$3,516
Jamaica 1978-1982 World Bank		Jamaican staff should have received more early training		-All output qualitatively deficient; activities incomplete or never done; the manpower selection, training, and placement system is now less effective than before the project; data proved useless; 3 of 12 completed guidebooks useless; training curricula only partially completed. -Author suggested use of an ongoing linkage with a U.S. university for manpower data analysis over using individual consultants	Total: US\$950,000, GOJ\$650,000
Jamaica 1983-1989 World Bank		Instructors upgraded, but not all remained in the system or even in the country	New equipment and renovations of facilities	-Project too complex for its timeframe (5yrs); division among 3 agencies left authority unclear; unrealistic expectations	Total: US\$13.4m; GOJ\$49.9m
Ecuador 1978-1981 World Bank		Lack of staff was a problem	Evaluates project to expand the capacity of the Quito Working Boys' Center (QWBC) in Ecuador to provide income-generating vocational training; 8 women received on-the-job training	-37 men completed training; 8 women received on-the-job training; 69 mothers completed training, 8 employed; 10 young men placed -Two key issues: low enrollment (only 15-20% of all eligible youth) and high drop-out rates; other problems: unrealistic targets; lack of staff; inability to attract trainees; trainees lacked basic academic skills; management insufficiencies; counterpart contribution not made	\$2,439
Ecuador 1979-1982 World Bank		Objective: to upgrade instructional staff; Problem: staff development program not initiated, staff lacked basic communication skills. Other problems: confusion over staff roles and responsibilities, lackadaisical administration	Objective: to strengthen institutional quality; Problem: weak curriculum, lack of equipment and materials. Other problems: failed to set up links with potential employers and to organize the planned on-the-job training component.		\$1,205

Honduras 1984-1992 World Bank	Training loan fund; guidelines for dispersing the fund were changed many times, which hampered disbursements and project accomplishments	Long-term commitment, management consensus and continuity all were key factors; technical advisors must be prepared to adapt to the culture of those they are serving; problem: lack of sufficient mid-level technical specialists	Remodeled and equipped 16 vocational training centers, developed competency-based instruction materials and trade certification for 31 trades	The project was a success: 90% job placement rate; 5,500 out of 6,500 (84.6%) received in-plant training from firms, approx. 80% of trainees were female; over 200,000 training modules and audiovisual units were produced and distributed to training centers, firms, and individuals -Lessons learned: a key factor for self-sufficiency would be a training loan fund; validated competency tests should be in place before developing the self-instructional modules; funding should be provided if they expect an institution to become self-sustaining	\$4,720
Paraguay 1977-1978	Majority of students can't afford the \$4 a month tuition; 20% don't pay at all; 63% work while they study in order to pay tuition	13 new trained instructors (8 from abroad)	Objective: construct facilities; upgrade electrical installations. All objectives achieved, no major problems Outputs: two new buildings for mechanics and carpenter workshops; installation of new machinery equipment for training purposes; increase in # of hours of shop instruction; improved curriculum and teaching plan	Enrollment rose from 156 in 1977 to 296 in 1980 (overall capacity = 320); 90% of graduates are working in the field in which they were trained	Total: US\$390,000
Egypt 1980-1984 World Bank			Objective: establish training center for transportation sector to serve 10 public sector bus and truck companies Output: performance generally poor, construction behind schedule, training 6 months behind schedule	-Target was 200 in first year (1980) and 540 in each following year. Output was 85 people in 4 years (1980-1984) -Project addressed a political issue (resulting from problems associated with Commodity Import Program-financed buses), not a development issue -Creating a new institution is time consuming; politically motivated projects often experience problems during implementation	\$52,941
Jordan 1979-1982 World Bank		Staff training was on schedule and on target throughout the project	Objective: construct and equip trade training center Output: construction behind schedule (construction schedule too ambitious); building finished 10/1983; over 300 line items of commodities purchased to outfit workshops	-Success: construction was completed -The 21-month project was granted a 28-month extension, but it eventually achieved its purpose	\$5,449
Morocco 1980-1985 World Bank		Objective: improve quality and range of skill training opportunities; improve administrative and management capability of the Ministry of Handicrafts and Social Affairs. Staffed by 2 teams of Peace Corps volunteers	Objective: develop institutions capable of providing training services; 5 pilot skill centers (open to women in non-traditional vocational skills), 13 Vocational Education Centers (open mainly to poor young primary school dropouts)	-All institutions successfully completed, but job placement after training was a problem -329 women graduated from pilot skill centers (100% of project target); 1340 completed training at Voc. Ed. Centers, but enrollments have fallen steadily due to poor record of job placement -All centers had problems with job placement	\$8,209
Indonesia 1979-1983 World Bank		Faculty lack technical capability	Objective: construct training center	Delays in release of funds	
Pakistan 1984-1990 World Bank		Objective: provide participant training; train local staff. Problem: hard to recruit qualified locals			
Thailand 1966-1972 World Bank		Facilities, equipment, and materials were barely adequate, many equipment repair and replacement problems	Objectives: 54 mobile training centers, 5 regional polytechnic schools. Outputs: 45 mobile training centers; 1 regional polytechnic school	-Mobile training centers: 83% construction success; regional polytechnic schools 20% construction success	

Study	Scholarships	Faculty	Facility	Level of achievement	Costs
Haiti <i>Support to Training of Trainers for the TVET System</i> 2008 IDB		Development of Competency Based Training program, pilot the new program to 30 technicians in three fields (18 month training program), assess the results and propose strategy for nation-wide generalization		Project still in progress. Plan to train technicians who already work in the field. Assessment will take place through round table discussions with stakeholders. Plan on mitigating recurring cost of training by making the training centers autonomous and allowing them to make extra funds by renting out school equipment outside class hours or having other income generating activities.	\$250,000 from IDB and \$25,000 from Haiti government
Bahamas <i>Transforming Education and Training Phase 1</i> 2005 IDB		National Training Agency linked with the economic sector to coordinate manpower planning and skills certification	Development of a manpower/labor information system to provide info on future employment needs, private sector participation in identifying skill profiles and standards Technology integration – distance technology and information technology as core subject	Implementation in progress. Expect National Training Agency to be operational and integrated in the education system structure. Also E-literacy core implemented in pilot schools, increase of 10% in students certified.	\$22,500,000 from IDB and 4,500,000 from Country Counterpart Financing

Chapter III: El Salvador TVET

The purpose of this study is to determine best practices for formal vocational technical education programs in developing countries. The results of this analysis will help determine an allocation of MCC's budget that maximizes the return on investment and subsequently aid in MCC's economic rate of return analysis. Specifically, it has looked at the successes and failures of programs that include facility improvement, scholarships for students, and faculty training and resource improvement. These activities are the essential components of the Formal Technical Education Sub-Activity in the El Salvador Compact intended to reach the goals of increased income and increased employment rates for graduates of middle technical schools in the Northern Zone of El Salvador. Regardless of the criticism that vocation specific curricula are costly and only marginally effective, there is a positive rate of return on investment, which supports the continued use of these formal programs if implemented correctly (McMahon 1988).

This report uses summary statistics from El Salvador's Ministry of Education Middle Technical School database to evaluate the environment of Northern Zone TVET programs. The dataset has 912 school-level observations encompassing the entire country.⁴³ When available, data from 2006 and 2007 is tabulated for each variable. The figures look at student, teacher, and facility statistics.⁴⁴ Vocational or Technical Bachillerato has four grades (designated as 1V, 2V, 3V, and 4V). In order to proceed to the next grade, a student must be approved to do so. If not approved, they repeat the grade. Students can graduate in either year 3V or 4V. However, a student has other requirements in addition to approval in order to graduate.

Northern Zone

This report first summarizes the current state of middle technical schools in the Northern Zone of El Salvador as compared to national level data. As can be seen in Table 2, the Northern Zone's TVET programs have much poorer student statistics and lack the resources other TVET programs enjoy throughout the country. On average, the schools in the Northern Zone have lower enrollment, higher dropout rates and lower test scores. Universally, the number of accredited teachers and years of experience range from 20% to over 90% less than in other areas of El Salvador.

⁴³ This dataset was created by Mathematica by combining three different sources: (1) the "Censo Matricular, Matricula Inicial"; (2) the "Censo Matricular, Matricula Final"; and (3) the PAES data file. More information concerning the dataset can be found in Mathematica's memorandum, "Description of the School-Level Dataset," dated 5/9/2008.

⁴⁴ All figures can be seen in Appendix 1: Data Summary Figures.

TABLE 2

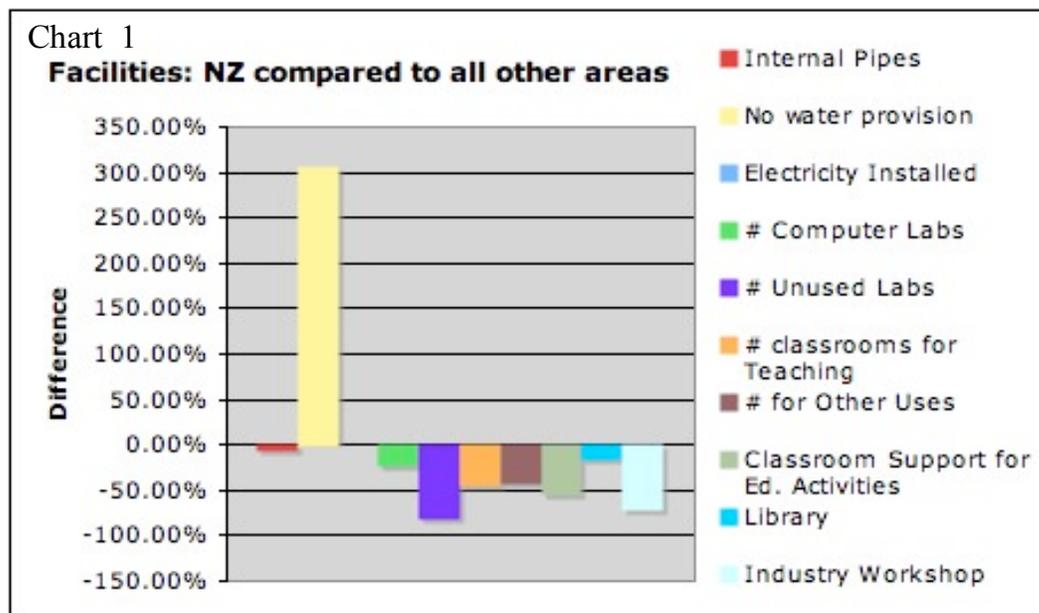
MEAN COMPARISON STUDENT AND TEACHERS OF THE NORTHERN ZONE
TO ALL OTHER ZONES OF EL SALVADOR (2007)

	Northern Zone	Remaining Zones
Total Enrolled Students in Vocational Programs	73.8 (144.67)	121.16 (238.98)
Graduates at Level 3V	6.57 (36.23)	3.73 (23.31)
Graduates at Level 4V	.11 (1.22)	.12 (1.56)
# of Dropouts Total	2.94 (11.18)	2.255435 11.59263
PAES Global Test Scores	5.53 (.75)	5.82 (.99)
# of Teachers at Vocational levels	5.05 (6.66)	7.88 (11.18)
Average years of experience for all Vocational Levels	5.71 (6.11)	7.7 (6.99)
Sample Size	142	770

Source: Calculations are based on the Ministry of Education's Middle Technical School Database, El Salvador 2006-2007

Note: Standard deviations are in parentheses

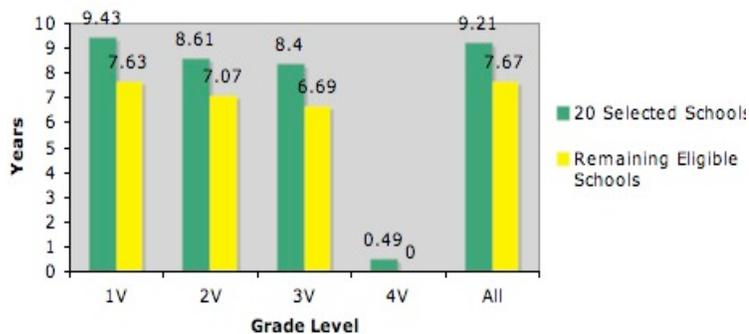
Chart 1 portrays the difference between facilities in the Northern Zone to the rest of the country. The Northern Zone has fewer schools with internal pipes as their source of water and more schools with no water provision available at all. There are also fewer schools in the north that have electricity installed. Overall, the Northern Zone has less facility space available for education. This can be seen in the fewer computer labs, libraries, classrooms used for teaching and other uses, and industry workshops.



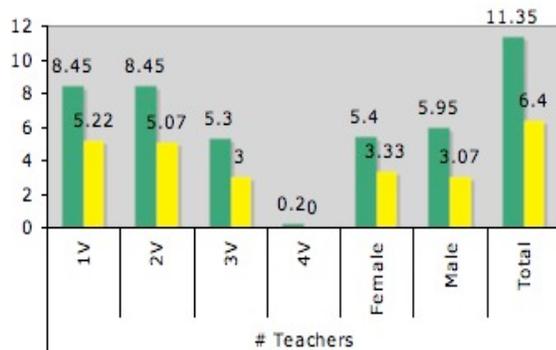
Intervention Schools

After analyzing the state of the Northern Zone of El Salvador, the current state of the 20 middle technical schools that were selected to receive aid from MCC are summarized and then compared to the remaining eligible schools in the Northern Zone that were not selected (55 schools). The following charts depict these statistics. The 20 intervention schools have a higher average enrollment of students than the other eligible schools in the Northern Zone. The enrollment is approximately double in the selected schools. The average number of teachers and the years of experience are also greater in the selected schools. There are approximately two more teachers in the selected schools per grade and they have approximately 2 more years of experience teaching.

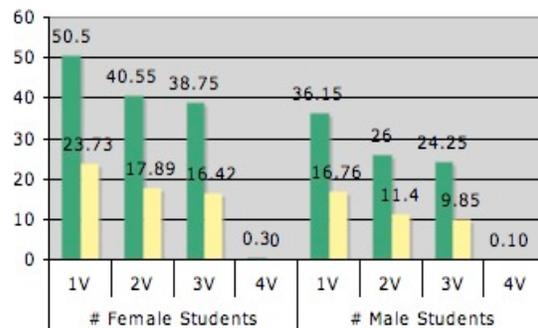
Teacher Experience



Teachers



Student Enrollment



The selected schools and remaining eligible schools have a different composition of programs offered. Table 3 is a mean comparison of the types of overall programs that are offered. These include day only programs, evening programs, and combination day/night programs. Table 4 shows a similar comparison with specific programs that are offered by the schools.

TABLE 3
MEAN COMPARISON OF PROGRAMS OFFERED

Program	Selected Schools	Remaining Eligible Schools	Difference Ratio*
Parvularia day program	.2 (.41)	.24 (.43)	.83 (.95)
1 st Cycle day program	.2 (.41)	.24 (.43)	.83 (.95)
2 nd Cycle day program	.2 (.41)	.24 (.43)	.83 (.95)
3 rd Cycle day program	.2 (.41)	.25 (.44)	.83 (1.10)
General day program	.9 (.31)	.95 (.23)	.95 (1.35)
Vocational day program	.8 (.41)	.71 (.46)	1.13 (.89)
Adult education day program	0 (0)	0 (0)	1 (1)
Distance education evening program	.2 (.41)	.18 (.39)	1.11 (1.05)
3 rd Cycle evening program	.05 (.22)	0 (0)	-
General evening program	.1 (.31)	.018 (.13)	5.56 (2.38)
Technical evening program	.05 (.22)	0 (0)	-
Adult evening program	.05 (.22)	0 (0)	-
Distance evening program	.3 (.47)	.24 (.43)	1.25 (1.09)
3 rd Cycle day/night program	.2 (.41)	.25 (.44)	.8 (.93)
General day/night program	.9 (.31)	.9 (.23)	1 (1.35)
Technical day/night program	.8 (.41)	.71 (.46)	1.13 (.89)
Adult day/night program	.05 (.22)	0 (0)	-
Distance day/night program	.3 (.47)	.24 (.43)	1.25 (1.09)
Sample Size	20	55	

Source: Calculations are based on the Ministry of Education's Middle Technical School Database, El Salvador 2006-2007

Note: Standard deviations are in parentheses

* Difference Ratio is the ratio of the mean and standard deviation of the selected schools divided by the mean and standard deviation of the remaining schools.

TABLE 4
MEAN COMPARISON OF STUDENTS ENROLLED IN SPECIFIC VOCATIONAL
PROGRAMS (2007)

Program	Selected Schools	Remaining Eligible Schools	Difference Ratio*
Accounting Specialty	57.95 (58.79)	44.53 (82.28)	1.30 (.71)
Technical Mechanics Specialty	6.35 (28.40)	0 (0)	-
Health Studies Specialty	3.90 (17.44)	0 (0)	-
Electro-technics Specialty	6.90 (30.86)	.93 (6.88)	7.42 (4.49)
Administrative Support Specialty	26.75 (72.09)	5.65 (30.77)	4.73 (2.34)
Accounting Support Specialty	45.2 (113.13)	16.36 (87.94)	2.76 (1.29)
Secretarial Support Specialty	12.6 (21.93)	7.33 (19.02)	1.71 (1.15)
Technical Auto Mechanics Specialty	11.6 (51.88)	0 (0)	-
Unspecified Bachelor's Program	.95 (4.25)	.02 (.13)	47.5 (32.69)
Electronics Specialty	0 (0)	0 (0)	-
Unspecified Business Field Specialty	42.9 (79.97)	21.24 (40.33)	2.02 (1.98)
Agricultural/Farm Specialty	1.5 (6.71)	0 (0)	-
Architecture Specialty	0 (0)	0 (0)	-
Electro-mechanics Specialty	0 (0)	0 (0)	-
Computer Science Specialty	0 (0)	0 (0)	-
Hotelier Specialty	0 (0)	0 (0)	-
Sample Size	20	55	

Source: Calculations are based on the Ministry of Education's Middle Technical School Database, El Salvador 2006-2007

Note: Standard deviations are in parentheses

* Difference Ratio is the ratio of the mean and standard deviation of the selected schools divided by the mean and standard deviation of the remaining schools.

While it was expected that these statistics would show the Northern Zone as being disadvantaged as compared to the rest of the country, it is not clear why the selected schools are at a clear advantage as compared to the remaining eligible schools in the Northern Zone. According to Mathematica, schools selected for intervention had a high score based on selection criteria and geographical dispersion. A high score reflected a high level of need according to the selection criteria.⁴⁵ Therefore, without the influence of geography, the selected schools reflect a higher need and should have fewer facilities and lower teacher and student statistics than the remaining eligible schools. However, the statistics above indicate that the selected schools have more available facilities, more teachers and with more experience, and a higher level of student achievement. One explanation for this is that because of the geography requirement, a school with less of a need may have been selected over a school with a higher need if the schools with higher needs were concentrated together and the school with less need was located in a different geographical region.

To determine the significance of the differences found above, a probit test was conducted on variables that indicated level of need. This was modeled after Mathematica's estimation of propensity score that was used to determine a control group for impact analysis.⁴⁶ The probability that a school was selected for intervention, coded 1 if the school was selected and 0 if it was eligible but not selected, is a function of a facilities score, the number of teachers, the average years of teaching experience, the total number of graduates and PAES Global Scores in 2007.

CIDE selected schools using *Score: Infrastructure and Space*, *Score: Access to Poor Populations*, and *Sum of Scores*. The original variables were not available and instead, a facilities score was calculated as:

$$\text{facilities} = \text{Internal pipes (2007)} + \text{number of computer labs (2007)} + \text{number of classrooms for education (2007)} + \text{library (2007)} + \text{electricity installed (2007)}^{47}$$

Graduates is a variable that sums the total number of graduates (3V, 4V, 2B and 3B) in 2007. These variables are correlated with probability of selection and also correlated with the outcomes Mathematica intends to measure in the impact analysis (education and labor market outcomes).

Table 5 presents the results of the probit model comparing the selected schools to the remaining eligible schools. A probit model is a non-linear model and therefore it is more relevant to examine the marginal effects as compared to the raw coefficients. The facilities score is negatively significant at the 10% level and the number of teachers is positively significant at the 5% level. The lower the facilities score and the higher

⁴⁵ CIDE was contracted to develop the criteria for selection of schools for intervention. When the selection criterion was agreed upon, the 75 schools eligible were ranked. CIDE's Entregable 17, Agosto 2008, describes the selection criteria and the construction of the ranking score.

⁴⁶ A propensity score is the probability that a school will be selected for intervention. The probit model above used similar variables as Mathematica's propensity score model in order to maintain measurement consistency. This can be found in: Mathematica Memorandum, "Selection of Comparison Group for the Impact Evaluation of the Technical Middle School Activity," 21 Nov. 2008. ESVED-133.

⁴⁷ Internal pipes, electricity installed, and library are variables coded as 1 if it is present and 0 if not available. A school with a higher facilities score has improved facilities and more facility space for education.

number of teachers a school has, the more likely they were selected for intervention. The table also shows a positive correlation between experience, graduation rates and PAES Global scores to selection for intervention. These variables are not significant however and the marginal effects are not very large. Therefore, the more years of teacher experience and student statistics that can be seen in the intervention group is not significant in the selection process.

TABLE 5
RESULTS FROM PROBIT MODEL USED TO COMPARE THE SELECTED
SCHOOLS TO THE REMAINING ELIGIBLE SCHOOLS IN THE NORTHERN ZONE

Variable	Coefficients	Marginal Effects
Facilities Score	-.13* (.08)	-.04* (.024)
# of Teachers	.14** (.058)	.042** (.018)
Average years of teaching experience	.016 (.076)	.0048 (.023)
Total number of graduates	.0042 (.019)	.053 (.06)
PAES Global scores	.17 (.21)	.0013 (.0057)
Constant	-2.08 (1.5)	-

Note: Variables are from 2007 data

*Significant at the 0.10 level.

**Significant at the 0.05 level.

***Significant at the 0.01 level.

Chalatenango

Finally this report summarizes the current state of the post-secondary institute of Chalatenango. Chalatenango had 20 students in 2006 and showed an increase to 43 in 2007. This institute has high approval rates and low dropout rates. Its facilities include internal pipes, installed electricity, multiple classrooms for various uses but no laboratory or workshop facilities for technical training.⁴⁸ The majority of funding for Chalatenango would have to go towards providing the facilities necessary to train teachers on the compulsory technical equipment on which they will be teaching in their own classrooms.

⁴⁸ The full data analysis is available in Appendix 1: Data Summary Figures.

Chapter IV: MCC First Round Assumptions

The Estimated Rate of Return (ERR)

Estimated rate of return (ERR) analysis is one method for deciding whether or not a policy or program should be implemented. ERR is viewed as the most effective means for judging the viability of a program. Because ERR is a quantitative approach to decision making, it is favored by many in the policy world due to its quasi-scientific nature.

When making an investment, the investor, or in the case of MCC, donor, is interested in ensuring a proper return on their investment. In the case of a financial investment, this would be increased money for the investor. MCC, however, is a donor, so rather than seeking more monetary returns for MCC, the desired outcome is increased returns for the people of El Salvador. An ERR predicts what that return will be based on some known information and some prediction. Thus before MCC or another investor would provide money to its investment program, an ERR will tell them, with varying certainty, if the investment will be worthwhile. It is important that the investment MCC makes produces greater returns for the people of El Salvador than the original investment, or the investment would be better spent otherwise.

MCC's ERR goal in their El Salvador TVET program was 8%. Because of a few measurement flaws, the goal was not met, yet the program has continued anyway. However, the plan of action for the TVET program can be tweaked to try and maximize this rate of return—Chapter V attempts to do so.

An ERR is a benefit-cost analysis that breaks down all of the expected costs of a program and compares them to the expected benefits. Often, many assumptions are made in formulating predictions for an ERR. Analysis is based on preliminary information and based on this information, the proposal must pass a preliminary test of financial feasibility, as tested by the ERR. This section of Chapter IV will describe the assumptions made in the original ERR and will refer to the “Original ERR” on page 31, which is the ERR that was developed in 2006.

Quantifiable Program Benefits

The primary objective in providing funding for El Salvador's TVET programs is to create opportunities for disadvantaged Salvadorans. Therefore, the most obvious gain people can make in attending TVET is the increase in pay they will see with an advanced degree. To calculate this benefit, MCC researchers found the average salaries of a person with a technical degree and of a person with an advanced technical degree as found in the 2004 Ministerio de Economía, Dirección General de Estadísticas y Censos (El Salvador's Ministry of Economy, Office of Statistics and Census). These salaries were compared to a person with no paying occupation.⁴⁹ As shown in figure 4.1, a person with a technical

⁴⁹ Ministerio de Economía, 2007. “Dirección General de Estadísticas y Censos.” *Encuesta de Hogares de Propósitos Múltiples*, División de Estadísticas Sociales.

degree that receives 10-12 years of education will have an expected monthly income of \$267.94, while a person with an advanced degree (which took 13 years) will have an expected monthly income of \$510.00. MCC expected a 78% graduation rate for middle school students and 72% for Chalatenango (advanced technical) students. Further, MCC examined the employment rate of TVET graduates and found it to be 49% for technical students and 70% for advanced technical students.

The benefits that come from the MCC program are only counted for students who would get their degree as a direct result of the MCC compact. For instance, teacher training would benefit all students who enter El Salvador's TVET schools, but benefit would only be counted for those who received a scholarship from MCC. Benefits to other students as a result of MCC policies would be too difficult to quantify and thus could not be included in the ERR. Based on these predictions and assumptions, MCC calculated its 15-year rate of return as 2% and its 25-year return as 6%. The values are positive, but a return of 6% in 25 years is minimal and well below the predetermined threshold of 8%. (These numbers are adjusted from a previous inaccurate estimation that was above the threshold, this current estimation is below the ERR threshold for El Salvador).

Program Costs

To calculate the costs in an ERR, an author must only know what the planned policies are and how much they will cost. As stated in previous chapters, the costs will come from three primary avenues: scholarships, training and facility improvement. In addition to those, there will be administrative costs associated with the compact.

The predicted yearly cost of scholarships in El Salvador to attend middle schools and Chalatenango were \$400 and \$900, respectively. To calculate scholarship costs, MCC predicted the amount of students for whom they would like to provide scholarships and multiplied it by the cost of the scholarship. At this point, MCC neglected to account for dropout rates. By calculating scholarship costs in this manner, MCC essentially assumed that all students dropped out after they had been in school for the three years necessary to graduate from middle school or the two years necessary to graduate from Chalatenango. This is nonsensical because a student would not dropout after they had completed all of their schooling (and used the full amount of their scholarship money). Rather, students realistically would drop out of school while in the middle of technical education. Since dropout rates were as high as 28%, the final rate of return would benefit significantly from removing these costs from the ERR.

Costs associated with both training and facility improvements were denoted as investment in the schools. The investments in the institutions were simply allocated by year in the ERR as decided by the overall budget allocation. Further detail can be seen in the original budget.

The final costs shown in the original ERR are those from administration. These costs are associated with the paperwork and manpower necessary to manage the implementation of TVET programs.

MCC initially planned to give TVET opportunities to 3,990 new students at middle schools and 2,400 new students at Chalatenango. With expected rates of graduation of 78 and 72 respectively, that equals 3,112 middle school graduate and 1,728 Chalatenango graduates. This is important to take into account since one method of maximizing benefit is maximizing the number of students graduating.

Original ERR

		1	2	3	4	5	6	7	8	9	10	
Enrollment projections - MINED												
Students graduating from the middle technical school (cumulative)		20 institutes					302	604	906	1,208	1,510	1,510
Graduates employed						303	303	303	303			
Students graduating from the middle technical school	78%					622	622	622	622			
New net enrollment (incremental)		0	798	798	798	798	798					
Total Enrollment	6,064	6,064	6,862	7,660	8,458	9,256						
Students graduating from MEGATEC (culmulative)												
Students graduating from MEGATEC (culmulative)					151	352	604	906	1,208	1,208	1,208	
Graduates employed					151	201	252	302	302			
Students graduating from MEGATEC	72%				217	289	362	434	434			
New net income (incremental)		0	300	400	500	600	600					
Employment rate for middle technical school												
Employment rate for middle technical school	49%	EHPM 2004										
Employment rate for MEGATEC	70%	ITCHA 2005										
Scholarships at middle technical school												
Scholarships at middle technical school	\$0.4											
Scholarships at MEGATEC	\$0.9											
Base salary (Statistics from EHPM-2004, Schedule E01, pg 67)												
Monthly income 10 to 12 years of study (\$000)	\$0.27											
Monthly income 13 or more years of study (\$000)	\$0.51											
Proposed evaluation model												
Annual incremental salary of technical school	42.2%											
Annual incremental salary of MEGATEC	36.6%											
Detailed costs												
Total investment in Chalatenango		\$650	\$3,100	\$2,150	\$800	\$300						
Total investment in middle technical school		\$700	\$3,950	\$2,300	\$1,400	\$650						
Cost of study at middle technical school		\$0	\$319	\$638	\$958	\$958	\$958	\$638	\$319	\$0		
Cost of study at MEGATEC		\$0	\$481	\$1,123	\$1,444	\$1,764	\$1,925	\$962				
Technical Assistance Contract		\$720	\$400	\$400	\$400	\$400						
Compact Admin		\$ 476	\$ 476	\$ 476	\$ 476	\$ 476						
Total costs		\$2,546	\$8,726	\$7,087	\$5,477	\$4,548	\$2,882	\$1,601	\$319	\$0	\$0	
Benefits												
Additional income		\$0	\$0	\$0	\$0	\$338	\$1,166	\$2,107	\$3,160	\$4,213	\$4,590	
Total benefits		\$0	\$0	\$0	\$0	\$338	\$1,166	\$2,107	\$3,160	\$4,213	\$4,590	
Net Benefit Flow		-\$2,546	-\$8,726	-\$7,087	-\$5,477	-\$4,210	-\$1,716	\$506	\$2,841	\$4,213	\$4,590	
15-year ERR												
2%												
25-year ERR												
6%												

Compact Budget

For the TVET, the largest slice of the budget pie is usually allocated for equipment, as is the case for El Salvador. This is because the equipment is work specific and more expensive than that needed for general education. Other large portions of the budget include administrative support services (such as centralized computing and accounting services), student services (such as the registrar's office and financial aid), maintenance, including grounds, building services, and utilities; and libraries. Generally, the allocations fall into three main activities: (1) salaries and benefits; (2) capital outlay, which refers to major purchases of expensive equipment, such as equipment and systems, and (3) expense items, which include less expensive items and continuing costs such as office furniture, service contracts, expendable supplies, and travel.

Flow and Allocations

Budget is the architecture (or basic plan per category) of how money will be expended. Allocation, however, refers to the actual funneling of dollars to various units within an institution. The classical budget allocation done is through “incremental budgeting.” This is when an institution uses current and past budgets as guides and adds to or subtracts from them to arrive at the coming period's expenditures. The advantages of this are that the budget is stable and change is gradual. Managers can operate their departments on a consistent basis and the system is relatively simple to operate and easy to understand. However, allocating in this manner also carries disadvantages. For instance, it assumes activities and methods of working will continue in the same way. There is little incentive for developing new ideas and this method encourages spending up to the budget so that the budget is maintained next year.

Another allocation process, often coupled with incremental budgeting, is formula-based allocation. This can be more flexible than simple incremental budgeting, because such formulas are usually based upon total credit hours or full-time head count per academic unit. This type of allocation process rewards those academic units that are most popular with students, and therefore provides flexibility to fund programs that are most in demand. Conversely, if an academic program is critical to an institution's mission, but does not attract large numbers of students, it is automatically punished by formula-based allocations. In short, this is a market-based allocation process.

The TVET budget for El Salvador is relatively new, meaning that the program has only started a couple of years ago and has not had much time to reflect results and adjust budget categories accordingly. It is based on the economic census and plans for economic growth through some of the successful economic sectors such as textiles, coffee and tourism. Therefore there may not be enough past information to use incremental budgeting and it is quite likely that the budget is mixture of formula based allocation and estimates. One consideration is that the estimates are government based and it is assumed that the industry has been consulted prior to the allocation to the programs. In this way the TVET programs are still market based and thus the students will be interested to apply since the chances of being employed will be stronger.

The current budget puts much of its emphasis on strengthening the 20 middle school institutions and Chalatenango through refurbished buildings, labs, equipment and

learning resources. The total going to buildings, equipment and training is \$16 million (70%) over the period of five years. The amount budgeted for facilities and equipment for Chalatenango and the middle schools is \$12.8 million. This total is excluding staff training, which will still require specific training equipment but is in a separate category.

Faculty Assumptions

According to the updated figures, the project will have approximately 2,765 new students enrolled over the length of the project. The students will be spread across the 20 schools discussed earlier. Currently the budget appears to be training the faculty while on the job, throughout the five-year period.

Facilities Assumptions

Currently the instructional equipment for Chalatenango and the 20 middle schools is \$4,600,000 for the period of 5 years. This is 28% of the \$16 million investment in strengthening the middle school and Chalatenango institutions and the highest expense category of the three (buildings, equipment, learning resources) making 42%..

Scholarship Assumptions

The updated ERR tells us that MCC pays \$400 for the 1st year/student in the Middle Technical School and \$1500 for the first year/student at Chalatenango. MCC also pays the 2nd year tuition for some of the students but not all. Therefore scholarships have allocated \$1,536,000 for 3,840 middle school scholarships for the three years. The remaining \$1,356,190 is covered by the government. For Chalatenango, \$2,100,000 is paid by MCC and \$342,000 by the government, totaling \$3,646,000 for scholarships.

In terms of administrative costs, it was updated to \$4.7 million, which includes technical assistance expenses as well as “compact administration”

The Original Budget

The original budget as given by MCC is for a total of \$20 million that would go toward formal TVET education. The three main categories of expenses included improvements for the Megatec Institute of Chalatenango, scholarships and middle school improvements. The total allocated for Chalatenango is \$7 million and it includes subcategories such as: building and workshop improvement, purchase of instructional equipment and learning resources such as software and instructional equipment as well as program design and training for Chalatenango personnel. A lot of the investment for Chalatenango is frontloaded in the first few years. This is because there is a lot of funding that goes towards strengthening of the buildings, equipments and resources in the beginning and towards the end of the program, presumably the money is used for maintenance, parts replacements, etc.

In terms of scholarships, money is not allocated in the first year of the compact because the scholarships start from the second year of the compact onward. According to the original ERR, there are 798 new student enrollments each year as paid for by MCC.

The scholarship administration services are also under the category of scholarships, bringing the total to \$3.8 million.

In terms of middle school strengthening, for the 20 institutions, there is \$9 million disbursed through expenditure on buildings and workshops, instructional equipment, learning resources and program design training for the directors, teachers and staff. The investment in buildings and equipment is equal to \$2.5 million, which, together with the learning resources, is the largest sum of the budget money in this category.

The Original Budget

	Year 1				Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
	Q1	Q2	Q3	Q4						
Education										27,705,000
FORMAL EDUCATION										7,000,000
MEGATEC Institute of Chalatenango										7,000,000
Buildings, workshops, labs and physical assets				50,000	50,000	800,000	550,000	200,000		1,600,000
Instructional Equipment				250,000	250,000	1,200,000	300,000	250,000	100,000	2,100,000
Learning Resources (software, instructional materials)				100,000	100,000	800,000	800,000	250,000	150,000	2,100,000
Program design and training for MEGATEC personnel		50,000	100,000	100,000	250,000	300,000	500,000	100,000	50,000	1,200,000
Scholarships										3,800,000
Scholarships for MEGATEC and Middle Schools						200,000	800,000	800,000	1,655,000	3,455,000
Scholarships administration service						20,000	80,000	80,000	165,000	345,000
Middle School Strengthening for 20 institutes										9,000,000
Buildings, workshops, labs and physical assets				100,000	100,000	1,500,000	500,000	400,000		2,500,000
Instructional Equipment				250,000	250,000	1,200,000	800,000	250,000		2,500,000
Learning Resources (software, instructional materials)			150,000	100,000	250,000	750,000	500,000	250,000	250,000	2,000,000
Program design and training for 2,000 middle schooldirectors, teachers and staff				100,000	100,000	500,000	500,000	500,000	400,000	2,000,000
INFORMAL EDUCATION										5,005,000
INSAFORP training administration					60,000	160,000	120,000	60,000	55,000	455,000
Training			300,000	300,000	600,000	1,600,000	1,200,000	600,000	550,000	4,550,000
EDUCATION SECTOR TECHNICAL ASSISTANCE CONTRACT										2,900,000
Diagnostic Studies		100,000	100,000	100,000	300,000					300,000
Study for Generation of Local Revenue				100,000	100,000					100,000
Education Sector Technical Assistance Contracts					500,000	500,000	500,000	500,000	500,000	2,500,000
SUBTOTAL	\$ -	\$ 150,000	\$ 650,000	\$ 1,550,000	\$ 2,910,000	\$ 9,530,000	\$ 7,150,000	\$ 4,240,000	\$ 3,875,000	\$ 27,705,000

Chapter V: Updated Assumptions

Estimated Rate of Return (ERR)

New Benefits

As mentioned in Chapter IV, the initial ERR only accounted for increases in wages for TVET graduates. It is possible, however, to adjust the scope of the ERR. In this case, even though the primary concern is TVET students, others will benefit from their education. Chapter I described the importance of human capital investment and the many advantages it has. Among these benefits are those to the overall Salvadoran economy. By having more educated and thus more effective workers, the economy will become more efficient. The effects can best be shown through increased outputs by the companies for whom TVET graduates will work. These increased outputs grow the Salvadoran economy and provide benefits in a number of ways.

Determining how much extra output these firms will enjoy can be difficult, but previous studies provide general methods for predicting the increases in output. It can be assumed that a better educated worker will increase productivity. At the same time, in the case of El Salvador, household survey data⁵⁰ has shown what expected wage increases should be. These two clues provide enough information to predict increases in output. As companies hire better workers, it will become more efficient and will enjoy more revenue and thus more profit. With these extra profits, employers will increase the wages of their workers, to whom they owe the companies' increase in revenue. Previous studies⁵¹ have shown that, in general, firms can be expected to pay 50% of their new profits to their employees. Thus simply doubling the known value of wage increases enjoyed by Salvadorans, the amount of new revenue for these firms can be derived. Since new firm revenue paid to employees is about 50%, the extra gain to the employers will be equal to the gain of the employees. Thus, the benefit stream is effectively doubled when the larger Salvadorian economy's benefits are considered.

Apart from additional output, other benefit or cost streams are near impossible to include in a ERR with the available data. For instance, costs such as opportunity cost or benefits such as improved school quality are impossible to quantify.

MCC Updates to the ERR

The ERR discussed in Chapter IV was last updated in 2006. Two years later, MCC has begun the compact, chosen its 20 schools, collected more data and refined its policy strategies. This section will thus bring the ERR to its current state. The updated ERR is shown on page 50.

⁵⁰ Dirección General de Estadística y Censos (DIGESTYC). Gobierno de la República de El Salvador. Ministerio de Economía. 2008. *Encuesta de Hogares de Propósitos Múltiples 2007* (STATA Dataset).

⁵¹ Organisation for Economic Co-operation and Development. 1998. "Human Capital Investment: An International Comparison."

Initially, Chalatenango scholarships were expected to cost \$900 per student per year. MCC has since found that Chalatenango scholarships will cost \$1500 per student per year. Middle school scholarships, on the other hand, have been found to be constant at \$400. This cost disparity is very significant because studying at Chalatenango is almost four times that of the middle schools.

MCC, working with the El Salvador Ministry of Education, has decided upon its scholarship allocations. The exact figures for middle school scholarships have been decided upon by year and level. Scholarships for Chalatenango have been decided only in terms of how many scholarships will be handed out per year. In the original ERR, MCC had planned to provide scholarships to five new classes of students. In their updates, they have decided to provide for only four classes at both the middle schools and Chalatenango. The expected allocations are shown on page 51. In the second year of the compact, MCC will begin to provide scholarships for 150 students, then 1,000, 1,000 and 615 incoming students each following year. Further, in the third year of the compact, MCC will provide half the amount of scholarships to level two students as to level one students from the year before. The remainder of scholarships needed for the first class will be provided by El Salvador's Ministry of Education. MCC will provide no level three scholarships, as El Salvador will be responsible for all students entering level three.

Chalatenango scholarships will be assumed to operate in the same way as middle school scholarships. The total amount of scholarships per year has been predetermined. Thus half of the students from the first level will be funded at the second level. Figure 5.3 shows the scholarship allocations. Since Chalatenango is only a two-year program,⁵² El Salvador only needs to provide for the remaining level two students.

In this updated ERR, dropout rates were accounted for in determining how many scholarships need to be provided. As mentioned in Chapter IV, students will most likely drop out either after receiving funding for either their first or second year. Household survey data has shown that most students drop out after their first year. Thus in this ERR, it is assumed that 75% of dropouts happen after the first year and 25% after the second. Therefore, if dropout rate is 22%, as with middle schools, then 83.5% of the class will remain after the first year and 78% will remain after the second. This reduction means that 16.5% fewer scholarships in the second year need to be provided than were suggested in the first ERR. Further 22% fewer scholarships need to be provided for the third year than were expected. For Chalatenango scholarships, 28% fewer scholarships need to be provided the second year as opposed to the first ERR.

New wage rates were calculated using El Salvador's 2007 census data. The mean salary was calculated for individuals with 10-12 years of schooling. The salary was also calculated for individuals with 13 or more years of schooling. This was done to be consistent with the calculations in the original ERR. Individuals with 10-12 years of schooling made an average of \$26,000 in 2007. Individuals with 13 or more years of schooling made on average \$46,000. Vocational education is generally identified as having completed year 12 while General Bachillerato is identified as having completed 11 years of school. Finally, the new benefit flow of increased output is included in the new version of the ERR.

⁵² The Original ERR calculations showed that students only attend Chalatenango for two years and middle schools for three.

With all of the changes mentioned above, the ERR shows the following results. The rate of return has increased to 6% over 15 years and 9% over 25 years. The program should result 2,765 new students having the opportunity to attend middle school, with 2,154 of them expected to graduate. 956 new students should enter Chalatenango with 691 of them graduating for a total of 2,845 new Salvadorans graduating with technical degrees. The total budget of the program will be \$26,033,000 with all promised scholarships, improvements and administrative costs. Since MCC has agreed to pay all improvement and administrative costs in addition to some scholarship costs, MCC has promised to pay \$24,334,800—more than four million over the budget of \$20 million. Finally, the most current plan expects El Salvador to pay \$1,698,570 dollars in scholarship money. In comparison with the old ERR, meaning the elimination of the new benefit stream, the rate of return decreases to negative 3% over 15 years and 4% over 25 years. Since the original returns were expected to be 2% and 6%, the updates result in a 5% loss in the first 15 years and a 2% loss over 25 years. Thus the recently decided allocations are damaging to the rate of return prediction.

Updated ERR

		1	2	3	4	5	6	7	8	9	10	
Enrollment projections - MINED												
Students graduating from the middle technical school (cumulative)		20 institutes				56	435	814	1,047	1,047	1,047	
Graduates employed						57	380	380	233	0		
Students graduating from the middle technical school	78%					117	779	779	479	0		
New net enrollment (incremental)		0	150	1,000	1,000	615						
Total Enrollment	4,332	4,332	4,482	5,482	6,482	7,097						
Students graduating from MEGATEC (cumulative)												
Students graduating from MEGATEC					176	315	447	481	481	481	481	
Graduates employed					176	138	132	35	0			
Students graduating from MEGATEC	72%				253	199	190	50	0			
New net enrollment (incremental)		0	350	275	263	69						

Employment rate for middle technical school	49%
Employment rate for MEGATEC	70%

Scholarships at middle technical school	\$0.4
Scholarships at MEGATEC	\$1.5

Base salary	
Monthly income 10 to 12 years of study (\$000)	\$0.26
Monthly income 13 or more years of study (\$000)	\$0.46

Proposed evaluation model	
Annual incremental salary of technical school	42.2%
Annual incremental salary of MEGATEC	36.6%

	1	2	3	4	5	6	7	8	9	10
Detailed costs										
Total investment in Chalatenango	\$650	\$3,100	\$2,150	\$800	\$300					
Total investment in middle technical school	\$700	\$3,950	\$2,300	\$1,400	\$650					
Cost of study at middle technical school	\$0	\$60	\$450	\$781	\$892	\$517	\$192	\$0	\$0	
Cost of study at MEGATEC	\$0	\$525	\$791	\$691	\$387	\$50				
Technical Assistance Contract	\$720	\$400	\$400	\$400	\$400					
Compact Admin	\$476	\$476	\$476	\$476	\$476					
Total costs	\$2,546	\$8,511	\$6,566	\$4,547	\$3,104	\$567	\$192	\$0	\$0	\$0

Benefits										
Additional income	\$0	\$0	\$0	\$0	\$354	\$699	\$1,419	\$1,944	\$2,223	\$2,223
Estimated Employer Increased Output Income	\$0	\$0	\$0	\$0	\$354	\$699	\$1,419	\$1,944	\$2,223	\$2,223
Total benefits	\$0	\$0	\$0	\$0	\$708	\$1,398	\$2,839	\$3,888	\$4,447	\$4,447
Net Benefit Flow, minus Increased Output	-\$2,546	-\$8,511	-\$6,566	-\$4,547	-\$2,750	\$132	\$1,228	\$1,944	\$2,223	\$2,223
Net Benefit Flow	-\$2,546	-\$8,511	-\$6,566	-\$4,547	-\$2,397	\$832	\$2,647	\$3,888	\$4,447	\$4,447
Cumulative Net Benefit Flow	-\$2,546	-\$11,057	-\$17,623	-\$22,170	-\$24,567	-\$23,735	-\$21,088	-\$17,201	-\$12,754	-\$8,307

	6%	-3%	Total MS Schol.	\$2,892	MCC MS Schol.	\$1,536.0	ES MS Schol.	\$1,356.19
15-year ERR (w/ & w/o Added Output)	6%	-3%	Total MT Schol.	\$2,442	MCC MT Schol.	\$2,100.0	ES MT Schol.	\$342.38
25-year ERR (w/ & w/o Added Output)	9%	4%	Total MS Inv.	\$9,000	MCC MS Inv.	\$9,000	ES MS Inv.	\$0.00
New MS students (Before & After Dropouts)	2,765	2,154	Total MT Inv.	\$7,000	MCC MT Inv.	\$7,000	ES MT Inv.	\$0.00
New MT students (Before & After Dropouts)	956	691	Total Admin.	\$4,699	MCC Admin.	\$4,699	ES Admin.	\$0.00
Total (Before & After Dropouts)	3721	2,845	Total Costs	\$26,033	Total MCC Costs	\$24,334.8	Total ES Costs	\$1,698.57

Changes Made:	Line	Change
Decreased Expected Wage	26-27	Changed to .26 and .46
Add Estimated Employer Increased Output	45	Is equal to increased wages
MEGATEC scholarship costs	23	Increased to 1500
Student Enrollment	11	Changed based on Household Survey data
Scholarships Amounts	10	Set to most recent numbers
Account for dropouts in scholarships	37-38	For MS, drop outs were 83.5% by 1st yr, 78% by 2nd. For MT, 72% dropped after 1st yr
MT scholarships	16	are assumed to be organized the same as MS scholarships

Updated Scholarship Allocations

Midde Schools						
Year	1	2	3	4	5	Total
1		150	1000	1000	615	2765
2			75	500	500	1075
3						0
Total		150	1075	1500	1115	3840
Chalatenango						
Year	1	2	3	4	5	Total
1		350	275	263	69	956
2			175	138	131	444
Total	0	350	450	400	200	1400

The Recommended ERR

Chapter II recognized many recommendations based on literature about previous TVET programs. This section will describe the effects of those recommendations if they were to be implemented. Further, suggestions for resource allocations to maximize the ERR will be provided. The recommended ERR is shown on page 54.

One of the more glaring recommendations that applies easily to the ERR is the problem of middle school facility improvement. Rather than building new labs and workshops for students, the literature review found it more efficient to foster partnerships with local businesses and industries. For this reason, in the recommended ERR, new facilities in middle schools have been completely eliminated. Doing so frees almost \$5 million for spending on other categories. The budget for improving middle schools was not completely eliminated however. The literature review showed the importance of teacher training and especially textbooks and software for learning aids. Thus the original allocation of \$4 million is still provided for those purposes.

The recommended ERR does not advocate for eliminating lab and workshop construction in Chalatenango. It was concluded that Chalatenango would be the hub of vocational training in El Salvador, and so it is important to have facilities where the best students may explore and experiment more rather than only learning to become effective workers. This is difficult in business or internship settings intended to familiarize students with the workplace. Thus Chalatenango's improvement budget was not changed in the recommended ERR.

An important consideration when eliminating facility improvement is the prospect of fostering relationships between industries and schools. Therefore, there must be faculty hired to ensure students may find placements in a relevant setting. The administrative allocations were increased significantly to allow for the hiring of full time positions to administer school-industry relationships. Further, MCC should provide funding for administrative guidance two years after the compact has completed so that the students entering schools due to MCC's scholarships have MCC-funded guidance for their entire TVET career. Thus extra administrative funding has been allotted for the two years after the compact is complete to ensure the school-industry relationships stay intact.

The final adjustments recommended are those of scholarship allocation. The literature review states that scholarships are necessary for the access of students to institutions. In the case of El Salvador, MCC aims to increase student access. Thus to maximize benefit, MCC should concentrate much of its budget on scholarships. This means either increasing the money for scholarships by cutting expenses on other categories or by reducing the costs of scholarships.

Wages were not adjusted in the new ERR. The human capital theory recognizes that an increased number of educated workers result in increased wages for all workers in the area. This is due to spillovers and increased productivity. Wages were not increased in this case because, conservatively, wages are not expected to rise immediately. It will take time for wages to adjust to the increased number of educated workers and the resulting productivity.

In the case of the middle schools, for reasons of cost sharing and encouragement of sustainability, MCC only paid for the first and half of the second year scholarships. El Salvador was expected to pay the rest. This rule should apply to Chalatenango as well. MCC should provide the first year of study and let El Salvador pay for the second and final year of study. By doing so, MCC clears more money so that it may achieve its budgetary goal of spending \$20 million. In addition to this scholarship policy change, MCC should provide fewer Chalatenango scholarships and more middle school scholarships. The reasons for this are twofold. First, the returns from middle schools are much better since they are much less expensive than Chalatenango and yet still provide for significant increases in wages. The recommended scholarship allocations are shown on page 53. The other reason being that a pure increase in the amount of technical graduates (as is the result of this reallocation) affects more Salvadorans, and can thus be viewed as increased program success.

If the recommended ERR is implemented, it will have the following results, as shown on page 55. Most importantly, the 15-year rate of return would be 12%, while the 25-year rate of return would be 15%. Even if the new benefit stream is not used, the 25-year rate of return becomes 8%, which achieves MCC's goal. Further, there would be an increase in students entering the system to 6,325 with 4,882 of them expected to graduate. Overall program costs would decrease to \$23.6 million. MCC would also be within its budget of \$20 million. One challenge, however, is that the amount El Salvador's Ministry of Education contributes would increase significantly to \$3.6 million.

Recommended Scholarship Allocations

Midde Schools						
Year	1	2	3	4	5	Total
1		1346	1346	1346	1487	5525
2			600	600	600	1800
3						0
Total		1346	1946	1946	2087	7325
Chalatenango						
Year	1	2	3	4	5	Total
1		200	200	200	200	800
2						0
Total	0	200	200	200	200	800

Recommended ERR

		1	2	3	4	5	6	7	8	9	10	
Enrollment projections - MINED												
Students graduating from the middle technical school (cumulative)		20 institutes				510	1,020	1,530	2,094	2,094	2,094	
Graduates employed						511	511	511	564	0		
Students graduating from the middle technical school	78%					1,049	1,049	1,049	1,158	0		
New net enrollment (incremental)		0	1,346	1,346	1,346	1,487						
Total Enrollment	4,332	4,332	5,678	7,024	8,370	9,857						
Students graduating from MEGATEC (culmulative)												
Graduates employed					101	201	302	403	403	403	403	
Students graduating from MEGATEC	72%				145	145	145	145	0			
New net enrollment (incremental)		0	200	200	200	200						

Employment rate for middle technical school	49%
Employment rate for MEGATEC	70%

Scholarships at middle technical school	\$0.4
Scholarships at MEGATEC	\$1.5

Base salary	
Monthly income 10 to 12 years of study (\$000)	\$0.26
Monthly income 13 or more years of study (\$000)	\$0.46

Proposed evaluation model	
Annual incremental salary of technical school	42.2%
Annual incremental salary of MEGATEC	36.6%

	1	2	3	4	5	6	7	8	9	10
Detailed costs										
Total investment in Chalatenango	\$650	\$3,100	\$2,150	\$800	\$300					
Total investment in middle technical school	\$315	\$1,778	\$1,035	\$630	\$293					
Cost of study at middle technical school	\$0	\$538	\$988	\$1,408	\$1,464	\$917	\$464	\$0	\$0	
Cost of study at MEGATEC	\$0	\$300	\$516	\$516	\$516	\$144				
Technical Assistance Contract	\$720	\$400	\$400	\$400	\$400					
Compact Admin	\$500	\$500	\$500	\$500	\$500					
Total costs	\$2,185	\$6,616	\$5,589	\$4,254	\$3,473	\$1,061	\$464	\$0	\$0	\$0

Benefits										
Additional income	\$0	\$0	\$0	\$0	\$202	\$1,017	\$1,831	\$2,645	\$3,322	\$3,322
Estimated Employer Increased Output Income	\$0	\$0	\$0	\$0	\$202	\$1,017	\$1,831	\$2,645	\$3,322	\$3,322
Total benefits	\$0	\$0	\$0	\$0	\$404	\$2,033	\$3,662	\$5,290	\$6,644	\$6,644
Net Benefit Flow, minus Increased Output	-\$2,185	-\$6,616	-\$5,589	-\$4,254	-\$3,271	-\$44	\$1,367	\$2,645	\$3,322	\$3,322
Net Benefit Flow	-\$2,185	-\$6,616	-\$5,589	-\$4,254	-\$3,068	\$972	\$3,198	\$5,290	\$6,644	\$6,644
Cumulative Net Benefit Flow	-\$2,185	-\$8,801	-\$14,390	-\$18,644	-\$21,712	-\$20,740	-\$17,542	-\$12,252	-\$5,608	\$1,035

15-year ERR (w/ & w/o Added Output)	13%	3%	Total MS Schol.	\$5,779	MCC MS Schol.	\$2,930.0	ES MS Schol.	\$2,849.1
25-year ERR (w/ & w/o Added Output)	16%	9%	Total MT Schol.	\$1,992	MCC MT Schol.	\$1,200.0	ES MT Schol.	\$792.00
			Total MS Inv.	\$4,050	MCC MS Inv.	\$4,050	ES MS Inv.	\$0.00
New MS students (Before & After Dropouts)	5,525	4,304	Total MT Inv.	\$7,000	MCC MT Inv.	\$7,000	ES MT Inv.	\$0.00
New MT students (Before & After Dropouts)	800	578	Total Admin.	\$4,820	MCC Admin.	\$4,820	ES Admin.	\$0.00
Total (Before & After Dropouts)	6,325	4,882	Total Costs	\$23,641	Total MCC Costs	\$20,000.0	Total ES Costs	\$3,641.1

Changes Made:	Line	Change
Decreased Expected Wage	26-27	Changed to .26 and .46
Add Estimated Employer Increased Output	45	Is equal to increased wages
MEGATEC scholarship costs	23	Increased to 1500
Student Enrollment	11	Changed based on Household Survey data
Scholarships Amounts	10	Set to most recent numbers
Account for dropouts in scholarships	37-38	For MS, drop outs were 83.5% by 1st yr, 78% by 2nd. For MT, 72% dropped after 1st yr
MT scholarships	16	Set to most recent numbers
Recommended:		
Middle School Improvements	36	Subtracted building costs, decreasing costs by 55%
Admin Costs	40	increase for partnership facilitation. Also extended 2 years for care of all students
Scholarship funding for MEGATEC students	SA, 9	Stopped paying for 2nd year of study for MEGATEC students since it is only 2 years.
Scholarships for MS students	SA, 2-3	Used money saved in other areas to give more MS scholarships
Scholarship funding for MEGATEC students	SA, 8	Decreased amount of MT scholarships

Budget/ERR Comparison Table

Updated Budget/ERR				Recommended Budget/ERR			
15 year ERR	w/New Benefit	6%		15 year ERR	w/New Benefit	12%	
	w/o New Benefit	-3%			w/o New Benefit	2%	
25 year ERR	w/New Benefit	9%		25 year ERR	w/New Benefit	15%	
	w/o New Benefit	4%			w/o New Benefit	8%	
New Middle School Enrollment				New Middle School Enrollment			
	Before Dropout	2,765			Before Dropout	5,525	
	After Dropout	2,154			After Dropout	4,304	
New Chalatenango Enrollment				New Chalatenango Enrollment			
	Before Dropout	956			Before Dropout	800	
	After Dropout	691			After Dropout	578	
New Total Enrollment				New Total Enrollment			
	Before Dropout	3,721			Before Dropout	6,325	
	After Dropout	2,845			After Dropout	4,882	
MCC Costs (in thousands)				MCC Costs (in thousands)			
	Middle School Scholarships	\$1,536			Middle School Scholarships	\$2,930	
	Chalatenango Scholarships	\$2,100			Chalatenango Scholarships	\$1,200	
	Middle School Facility Investment	\$9,000			Middle School Facility Investment	\$4,050	
	Chalatenango Facility Investment	\$7,000			Chalatenango Facility Investment	\$7,000	
	Administration	\$4,699			Administration	\$4,820	
	Total	\$24,335			Total	\$20,000	
MINED Costs (in thousands)				MINED Costs (in thousands)			
	Middle School Scholarships	\$1,356			Middle School Scholarships	\$2,849	
	Chalatenango Scholarships	\$342			Chalatenango Scholarships	\$792	
	Middle School Facility Investment	\$0			Middle School Facility Investment	\$0	
	Chalatenango Facility Investment	\$0			Chalatenango Facility Investment	\$0	
	Administration	\$0			Administration	\$0	
	Total	\$1,699			Total	\$3,641	
Total Costs (in thousands)				Total Costs (in thousands)			
	Middle School Scholarships	\$2,892			Middle School Scholarships	\$5,779	
	Chalatenango Scholarships	\$2,442			Chalatenango Scholarships	\$1,992	
	Middle School Facility Investment	\$9,000			Middle School Facility Investment	\$4,050	
	Chalatenango Facility Investment	\$7,000			Chalatenango Facility Investment	\$7,000	
	Administration	\$4,699			Administration	\$4,820	
	Total	\$26,033			Total	\$23,641	

Delineating Benefit Streams

Another way in which the ERR can be useful is to try and identify benefit streams, for example, what direct effects do certain kinds of expenditure have? In this case, the question is: what benefits are results of spending on scholarships, teacher training or facility improvement? While it is difficult to know with all certainty where these streams lie, it is possible to estimate with confidence.

There are two benefit streams (increased wages, increased output revenue) and three primary input streams (scholarships, teacher training and facility improvement). Identifying what makes the two benefit streams possible can separate them. The reason a TVET graduate gets a new job is not for any reason but that he has a TVET degree. Because he has that degree, his employer assumes he has the necessary skills to carry out his responsibilities. On the other hand, the actual increases in revenue the employer will eventually enjoy are a result of the skills of the TVET graduate. The skills they learn are a result of the classes they take.

Thus there are two streams to benefit: having a degree and having skill. Skill is dependent upon things such as teacher quality and learning opportunity. Therefore, it can be concluded that quality teaching and learning materials result in skill, which results in increased productivity or revenue for employers. Also, by that same logic, scholarships are what allow students to enter TVET programs, and thus provide their degrees. Also, to a smaller degree, expenditure on administration leading to school-industry relationships results in employment. The internship process facilitated by these relationships helps employers get to know students and thus be more likely to hire them.

The resulting streams are that scholarships result in personal benefit, or increased wages, while quality instruction results in more public benefit, or increased production. It would appear, then, that in terms of pure benefit, scholarships have the greatest returns because they make up half of all benefit while the other half is split by faculty and facilities. This is not to say, however, that the streams are mutually exclusive. Employers count on their new employees to have necessary skills. Thus if a TVET graduate does not have the necessary skills, eventually the TVET degree becomes useless because it means nothing to employers. Therefore it is still of the utmost importance to provide quality instruction.

Compact Budget

In order to fully implement the updated ERR, the total budgeted amount needed is over \$26 million with MCC committed to \$24.3 million. This amount is above the compact agreement of \$20 million. The recommended reallocated budget eliminates this excess amount of money needed, while increasing the ERR almost two fold for the 15 years. The recommendations are that expenditure on facilities and equipment needs to be reduced and the savings used on scholarships and teacher training.

The Updated Budget

Based on the new information that was received, the scholarship budget category was updated. This was because scholarships were originally planned to be around \$400 for the middle schools and \$1500 for the Chalatenango schools per year. However as it can be seen in the updated ERR, MCC will also sponsor half of the students in their second years, which results in an increase of \$181,000 to MCC, with the government of El Salvador now contributing \$1,698,570. The overall scholarship expenses increased by \$1,879,570. However, with the help of the Salvadorian government, the MCC budget is manageable, as the government covers a considerable amount now. Based on the new information, Chalatenango and the middle schools were subject to no changes and thus the expenses for these categories were not altered. The overall total for formal education however came to \$24,336,000, which is above the planned \$20 million. A big contributor to that was the increase in administrative expenses of \$4.69 million.

The Recommended Budget

The updated budget shows that the expenses are higher than the allowance. Furthermore the literature review and the updated ERR, suggest that certain changes can be made to both lower the overdrawn budget and also increase the ERR. In terms of Chalatenango, no deduction in either buildings or equipment was made. This is because the institute is said to be the center of teacher and student education and it therefore needs to have all the necessary facilities, labs and equipment. Furthermore, the salaries earned by its graduates are almost twice those of students from the middle schools, which suggests that the institute is well looked after and produces quality students and teachers.

Realistically, equipping every one of the 20 middle schools with top of the range facilities is largely unfeasible. This is because of the continued change in technology and the possibility that machinery will be out of use after several years. As a result, the middle schools were only allocated enough for them to have the basic facilities and labs. The previous total of \$9 million decreases to \$4,050,000. It is important to note here that the category relating to program design and training for middle schools was not altered. This is because, according to the literature review, well-designed TVET program will be more relevant to the current industry needs and therefore the students will be receiving the most applicable skills for the current job market. Another reason is that in many cases teaching instructors need to be competent which would require the proper technical training. In previous programs, as mentioned in the literature review, teachers tended to

be recent graduates with little teaching and practical experience that resulted in unsuccessful programs.

One might wonder how would the students be able to train with limited equipment. The solution is to allocate the students to different businesses in industry, where they can train on the most up to date machines. In order to facilitate this school-business relationship, adjustments allocated a considerable amount of money to the administration function, \$120,000. This increase is to enable the institutions to hire more people to work with the industry and business and secure practical experience for the students. As a whole, the service industry for El Salvador is comprised of many smallholder businesses of four people or less. As a result, it will be more difficult to coordinate the training and therefore, it will require more people.

The recommended budget lowers the expenses within the margins allocated, while raising the ERR. This can be made possible with the government of El Salvador contributing an extra \$1,942,580 towards the cause. Nevertheless, in many cases, business and industries tend to help the schools by donations in the form of school materials and furniture, which is not reflected in the budget. This can further aid the Salvadorian government by providing some of the needed resources.

Budget Reallocation

Based on the literature review and previous project recommendations, the “facility investment” category was identified as the main opportunity for savings. The costs for middle technical schools and Chalatenango lowered by 69% from \$16 million to \$11.05 million. MCC will commit to \$7 million for Chalatenango and \$4.05 million for the twenty middle technical schools. The higher proportion of costs is now allocated for Chalatenango because it is the “main hub” for training and it needs to be equipped to do so. Buildings and instructional equipment were heavily affected by this change, leaving only enough to cover renovations and basic equipment. This is based on the assumption that student training will now rely mainly on the industry and business.

As a result of higher dependence on industry equipment and training, it is assumed that there is a slight increase in administrative costs. This is to provide sufficient funding to facilitate and improve the relations with industry. Therefore some additional personnel acting as TVET representatives and contacts with the industry will be beneficial. The total increase in this line item of the budget is \$121,000 for the five years of the program and can allow for the hiring of twenty personnel with the specific task of forming relationships with industry (this is with an average salary of \$5,300 per year). Increased funding for administration will allow for better communication and faster program adjustment to industry demands.

In terms of the scholarships, the savings from equipment and buildings was used to increase the number of scholarships. More specifically, scholarships were increased for middle schools. This is due to the lower tuition costs and reduction in expenses. As a result there is an increase of 3,485 scholarships for middle schools, totaling 7,325, and a decrease of 600 for Chalatenango, bringing their total to 800. Overall scholarships were increased scholarships by 2,885, which is consistent with MCC’s goal of increasing access to education while improving the rate of return for the program. The new scholarship amount covered by MCC is \$4,130 million. This is a total increase of

\$494,000. However, the government of El Salvador is to cover 46% of the \$7.771 million compared to 31% of the previously updated \$5.334 million.

Updated Budget

UPDATED BUDGET	Year 1				Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
	Q1	Q2	Q3	Q4						
Education										24,334,839
FORMAL EDUCATION										
MEGATEC Institute of Chalatenango										7,000,000
Buildings, workshops, labs and physical assets				50,000	50,000	800,000	550,000	200,000		1,600,000
Instructional Equipment				250,000	250,000	1,200,000	300,000	250,000	100,000	2,100,000
Learning Resources (software, instructional materials)				100,000	100,000	800,000	800,000	250,000	150,000	2,100,000
Program design and training for MEGATEC personnel		50,000	100,000	100,000	250,000	300,000	500,000	100,000	50,000	1,200,000
Scholarships										3,981,000
Scholarships for MEGATEC and Middle Schools						585,000	1,105,000	1,200,000	746,000	3,636,000
Scholarships administration service						20,000	80,000	80,000	165,000	345,000
Middle School Strengthening for 20 institutes										9,000,000
Buildings, workshops, labs and physical assets				100,000	100,000	1,500,000	500,000	400,000		2,500,000
Instructional Equipment				250,000	250,000	1,200,000	800,000	250,000		2,500,000
Learning Resources (software, instructional materials)			150,000	100,000	250,000	750,000	500,000	250,000	250,000	2,000,000
Program design and training for 2,000 middle schooldirectors, teachers and staff				100,000	100,000	500,000	500,000	500,000	400,000	2,000,000
Education Sector Technical Assistance Contract										4,353,839
Diagnostic Studies		100,000	100,000	100,000	300,000					300,000
Study for Generation of Local Revenue				100,000	100,000					100,000
Education Sector Technical Assistance Contracts					500,000	500,000	500,000	500,000	500,000	2,500,000
Miscellaneous Administrative Costs					295,768	355,768	295,768	295,768	210,768	1,453,839

Recommended Budget

RECOMMENDED BUDGET	Year 1				Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
	Q1	Q2	Q3	Q4						
Education										20,000,000
FORMAL EDUCATION										
MEGATEC Institute of Chalatenango										7,000,000
Buildings, workshops, labs and physical assets				50,000	50,000	800,000	550,000	200,000		1,600,000
Instructional Equipment				250,000	250,000	1,200,000	300,000	250,000	100,000	2,100,000
Learning Resources (software, instructional materials)				100,000	100,000	800,000	800,000	250,000	150,000	2,100,000
Program design and training for MEGATEC personnel		50,000	100,000	100,000	250,000	300,000	500,000	100,000	50,000	1,200,000
Scholarships										4,475,000
Scholarships for MEGATEC and Middle Schools						838,400	1,078,400	1,078,400	1,134,800	4,130,000
Scholarships administration service						20,000	80,000	80,000	165,000	345,000
Middle School Strengthening for 20 institutes										4,050,000
Buildings, workshops, labs and physical assets					100,000	100,000	100,000	100,000		400,000
Instructional Equipment				100,000	100,000	100,000	200,000	100,000		500,000
Learning Resources (software, instructional materials)			100,000	100,000	200,000	200,000	250,000	250,000	250,000	1,150,000
Program design and training for 2,000 middle schooldirectors, teachers and staff				100,000	100,000	500,000	500,000	500,000	400,000	2,000,000
Education Sector Technical Assistance Contract										4,475,000
Diagnostic Studies		100,000	100,000	100,000	300,000					300,000
Study for Generation of Local Revenue				100,000	100,000					100,000
Education Sector Technical Assistance Contracts					500,000	500,000	500,000	500,000	500,000	2,500,000
Miscellaneous Administrative Costs					320,000	380,000	320,000	320,000	235,000	1,575,000

Chapter VI: Other Recommendations

In many cases with TVET projects, budget difficulties have led to the deterioration of services in training centers, and to the elimination of programs and equipment. In addition to financial difficulties, the training lacks flexibility, focusing on meeting the requirements of traditional employment with little diversification, as teachers are usually highly specialized and resistant to change. However one of the main problems is the sustainability of the program. How can El Salvador continue toward the same goals and objectives, once the foreign financial aid is over?

There are many different ways of doing so as they work differently for each country, but some of the more relevant for El Salvador are:

Industry Contribution

In developing countries, the shortage of skilled labor is significant, and the opportunity for overcoming this shortage may already provide strong motivation for engaging in cooperative TVET. It is equally important to raise awareness for the economic and social dimensions of cooperative TVET since it provides the economy with skilled labor capable of competing with international standards and increases the employability of the trainees. Raising the awareness is crucial not only at the level of individual enterprises, but also for boosting the country's competitiveness in global markets and fostering economic growth and social development as a whole. Government needs to pro-actively campaign in order to raise the public's awareness of the benefits of cooperative training. Society as a whole and not just the private sector needs convincing. This advocacy and marketing is also not a one-time campaign but must remain a continuous effort.

Tangible incentives for private sector investment in TVET may include tax deduction for training expenses and training-related donations, subsidies for capital expenses to improve training facilities, collective or individual agreements to insert training clauses into the labor contracts of trainees (whereby trainees who leave the company before a pre-established point in time after completing their training have to refund part of the training costs to the company), etc. An extreme example of this is in Japan where individuals are fined if they leave the firm that they were training with. Another example is a levy used to maintain sustainability. With a dual training program, the employers cover the trainees' fees for the in-school component of cooperative TVET and contribute to a revolving fund used for capital and operational expenses of the TVET institutions as well as for need-based scholarships. All this constitutes a net inflow of resources into the TVET system. An example of such a system is Ethiopia where companies contribute 1% of their revenue to a government TVET fund to aid in the training and scholarships of the program.⁵³

⁵³ International Monetary Foundation and International Development Association. 16 January 2004. "Ethiopia: Poverty Reduction Strategy Paper Annual Progress Report Joint Staff Assessment."

Competition

Once the MCC program is over, the government will be taking full control over TVET training. It is thus important to create an environment of sustainability where there is a constant inflow of money into a TVET account that is used towards the budget. This could be very difficult for a developing country such as El Salvador where resources are scarce. The government and MCC must work during the five-year compact to manage its resources and create a well-managed working environment where a trained quality workforce can enter. The industry will be much more susceptible to a better-trained workforce. Government can do this by encouraging school competition through public funding and awards. By competing with each other, schools will make sure that their graduates are better trained. Better-trained graduates will be able to find work easier and boost the positive stats for the school that they come from. Such strategies are also likely to improve the pass rates of students. The idea is to introduce school report cards that permit schools to compare themselves to others and then take action to improve performance.⁵⁴ This situation, however, could lead to faculty being more concerned with the pass rates and thus diluting the quality of the workforce. Notwithstanding, incentives should be attractive and performance measures reliable.

Monthly Repayments

It will be fair to design a system of student loans similar to that in the US. In that way, graduates who become employed will pay back into scholarship funds. The ERR for personal benefit would decrease because workers would have to pay back some of their increase in wages. Social and overall economic benefit would not be affected. Despite the loss in personal benefit, such a strategy would help improve sustainability. It will also create government incentives for better TVET monitoring and industry involvement that will ensure employability after graduation.

Monitoring

Monitoring is important and applies to both faculty and students. Monitoring is important when determining who receives scholarships. Poor monitoring may result in poor quality students who do not receive approval to the next year or even drop out of the system. Scholarships will become inefficient because there will be fewer graduates entering the workforce or entering at a slower pace. It is also important that counseling is available for students. Counseling can help students succeed in the program and be successful in finding employment. Monitoring of the faculty is critical in identifying problems in the system early on and to adjust training as areas needing improvement are identified.

⁵⁴ Ramanantoanina, Patrick. World Bank. 2008. "The Challenge of Expanding Secondary Education and Training in Madagascar." *World Bank Working Paper No. 141: Africa Human Development Series*.

Future Sector Trends

According to the 2005 El Salvador economic census, 66% of total establishments were involved in commercial activities. It is important to note that companies that had four or fewer workers and engaged in commercial activities comprised 94.8% of all business establishments. Those with five or more workers were 5.2%. The commerce sector is followed by the services and industry sector. This would suggest that the economy is made up of many smallholder businesses. The large proportion of smallholder businesses could be problematic for TVET administration to build and maintain strong relations with the industry when the industries are hiring few workers. It would be time consuming to contact these small businesses and negotiate training schedules with them. TVET administration may need the help of the government to create incentives for smallholders so that they request students from TVET administration. This can be done through tax breaks, when they take on new students.

Conclusions

Based on the literature review of past TVET programs, the following policy options were developed.

1. One Policy option is the development of "dual approach" training programs that link public training programs to private institutions through apprenticeships. This will not only prevent high costs from buying equipment that becomes obsolete and allows students to train on up to date equipment.

2. In order to be effective, the recommended policy option is tax subsidies for firms that train workers. When firms are given incentives in the form of tax breaks, they will be more willing to hire students. Subsidies account for possible market failure that occurs when some students do not work for the firm that trained them. Strict standards for training and accreditation is needed in order to ensure legitimacy among the labor and business sectors.

3. Scholarships provide access to education for the poor and theoretically employment after graduation. However, in order for the scholarships to be effective, the government needs to address the high dropout rates and the after-training job availability. Student training without job perspectives will make the training wasteful. Scholarship efficiency should also be considered, which is related to lowering the costs. In past TVET programs, the unit cost per student was lowered by improving the student to teacher ratios as well as through better monitoring of the students prior admission and during studies. As a result these programs had high graduation rates (80-90%). By reducing the unit cost the programs, they were able to offer scholarships to more people and thus meet the program goals.

4. A policy option for the TVET in El Salvador is 30 students per teacher. This ratio was found to work well in countries such as Mongolia and Bangladesh, where Technical and Vocational education was the main focus of certain programs. Graduation rates were high, due to better learning and utilization of equipment of space allowed to drive down the training costs per student and make the scholarships more efficient, which resulted in savings, which savings allowed for more scholarships to be given in the subsequent years and improved the sustainability by exceeding the targets. The capacity of the schools in El Salvador is unknown and thus this policy option may not be viable.

5. There is a significant relationship between the achievement of students and the number of courses an instructor completes (Fuller 1985). It also has been found that it is more effective to teach industry leaders how to teach then to teach teachers the fundamentals of industry.

6. Successful programs place priority on strengthening management capability, increasing the opportunities for staff training and standardized curriculum and resources, and providing these resources in a cost-effective way. Training, supervision,

and resources need an element of flexibility in content, methods and delivery in order to be effective. This flexibility allows for adaptation to a growing and possibly unstable labor market. In many cases the programs are out dated or not adjusted to the industry needs and this dissuades employers from hiring from the local labor force.

7. Several authors cite the same conclusion: facilities should not be the primary focus of funding.

When the budget was updated, it was found that the total exceeded the \$20 million threshold by \$4.36 million. This was due to an increase in scholarship prices. From the literature review, it was determined that less money should be allocated towards facilities and more money be allocated towards administrative services to facilitate private-public relations as well as towards faculty training and scholarship amounts. This was compensated for by reducing the building and equipment costs for the Middle technical schools. The final recommended ERR resulted in a rate of return of 12% over 15 years and 15% over 25 years. This includes the added benefit stream of increased productivity enjoyed by the company that resulted in overall increased output.

As discussed in Chapter I, ERR is a preferred method for policymakers in deciding whether or not a project or program should be implemented. ERR is preferred because it is a quantitative measurement of benefits and costs. Therefore, it is easiest for a policymaker to stand in front of a board and state that a project will be effective because he has hard numbers to support the project. If a critic were to ask exactly how much a program would benefit those involved, the policymaker can simply state a number, and the critic is forced to accept the viability of the program, so long as the number is based on reliable evidence.

There exists an important problem with ERR, however. The advantage of being a quantitative analysis of a program is also an ERR's weakness. Because the final product of an ERR is always a percentage of return on an investment, the intangibles, or unquantifiable aspects of a program are lacking in such an analysis.

In the case of El Salvador, the original ERR expressed only the limited benefit of increased wage. Had the ERR been calculated correctly from the beginning of the program, the TVET project would not have taken place because it did not reach the threshold of 8% that was required. The problem, however, lies with the inability for an ERR to see beyond the scope of that percentage, especially in the case of social benefits. The investment in vocational schools in Northern El Salvador can have many benefits beyond simply raising wages or anything else monetary. A better educational system can have effects that range from a decrease in crime to an increase in civic participation to overall stability.

These benefits are very important, and to many, would be considered more important than a rise in wages. How does one set a value to increased voter participation to include in an ERR? Such a task is impossible, yet very important to consider.

Therefore, it is important to consider an ERR for what it is: a method for predicting and therefore maximizing the quantifiable benefits of a program. If the goal of MCC's compact were to simply increase wages for workers, ERR is most definitely the proper method. But MCC is concerned with the larger picture, including quality of life,

political stability and others. This means that policymakers must take a step back from simply analyzing an ERR to determine whether or not a program should be implemented. They should consult sociologists and political scientists to analyze the possible outcomes of such a program in addition to conducting an ERR analysis.

To be sure, the ERR is an effective tool in determining where money should be allocated and the viability of the program. This paper recommends that ERR should not be the only evidence consulted to determine the benefits of a program. And where social benefits may be substantial, leniency should be given to programs that may have an ERR slightly below a required threshold.

Although an ERR is primarily used to predict the outcome of a program, it can also be a useful tool for guiding a program as it progresses. MCC is concerned with gaining the largest amount of quantifiable benefit possible, and the ERR can help to do so. Updates should be put into the ERR as a program progresses to provide clues about future policy moves, especially in terms of allocations.

In the case of El Salvador, consistently updating the ERR could prove to be very useful, especially in terms of scholarship allocations. If there are predictions for increases in wages and costs of study, an ERR can predict the change in return. For this reason, it is useful to try new combinations of scholarships (or any other allocations) to find a method for maximizing returns. Therefore, rather than arbitrarily assigning scholarships, the ERR can be utilized in conjunction with any method currently in place for deciding scholarship allocations. Only by updating the ERR can this method be used.

APPENDIX 1: DATA SUMMARY FIGURES

Data Summary from the Ministry of Education's Middle Technical School Database
El Salvador 2006-2007

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Created: 10/1/08

A. Table of Contents

1. Statistics	This page summarizes the current state of middle technical schools in the Northern Zone of El Salvador compares this with national level data.
2. Selected Schools	This page summarizes the current state of the 20 middle technical schools that were selected for aid and compares this with the remaining eligible schools in the Northern Zone (55 schools).
3. Chalatenango	This page summarizes the current state of Chalatenango specifically.

B. Dataset Sources

The data set is school-level. It was created by Mathematica by combining three different sources: (1) the "Censo Matricular, Matricula Inicial"; (2) the "Censo Matricular, Matricula Final"; and (3) the PAES data file. More information concerning the dataset can be found in Mathematica's memorandum, "Description of the School-Level Dataset," dated 5/9/2008.

C. Background information

When available, data from 2006 and 2007 is tabulated for each variable. The tables include student, teacher, and teaching facility statistics. Vocational or Technical Bachillerato has four grades (designated as 1V, 2V, 3V, and 4V). In order to proceed to the next grade, a student must be approved to do so. If not approved, they repeat the grade. Students can graduate in either year 3V or 4V. However, a student has other requirements in addition to approval in order to graduate. This explains some of the disparities between dropout rates, retention, and graduation rates. Each variable specifies the grade level and, when available, the gender.

Facility tabulations include both General Bachillerato and Technical or Vocational Bachillerato schools. PAES Test Scores also do not distinguish between General Bachillerato and Technical or Vocational Bachillerato schools.

Retention Rates are calculated as the number of students in grade Y+1 and year X+1 divided by the number of students enrolled in grade Y in year X. For example: for females from 1V to 2V, the number of females in 2V in 2007 was divided by the number of females in 1V in 2006.
 $40.55/55.75 = 72.74\%$

Statistics	Level	2006				2007			
		Average		Total		Average		Total	
		Northern Zone	All other areas						
STUDENTS	Level								
Enrolled Students	All	77.67	130.2	10641	95306	73.8	121.16	10421	928
Dropouts	1B/V					1.87	1.44	247	10
	2B/V					0.79	0.57	104	4
	3B/V					0.26	0.18	34	1
	4B/V					0.023	0.057	3	
	ALL					2.94	2.26	388	16
Female Graduates	3V					3.65	1.98	482	14
	4V					0.0455	0.068	6	
Male Graduates	3V					2.92	1.75	385	12
	4V					0.061	0.05	8	
Total Graduates	3V					6.57	3.73	867	27
	4V					0.11	0.12	14	
Female Students	1V	19.76	27.82	2707	20362	18.32	25.72	2602	198
	2V	14.94	21.24	2047	15551	13.9	19.74	1974	152
	3V	13.53	18.96	1854	13881	12.87	17.84	1828	137
	4V	0.022	0.4	3	290	0.04	0.36	6	2
Male Students	1V	13.61	26.72	1864	19558	12.52	24.6	1778	189
	2V	9.12	19.04	1250	13936	8.71	17.44	1238	134
	3V	7.94	16.32	1088	11949	7.68	15.56	1090	119
	4V	0.0073	0.34	1	246	0.014	0.32	2	2
Retention Rate Females	1V->2V					70.34%	70.96%	72.92%	74.66%
	2V->3V					86.14%	83.99%	89.30%	88.2%
	3V->4V					0.30%	1.90%	0.32%	1.98%
Males	1V->2V					64.00%	65.27%	66.42%	68.6%
	2V->3V					84.21%	81.72%	87.20%	85.9%
	3V->4V					0.18%	1.96%	0.18%	2.0%
Students	All	78.93	130.84	10814	95773	74.07	121.56	10460	930
Approved Females	1V	16.22	22.36	2174	16079	15.86	21.11	2252	160
	2V	13.83	18.68	1853	13430	12.89	17.66	1831	133
	3V	13.14	17.64	1761	12686	12.31	16.93	1748	128
	4V	0.022	0.4	3	290	0.04	0.31	6	2
Not Approved Females	1V	1.87	2.47	251	1774	0.92	1.95	131	14
	2V	0.56	1.13	75	816	0.16	0.96	23	7
	3V	0.22	0.27	29	196	0.03	0.2	4	1
	4V	0	0.014	0	10	0	0.004	0	
Approved Males	1V	10.25	19.82	1374	14250	10.21	19.29	1450	146
	2V	8.13	15.84	1089	11389	7.8	15.32	1108	116
	3V	7.93	15.37	1063	11053	6.91	14.9	981	112
	4V	0.01	0.36	1	262	0.014	0.27	2	2
Not Approved Males	1V	1.54	3.14	206	2256	0.94	2.65	134	20

		2006				2007			
		Average		Total		Average		Total	
		Northern Zone	All other areas						
ES Test Scores	2V	0.6	1.52	80	1096	0.3	1.09	43	823
	3V	0.11	0.31	15	224	0.05	0.38	7	285
	4V	0	0.02	0	14	0	0.013	0	10
	MATH	5.04	5.17			5.15	5.2		
	SOCIAL SCIENCE	5.38	5.82			6.06	6.35		
	LANGUAGE SCIENCES	5.48	5.84			5.62	6		
	GLOBAL SCORES	5.18	5.47			5.65	5.92		
		5.1	5.47			5.53	5.82		
of Students Tested									
		83.95	122.48	8731	74604	56.04	78.03	5884	49083
ACHERS									
Credited Teachers	All					4.45	6.22	626	4747
	1V					4.11	6.14	584	4718
	2V					3.87	5.73	550	4406
	3V					2.25	3.36	320	2581
	4V					0.028	1.79	4	138
Female Teachers	All					2.54	3.44	360	2649
Male Teachers	All					2.51	4.43	357	3407
Total Teachers	All					5.05	7.87	717	6056
Experience (years)	1V					5.74	7.41	815.14	5700.97
	2V					4.98	6.93	707.66	5327.76
	3V					4.41	6.25	626.62	4807.56
	4V					0.069	0.68	9.75	522.65
	ALL					5.71	7.7	810.25	5924.09
ACHING FACILITIES									
Water									
Internal Pipes		89.05%	93.44%	122	684	90.84%	94.29%	125	693
No water provision		2.19%	0.41%	3	3	2.11%	0.52%	3	3
Electricity Installed		100%	100%	134	723	99.30%	100%	134	723
Classrooms									
Computer Labs		0	0	0	0	0.9	1.15	128	883
Unused		0.08	0.45	11	330	0.085	0.44	12	337
for Teaching		8.96	15.88	1227	11623	8.52	15.02	1210	11562
for Other Uses		1.27	2.33	174	1710	1.34	2.26	190	1740
Classroom Support									
Ed. Activities		10.22%	27.19%	14	199	11.97%	25.97%	17	200
Library		71.53%	84.70%	98	620	71.13%	82.99%	101	635
Industry Workshop		0%	0%	0	0	2.82%	9.40%	4	72

4. SELECTED SCHOOLS

Average Statistics Comparing the 20 Schools Selected in the Northern Zone and the Remaining Eligible Schools in the Northern Zone

	Enrolled	# Female Students				# Male Students					Female Retention Rate			Male Retention Rate				
		1V	2V	3V	4V	1V	2V	3V	4V	All	1V-2V	2V-3V	3V-4V	1V-2V	2V-3V	3V-4V		
2006																		
20 Selected Schools	222.5	55.75	43.1	38.4	0.15	39.5	28.55	23.7	0.05	229.2								
Remaining Eligible Schools	97.33	24.45	18.45	16.93	0	17.47	10.96	9.76	0	98.04								
2007																		
20 Selected Schools	215.65	50.5	40.55	38.75	0.3	36.15	26	24.25	0.1	216.6	72.74%	89.91%	0.78%	65.82%	84.94%	0.42%		
Remaining Eligible Schools	96.04	23.73	17.89	16.42	0	16.76	11.4	9.85	0	96.05	73.17%	89.00%	0.00%	65.25%	89.87%	0.00%		
		Female Approved/Not Approved**							Male Approved/Not Approved**									
		1V: Approved	1V: Not Approved	2V: Approved	2V: Not Approved	3V: Approved	3V: Not Approved	4V: Approved	4V: Not Approved	1V: Approved	1V: Not Approved	2V: Approved	2V: Not Approved	3V: Approved	3V: Not Approved	4V: Approved	4V: Not Approved	
06																		
Selected Schools	41.7	5.1	39.05	0.9	37	0.2	0.15	0	27.4	4.7	24.5	2.15	22.65	0.4	0.05	0		
Remaining Eligible Schools	20.11	2.55	16.58	1.04	16.04	0.31	0	0	13.04	1.96	9.75	0.6	9.76	0.09	0	0		
07																		
Selected Schools	44.35	2.25	37.7	0.3	36.65	0	0.3	0	29.7	2.7	22.5	1.15	20.3	0	0.1	0		
Remaining Eligible Schools	20.2	1.47	16.73	0.29	15.76	0.07	0	0	13.56	1.31	10.55	0.35	9.45	0.11	0	0		
		# Dropouts					Female Grads*		Male Grads		All Grads		PAES Test Scores					
		1B/V	2B/V	3B/V	4B/V	All	3V	4V	3V	4V	3V	4V	Math	Social Science	Language	Sciences	Global	# Tested
06																		
Selected Schools													5.13	5.46	5.85	5.25	5.3	166.1
Remaining Eligible Schools													5.15	5.42	5.48	5.3	5.19	81.87
07																		
Selected Schools	0.53	0.12	0	0	0.65	0.82	0	1.06	0	1.88	0	5.57	6.01	5.82	5.78	5.83	105.15	
Remaining Eligible Schools	0.7	0.3	0.14	0	1.14	1.16	0	0.72	0	1.88	0	5.14	6.14	5.63	5.72	5.56	57.38	

# Teachers							Teacher Experience in Years					Facilities***			Classrooms and Educational Support***						
1V	2V	3V	4V	Female	Male	Total	1V	2V	3V	4V	All	Internal Pipes	No Water Provision	Electricity Installed	# Computer Labs	# Unused Classrooms	# For Teaching	# For Other Uses	Classroom support	Library	Industry Workshop
												80%	0%	100%	0	0	11.95	1.35	10%	75%	0
												92.73%	3.60%	100%	0	0.07	8.11	1.04	9%	72.73%	0
45	8.45	5.3	0.2	5.4	5.95	11.35	9.43	8.61	8.4	0.49	9.21	85%	0%	100%	1.3	0	11.6	1.45	10%	70%	10
22	5.07	3	0	3.33	3.07	6.4	7.63	7.07	6.69	0	7.67	94.55%	0%	100%	1.07	0.05	7.53	1.13	10.90%	72.73%	1.82

All graduate data was collected in 2007 for the previous year

1V, 2V, 3V Approvals are Day + Evening programs; 4V programs are Evening programs

*If presented as a percent, it is the percent of schools that have the particular facility

Note: The 20 schools selected are: INSTITUTO NACIONAL DE JUTIAPA, INSTITUTO NACIONAL BENJAMIN ESTRADA VALIENTE, COMPLEJO EDUCATIVO SANTIAGO DE LA FRONTERA, INSTITUTO NACIONAL DR. FRANCISCO MARTINEZ SUAREZ, INSTITUTO NACIONAL GENERAL JUAN ORLANDO ZEPEDA, INSTITUTO NACIONAL DE LA PALMA, INSTITUTO NACIONAL LA REINA, INSTITUTO NACIONAL DE NUEVA CONCEPCION, INSTITUTO NACIONAL DE SAN IGNACIO, INSTITUTO NACIONAL DE JULIARES, COMPLEJO EDUCATIVO CANTON EL TULE, COMPLEJO EDUCATIVO SOTERO LAINEZ, INSTITUTO CAROLINA, INSTITUTO NACIONAL DE SESORI, COMPLEJO EDUCATIVO GENERAL MANUEL JOSE ARCE, INSTITUTO NACIONAL 14 DE JULIO : 1875, INSTITUTO NACIONAL DE EL SAUCE, INSTITUTO NACIONAL DE OSICALA, INSTITUTO NACIONAL DE ANAMOROS, INSTITUTO NACIONAL DE CHAPELTIQUE

3. Chalatenango

COLEGIO ADVENTISTA DE
CHALATENANGO

			Level (if applicable)		2006	2007
			STUDENTS			
Code: 20146					16.7	16.50
Middle School Level Program						
# of Teachers	N/A	10				
Offers morning programs	YES	YES	ALL		20	40
Offers afternoon programs	YES	YES	1B		12	32
Offers evening programs	NO	NO	2B		8	11
Offers weekend programs	NO	NO	3B		0	0
Internal pipes used as water provision	YES	YES	1V		0	0
School has electric energy installation	YES	YES	2V		0	0
Energy Installation Working	YES	YES	3V		0	0
Distribution company used as source of electricity	YES	YES	4V		0	0
# of working sewers	2	3	FEMALE		11	27
# of broken sewers	0	2	MALE		9	16
Pit latrines	NO	NO	# Enrolled		138	167
Septic Tanks	NO	NO	# Approved		8	22
# of computer labs	0	1	MALE		9	14
# unused classrooms	0	0	# Not Approved		3	0
# classrooms for teaching	7	6	MALE		1	0
# classrooms for other uses	2	2	# Dropouts			0
Library	YES	YES	# Graduates			0
Basketball Court	YES	YES	PAES Test Scores		4.28	5.3
Soccer Field	YES	YES	MATH			
Clinic	NO	NO	SOCIAL			
Agriculture/Farm	NO	NO	SCIENCE		5.2	6.2
Science Lab	NO	NO	LANGUAGE		4.72	5.78
English Lab	NO	NO	SCIENCES		5.1	6.4
Multipurpose Room	NO	NO	GLOBAL		4.56	5.9
Industrial Workshop	NO	NO	SCORES			
School Eligibility for Technical Middle School		NO	# of Students Tested		9	10
Strengthening Component			TEACHERS			
			# Teachers			
			FEMALE (Middle School)			4
			MALE (Middle School)			1
			FEMALE (ALL)			9
			MALE (ALL)			1
			PRACTICING			9
			Avg. Years Experience			9.5
			# Accredited Teachers			9
			# Teaching			
			1B			4
			2B			4
			ALL BACH LEVELS			4
			ALL MS LEVELS			4

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