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Computer Technology Implementation In A Mexican Elementary School

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COMPUTER TECHNOLOGY IMPLEMENTATION IN A MEXICAN
ELEMENTARY SCHOOL

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Master's Program in Manufacturing Engineering

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Dedication

To Rita Yaneth and Nelson Rafael

COMPUTER TECHNOLOGY IMPLEMENTATION IN A MEXICAN
ELEMENTARY SCHOOL

by

GRISELDA TERRAZAS, MBA

THESIS

Presented to the Faculty of the Graduate School of
The University of Texas at El Paso
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of the Requirements
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Abstract

The premise of this thesis is that the move toward technology in primary public schools in Mexico would improve access to information, would result in higher academic levels, and would induce quality basic education. Many people believe this transition should be inevitable but it has not been possible under the current conditions in Mexico. However, adopting new technology to improve schools is a global perspective and it has proven successful in many countries. So far, this strategy has not yet been realized in Mexico, and today most public schools lack computers. Furthermore, Mexico's schools face other more fundamental problems.

The purpose of this thesis is to identify and understand how Computer Technology (abbreviated CT from now on) can be used to strengthen the quality of primary education and to explore the influence of CT on students' motivation and success. The study will be focused primarily on the teachers' knowledge, their skill levels in using computers, and in the teachers' interest in integrating CT into the students' curriculum.

Qualitative studies are used in this thesis, primarily through the use of teachers' interviews and a survey. The purpose of these studies is to understand how CT can be applied in the classroom, how students' academics could improve and if students could be motivated using CT. A literature review has been done to investigate the elements that may impact CT integration in the classroom and the motivation for students.

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Chapter 1: Introduction

“Education is the source of empowered minds.”

A significant number of elementary schools in Mexico do not have all basic services: electricity, water, sewage, heating and cooling systems. In addition, it is estimated that close to forty-seven percent of schools are not considered safe because of the type of materials used in building their walls, roofs, floors and perimeter fences. This information is based on a survey carried out by the National Institute for Educational Evaluation (INEE) in a representative sample of public schools during the 2014 and 2015 school years (Poy Solano, 2016). As shown in Figure 4.1, the perimeter fence of school Fernando Ahuatzin Reyes, which is the school I am working for and selected for the purpose of this thesis, is not secure and puts students at risk as it can be easily breached.

Regarding the benefits of implementing Computer Technology (CT) in the schools, I can think of two main benefits: First, the ease to find information over the Internet on any unimaginable topic is a handy resource for teachers and students, and secondly, the proper integration of computer-based education can actually serve to make the traditional subjects of the curriculum easier for students to comprehend, complementing the traditional curriculum with interactive computer-based activities, electronic examinations, and educational games.

Effectance motivation (Advise America, 2016) is a concept I learned during this research and it is worth to be shared: It is a person's inclination to explore and influence her/his own environment by increasing the person's competencies. This term is different from intrinsic and extrinsic motivation to be discussed later on. For instance, the concept effectance motivation (Advise America, 2016) could be understood in the sense of satisfaction of overcoming a difficult task and continuing as an ongoing process. I consider CT is a challenge for students because of its complexity, and CT is expected to increase effectance motivation which will lead students to feel competent, create a positive feeling and ongoing learning. In addition, computers would enhance students' self-identity. CT would be an important medium for children to develop

written communication skills, to express new ideas, to have more cooperation in the class, and a development of positive attitudes toward learning.

With the recent educational reforms in Mexico, an emphasis has been made in promoting the learning of the English language. This is due to the fact that English has been positioned as the language for global communication and international trades as a result of diverse factors related to historical conditions. In 2009, the government of Mexico took several actions in order to include English as a school subject in public education by officially incorporating the English National Program (PRONI) into basic elementary education and I am a teacher currently working for this program.

In this research thesis, three different topics will be discussed: First, this thesis will describe concepts about the elements that influence the teachers' utilization of CT in the classroom. Then, this thesis will look at various ideas on the motivation and involvement of students while using CT in the classroom. Finally, this thesis will make the proposal for implementing CT in a specific school and describe the academic improvements expected by the teachers.

The selected school for implementing CT is Elementary Public School Fernando Ahuatzin Reyes. The goal of Fernando Ahuatzin Reyes School is to prepare students for a competitive world through the implementation of CT and professional training for teachers. The lack of knowledge about technology at Fernando Ahuatzin Reyes School restricts the potential for intellectual growth for all students, from first to sixth grades. The school's objective is to enable students to increase their knowledge through a CT initiative that integrates a computer-based learning method and as a starting point to develop competent citizens.

While the use of CT as a medium of instruction is just beginning in primary education in Mexico, it is already clear that it will be a dominant trend over the next decade. The reasoning behind teaching CT to elementary students goes well beyond career development. For children just entering school, teaching CT is about giving them the analytical skills that will help them

become proactive learners and future successful professionals in a world that's increasingly influenced by technology.

The initiative to implement a CT lab is applicable to any school in the north border of Mexico and in any school in the United States with the same need. The scope of this thesis is only the proposal with a list of equipment and the presentation of expected benefits. This study was possible thanks to the collaboration of the following individuals to whom I extend my deepest gratitude: Sandra Barajas, Principal at Elementary School Fernando Ahuatzin Reyes; Florentino Corral Astorga, Inspector Supervisor for Federal School District's Zone 40; and Dr. Rafael Gutierrez, Professor at UTEP.

Chapter 2: Impact of Socioeconomic Status in the School System based in the United States review

“Admirable humbleness is not necessarily found in the poor.”

In the early 2000's the US Congress passed a bill named "No Child Left Behind Act" (NCLB), this act has set since then guidelines beyond expectancies to evaluate education results. The goal was to make stronger school systems and accountable for educating all subgroups in the population, including students coming from low socioeconomic backgrounds and minorities (Marter, 2009). According to the NCLB act, all students must be performing at a proficient level in the main subjects in the school system. In an educational system so strongly focused on standards for students in all subgroups, systems must be aware of the problems presented when students grow up in low socioeconomic conditions, systems must also be working continuously nurturing the educational programs to reduce the problematic and narrow the performance gap between students of different socioeconomic levels, in order to ensure academic success for students from all economic backgrounds.

Unfortunately, poverty has a negative impact on individuals and society that extends to the academic world. Children who live in low socioeconomic conditions often need additional resources from schools and teachers to overcome the special challenges they face (Pettigrew, 2009). It seems the schools that educate this subgroup are the schools receiving the least amount of funds, thus, they are at an economic disadvantage when in fact more resources are needed. Although the task may seem discouraging, there are practical ways to transform underperforming schools that teach children from low socioeconomic backgrounds. They have a problem that demands special attention, but the solution is not far-fetched.

For the most part, children are dependent beings. Children require assistance to live and prosper. Most children depend on their parents or caregivers for their economic well-being and caring. Therefore, to understand childhood poverty, we need to understand the reasons for parents and caregivers living in poverty. Many persons continue to live in low socioeconomic conditions because of race, place of residence, and family structure.

Place of residence has an important impact on the behavior of residents and on their cultural norms. Some researchers found that even when variables within the students and schools were controlled environments, place of students' residence, negatively affected their academic achievement (Pettigrew, 2009). For various reasons, the place of residence is a powerful influence on children's academic achievement. Residence placed in a poor neighborhood may involve some of the children in illicit activities, misdemeanors, and exposure to illegal substances. Unfortunately, sometimes even good parents who attempt to live above the negative influence of the neighborhood have serious problems with their children because the pull from peer groups is so powerful and intimidating (Pettigrew, 2009).

When struggling with the economy, choosing the right school and neighborhood may be not an option. The options for their children to choose formal and extracurricular education are limited, for instance, extracurricular classes may be difficult to afford. Children from high poverty school districts may not have the most competent teachers and children may not have good role models in education. Usually, competent teachers can select which school to work for and select more convenient districts.

Low socioeconomic status also negatively affects children's mental well-being. Children who experience some periods of poverty can suffer from emotional and behavioral problems (Pettigrew, 2009). Furthermore, children without access to life-sustaining resources like food, clothing, and health care are more likely to suffer from depression and experience levels of stress that a child shouldn't have to experience. What's more, some researchers have mentioned that persistent poverty was an indicator of later behavior problems, that were reflected when children entered school (Pettigrew, 2009).

This thesis only covers the topics that I found most interesting to present. I found some articles that mentioned that low-income children sometimes have a slow cognitive development. Children raised in families with low-incomes were more likely to suffer from learning problems and developmental delays than the affluent counterparts were (Pettigrew, 2009). In addition, low socioeconomic conditions can affect short-term memory, mainly related to poor nutrition. It is

possible that inequality in cognitive development continues to affect academic achievement in later school years.

Children raised by economically disadvantaged parents or tutors represent a challenge for teachers. Low socioeconomic conditions negatively influence school readiness, academic achievement, and overall school success. Socioeconomic conditions and school readiness are developed long before the start of children's formal education and previous learning environments vary across social lines (Pettigrew, 2009). For instance, middle and upper-class parents frequently enroll their children in daycare programs that offer curriculum adapted to develop and prepare the children for formal education. However, low-income families lack the means to provide such educational programs. Many economically disadvantaged children can fail to develop the knowledge and abilities needed for kindergarten. In addition to the few options in education, low-income parents could lack the technology that would further develop academic skills (Pettigrew, 2009). Homes with few or no books for reading or families not engaged in educative recreations like taking children to the museum, library, concerts, theater, or trips to the zoo.

Standardized tests are used commonly in the school systems and they do not measure the overall students' achievement. For this reason, educators and administrators must take into account how economic elements are affecting the grades on standardized tests. Usually, this group of students averaged below the acceptable grades on standardized examinations regardless of the subject. For reasons beyond their control, children from low socioeconomic level faced an increased risk of failing standardized examinations. The failure of the tests could cause an overwhelming impact on students, families, the school system, and society at large because eventually the students may be dropping out of school. In a public system using standardized examinations, it is known that socioeconomic levels impact grades. There is a need to take the necessary steps to narrow the achievement for different socioeconomic levels.

Some teachers unintentionally contribute to the failure of students when they impose a general view of common practices and daily life knowledge for students. Without the proper

training, some teachers don't understand these children were not raised in an environment that teaches them a good behavior. It is not fair to assume the similar life experiences for all the children. For instance, a teacher assuming all children have had traveled on an airplane before. Teaching to the majority culture may lead students and families feel devalued and to adhere either to the school or the family when school and family life should've complemented one another. Perhaps, because students often feel isolated while at school, students from lower socioeconomic groups may miss more class time than affluent students.

Parents from lower socioeconomic groups are not as involved with the public school systems as are affluent parents. Because students from lower-income levels are more likely to exhibit inappropriate behavior, communication between school personnel and lower-income parents is often negative involving complaints. Thus, lower-income parents regularly view any contact with school staff as confrontational. Furthermore, because of the problem just mentioned, parents from lower socioeconomic groups are not willing to be active members of committees. These parents may not participate in any functions at the school because they don't have spare time if they need to work excessive hours to provide for the family needs. Although the lack of parents' participation in the school cannot fully explain the achievement gap between lower and affluent children, it is logical that parents who stay connected to the school are more involved and informed. Unfortunately, however, because of the constraints placed on parents' finances and time, lower-income parents are less involved in their children's education (Pettigrew, 2009).

In summary, it is clear that socioeconomic conditions impact every aspect of children's life. It threatens a child's development, cognitive and motor developments. Research and data show poverty has several unfavorable effects on society's most vulnerable people. Various studies show that in the United States, comes to the world an economically disadvantaged child every 35 seconds and nearly 13 million children live in poverty (Pettigrew, 2009). I haven't found any statistics on this topic in Mexico so far. Policymakers, society, teachers and, faculty should take further actions, in addition to the school system's efforts, to help this generation of

low-income families close the gap of academic achievement between economically disadvantaged students and affluent ones.

Chapter 3: Conditions of Public Schools in Mexico

“Someday we will reach happiness.”

I would like to give estimates about the conditions of public schools in Mexico (Poy Solano, 2016). Between thirty to forty percent of schools had some kind of problems with their electrical service, water, and stairs, damage to walls, ceilings, and floors caused by moisture and cracks. Electricity was a major problem in some regions and around seven percent of schools in rural zones did not have any access to it. According to some studies (Poy Solano, 2016), in about thirteen percent of elementary schools, there was a shortage of classrooms and the schools had limited capacity for accepting new students. Almost thirty percent of teachers in fourth, fifth and sixth grades considered their classrooms too small for the number of students they had, and over thirty percent considered that the ventilation and lighting were not the most appropriate. As for equipment, in twenty-three percent of fourth to sixth grade classrooms, the deterioration of the white boards prevented using them to write. As it can be seen in Figure 4.1, Fernando Ahuatzin Reyes School does not have a sidewalk on the rear side of the school.

Here are more estimated numbers about public schools in Mexico (Poy Solano, 2016). Only forty percent of students could get access to a working computer, and in twenty-three percent of schools, there was no Internet access for the entire community. Almost forty-six percent of schools did not have a sports field. Locally in Juarez, the soccer fields are improved dirt fields without any maintenance, as it might be seen in Figure 4.3 for Fernando Ahuatzin Reyes School’s soccer field. Thirty percent of schools had no patio or playground and when they had one, the playground was the outside auditorium for all the school’s events held in the same space. Figure 4.2 shows Fernando Ahuatzin Reyes School’s playground. Twenty-one percent of schools did not have the resources to deal with emergencies. Hygiene conditions were another challenge, as thirty percent of schools reported that they had never been fumigated and eleven percent did not have any maintenance or cleaning of their water tanks, while only forty-two

percent of schools had purified drinking water for students (Poy Solano, 2016), I have not seen purified water in any public school in Juarez.

Personally, I can talk about my experience in Fernando Ahuatzin Reyes School: the classrooms don't have bookcases and the English books for the students are stored in a cardboard box on the floor. This school does not have any type of technology like projectors or computers, where I could show students the news or videos related to the syllabus' topics, the English classes have audio material for the students to listen to and I have to play it on my cell phone for the students. There are no flip chart stands so it is very difficult for me as a teacher to show students the portfolio with educational materials. As incredible as it sounds, I don't have a desk or a chair, so I teach standing up all the time with my materials on the floor in some classrooms.

Chapter 4: Selected School Fernando Ahuatzin Reyes

“If we teach technology to children, it will become their tool for success in the future.”

Fernando Ahuatzin Reyes Elementary school was built in 1982 and has come a long way since its creation. The school programs are centered on motivation and education. Fernando Ahuatzin Reyes Elementary School was recognized with a 1984 Chihuahua Historic Marker. It is located in Ciudad Juarez, 3.2 kilometers southwest downtown’s Cathedral, and going up Juarez’ mountains, it serves elementary first through sixth grades. Students live on the southwest side of the outer limits of the Juarez city known as Periphery. The Periphery in Juarez is a low socioeconomic area with poor quality houses. As of today, these houses have limited amenities and are now permanent homes, but initially, they were illegal settlements, where the houses were built from whatever materials the people could find, and there were no basic amenities initially. These lower class housing projects are located close to downtown, where prevailing winds blow with pollution and dust. I encounter many dirt roads, only the main avenues are paved in that zone.

At present, Fernando Ahuatzin Reyes is part of the Federal School District named “Zone 40”, which includes approximately eight elementary schools, four intermediate schools, and five federal preschools. The School District 40 serves more than 2,000 students. The School District 40 currently employs more than 60 teachers and 20 regular employees. The instructional program of the School District 40 requires high expectations from students. The School District 40 assesses student progress through multiple measures on an annual basis. The current results indicate that in School District 40’s students are performing above the state average in most areas including academics, cultural and sports subjects. The School District 40 believes in parent involvement and every school maintains an active parent committee board every year.

The mission of Fernando Ahuatzin Reyes Elementary School is to develop responsible students who are respectful, have integrity, self-discipline, and empathy. The school faculty,

parents, and community provide a safe environment where the students can achieve academic and lifelong success.

In the 1980s, a rapidly growing, low socioeconomic population in the area caused the joint decision by the School District 40 and Juarez government to plan for a school facility for children. They built a twelve brick rooms' school in December 1982. The cost was paid entirely through Federal government funds. In 1984, as Chihuahua commemorated the centennial anniversary of the Mexican Revolution, the school was dedicated to Fernando Ahuatzin Reyes: an inspector and teacher member committed to improving Juarez' education who was the victim of a fatal car accident while driving from Juarez to Chihuahua's education facilities. The school was officially dedicated to Ahuatzin in 1984.

The elementary School Fernando Ahuatzin Reyes currently serves 380 students. The ratio of students to teaching staff in Fernando Ahuatzin Reyes School is more than 30 students per teacher with the OECD (Organization for Economic Cooperation and Development) average being 32. This high ratio is likely to influence the amount of attention devoted to each student as well as the quality of the students' academic outcomes. This ratio raises important challenges for teachers.

It is known that Mexico has a highly centralized and bureaucratic educational system, especially regarding funding. It is also clear that most successful school systems are becoming increasingly decentralized. The centralization of funding comes from the federal government through allocations to the states and then to the cities. The state plays an important role in determining their budgetary priorities and my point of view is that the allocation of funds and personnel is not enough in this particular school.

At the end of 2005, a reflection was made and the Mexican government through its Ministry of Education set as a goal for the year 2025, the attainment of what was called a well-organized and diversified system of education. The goal was to provide the means for the full development of its students and a system of education that is recognized both nationally and globally for its quality in education, starting the basis for the social, cultural, scientific and

technological growth of the Mexican nation in the 21st century. The potential impact on the students and the community will be truly limitless with the implementation of Computer Technology (CT) in the School Fernando Ahuatzin Reyes.

The school's objective is to enable students to increase their knowledge through a CT initiative that integrates a computer-based learning method. The goal of Fernando Ahuatzin Reyes School, as mentioned previously, is to prepare students for a competitive world through the implementation of CT and professional training for teachers. The lack of knowledge about technology at Fernando Ahuatzin Reyes School restricts the potential for intellectual growth for all students, from first to sixth grades. The focus is not only on learning to use CT but rather using CT to learn. Current photographs of the School Fernando Ahuatzin Reyes are shown below.



Figure 4.1: Exterior photograph of Fernando Ahuatzin Reyes School.



Figure 4.2: Photograph of the playground at Fernando Ahuatzin Reyes School.



Figure 4.3: Photograph of the soccer field at Fernando Ahuatzin Reyes School.

Chapter 5: Literature Review

“Love and friendship must be earned not forced.”

Major Influencing elements in the use of Technology

There are many elements for teachers to use Computer Technology (CT) in their classrooms (Pourhosein, 2013). I was wondering if the teachers would be interested in implementing CT in the classrooms, and to what extent technology will help as an instructional and as a cognitive resource. As of today, education and technology cannot be separated because technology is part of every step concerning education.

The integration of CT in education eventually changes the teaching methods and it revolutionizes knowledge. The teacher is the main player to effectively take advantage of this CT opportunity. Technology has been adapting new living standards for us, the daily use of computers, tablets, digital displays in home appliances, GPS, smart TV, smart cell phones, etc., so it is time for teachers to prepare students for the use of computers.

A self-efficacy qualification is the consequence of personal motivation, it is a motivation driven by conviction (Carey & Forsyth, 2016). In other words, with self-efficacy, a person achieves the things attempted to do with confidence. Teachers' confidence is gained by the teachers' realized success in using CT for educational practices and by the ability to control the classroom. Teachers' CT self-efficacy influences how the teachers will model the teaching methodologies and be ready to improvise because technology would outreach the objectives. Basically, to expect an effective integration of CT in teaching methods, the teachers' self-efficacy plays a significant role (Pourhosein, 2013).

There are many elements that encourage teachers to use CT in the classroom (Pourhosein, 2013). These elements include CT training, teachers' CT self-efficacy, CT use outside work, positive convictions and expectations towards CT, training in CT use, practice, and teachers' abilities. These elements are expected to motivate teachers to use CT and integrate it in the

planning lessons. CT will be effective only when the teacher has a plan and a method of instruction including CT.

CT self-efficacy refers to the person's experience in using computers or computer's proficiency. At the same time, the teacher's common use of CT is influenced by self-efficacy. Teachers who have a higher self-efficacy conviction use CT more frequently than teachers who have a less self-efficacy conviction. In other words, teachers' time spent on using CT is reflected by self-efficacy. On the opposite side, those teachers using the technology at a minimum, usually have less computer self-efficacy or confidence and get disappointed when encountering problems. CT integration is intended to ease the teachers' tasks.

The intention is to promote computer self-efficacy for the teachers so they feel excited to implement it in the classroom. Professional training plays an important role to overcome any fear and develop the necessary skills. I think that teachers, who feel less confident in using CT, prefer not to include it in lessons. Competency is an important element to understand the intention of teachers to use CT in the lessons as well. I am exploring the teachers' perspective of using CT with the survey found in Appendix 2. Based on the survey's results, the teachers expressed a willingness to integrate CT in the classroom.

Students may be already using technology. They may have a wider knowledge of computers, and they can question the teachers' knowledge. Therefore, we will be questioning who is exercising the teacher's role. This represents a challenge for the teachers to take advantage of. Some teachers may feel concerned about losing control of the class (Pourhosein, 2013). In the teacher-centered approach, teachers are used to having full authority in the classroom and the teaching methods. Now with the introduction of technology, student-teacher roles are expected to change into new forms.

The integration of CT depends on teachers' self-efficacy perception and simplicity of computer use. Teachers may not use CT often if the resources are not available or if they feel unfit to use it. Teachers preferring not to be exposed or feeling their knowledge is questionable; those are important negative elements for teachers' distrust in integrating CT into the classroom.

Professional training can overcome any doubts. Another contextual element that affects the use of CT in the classroom could be the inadequate CT support in technical issues (Pourhosein, 2013).

It is important to provide schools with computer equipment, software and internet connections. In addition to providing them with maintenance plans, hardware insurances, and technical support for an ongoing use of CT in schools. We would like for the teachers to feel supported and motivated to integrate CT in teaching. In conclusion, we try to understand the positive and negative elements for making it possible for teachers to integrate CT in their teaching methods.

There are possible roadblocks or barriers that discourage teachers' use of CT in the classroom. Some include an absence of CT skills, the need of teachers' confidence, the need for pedagogical training, not enough follow-up integration, and a shortage of training options. The school's level barriers constitute the absence of CT infrastructure and this is at risk if not considered into the CT integration plan. In addition to inadequate equipment, a deficit of appropriate educational applications, CT out of availability, and the need of CT to be part of the school's strategy, the fixed organizational charts and procedures, standardized tests, restrictive curriculum and restrictive job descriptions (Buabeng-Andoh, 2012).

Teachers can successfully use CT in the classrooms. To understand how this is possible, we need to understand what is going on in their minds, the attitudes and convictions toward using CT, and other external elements that may have consequences in their use of CT. A technical support plan needs to be in place so teachers feel supported by the experts, teachers would need to learn various software programs and some complex ones. (Pourhosein, 2013).

Teachers develop customized planning lessons and have particular teaching styles. A change of teaching methodologies may be influenced by the introduction of CT in the classrooms. The teaching objectives need to be revised when including CT in the classroom as well. About having technical support, teachers will feel supported to use CT in teaching and prevent the loss of class time when encountering problems. For instance, if there is no CT

technical support on hand, then it could cause a lot of problems and wasted class time for teachers.

The teaching methods for teachers may have to change when integrating CT in the classroom. The teacher will become a class coordinator of the information, an integrator of technology, a motivator who engages learners instead of a provider of knowledge (Pourhosein, 2013). Instead of providing information like usual on the teacher-centered approach, the CT will be used to plan activities that motivate students and introduce problems to the students with open-ended solutions, changing the students' mindset.

The change of teaching methods is a direct consequence of CT training given to teachers. Teachers become more student-centered when integrating CT into teaching methods (Pourhosein, 2013). CT activities will emphasize cooperation and competition among students. The teachers will find ways to link different subjects and students will find creative solutions. It will be great for teachers to spend less time giving unilateral lessons to the class. As mentioned above, the new changes in instruction include a transition from the teacher as the provider of knowledge to a class coordinator. It is expected the transition from teacher-centered lectures to more student-centered methodologies will result in students making inquiries for information, discerning data, and contributing with their own conclusions. This enormous change in teaching methods could be a source of resistance of CT implementation (Pourhosein, 2013).

The type of professional training prepared for teachers is very important. Professional training should be content focused if we want students to succeed in learning. The goal is for teachers to acquire effective CT knowledge and include it in their syllabi and in their teaching methods (Pourhosein, 2013). Teachers' professional training should include CT software applications. Professional training programs prepare teachers for developing skills to integrate CT into their teaching and learning methods. Teachers who spend more time in training programs are more likely to feel well prepared to teach with CT. In general, teaching methods will be improved in the classroom, aimed at CT training programs.

Basically, training is expected to help teachers integrate CT and improve teaching methods. Teachers' CT abilities are strong determinants of CT implementation. There are many online training programs available for teachers. The training programs are divided into two categories, one is the use of technology and the second is about introducing the subjects with technology or training content. Many years of experience as a teacher could possibly slow down the integration of CT in classrooms. Based on my literature review (Pourhosein, 2013), there were statistics showing that newly certified teachers were already using CT for teaching, compared to teachers with more than ten years of experience not using it yet.

The commitment to training will positively impact the CT implementation in the classroom while increasing skills and knowledge. It is important to allow teachers to apply freely CT in their teaching methods. Training programs for teachers that support content, teaching strategies, new abilities, and updates allow teachers to improve their lesson plans and apply CT in real situations.

CT learning opportunities usually provided for teachers are supported by the top management. Learning opportunities are important elements for succeeding with technology. There is an association of the CT leadership and the high percentage number of schools considered on the top list of schools providing a high quality of CT learning. A leadership focused on teamwork, the introduction of CT, changing teaching styles to student-centered methods, and helping with effective CT integration. Transformational leadership from the faculty (Buabeng-Andoh, 2012), has the flexibility to adapt to the introduction of CT with a revised school's vision, promoting team goals, offering intellectual stimulation, setting high-performance expectations, and fortifying school values. Transformational leadership influences positively the integration of CT. Transformational leadership opposite to transactional leadership is a key element to succeed in integrating CT into teaching methods because the commitment of the faculty and staff is much needed.

The school's principal is the key person to integrate CT while promoting visionary leadership, faculty development, and teacher involvement in the integration process. Three levels

of leadership influence a successful integration of CT in schools: the principal, management leadership, and technical support. Leadership will help the school's principal to delegate activities so that he/she can focus the necessary time for the integration of CT in the school. An institution exemplified by executive involvement and decision-making strengthens the CT plan and effectively integrates CT in the curriculum.

In conclusion, technology upgrades constantly and it is difficult to keep up with the necessary skills to integrate CT in the classrooms. The successful adherence of CT into classroom methods is going to be a challenging task for teachers. This chapter discussed some positive and negative elements encountered to be considered when developing the integration plan for CT. These elements are organizational, personal and technological.

Using Computer Technology to Motivate Elementary Students

Motivation is divided into intrinsic and extrinsic aspects that encourage passion and vitality in people. Motivation is the internal engine for us to get committed to activities, accomplish tasks and attain goals. When people are intrinsically motivated to do a task, they will start the task on their own, keep on doing the task on self-interest, and furthermore improve it. It's better for society and for each person when people participate freely of their own will, meaning when people take initiatives, this results in prosperity for society as a whole. Computer Technology (CT) makes students' learning significant, worthwhile, and satisfying; as a result, academic success rises and then motivation and students' self-efficacy improves.

Teachers have the hard task to find the way to motivate and challenge the students' minds. Teachers usually need to encourage students' intrinsic motivation (Carey & Forsyth, 2016) in a traditional teacher-centered program. Intrinsic motivation is attained from aspects such as interest and curiosity about the topic. On the opposite side, extrinsic motivation is related to receiving incentives, in my case, I cannot give any gifts or rewards to my students so extrinsic motivation is commonly out of reach in the school. In a teacher-centered program, the motivation and engagement are even harder to obtain, teachers have to differentiate teaching lessons and engage students with participation and imagination. In a teacher-centered approach, teachers must know the interests of students and understand what the students already know as a starting point.

The use of CT is often motivating students by itself in terms of getting them to learn new things. CT requires effort to read and write more carefully. When creating presentations, the ability to add effects, colors, graphics, videos, and sound; when using word processors, the ability to type and mark text using highlighting options, and different font types and sizes; when using educational games; etc. For Mexican students, would be even more motivating and inspiring because a lot of content is in the English language.

CT will engage students in the newly applied learning methods. Considering the flexibility of CT to diversify activities for students, almost any activity could be designed to take

into account the students' prior knowledge and to address students' interests. It is expected that CT will shift teaching methods from a teacher perspective to a personalized approach. It is expected student motivation will be enhanced with the help of CT because it is flexible to engage academic activities that build upon students' prior knowledge and then enable students to construct their own understanding of the content. CT is able to teach an infinite number of topics, to develop limitless abilities for students, and it is a key player resource for students' success in their future life.

How Computer Technology is Used in Education for Elementary School

Technology is used everywhere nowadays and computer's competence is an important skill for students to develop since their early years. Integrating CT into daily activities in elementary schools expose students to the use of electronic devices and prepares students for higher levels of education and in the future to be able to get jobs requiring advanced computer skills, especially in the case of students who do not have computers at home (Chapman & Mähle, 2004).

Computer-Based Learning (CBL) is a concept about using computers for teaching purposes. Including activities like the following: investigating concepts, creating computer presentations for the class, computer-based testing, drawings or developing projects. The purpose is to integrate technology into the curriculum for all grades, rather than teaching CT as an additional class (K12 Academics, 2016). The CBL concept basically introduces technology to students, with an early years' exposure, the children grow up in familiarity with the use of technology.

Activities for elementary students could be very easy to develop and the learning obtained and skills developed will impact later levels of education. Few examples are activities such as reviewing online newspapers, consulting online references, and looking for data. All of these are possible with Internet-connected computers in elementary schools. Next, I found few interesting concepts about learning and students' engagement with CT. The learning concepts below are associated with teaching methods, integration of CT and assessment of learning progress when integrating technology in education (Manichander, 2016).

- Learning consists of a dynamic elaboration of different teaching approaches.
- Commitment is derived from the intention of learning with CT.
- Learning is associated with understanding, imagination or experiences, having a starting point to develop.
- Learning is successful when cooperating with people and resources.
- Learning is constructive because adheres concepts and integrates the ideas.

- Learning is not linear; it has different levels of profound growth based on the students' capabilities.

- Learning is linked to motivation and the will to learn.

Chapter 6: Grant Proposal for a Computer Technology Lab

“Analytical minds to generate assertive minds”

This chapter addresses the need for elementary students, in Fernando Ahuatzin Reyes School, to use Computer Technology (CT) in their everyday learning through a computer lab initiative. The elementary school Fernando Ahuatzin Reyes, located on the north border of Mexico, has limited access to technology. This school has a library with plenty of space, it is an accessible location for all the students and staff, and it is accessible for any students with mobility difficulties. The library would be accommodated to be a learning resource center and computer lab. The total area of this building is approximately 48 square meters.

The traditional layout is proposed for accommodating the computer lab, as shown in the Figure below, with the suggestion of one device per student, an LCD (Liquid Crystal Display) projector with a screen, a printer, and software applications. The computers should be able to connect to the current school network and provide each computer with access to the network and Internet services (e-mail server, printer access, Wi-Fi, etc.).

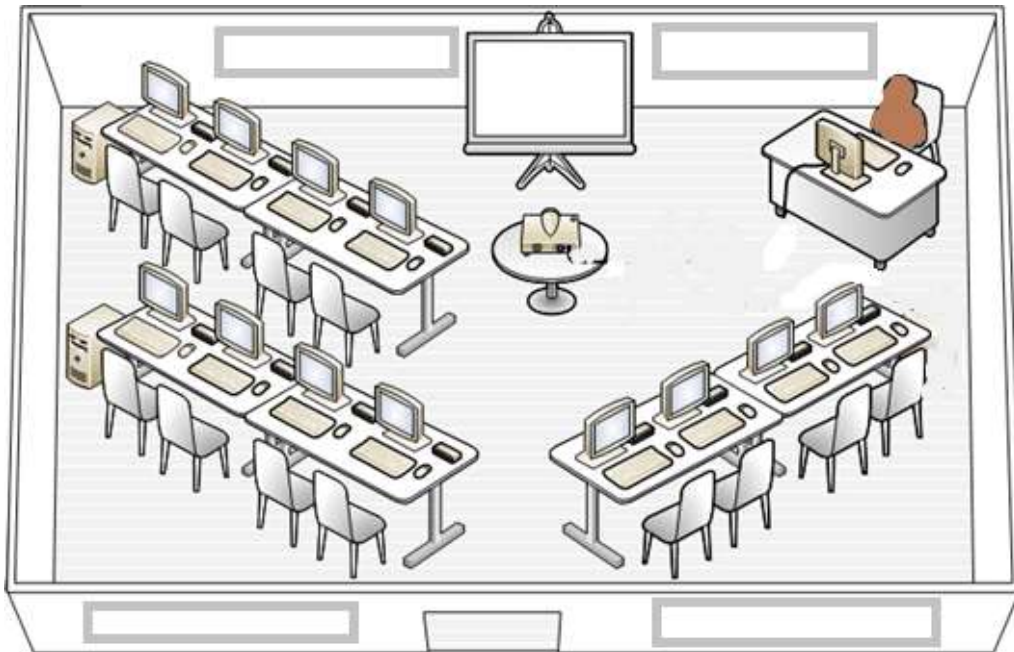


Figure 6.1: Proposal for Fernando Ahuatzin Reyes School’s Computer Lab.

Most of the budget will be used to acquire computer equipment. This computer lab initiative is proposing the purchase of 33 computers to have a one-to-one computer, one LCD projector, one all-in-one printer, and one screen for the projector. See Figure 6.2 below with the 33 computer arrangement. This one-time buy will get the initiative in place ready for installation and training. The cost for services is for one technician for installation, technical support, and initial training on how to use the new equipment, in addition to transportation services for the equipment. There is one teacher in the school assigned as a coach for installation and technical support; he is already on the school's payroll so no additional costs may be incurred.

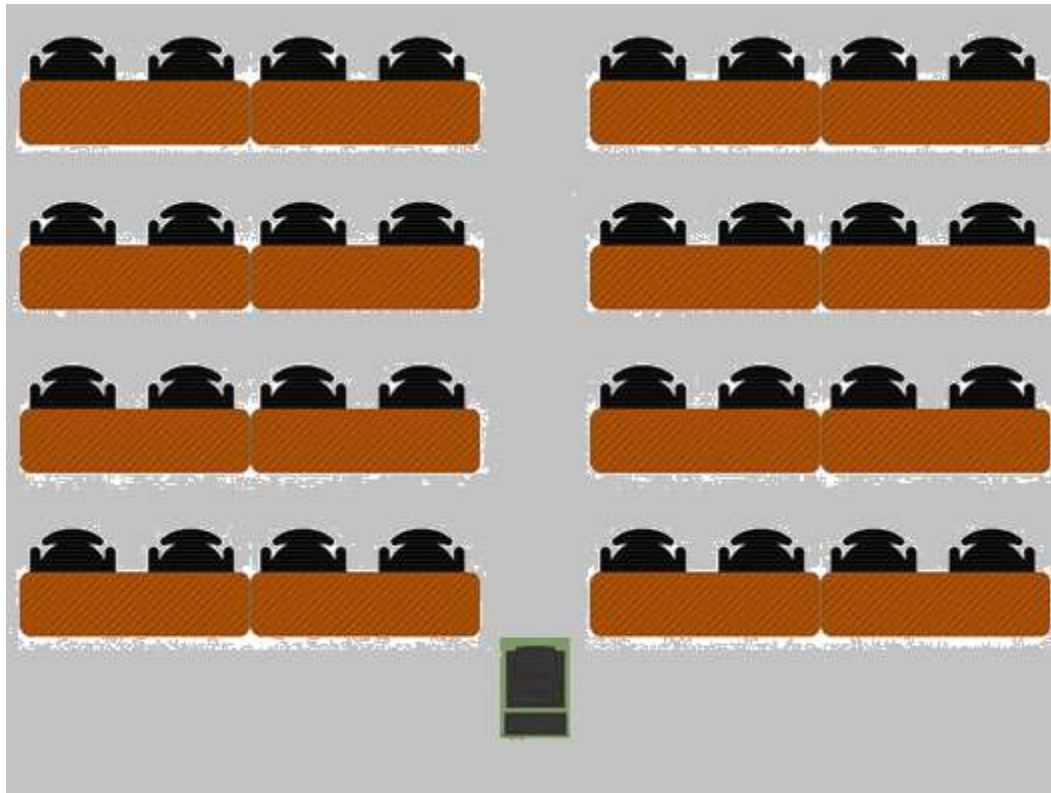


Figure 6.2: This is a diagram of a computer classroom with thirty two computers plus a teacher computer.

A table below is outlining the proposed resources required for this initiative to take place.

Table 6.1: List of all items and resources needed for the Computer Lab.

Description	Quantity and Cost	Budget Requested
I. Equipment	33 @ \$960	\$31,680
Computers		
HP - ENVY 23.8" Touch-Screen All-In-One -		
Intel Core i5 - 8GB Memory - 1TB Hard Drive		
Model: 24-n014SKU: 4464400. Windows 10		
Technical details: 6th Gen Intel® Core™ i5 processor		
Special features: Touch screen; built-in wireless		
networking; Bluetooth; wireless keyboard and		
mouse; HDMI output; webcam. DVD/CD not included.		
Printer		
HP - Officejet Pro 6978 Wireless All-In-One	1 @ \$120	\$120
Instant Ink Ready Printer		
Model: T0F29A#B1HSKU: 5119600		
4-in-1 functionality. Built-in wireless LAN		
Prints up to 20 ISO ppm in black		
225-sheet input tray, 35-sheet ADF. Touch screen.		
Electricity outlet		
Insignia™ - 12-Outlet Surge Protector	3 @ \$48	\$144
Model: NS-PWS5129 SKU: 5741033		
4350 joules of protection; 12 surge-protected outlets; 8'		
Projector		
Epson - Home Cinema 740HD 720p 3LCD Projector	1 @ \$599	\$599
Model: HC 740HD Projector -		
V11H764020SKU: 4338613		
1280 x 800 resolution		
3000 lumens white and color brightness		
16:10 aspect ratio (resizable to 16:9 and 4:3)		
Projector screen		
Projecta - Designer Contour 120" Electric Projector	1 @ \$724	\$724

Screen - White Model: 38217SKU: 9439869		
69"H x 92"W viewing area; electric for wall or ceiling		
mounting; aluminum casing		
Mount for Projector		
Sanus - Universal Ceiling Mount for Front Projectors	1 @ \$180	\$180
Model: VMPR1SSKU: 7119646		
Fits most front projectors; pitch, roll and yaw		
adjustment; quick-release feature		
II. Software and services		
Anti virus		
Norton Security Premium for up to 10 PCs 2 years	4 @ \$130	\$520
Warranty		
3-Year Geek Squad Protect & Support	33 @ \$152	\$5,016
Microsoft Office		
Office 365 University 4-years subscription, 1 PCs/Macs	33 @ \$87	\$2,871
Services		
Installation and initial training with local supplier	20 hours @ \$40	\$800
Transportation	1 @ \$110	\$110
<u>Total budget requested</u>		<u>\$42,764</u>

The estimated budget for the CT initiative is \$42,764 USD. This estimated cost covers the purchase of computers, software, installation, initial training, and transportation. The equipment is subject to a twelve percent import duty already included in the costs; this cost could be avoided if processed as a donation to public school Fernando Ahuatzin Reyes. There is no need to buy additional hardware or Internet service because a wireless system is already in place in the school and Internet connectivity was installed on October 5th, 2016 by the Mexican Federal Government. The suggested equipment on the table above can be changed for similar equipment and services at the time of purchase.

This initiative will help School Fernando Ahuatzin Reyes accomplish its commitment to student preparation for today's global technological advances. Elementary students will learn to use CT for their personal life and future steps in education. Appendix 1 illustrates a process flowchart explaining the equipment and software acquisition procedures to be used by the school and the project's team members. The process flowchart has diagrams that illustrate the sequence of steps to be taken to get the acquisition of the items. To simplify it, the process flowchart focuses on the main steps for analyzing and purchasing the items, and the authorizations and reviews necessary by the team members. The project's team members are Dr. Gutierrez, Mrs. Terrazas, Mrs. Barajas and Mr. Corral as mentioned in the Abstract.

Chapter 7: Survey Results

“I couldn’t get rid of hard work.”

The following results are based on the views of twelve teachers at Elementary School Fernando Ahuatzin Reyes. The teachers shared their perspectives in a survey conducted on October 6th, 2016; the survey was conducted one to one in their own classrooms. The survey’s questions are found in Appendix 2. The School Fernando Ahuatzin Reyes is representative of the School District 40, the results capture the perceptions of educators at this school.

The response for each of the six questions was scored on a 0-100 grade. Zero score represents a negative answer and it goes up to a positive answer toward the belief of CT integration success. The overall score is calculated by averaging results for all six questions. In this thesis, the overall score or confidence index is a comprehensive indicator of teacher’s confidence in Computer Technology (CT) integration. The score is 87 out of 100 which represents a very high expectancy and willingness to implement CT as soon as possible.

The survey offers an opportunity to better understand both teachers’ current perspectives on CT implementation and their views on educational needs. In addition to the influence of computer literacy skills and teachers’ self-efficacy that will impact their effectiveness in teaching methods. The six different questions to assess the views of the present conditions and future projections in four key areas shaping education with CT: teachers’ proficiency, expectations, roadblocks, and expected student’s skills to be developed by CT.

The doughnut chart in Figure 7.1 represents that most teachers score high level of effective CT use: 83 percent of the total have a very high level of confidence in CT use, less than one percent of the teachers earn low scores while a 16 percent are in the middle still having a high level of confidence with CT use.

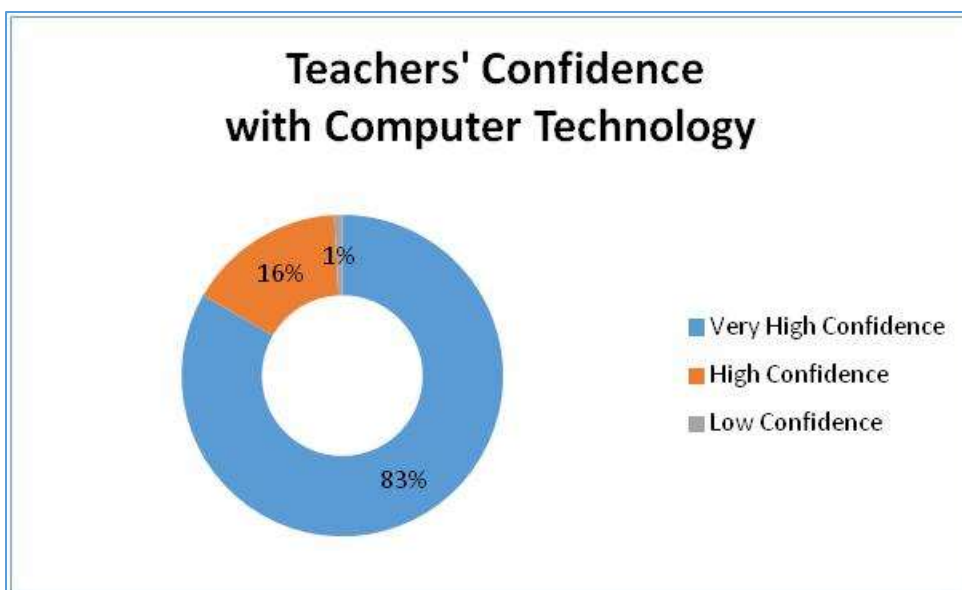


Figure 7.1: The Doughnut Chart shows the Teachers' confidence to integrate CT in the classroom.

CT has more potential than whiteboards and facilitates flexible and innovative uses of technology that involve creation and collaboration. After all, CT is easy to adapt and to use for student-centered activities that depart from the traditional models of the teacher-centered lessons using whiteboards. Teachers comprehend the potential for CT to help students acquire knowledge based on learning activities with CT.

At the end, if guided in a proper way, technology is the educational system ally to speed up the learning, nurture content, and develop abilities beyond the parameters set by traditional teaching methods. According to the teachers' answers, students may be able to improve their abilities or skills in this order: Science, Social Studies, Reading, Writing, and Mathematics. This is shown in the bar chart in Figure 7.2 below. These skills are fundamental to enabling students to learn in all subject areas, and through developing these skills we expect to raise standards across the curriculum.

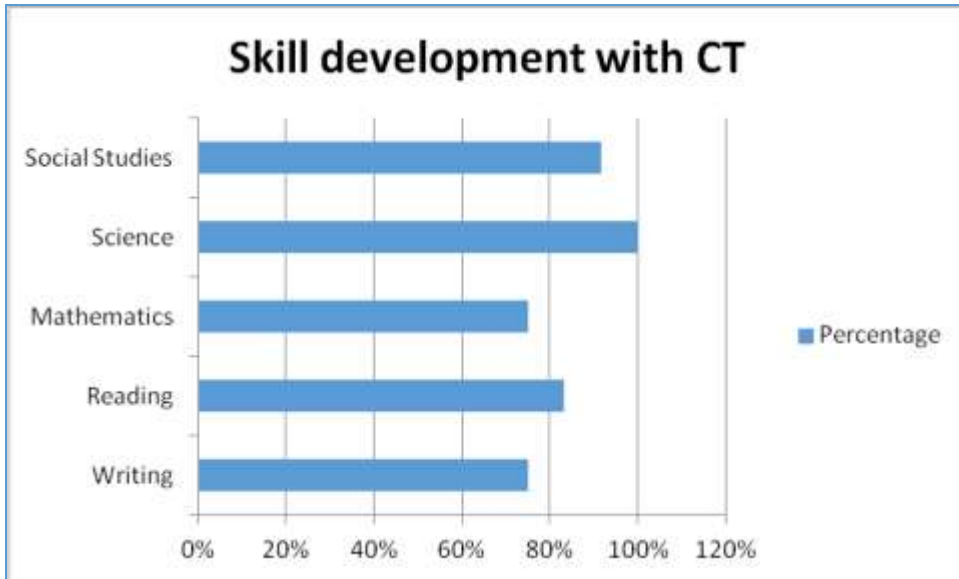


Figure 7.2: The Bar Chart shows the Expected learning skills improvement.

The twelve teachers surveyed in this study have similarities in training and experience. Based on the survey results, the teachers had equal or similarly high experience in computer competencies and Internet use. All of the teachers have minimum experience integrating CT into the core curriculum, though. As shown in the bar chart in Figure 7.3 below.

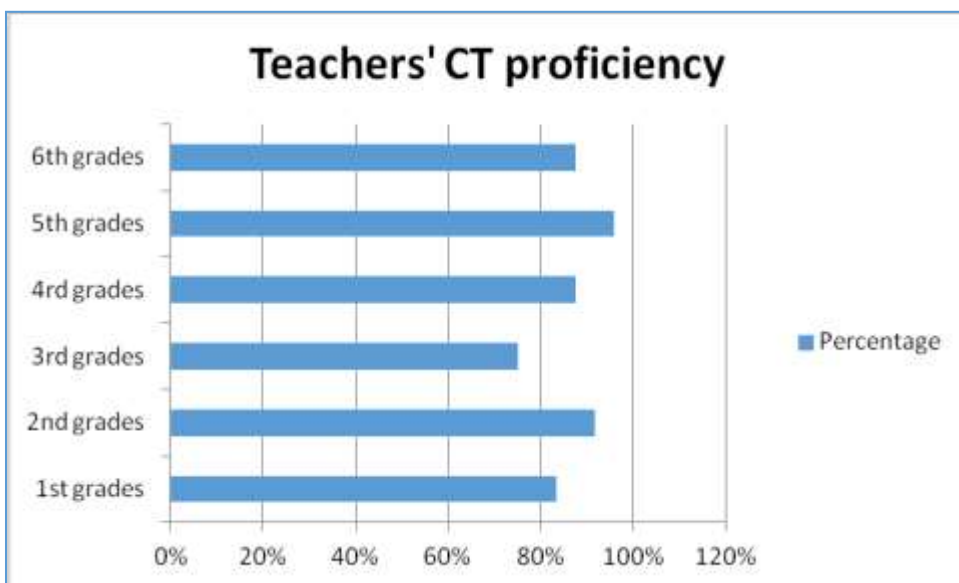


Figure 7.3: The Bar Chart shows the Computer Literacy of Teachers.

In order for students to use CT as a tool to improve learning, the School Fernando Ahuatzin Reyes must have ready access to technology and the necessary teachers' competencies to use this technology effectively. Unfortunately, computer equipment is not available in this particular school. Funding to provide CT in classrooms is often difficult to get.

To further enrich this chapter, I did an additional interview to understand a teacher's attitude and his current CT practices. The "CT implementation interview" below consists of 25 questions (Wozney, Venkatesh, & Abrami, 2006). The collection of information was done in Elementary School Fernando Ahuatzin Reyes, interviewing one of the teachers from second grade. I selected this specific teacher because concluding from chapter 5, it indicated that introducing CT in early years for children was more beneficial as the second-graders already knew how to read and write, thus they will be taking advantage of the knowledge that CT will foster in them.

"CT implementation interview:"

Instructions: Please choose one of the following options: Strongly concur, moderately concur, slightly concur, slightly differ, moderately differ, or strongly differ.

1. Does CT increase academic goals (behavior in the class, grades, attendance, etc.)? Strongly concur.
2. Does the CT result in students disregarding important traditional learning tools (textbooks, notebooks, etc.)? Moderately differ.
3. Does CT promote student participation? Strongly concur.
4. Does CT promote the improvement of students' abilities (essays, grammar, presentations, etc.)? Moderately concur.
5. Is it necessary for teachers to have access to a computer outside work to succeed in the classroom? Strongly differ.
6. Does CT make you grow as a professional? Strongly concur.
7. Is it necessary to have quality training for teachers on how to implement teaching strategies including CT? Moderately concur.

8. Is it necessary to have technical support to be successful in the use of CT? Moderately concur.
9. Do you need parental involvement for CT to be successful? Strongly differ.
10. Is CT an inclusive resource for students with normal and different abilities? Moderately concur.
11. Is CT important to be learned at school even though it can be learned outside school? Strongly concur.
12. Does the CT use enhance my curriculum as a teacher? Moderately concur.
13. Does CT decrease the stress on me as an educator? Slightly concur.
14. Is it a good idea to include the teachers' suggestions before acquiring the technology in the school? Moderately differ.
15. Is CT adaptable to different learning styles for students? Moderately concur.
16. Is CT intrinsically motivating students to participate and learn? Strongly concur.
17. Does CT restrict your options of activities and tools? Moderately differ.
18. Will CT integration require a lot of time from you for training? Moderately differ.
19. Does CT improve students' interpersonal qualities (to be a good team member, etc.)? Moderately concur.
20. Does CT require a wide number of technology resources in place? Moderately differ.
21. Is CT easy to use, helped by the fact that some students have knowledge about computers? Moderately concur.
22. Is CT learning possible only if the students use technology outside school? Strongly differ.
23. Does CT require more time than usual for planning lessons? Slightly concur.
24. Does CT intend to make students' knowledge concise and relevant? Moderately concur.
25. Will you feel more motivated to teach using CT if your students do not have access to technology at home? Moderately concur.

The above questions assessed the second-grade teacher's attitude, values, and convictions towards the integration of CT in the classroom. In conclusion, this study brings to light the motivation related to the teacher's implementation of CT. Consistent with other findings, this study found that CT implementation is a dynamic process compatible to subjective teacher's qualities and helped by specific settings in the school.

We can assume that teachers involved in student-centered methodologies support and feel positive about integrating CT more frequently. These are teachers having computer self-efficacy, they have an inner confidence and are perceived ready to improve teaching procedures and implement CT in classrooms. The qualitative results of this thesis are the basis for the next step which is to look for funds with the objective of implementing a CT lab for Elementary School Fernando Ahuatzin Reyes.

Chapter 8: Conclusion

“Develop analytical minds to generate assertive minds.”

The public schools in Mexico have struggled to introduce Technology into the classroom in all sorts of ways. It started years ago with the introduction of televisions, CD players, and projectors and now the school system is trying to introduce tablets and computers connected to the Internet (Tech in our everyday life, 2016). It is very important for students to learn Computer Technology (CT) use to be prepared to compete in a world submerged in technology. The starting point is to make it possible for students to learn how to use CT in the classroom and for the teachers to improve their teaching methods.

CT use in education has benefited both teachers and students. The inclusion of CT has made it easier for students to learn and has made the teachers' planning easy to be developed and taught. Students who use CT learn to use word processors for writing essays, spreadsheets for calculations, presentations and subsequently they strengthen grammatical skills. In Mexico, students using CT will learn to read and write in English as a second language since the programs and the sources of information are usually in the English language. One advantage for students could be to look up lessons on websites or through email rather than carrying heavy textbooks with them every day.

Based on research made in the United States over the years, and commented in previous chapters, the impact on students using CT is very positive. These students tend to attend school more steadily and perform better than students who do not use CT. Students tend to feel more motivated and involved with their lessons if they use computers (Tech in our everyday life, 2016). Using CT students become more focused on their work at home, work in collaborative team projects with other students, and work on their own projects.

Teaching students how to use CT helps them prepare for any number of careers. CT is vital in the modern business world, and many jobs involve CT. CT makes the learning process

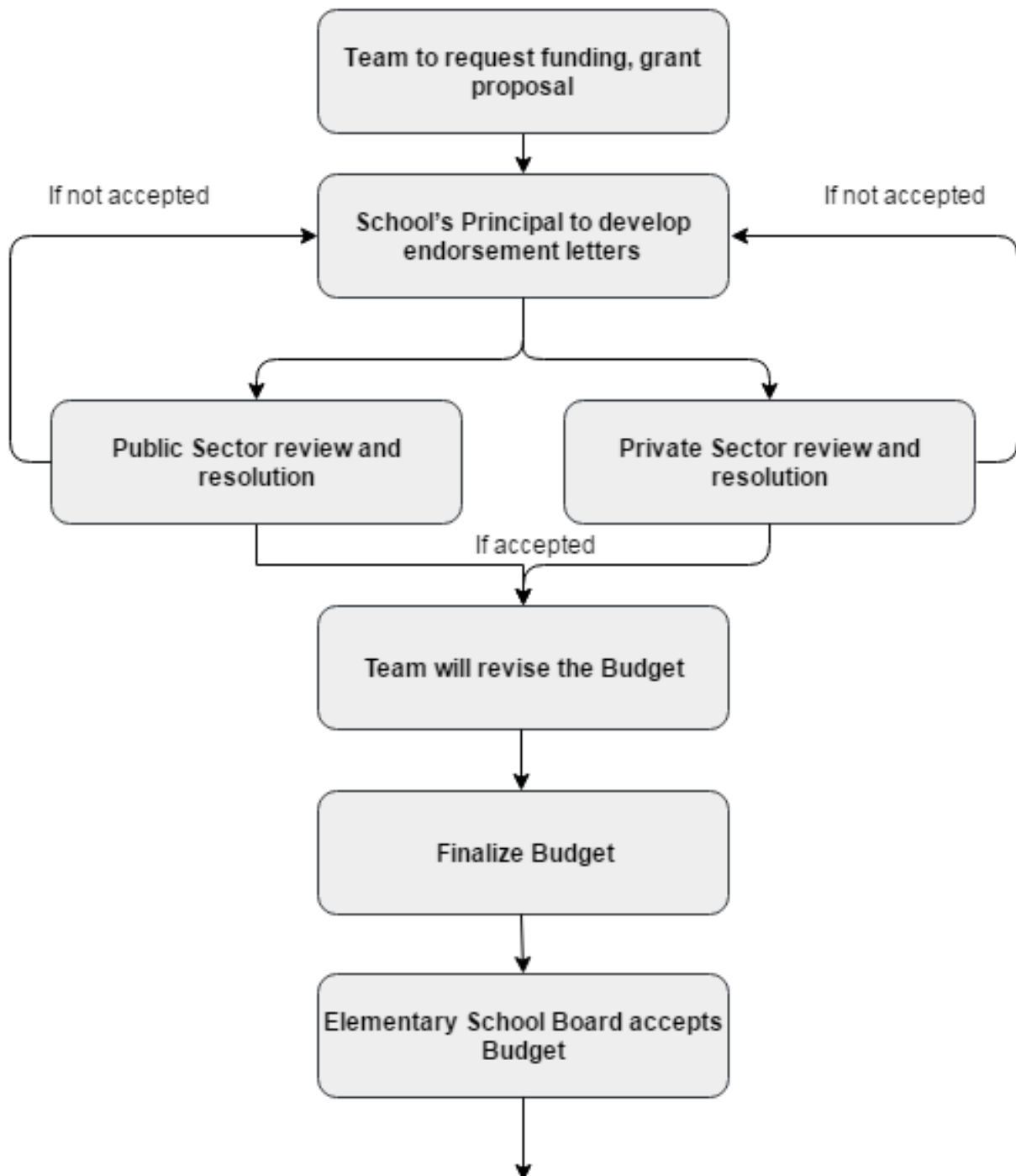
simple, understandable and efficient. Online communication is very effective for students to get evaluations, lesson plans, check their grades and to submit homework or projects.

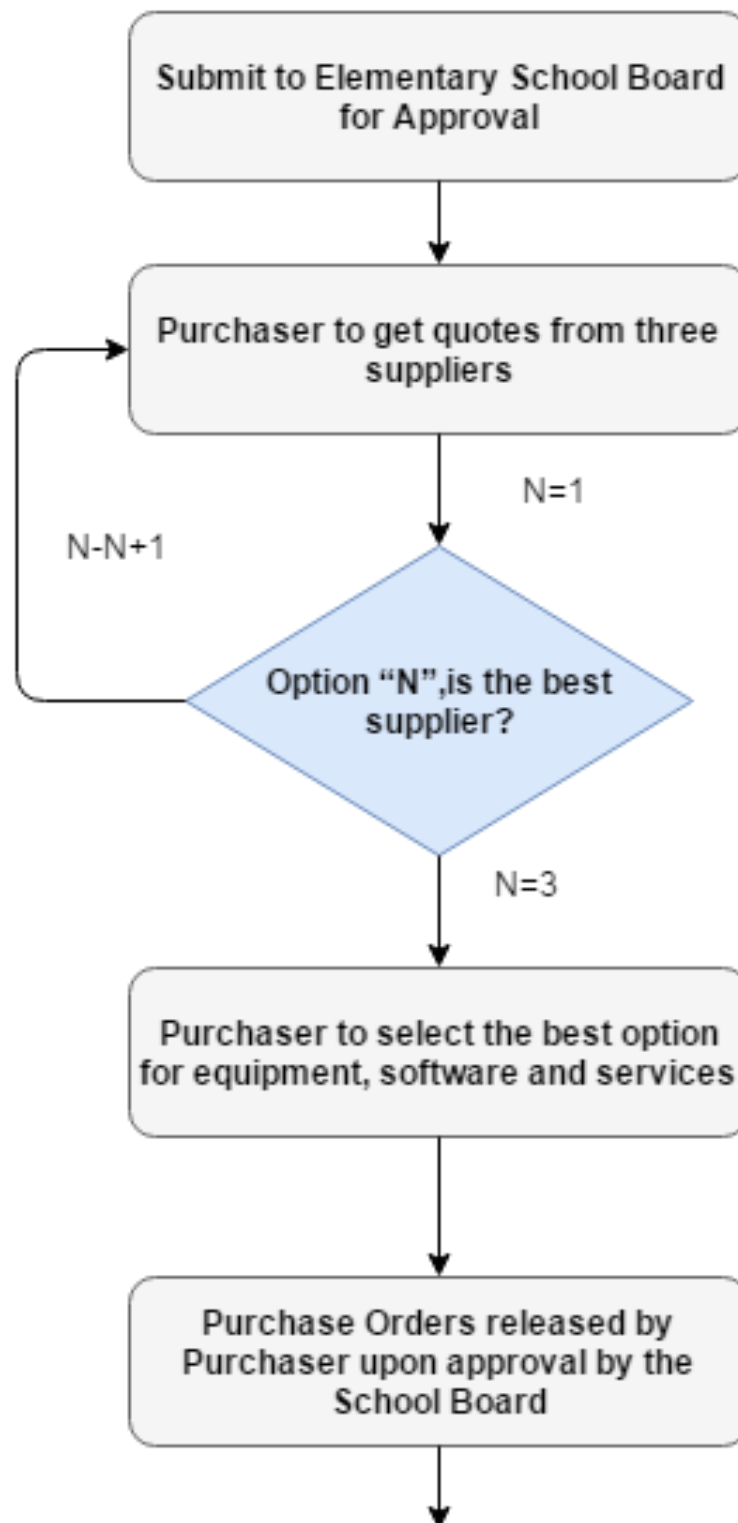
To conclude, the qualitative data from the surveys and the interview confirm the premise that CT will improve the access, efficiency and quality of basic education in Mexico. When CT is introduced into schools, it leads to be used at first to complement existing teaching methodologies and eventually to transform them. Introducing CT into schools for the first time is costly and time-consuming. I truly believe technology will help teachers grow as professionals and open new opportunities for students. CT is an important tool that motivates students and would help them achieve better efficiencies allowing an educational reform including CT integration. The team would recommend going ahead with a plan to implement CT at Fernando Ahuatzin Reyes School in the near future.

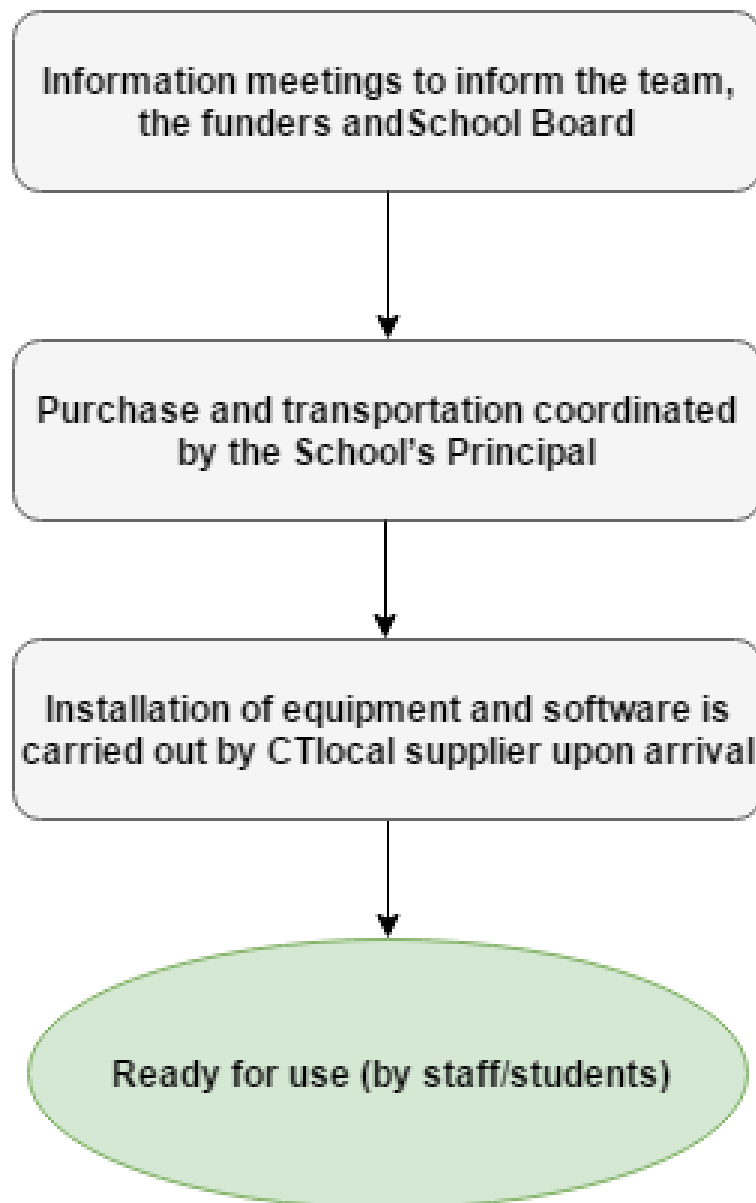
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Appendix 1: Process Flow Chart for Equipment and Software Acquisition.







Appendix 2: Survey for Teachers on CT Implementation.

1. For your personal use other than work, how often do you use the computer outside of work?

- ☐ Almost daily
- ☐ At least one time per week
- ☐ At least one time per month
- ☐ Less than a month
- ☐ Rarely

2. How often do you use the internet at home for work-related activities?

- ☐ Almost daily
- ☐ At least one time per week
- ☐ At least one time per month
- ☐ Less than a month
- ☐ Rarely

3. How often do you include technology in regular classes?

- ☐ Almost daily
- ☐ At least one time per week
- ☐ At least one time per month
- ☐ Less than a month
- ☐ Rarely

4. Do you think that including technology can improve the performance of students in the topics of the syllabus?

- ☐ No
- ☐ Yes, somehow
- ☐ Yes, for sure

5. What can affect or stop you to integrate technology in the regular classes? (Select all that apply)

- ☐ Enough time during the day
- ☐ Additional time for planning
- ☐ Availability of the technology components
- ☐ Technology integration hints
- ☐ Personal CT skills and knowledge
- ☐ The Internet sites available or software applications
- ☐ Slow connectivity

6. In what areas of student performance, can technology help to improve them? Check all that apply with “X”.

Proficiency	CT is not used	A minimum part	A maximum part
Mathematics			
Writing			
Social Studies			
Science			
Reading			

Teacher name: _____

Teacher signature: _____

Current grade: _____

Vita

Griselda Terrazas, MBA, and Computer Systems Engineer. Teaching experience in Elementary School from the year 2015 to the present, school grades 3rd to 6th. Worked as a “Commercial Manager” at Lear Corporation from 2007 to 2013 years, before that, worked for the same Corporation as a “Cost and Price Manager” from 2004 to 2007 years, and before, for the same Corporation as a “Computer Engineer for Manufacturing”. Since 2013 started a Beef Jerky business named “Crunchy Beef Jerky”. Currently pursuing professional growth in the educational field to continue with my best efforts to improve children’s education and continue serving as a role model for the students.

“Earning a degree is not about time it’s about effort.”

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This thesis was typed by the author.