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A culture of excellence - a study on high achieving public high schools in California

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A CULTURE OF EXCELLENCE - A STUDY ON HIGH ACHIEVING PUBLIC HIGH SCHOOLS IN CALIFORNIA

A dissertation submitted in partial satisfaction

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by

Rhea Sanchez

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This dissertation, written by

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ACKNOWLEDGEMENTS

According to Frankl (1959) even when there is nothing left but the clothes on your back, a man still has one possession that can never be taken away "the last of the human freedoms- to choose one's attitude in any given set of circumstances, to choose one's own way" (p .66). I have been blessed to have family, friends, and mentors who have chosen to be an instrumental part of my life. This dissertation would not complete without my acknowledgement of the roles they have played in my life.

My parents, who have taught me that loving your family unconditionally is a responsibility that each of us must fulfill with gratitude. My dad, who has lived his whole life loving my mom, my sisters, and myself without expecting anything in return; this valuable knowledge that I could never have found in any textbook. In her own way, my mom has taught me to finish anything I started, including goals that I dared to dream about.

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DEDICATION

This goal of mine to further my education and obtain a doctoral degree is dedicated to my parents who have taught me the value of knowledge.

My lifelong pursuit to continue to better myself is dedicated to Joseph, Jaden, and James, who inspire me to strive to be the wife and mother worthy of receiving their unconditional love.

VITA

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RELEVANT QUALIFICATIONS:
Hard working and resilient professional with successful outcomes in implementing vision into reality. Ability to lead and to teach with a humble heart, to inspire individuals to seek their highest potential, and to provide a supportive environment for individuals to work together for a common goal.

- In-depth educational background experience in leadership and organization change
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Doctor of Education in Organizational Leadership — June 2012

California University of Long Beach
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CREDENTIALS:
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K-12 EDUCATIONAL EXPERIENCE:
Options for Youth, Public Charter Schools, Upland CA — 2010 – Present
Lead Teacher (Assistant Principal)
- Manage and obtain projected ADA for learning centers
- Implement on-going training and development of teachers and staff
- Monitor growth of staff, implement action plans to improve school culture, staff performance and increased student retention and productivity
- Provide guidance to teachers in ensuring students made adequate progress towards graduation
- Coordinate and collaborate with other leadership and administrators in sharing best practices, implementation of policy changes, and creative problem solving

Options for Youth, Public Charter Schools, Pasadena CA — 2006 – 2010
Educational Projects Manager
- Led and developed teams to complete projects
- Gathered all final outcomes from stakeholders involved in projects

- Identified key personnel required to create team
- Created and implemented timelines and detailed action plans for projects
- Supervised curriculum instructions, design and policies
- Initiated, directed and coordinated educational programs for multiple sites
- Analyzed and communicated effectiveness of educational programs to Assistant Superintendent
- Secured, managed and reconciled state grants and funds
- Directed and coordinated specially funded programs for multiple sites
- Updated and implemented student related policies and procedures to comply with all charter laws, Educational codes and other applicable regulations
- Implemented, revised and coordinated student and site emergency policies and procedures
- Led, developed and trained staff on school emergency procedures
- Initiated, implemented, and coordinated staff in-services and professional development on effective leadership practices

Options for Youth, Burbank, CA
Master Teacher/English Language Administrator 2004 – 2006

- Supervised day-to-day operation of three school-sites including budget and supplies
- Implemented on-going training and development of teachers and staff
- Led leadership team in monitoring growth of staff, implementing action plans which resulted in improved school culture, more efficient staff performance and increased student productivity
- Provided guidance to teachers to ensure students made adequate progress towards graduation and increasing overall student productivity of the school-sites
- Coordinated and collaborated with other leadership and administrators in sharing best practices, implementation of policy changes, and creative problem solving
- Oversaw report writing and preparation of staff and learning centers for WASC accreditation visits
- Implemented and coordinated WASC action plans throughout school year
- Served as Educational Administrator on individual Education Plan (IEP) team

Options for Youth, Burbank, CA
Mentor Teacher 2001 – 2004

- In addition to teaching responsibilities, mentored teachers and staff

to be more effective
- Trained and provided guidance for new teachers and staff on school's policy and procedures
- Worked with administrators in monitoring growth of staff and implementing improvement plans, stabilizing student enrollment and improving staff performance
- Key member of educational Advisory Council, Burbank Charter's leadership team, IEP meetings, and coordinated student activities within learning center

Options for Youth, San Gabriel, CA
Academic Recovery Teacher 1998 – 2001
- Provided one-on-one instructions to students in multiple subjects using variety of educational methods and tools
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- Utilized creative teaching strategies to meet students at their current level
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University of Phoenix 2011 - Present
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ABSTRACT

Pockets of success in the United States exist where public schools have been able to produce highly educated students. A wealth of information can be gleaned from the successful practices being employed by these distinguished schools. The purpose of this study was to investigate the best practices being employed by these high achieving public high schools, specifically in California.

A qualitative research design was used to explore the phenomenon that existed in high achieving public high schools, as well as in gathering the data concerning common best practices based on the perspectives of the participants in this study. The criteria that were used in selecting the participating schools included: (a) school was designated as a high school, serving ninth-twelfth grade students, (b) school had an Academic Performance Index score of 800 or above, and (c) school had a Similar School Ranking Score of 8 or above. The principals or the head of schools that met the criteria were invited to participate in the study. The approach used in this study most closely resembled the procedures employed in conducting a grounded theory research.

The findings of this study might be beneficial to educators in improving the achievement level of their schools. The study described common best practices to development students' mastery and their application in reading, mathematics, and science literacy. The purpose of the study was to seek the programs and practices that helped students to enter and to prepare for post-secondary institutions, including STEM-related degrees. Also included in the study are the common best practices that created opportunities for students to foster and promote innovative and critical thinking skills. Moreover, this study explored the role of parents and community as well as the related

common best practices that helped the schools build partnerships with parents and members of the local community. This study also included the participants' descriptions of effective teachers and school leaders. Finally, this study described how school leaders had overcome the challenges they faced in bringing their vision of high achieving public high schools to fulfillment.

Chapter I: Introduction

During the early 1960s, many Americans feared that the United States was falling behind in the space race with the Soviet Union, a concern triggered by the Soviet Union's successful launch of Sputnik, the first manmade satellite to orbit earth (Pearson Learning Group, 2003). Consequently, American leaders became increasingly concerned that the United States' educational system was no longer producing the world's most highly educated students, particularly in math and science (Boyle, 2008). This concern prompted American leaders and educators to reform public education in order to produce students who would surpass any technological developments accomplished by the Soviet Union (Boyle, 2008). The aim was to produce students who would become scientists and engineers that could help win the Cold War. Therefore, more rigorous science curriculum was implemented and science labs were added to existing high school buildings (U.S. Department of Education, 2007). After winning the space race, United States public education earned the distinction of being "world-class" (U.S. Department of Education, 2008, p. 1); people around the world knew that Americans had an education system that was capable of producing a highly skilled workforce.

During the rest of 1950s through the 70s, the focus of education reform in the United States shifted. After winning the Cold War, the focus changed from producing the best and brightest students in the world to ensuring equal access to public education for all students regardless of students' race or special education needs. In 1954, the United States Supreme Court's decision in Brown v. the Board of Education of Topeka, Kansas ended the separation of students on the basis of their race (Birzer & Ellis, 2006). A unanimous vote by the Supreme Court Justices declared that separate but equal

facilities for Black students were unconstitutional (Birzer & Ellis, 2006). Twenty-one years later, the United States Congress enacted a law that would also change the makeup of the student population in public schools. In 1975, the Education of All Handicapped Children Act was passed, giving full educational opportunities for all children with disabilities (Singer & Butler, 1987). This act mandated all public schools to identify and provide special education services to all students with "educational, developmental, emotional, or physical disabilities" (as cited in Singer & Butler, 1987, p. 125). These two historical events guaranteed free public education for every student living in the United States. In between these events, there was a change in the lifestyle of Americans that also altered the student population of schools.

In the 1960s, middle-income families began moving out of densely populated cities. Families who could afford to move out of the cities began buying homes in quieter suburban neighborhoods (U.S. Department of Education, 2007). This geographical movement of the upper class created a separation from the families of lower socioeconomic status background who remained living in the inner cities. Because of the increased concentration of low-income students, high schools in the inner cities gained a term that is still currently referred to today as "low-income minority high schools" (U.S. Department of Education, 2007, p. 3). By the mid-1960s, educators began to see lower standardized test scores, grade point averages, graduation rates as well as a lower number of students going to college from these low-income minority high schools in comparison to their peers enrolled in suburban high schools (U.S. Department of Education Planning and Evaluation Service, 2001). With less emphasis on producing highly educated students and more reforms passed to combat the achievement gap between poor and

affluent students, the overall standard of the public education system began to suffer due to fewer resources available to address the needs of public education.

By the 1980s, the reputation of the United States' public education system became questionable. In 1983, the United States' Department of Education released a report, *A Nation at Risk: The Imperative of Education Reform,* which gave Americans another reason to be alarmed about the state of their public education system. This report pointed out that the supposed "world-class" education system in the United States was in fact falling behind, and this time, not just to one economic powerhouse country, but also to numerous emerging countries such as the Republic of Korea, Germany, and Japan. According to the National Commission on Excellence in Education (1983), "Internal comparisons of student achievement completed a decade ago, reveal that on 19 academic tests American students were never first or second, and in comparison with other industrialized nation, were last seven times" (p. 11). The report also noted that any advancement in education as a result of the nationwide motivation to win the space race had been wasted. The Commission reported, "We have even squandered the gains in student achievement made in the wake of the Sputnik challenge" (p. 10).

More than 2 decades later, the Unites States Department of Education is still conveying the same message. In 2008, the United States Department of Education declared that over the past few decades, "our supposedly world-class system of education [has] not [been] keeping pace with the progress of other nations" (p. 1). The United States is currently producing students who can barely score average at best, and lowest when compared to students in other developed countries. Among all advanced industrialized nations, "American students and young adults are placed anywhere from

the middle to the bottom of the pack in all the continuing comparative studies of achievement in mathematics, sciences, and general literacy" (National Center on Education and the Economy, 2007, p. 4). Therefore, it appears that more than half of the countries in the world are producing better-educated students than American graduates who are entering the workforce in the 21st century.

The poor quality of education leaves Americans at a disadvantage when competing in both low-wage and high-wage skills jobs, and because the geographical barriers of employment between countries is quickly disappearing due to advances in technology, the current job market in the United States is no longer confined within its borders. In his book, *The World is Flat*, Friedman (2005b) argues that the world is a level playing field – a flat world – in terms of commerce, where people from all nations have an equal opportunity to compete for jobs. According to Bill Gates, technology has rearranged geography and "natural talent has started to trump geography" (as cited in Friedman, 2005b, p. 194). Technological advances have given students from other countries the opportunity to compete in the same job market with American graduates without leaving their countries. For example, in January 2004, IBM offered 3,000 American computer-programming jobs to foreign candidates who were more qualified and who accepted lower salaries for the same positions than American candidates (Bronfenbrenner & Luce, 2004). Hence, advances in technology enable employers to choose the most qualified candidate regardless of his or her home address.

In the same manner, technological advancement makes it easier for businesses to set up shop anywhere in the world. In the coming years, labor-intensive jobs requiring low skills will continue to further diminish in the United States due to emerging cost-

cutting practices in business. The growing trend among companies to engage in outsourcing and offshoring has become an essential business practice to remain competitive. In order to keep costs down, companies will outsource a specific function to another company located locally or internationally instead of doing the task themselves. On a larger scale, the other growing trend among companies is to *offshore,* to relocate their entire factory to another country in order to take advantage of cheaper labor and lower health-care costs (Friedman, 2005a).

Advances in technology along with outsourcing and offshoring have an effect on the quantity of jobs that will be available to students entering the workforce in the United States without a high school diploma. As more entry-level jobs are outsourced or offshored, high school student dropouts entering the workforce with limited skills and qualifications will have even fewer jobs available to them. Meanwhile, the entry-level jobs that are available now increasingly require post-secondary degrees. According to Darling-Hammond (2010), "At least 70% of U.S. jobs now require specialized knowledge and skills, as compared to only 5% at the dawn of the last century, when our current system of schooling was established" (p. 2). Even a career as an auto mechanic will require math and science knowledge as cars become more technologically advanced and adopt more computer-related functions (Young, 2011). Although the national dropout rate has historically improved, the increasing requirements of entry-level jobs can be a serious threat to students who do not complete high school as the number of blue-collar jobs continues to diminish.

The high school dropout rate in the United States has declined since the 1960s, however, this success is not comparable to the success achieved by other countries that

have been able to educate more of their student population through high school. In 1960, the national U.S. dropout rate was 27.2% (National Center for Education Statistics [NCES], 2010). By 1970, the dropout rate decreased to 15.0% and continued to drop to 8% by 2008 (Chapman, Laird, & KewalRamani, 2010). Nevertheless, in comparison to the United States, more and more countries have been more successful in increasing their number of students who enters the workforce with a high school diploma or its equivalent (National Center on Education and the Economy, 2007). To make matter worse, in 2009, the dropout rate increased to 8.1% and continues to increase (NCES, 2010). Currently about one-third of the student population does not graduate from high school in the United States. For the class of 2010, over 1.4 million students nationwide were expected to dropout of high school (Editorial Projects in Education, 2010). According to Darling-Hammond (2010):

> At a time when high school dropouts are unlikely to be able to secure any job at all, our high school graduation rates - stuck at about 70% - have dropped from first in the world to the bottom of industrialized nations. (p. 3)

According to Wise and Fulmer (2010), high school dropouts will likely earn $9,200 less per year than a high school graduate.

The following figures are an in-depth look at the State of California's dropout numbers. In 2007, the California Department of Education (CDE) reported a 15.3% high school student dropout rate (CDE, 2010b). Also in 2007, 48,268 students left their schools with no stated interest in re-enrolling at any other school (CDE, 2010b). It is important to note that this number does not account for the thousands of students who have been expelled or enrolled in adult schools but did not complete their requirements.

The increasing number of high school dropouts also means an increase in the number of unqualified job seekers who enter the workforce.

While the number of high school graduates continues to decline in the United States, the number of American jobs lost due to outsourcing and offshoring is steadily increasing. In 2001, 85,000 manufacturing and service jobs were transferred from the United States to Mexico and another 85,000 manufacturing and service jobs were moved to China (Bronfenbrenner & Luce, 2004). Three years later, 99,000 American jobs were moved to China and 124,000 American jobs were relocated to Mexico. Both outsourcing and offshoring have grown controversial because they have resulted in significant layoffs of many American workers who perform these low-wage skills jobs. Outsourcing and offshoring negatively affect the nation's economy, but the problem extends beyond merely losing low-wage skills jobs and the specific workforce who fill those jobs.

Most of the attention from the American public continues to be focused on the millions of low-wage skills jobs that have been outsourced or offshored to other countries. However, it is equally important to note that at the same time, the United States continues to outsource and offshore high-wage skills jobs to other countries because they cannot find qualified American candidates to fill those positions (Gordon, 2009). According to Gordon (2009), in early 2008 the unemployment rate was at 5.6%. However, 3 million jobs, mostly science, technology, engineering, or mathematically (STEM) related careers remained vacant for at least 6 months or more.

The inability to find local, qualified candidates are the main reason why American businesses are moving their high-wage skills jobs into the international employment market. According to Manning, Massini and Lewin (2008), "accessing pools of highly

skilled talent around the world" (p. 35) has become another emerging business strategy. This trend for American businesses to look to other countries for qualified candidates has moved from a cost-cutting trend to a necessary business practice. The Offshoring Research Network (ORN) conducted a survey between 2004 and 2006 using 1,600 small and mid-size American and European companies as participants. The survey revealed that the second most important reason, after access to cheaper labor and lower health care cost for businesses to practice outsourcing and offshoring, is access to a workforce with talent and high skills (Manning et al., 2008). In 2007, American companies were choosing to offshore in order to have access to qualified personnel even though the return of investment was lower than the cost to hire non-American employees. Angeli and Grimaldi (2010) conducted a case study on a medium-sized Italian business that used Indian mechanical engineers. This particular business transformed itself from selling software to selling the expertise and knowledge of their Indian employees. This empirical study proved that outsourcing is no longer a business strategy to save cost but to capitalize on knowledge.

In the past, American companies conducted research and development within or near their home bases and employed local engineers. However, the scarcity of workers with skills to fill STEM-related jobs forced businesses to look for talent in the global pool of qualified candidates (Gordon, 2009). After Information Technology-related professions, the most popular and frequently outsourced and offshored business functions are all STEM-related careers, such as product design, engineering services, and research and design (Manning et al., 2008). The United States, a country that has a technology-based economy, has failed "to invest enough long-term resources to educate the nation's

youth, preparing them to work in the next wave of emerging science, technology, engineering, or mathematically based (STEM) jobs" (Gordon, 2009, p. 34). According to Wadhwa, Gereffi, Rissing, and Ong (2007), in the United States, which has a population of about 307 million, there are about 70,000 students who graduate with an engineering undergraduate degree annually. However, in India, which has a population of about 1.21 billion, the average is 350,000 engineering students. In China, which has a population of about 1.3 billion, the average is higher; 600,000 students pursue and graduate with an engineering degree. Wadhwa et al. (2007) note, "Even the National Academies and the U.S. Department of Education have cited these numbers. Such statement often concludes that China and India graduate 12 times more engineers than does the United States" (p. 74).

As an example of the scarcity of STEM workers in the United States can be found when American manufacturer, Advanced Micro Devices (AMD) planned on building high-tech plants in California and Texas. Unfortunately, the company was not able to find qualified entry-level technicians needed to operate the plant. AMD decided to build the plant in Germany, where they found candidates with the talent and skills they were looking for. Nine years later, AMD opened its second plant in Germany, also employing German citizens to run its operations (Gordon, 2009).

Educators and policymakers in developing countries know that American businesses are engaging in outsourcing and offshoring for both low-and high-wage skills jobs. Countries such as India and China reap the benefits of a better livelihood that international companies provide when they outsource and offshore jobs to other countries. Thus, Friedman (2005b) states, "One person's economic liberation could be

another's unemployment" (p. 205). In fact, India and other emerging Asian countries are counting on these types of jobs to provide a higher quality of living for their people. Leaders from countries that are struggling to emerge from their current third-world status are aware that the foundation of their economic prosperity is based on enabling their students to compete successfully in the international job market. Therefore, the education in these countries includes preparing students to compete for both low and high skill careers in the international job market, making it easier for businesses to choose international over American graduates (Wadhwa et al., 2007).

The United States' failure to provide a globally competitive education may greatly affect the chances of American students to successfully enter the 21st century workforce and to maintain a high quality of living. According to the United States Department of Education (2008), the nation has "lost sight of the basic purposes of schooling and of the high expectations and disciplined effort needed to be a nation with a highly skilled workforce" (p. 1). However, history has documented the United States' successful record in the area of innovation. Friedman (2005a) points out that Americans should not focus on the increasing number of jobs being taken from Americans and outsourced to other countries. Instead, he argues, Americans should place their attention on maintaining the area in which the nation has historically been successful: innovation. According to Farrell and Kalil (2010), "The United States must foster innovation that will lead to the technology of the future, which will in turn lead to the industries and jobs of the future" (p. 46).

Should Americans choose to follow Friedman's advice, innovation is very likely to be the driving force to sustain the United States' emerging high-tech economy. Farrell

and Kalil (2010) describe innovation as beginning "with the development—of a new product, service or process" and ending with its implementation (p. 45). Goldston (2009) defines *innovation economy* as promoting innovation in order to increase economic growth. In fact, innovation has always been a resource for American economic growth. In 1987, Robert Solow won the Nobel Memorial Prize in Economic Sciences for proving that 90% of the economic growth in the United States during the first half of the 20th century was due to human skills and new technology (Farrell & Kalil, 2010). Research in economic growth continues to support Solow's theory that both human skills and innovation are two of the most influencing factors to sustain economic prosperity.

Throughout the years, the educational level and technical skills needed for innovation in the world have become more advanced and sophisticated, yet the level of education in the United States continues to fall behind the rest of the world. The innovation that is required for creating new technology continues to become more complex in order to meet the demands of a global world and to continue improving the standard of living in America (Gordon, 2009).

Unfortunately, according to Farrell and Kalil (2010), American students are not receiving the education needed to contribute to an innovative economy. This can be a problem for the United States. According to Farrell and Kalil, "For local communities and the country at large to thrive in this new century, the nation must harness the spirit of innovation and discovery that has always moved the country forward" (p. 46). Therefore, the United States' long history of innovation and economic growth is at risk because American educators continue to ignore this challenge (Manning et al., 2008).

Meanwhile, leaders in other countries have realized the important role of innovation in sustaining their future. Hong Kong is an example of a country whose educational policymakers have accepted innovation as a means to secure their economic future. Hong Kong also faces the same challenge as the United States in having significant numbers of immigrants entering its educational system; however, students from Hong Kong have consistently scored higher than the students in the United States in the same mathematics and science literacy tests (Organization for Economic Cooperation and Development [OECD], 2007). Hong Kong's Deputy Secretary of Education Bureau believes innovation is the key to continuing its success, and he has made reforms in their education system to foster the innovative spirit. According to Wong (2009), "Every single measure is geared toward fostering the innovative talent to secure Hong Kong's future" (p. 1).

To be innovative, students will need to possess knowledge in mathematics and science, as well as critical thinking. In 2007, several members from the National Academy of Sciences, the National Academy of Engineering and Institute, and the Institute of Medicine of the National Academies formed a committee to identify how the United States could maintain its leadership in science and engineering. The Committee on Prospering in the Global Economy of the 21st Century (2007) found that in order "to develop an innovative workforce, [American educational policymakers] must begin now to improve public education in science and mathematics" (p. 194). Unfortunately, American students are not doing well in science and math skills and knowledge.

Currently in international assessments, American students are ranked in the lower bottom of the scale in math and science knowledge compared to their international peers

(Alliance for Excellent Education, 2009). American students' declining competence in math and science will continue to hinder technical innovation in the United States. Wadhwa et al. (2007) recommend that educators increase the number of students majoring in Engineering to safeguard the nation's foothold as a leading country of innovation. However, educators must first address the fact that most high school graduates do not go into science and engineering careers because they do not feel that they have received an adequate foundation in mathematics and science to begin with (as cited in Manning et al., 2008). According to Gordon (2009), the gaps in skills are due to the lack of education and training the students receive in the classroom. Only half of the 1.4 million 12th graders who took the ACT test were found ready for college-level reading (as cited in Gordon, 2009). Gordon also notes "In a 2005 survey, 60% of American manufacturers reported that even those who did graduate were poorly prepared for entry level jobs" (p. 38).

This problem has resulted in American students being only remotely interested in pursuing higher-level education in mathematics and science. As cited in a report by the Committee on Prospering in the Global Economy of the 21st Century (2007), more than 50% of high school students who participated in the Gallup poll stated that they were either *completely dissatisfied* or *somewhat dissatisfied* with the American public school system (p. 30). American students will need to be more prepared as global competition increases and "will need to work hard to maintain a knowledge and skill that keeps up with changing demands" (OECD, 2010, p. 3).

Just as other world leaders have prepared their students, American educational policymakers will also need to reform their educational system to support students with

the skills and knowledge necessary for innovation and to be successful in the 21st century workforce. American educational policymakers must realize that there is a "global race for talent" and knowledge has become a commodity in the international arena (Manning et al., 2008, p. 41). Also, educational policymakers in other countries such as China have already taken this challenge into account as they reform their education system (Wadhwa et al., 2007). The Chinese government believes that their education system "must foster creativity and innovation to compete in the global economy" (Preus, 2007, p. 117).

However, for the last 2 decades, educational policymakers in the United States have failed to look ahead as other world leaders have done. They also continue to fail to see that the lack of talent to fill research and design careers on American soil will also lead to a lack of innovation and creation of new technology that will limit the growth of the American economy (Wadhwa et al., 2007). According to Gordon (2009), educational policymakers need to re-invent how the public educational system produces highly qualified graduates and the kind of knowledge and skills they will need to successfully enter the 21st century workforce. Gordon asserts that currently, the United States is "not producing enough graduates with the kind of technical, communication, and thinking skills needed in the 21st century workplace" (p. 35).

Statement of Problem

It seems that Americans did not heed the National Commission on Excellence in Education's warning as American leaders and educators continue to fail to utilize its public educational system to give their students the knowledge and skills necessary to compete in the 21st century workforce. In 1983, the National Commission on Excellence in Education warned Americans:

> Knowledge, learning, information, and skilled intelligence are the new raw materials of international commerce and are today spreading throughout the world as vigorously as miracle drugs, synthetic fertilizers, and blue jeans did earlier. If only to keep and improve on the slim competitive edge we still retain in world markets, we must dedicate ourselves to the reform of our educational system for the benefit of all–old and young alike, affluent and poor, majority and minority. Learning is the indispensable investment required for success in the "information age" we are entering. (p. 6)

The "information age" to which the Commission referred is happening right now. A high standard of living for future generations will be impossible if American students do not graduate with the ability to think critically as well as to excel in math and science. Math and science are necessary for innovation, which is a proven successful strategy for the United States to secure its economic growth. However, this advantage can be lost if educational policymakers do not foster innovative skills and spirit in their students. According to Louis Pasteur (as cited in Friedman, 2005b), "Fortune favors the prepared mind" (p. 113), and America's students will need to be prepared in order to reclaim its highly skilled workforce status once again.

Recent studies conducted by the OECD (as cited in Alliance for Excellent Education, 2009) show that 15-year-old Americans students have fallen behind in various subjects such as mathematics, science, reading literacy, and problem solving in comparison to students in countries around the world. American students ranked 18 out of 33 in mathematics literacy when compared to their peers globally. In scientific literacy, American students ranked 13 out of 33, and 7 out of 33 in reading literacy. Based on these comparative results, American students will need to catch up to be proficient before they can surpass other countries that are doing a much better job in reforming their education systems.

Other countries are reforming their education systems and viewing education as a resource with which they are better able to compete globally. According to Alliance for Excellent Education (2009), "Other countries take advantage of opportunities to compare policies and practices so that they can learn and improve" their education systems (p. 1). Countries like the Republic of Korea, Hong Kong, Taiwan, and Singapore have improved their economies as a result of improving their educational systems (Taylor, 2005).

Another country that continues to strengthen its economy, along with securing the first place in international educational status, is China. The Chinese government has been focused on developing its education to obtain international appeal and accolades (Minxuan, 2009). China's educational system has been able to prepare its students to compete successfully in the international job market. This country has been able to produce a workforce that can both fulfill labor-intensive and highly skilled jobs. Since the 1970s, the Chinese government has been reforming its education system and its hard work has paid off (Preus, 2007). China's high school students received the highest marks in comparison to 65 other countries including the United States on the 2009 math, science, and reading literacy assessments (OECD, 2010). According to the OECD (2010), "In mathematics, more than a quarter of Shanghai – China's fifteen-year-olds can conceptualize, generalize, and creatively use information based on their own investigation and modeling of complex problem situations" (p. 3).

China did not limit its research of educational best practices to Chinese classrooms. It has sought to reform its curriculum based on best practices around the world, including those of successful American schools (Alliance for Excellent Education, 2009). Early in their effort to reform their educational system, the Chinese government

had looked to the United States during the time the American public education system received its "world-class" status as a resource for improving China's own education (Preus, 2007). The Chinese government also allowed its students to study abroad in various countries such as the United States in order to bring knowledge back to their country (Minxuan, 2009). Local American school leaders could benefit from this practice as well and learn from high achieving schools to improve their own schools.

It is important to note that there are still public schools in America that have been successful in graduating students who are able to think critically and are highly proficient in reading, math, and science literacy. For example, students from several high schools in California such as Gretchen Whitney High School, La Canada High School, San Marino High School, Oxford Academy High School, University High School, and Troy High School have high student achievement scores as reflected in the CDE academic achievement accountability measurement system (CDE, 2011a). It would be relatively easy for American educators to become familiar with and begin to study these high achieving schools located in their own backyard. It is equally important for leaders of both low and average performing American schools to study and to learn best practices from these exemplary schools. Learning from other successful schools may give American educators a means to reexamine own their educational policies and practices, but they will need to begin by identifying local high achieving schools in their own state.

Statement of Purpose

There are pockets of success where public schools in the United States have been able to produce students who can equally compete in the new emerging global market. Much can be learned from the successful practices of these noted schools. Accordingly,

the purpose of this study is to investigate the best practices of these high achieving California public high schools: the high schools in California that are currently outperforming all other high schools in the state. The study will focus on public high schools in California that scored a Similar School Ranking (SSR) of 8 or above as well as a score of 800 or above on the Academic Performance Index (API). A detailed description of SSR and API will be given in Chapter II.

Significance of Study

It is not the goal of this study to solve problems in America's public education system; however, the results of this study may contribute to a better understanding of the phenomenon of how some public high schools in California are able to perform well when all other schools seem to be falling behind. The findings of this study may help all educators to improve their schools' achievement level. Educators and administrators may learn from school leaders who have been able to overcome challenges and bring their vision of high student achievement to fruition.

The researcher hopes that this study will be able to contribute to the body of knowledge regarding how to successfully progress students not just towards proficiency, but to excel in reading, mathematics and science literacy. Included in the study is a description of how several high achieving schools have been able to increase students' interest in and confidence regarding attending post-secondary institutions and prepare them to enter STEM-related degrees. Therefore, school leaders may be able to learn best practices on how to provide their students with world-class curriculum that provides and supports critical and innovative thinking, grow effective teachers and administrators as well as create a working partnership with parents and the community. Finally, school

leaders may be able to learn from high achieving public schools regarding how to prepare their graduates to compete with their global peers in the 21st century international job market.

Research Questions

This study explored the following research questions:

1. How does the use of the curriculum in high achieving public high schools in California support critical thinking skills and promote reading, math and science literacy?
2. What specific programs are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?
3. What specific programs or practices are implemented at high achieving public high schools in California that foster or promote students to utilize innovative thinking?
4. What are the roles of the parents and the surrounding communities at high achieving public high schools in California?
5. What are the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?
6. What were the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

Limitations, Delimitations, and Assumptions

For a variety of reasons, most qualitative studies have limitations. This study is no exception. The following limitations of the study should be considered.

1. The grounded theory established for this study is limited to a specific area of education and may not be applicable to all areas of the public education system in the United States.
2. The grounded theory generated from this study is subject to the limitations and weaknesses of the interviewing process which, was the only data gathering method utilized in this study.
3. By the time this study was completed, more current literature may have been published and made available to the public.

There are specific conditions that make conducting interviews more effective. However, the researcher had placed the following delimitations on the study.

1. The interviews took place at the high schools that were the natural work setting of the participants. However, due to distance and travel constraints, appointments with the participants were limited to one face-to-face meeting.
2. The participants were limited to 10-15 high school principals of the California public schools that received a current API score of 800 or above and a SSR score of 8 or above.
3. The researcher limited the gathering of data to 1 year from the date the approval to conduct the study was granted by the Pepperdine University's Institutional Review Boards.
4. Only the researcher conducted the data collection.

It is also important to note that the researcher had personal biases and beliefs while conducting the research for this study. Therefore, the following assumptions were made during this study.

1. The researcher assumed the information supplied by educators regarding their schools' demographics and made available on the CDE's website to be true and accurate.
2. The researcher assumed that her presence and the current state of mind of the participants had an influence on the participants' responses during the interview.
3. The researcher also assumed that the success of student achievement in the schools selected for this study had no relationship to or were influenced by the race and ethnic demographic background of the students enrolled at the schools.

Definitions of Terms

Academic Performance Index (API): API is a measurement of a school's academic performance based on a variety of mandated standardized tests (Education Data Partnership, n.d.).

Academic Progress Reporting (APR): "California's integrated accountability system that reports both the state Academic Performance Index (API), and the federal Adequate Yearly Progress (AYP) and Program Improvement (PI)" (CDE, 2010c, para.1).

Advanced Placement (AP): Courses in high school with curriculum set at college-level to prepare students for the Advanced Placement exams. Students who pass the exam with a certain score can receive college credit (Education.com, n.d).

Annual Yearly Progress (AYP): All schools are required to progress toward proficiency in English/language arts and mathematics by 2013-14. The progress of the school is based on meeting the following criteria: attaining the school's Annual Measurable Objectives, 95% of the student body participated in taking the state standardized tests, achieving the target API score, and meeting the target graduation rate for high school only (Education Data Partnership, 2010).

California High School Exit Exam (CAHSEE): A mandatory two-part test consisting of English Language Arts and Math that high school students must pass in order to receive their high school diploma (Education Data Partnership, n.d.).

Local Education Agency (LEA): "A public board of education or other public authority within a state that maintains administrative control of public elementary or secondary schools in a city, county, township, school district, or other political subdivision of a state" (EdSource, n.d.a, para. 1).

National Assessment of Educational Program (NAEP): More commonly known as the official report card to evaluate the United States' public education system (NCES, 2009).

No Child Left Behind (NCLB): A federal mandate on all schools and districts to make adequate yearly progress toward proficiency in English/language arts and mathematics. All schools and districts must also proctor statewide mandated test to 95% of all students and all significant subgroups (Education Data Partnership, n.d.).

Public School: According to the CDE, a public school is an educational institution serving kindergarten through grade 12 and or an adult educational institution that has the following characteristics:

1. Is supported with public funds;
2. Is authorized by action of and operated under the oversight of a publicly constituted local or state educational agency;
3. Provides educational services to all students who are enrolled;
4. Has an appropriately credentialed teacher (or teachers) who provides instruction;
5. Has at least one appropriately credentialed administrator, usually a principal, who is responsible for all aspects of school administration including supervision and evaluation of staff, fiscal responsibility, student discipline and safety, supervision and evaluation of curriculum, and assessment of academic achievement and school accountability;
6. Administers California statewide assessments to its students at the required grade levels;
7. Has an administrator, usually a principal, with access to and responsibility for maintaining official student records for all enrolled students;
8. Except for charters, implements a curriculum that fully meets state requirements as specified in the California *Education Code* relating to required courses of study;
9. Is non-sectarian;
10. Except for charters, the entity's budget structure is consistent with the budget structure of schools operated by the authorizing agency; and
11. Based in one or more buildings that are "Field Act" compliant, unless exempt (CDE, 2010a).

Similar School Rank (SSR): To generate an SSR, 100 similar schools with the same opportunities and facing the same challenges are grouped together by their API score and given a score between 1 to 10, with 10 being the highest rank (Education Data Partnership, n.d.).

Standardized Testing and Reporting (STAR): There are three statewide mandated tests in California that all students from grades 2 through 11 enrolled in public school must take:

1. California Standards Tests (CSTs) based on California academic content standards in English/language arts and mathematics in all grades, science in grades five and 9-11, and history/social science in grades 8, 10 and 11;
2. A standardized national test (CAT/6 replaced SAT-9 in spring 2003); and
3. A test for Spanish-speaking students who have been in a California school for 1 year or less ("Aprenda," as of 2006-07; Education Data Partnership, n.d.).

Science, Technology, Engineering, and Mathematics (STEM): STEM is an acronym for Science, Technology, Engineering, and Mathematics. The acronym originated from the National Science Foundation (NSF) to refer to a technical labor force including technical workers as well as scientists and engineers (NSF, 2010).

Title I: Federal funds to schools to supplement programs for educationally disadvantaged students. "In California, schools and districts receiving Title I funds are placed in Program Improvement if they fail to make Adequate Yearly Progress under NCLB" (Education Data Partnership, n.d., Title I, para. 1).

Trends in International Mathematics and Science Study (TIMSS): TIMSS is an International assessment that measures mathematics and science knowledge of fourth-graders and eighth-graders in various participating countries (Gonzales et al., 2009).

Summary

This chapter introduced a specific problem in the American public educational system. The education system plays a vital role in preparing students to acquire knowledge and skills in order to become qualified candidates entering the workforce in the 21st century. Unfortunately, the current status of the public education system in the United States is leaving American students at a disadvantage to compete for jobs in the 21st century workforce.

This chapter also explored the concept that the current American workforce is no longer limited to American soil. Advances in technology have extended the job market to include other countries with better-prepared and more qualified workers competing for the same low-wage and high-wage skills jobs as American students. Other countries have successfully utilized their education system to prepare their students to compete in this expanding job market. Meanwhile, the public education system in the United States continues to struggle to achieve the same mediocre results that past generations of American students have only been able to achieve.

Although the overall performance of Americans students in international tests has been poor, some American public schools are recognized as high achieving schools based on the successful performance of their students in national academic assessments. It is the purpose of this study to identify these high achieving public high schools in California and to learn about their best practices in order to benefit educational

policymakers and local school leaders. It is the hope of the researcher that the findings of this study might help improve the educational system in America and help educators prepare students to be successful in competing in the global market for jobs in the 21st century workforce.

A review of literature will be included in Chapter II. The research design will be described in Chapter III. The findings will be presented in Chapter IV. The summary, conclusion, and recommendations will be communicated in Chapter V.

Chapter II: Review Of Literature

Introduction

Through the years, the United States Department of Education has been trying to improve its educational system in order to uphold the academic excellence for which America was once known. Numerous federal laws have been enacted with the hopes of systematically improving the educational system and raising student achievement. The United States held a leading position in education but has been slipping behind other countries in recent years.

There are several factors that contribute to the urgency of increasing student achievement. First, technological advancements have increased the ability for businesses to engage in outsourcing and offshoring. These cost-cutting practices have led to a more competitive employment arena in the United States. Secondly, the quality of the current American workforce is decreasing. Unfortunately, "Whereas for most of the 20th century the United States could take pride in having the best-educated workforce in the world, that is no longer true" (National Center on Education and the Economy, 2007, p. 4). While the quality of American workforce diminishes, other countries have been more successful at providing the knowledge and skill-sets necessary for their students to compete in the 21st century international employment arena. According to the National Center on Education and the Economy (NCEE, 2007), "Increasingly, it is easier and easier for employers to get workers who are better skilled at lower cost than American workers" (p. 5).

In addition, the skills and knowledge necessary to fill current and future careers in the United States are becoming more demanding. According to Young (2011), entry-

level jobs have increased their minimum requirements. For example, by 2012, 40% of factory jobs will require postsecondary degrees as a minimum qualification. As technology begins to affect every aspect of human lives, even jobs that did not require knowledge in math and science will now become necessary requirements. According to Young, the 15 of the 20 fastest growing careers that will increase the most in 2014 will require knowledge in math, science, and post-secondary educational degrees. Therefore, earning a high school diploma will no longer be sufficient to qualify for future employment and preparing students in high school for a successful college career will be imperative.

The Executive Office of the President Council of Economic Advisers (2009), points out that the United States cannot afford to merely catch up to other countries because the demand for workers to be highly educated and skilled will keep increasing in the future. Currently, to fill STEM-related careers, candidates must hold at least a postsecondary degree in math or science as well as be innovative and possess critical thinking skills. In 2008, based on the Bureau of Labor Statistics' findings, STEM-related employment rose to 5.8 million, representing a 13.7% increase since 2004 (NSF, 2010). The demand for students to have higher math and science skills and knowledge is needed to fill the STEM-related careers that continue to grow at the estimated growth of 2.5 to 1 in comparison to general employment growth (NSF, 2010).

Chapter Overview

This chapter begins with a historical summary of the American public system as well as a review of the impact of American educational reforms on student achievement. Two international assessments will be addressed, namely the Program for International

Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS). The similarities and differences of these international assessments will be examined, as well as the National Assessment of Educational Program (NAEP).

In addition, this chapter will review successful best practices being employed by the international educational system in countries that have ranked high in international assessments. Also included in this chapter is a discourse of current best practices of successful public schools in the United States. Finally, this chapter will discuss how California public schools measure student achievement.

History of the Public Educational System in the United States

In its early stages, the focus of public education system was aimed for young children to be able to read and write. By the 17th century, children were expected to receive at least a primary education and schools were established in most towns or settlements. However, only wealthy male students were expected to attend high schools. In 1635, the Boston Latin Grammar School was the first private high school established in the United States to prepare elite male students to either attend Harvard College or prepare them for a career in government or in ministry. The first public high school was not built until 200 years later. In the early 19th century, public high schools were established to prepare male students of lesser financial background for postsecondary institutions. In 1821, the English Classical High School opened its doors to provide free public education for males intending to continue on to college (U.S. Department of Education, 2007). In Massachusetts, a law was passed that mandated every town with at least 500 families to establish a high school (Mayr, 2008). By 1870, there were 500

public high schools serving 50,000 students in the United States (U.S. Department of Education, 2007).

The 19th century also saw two major changes in the public education system. Since colonial days, only men were accepted as educators. During this decade, women were allowed to attend high schools to prepare them to become teachers. According to Preston (1993), "By 1840 women held 61 percent of all teaching positions in Massachusetts and around 30 to 50 percent in the other New England states" (p. 531). The other change affected the student population as well as the size of high school buildings. In the late 19th century, larger sized high schools in urban cities were established to serve a different purpose other than college preparation. These larger high schools enrolled students from working class families to prepare them to be good factory workers and to become a part of the industrial revolution.

The number of students enrolled in public schools rose dramatically during the late 19th century for two reasons. The first reason was due to an increase in the number of students of recent immigrant families entering the public school system. American educators believed that after high school most students from immigrant families would enter the workforce with few or no skills. The second reason was the fact that children of poor families no longer had a choice between working or going to school due to legislatures that made employing underage children illegal. The goal for high school changed to ensuring that these students became good citizens, were able to assimilate to the American culture, and received some form of preparation to work in factories (U.S. Department of Education, 2007).

The core structure of U.S. high schools during the industrial revolution remains the core structure serving today's students who are no longer entering an industrial revolution, but instead entering the 21st century workforce. According to the U.S. Department of Education (2007), the original purpose for high schools, which was to prepare students for college, changed as a result of an increase in student population during the 19th century. The 20th century also marked the beginning of grouping students based on their academic abilities. Educators started grouping students whose academic skills either identified them as college material or only capable of vocational training. In 1917, vocational schools were established to teach students the skills to work in factories. Meanwhile, college preparatory high schools targeted and enrolled college-bound students. Therefore, most high schools adopted less rigorous curriculum and more students took general studies in their curriculum that neither prepared students for college nor prepared them to learn any technical skills. Since then, several educational reforms have been passed to prepare all students for college once again.

History of Educational Reforms in the United States

A nation at risk. In the early 1980s, American leaders and educators realized that the superiority of their educational system was in danger. During the Reagan Administration, Secretary of Education Terrance Howard Bell requested that a National Commission on Excellence in Education (NCEE) be created in order to take a closer look at the quality of education that American students were receiving (NCEE, 1983). In 1983, the NCEE completed and published their report entitled, *A Nation at Risk: The Imperative for Education Reform*, an in-depth assessment of the value of education that American public schools were offering to their students.

The report described the problems that the NCEE (1983) identified within the American public educational system, as well as their proposed solutions. In their report, the NCEE warned Americans that a national security threat existed due to an evolving world that had become a global village. According to the NCEE, "Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world" (p. 3). The United States no longer had the means to stay unopposed in the world market. The NCEE also cautioned Americans about the threat to the standard of living of future generations due to the advancement in education and skills of the rest of the world while American education continued to become more and more inferior.

One of the areas that the NCEE explored was the standard of curriculum that American students were learning. The NCEE evaluated the curriculum designed for students to graduate high school and recommended that all states adopt minimum high school graduation requirements (U.S. Department of Education, 2008). Included in this requirement were English, math, science, and social studies classes, as well as foreign language for college-bound students.

Since this mandate was implemented in the 1980s, the number of students taking more challenging courses has increased slightly, but this was still a small gain compared to how fast the rest of the world was advancing in educating more and more of their students. However by 2005, 65% of American high school graduates completed the more rigorous recommended coursework; this percentage is four times greater than the initial number of students in 1983. However, one-third of high school students still did not take

the recommended coursework and were not prepared to enter any post-secondary educational institution (U.S. Department of Education, 2008).

The NCEE (1983) also addressed the lack of qualified educational leaders in the American school system. The commission reported that Americans "were not developing the leadership necessary to run a world-class system" (U.S. Department of Education, 2008, p. 7). Colleges and other higher educational institutions have answered this call and created programs for educational administrators to learn and acquire effective leadership skills. According to the United States Department of Education (2008), since the NCEE reported this area of weakness, "school principals and superintendents have taken on the role of instructional leaders as well as managers" (p. 7).

Other educational reforms. Throughout the years, several presidential administrations have passed different federal educational reforms. In 1989, President George H.W. Bush enacted the National K-12 Performance Goal for the Year 2000 Act (U.S. Department of Education, 2008). This act provided federal monies to states in return for adopting state standards and state standardized testing that were directly linked to the federal standards. According to Superfine (2005), "Together, standards, assessments, flexibility and accountability were thought to be key components that could spur systematic reform in the American Education system" (p. 10). However, this act was highly criticized for intruding on the states' right to be able to implement their own educational policies.

Opponents of the National K-12 Performance Goal for Year 2000 Act complained that mandating states to measure students' ability to memorize is not the same as educating students. According to Clinchy (1995), this federal mandate transformed

students from subjects into objects. Clinchy notes that the proponents of the National K-12 Performance Goal for the Year 2000 Act saw students as empty vessels to be stored with information. Clincy also adds that this federal act required students to regurgitate information during the states' standardized tests, which puts greater emphasis on measuring students' ability to memorize instead of measuring what students actually know.

Five years later, President Clinton approved the Improving America's Schools Act (IASA) of 1994 (U.S. Department of Education, 2008). According to Billig (1998), "This legislation reauthorized the Elementary and Secondary Education Act (ESEA) that originated in 1965 as part of the war on poverty" (p. 209). IASA provided schools that served large numbers of students from low socioeconomic status families with federal monies in order to supplement or enhance their education. Most of the themes in the act have been carried over from previous federal reforms. Billig notes five themes that the 1994 IASA legislation addressed:

- All children will be held to the same challenging academic standards.
- There will be flexibility with accountability in the design and delivery of these programs, and the law will encourage innovation.
- Trends will be targeted to the areas of greatest needs and throughout the K-12 spectrum of schools.
- Families and communities will form partnerships with schools to help all children succeed.
- Support systems will be developed to enable local education agency (LEA) staff, school support teams, and the Comprehensive Regional Assistance

> Centers to assist school-level practitioners to design, deliver, and improve programs and services to children (p. 210).

IASA emphasized that increasing parental involvement must also be included in reforming the American public school system. According to Beach (1997), "The Improving America's School Act Legislation of 1994 greatly increased the responsibility and requirements for parental involvement activities in Title I schools" (p. 7). Even though the request for a partnership with parents was first introduced in the National K-12 Performance Goal for the Year 2000, President Clinton brought the mandate and responsibility for it down to the school level.

IASA also brought back the idea that individual states should establish their own standards. The National Commission on Excellence in Education also recommended this idea in 1983. However, IASA mandated that all states establish more arduous and measurable academic content and standards, in addition to mandating annual standardized testing to measure student achievement (U.S. Department of Education, 2008).

No child left behind act (NCLB). In the 21st century, the reforms for education stressed for public schools to show their improvement. Due to the increased demands for improvement in public schools, President George W. Bush signed the No Child Left Behind (NCLB) Act of 2001 (U.S. Department of Education, 2008). This federal law mandated each state to adopt an even more rigorous reading and math content and standards as well as add an annual science standardized test (U.S. Department of Education, 2008). NCLB also focused on the teachers who were assigned to teach these more rigorous subjects.

NCLB also mandated that all teachers be highly qualified in the subject that they were assigned to teach. In order to be recognized as highly qualified, teachers must be fully certified or licensed by the state, possess a bachelor's degree, and be competent in a core academic subject (U.S. Department of Education, 2008). In the *Nation at Risk Report*, the NCEE identified that one of the problems causing the downturn of education was the fact that "many teachers did not have the knowledge, skills, and training they needed" to adequately teach students (U.S. Department of Education, 2008, p. 6). A recent study administered by Torff and Sessions (2005) reported that the primary cause of teacher ineffectiveness is deficiencies in content knowledge. However, it is yet to be proven if requiring teachers to be highly qualified has helped increase student achievement. The United States Department of Education (2008) notes, "there is little evidence to conclude that this provision has led to notable increases in the requisite subject-matter knowledge of students or to increase in measures of individual teacher effectiveness" (p. 6).

Since NCLB was not widely accepted by most educators, there exists a debate regarding the effectiveness of requiring teachers to be highly qualified in a subject. This federal law enabled educators to be aware of the wide achievement gap that existed among American students of different ethnicities and socioeconomic backgrounds at that time. According to Ghysels (2009), this federal law provided measures as well as a reason for educators to begin discussing student achievement among diverse students. The scores of American students on international testing also showed a disparity among students of varying socioeconomic statuses. Among all the nations participating in international tests such as the Program for International Student Assessment (PISA), "the

United States is among those where two students of different socioeconomic backgrounds have the largest difference in expected score" (Darling-Hammond, 2010, p. 12).

The reauthorization of the elementary and secondary education act. On March 2010, the blueprint for The Reauthorization of the Elementary and Secondary Education Act (ESEA) was released to replace NCLB. ESEA highlights specific issues in the American public educational system that President Obama still felt needed improvement. Similar to other reforms, the ESEA continues to identify the same problems that the National Commission on Excellence in Education of 1983 pointed out to educators over 20 years ago (U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010.

There is a need to increase the number of students who are well prepared to go into post-secondary institutions after graduating from high school. According to the NCEE (2007), 30 years ago, 30% of the world's college graduates were Americans. However, the current percentage of American graduates has decreased to 14% and continues to decline. The Executive Office of the President Council of Economic Advisers (2009) agrees that educators must rise to the challenge of ensuring students are not just completing high school but also prepared to enter and graduate from college. Therefore, ESEA mandates individual states to develop college and career readiness standards in their curriculum (Jennings, 2010). These college and career standards will help students gain what President Obama refers to as "world-class" education (U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010).

In the beginning of the ESEA, President Obama included a letter stating that it is a national priority to be able to provide a "word-class" education to all students in America

(U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010, p. 1). President Obama explained that a "world-class" education should be able to prepare students to succeed in college as well as learn the skills and knowledge needed to enter the 21st century workforce (U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010). President Obama also noted that a "world-class" education should also enable students to excel in math and science and be able to think and solve problems in creative ways. He encouraged educators to meet this demand for a "world-class" education and higher knowledge and skills beginning in early childhood education and be supported in the elementary as well as in the secondary education system. Research supports President Obama's request for higher quality in education beginning in early childhood. Findings from Wadhwa et al. (2007) show that the most common recommendation is to improve education from kindergarten through high school with emphasis on acquiring math and science knowledge. Even at an early age, both male and female students would benefit from being exposed to science and math in a positive manner (Sandow, Marks, & Borg, 2009). World leaders in other countries also agree with the benefits of early childhood education.

The Minister of Education in Singapore, another high ranking country among international assessments, has been advocating for early education reform in his country. According to Houlihan (2005), "Singapore's system improvement emphasizes the need to develop students' problem-solving skills earlier in their schooling in order to create a more broad-based academic experience and better prepare young people for life beyond school" (p. 217). An empirical study completed by Schütz, Ursprung, and Wößmann (2008) supports educational policies that emphasize a comprehensive and extensive early

childhood education. Their study further suggests that early childhood education can increase the equality of student outcomes from different socioeconomic and ethnic backgrounds. In Finland, 90% of students enroll in early childhood programs and the consistent high scores on international assessments indicate a small variance in the high student achievement of students from this country despite students' varying socioeconomic and ethnic backgrounds (OECD, 2004).

However, critics note that the Obama Administration still did not place enough importance on the value that preschool contributes to students' education. According to Doggett and Wat (2010), prekindergarten education can be a solution for students to receive a strong foundation, noting that "without a strong foundation of early learning, many children start school with a deficit, and teachers spend years trying to help these children catch up" (p. 8). Unfortunately, President Obama's educational reform does not heavily emphasize the importance of prekindergarten education.

Another area that the ESEA highlights is ensuring schools employ effective teachers and administrators. One of the mandates of ESEA is for schools that receive federal monies to define effective teachers and administrators based on their student achievement scores on state standardized tests (Jennings, 2010). Even with the NCLB's mandate for highly qualified teachers as well as post-secondary leadership degrees offered to administrators, President Obama believes that teacher and administrator effectiveness still needs improvement. According to the President, "Our goal must be to have a great teacher in every classroom and a great principal in every school" (U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010, p. 1).

Several studies have found that unqualified teachers and administration may have an effect on student achievement. Findings from one study show that "too many students are taught by teachers with a poor understanding" of math and science content (Sandow et al., 2009, p. 12). The same study also notes that female students are more affected by low-quality teaching than boys (Sandow et al., 2009). In comparison, effective teachers can "make all the difference in capturing the [interest of students] and pushing them toward new ways of thinking" (Cushman, 2005, p. 113). Several studies confirm the importance of quality teachers and school leaders as the key to high performing schools. The conclusion of an empirical study of 19 principals indicates that an effective principal is highly critical in order to successfully increase student achievement (Duke, Tucker, Salmonowics, & Levy, 2007).

Similar to the educational leadership and teachers who play an important role in improving student achievement, parents also play a part in education reform. In ESEA, President Obama also addressed the role of parents in education reform. President Obama noted that school leaders must recognize that parents are students' first teachers and it is equally important to foster collaboration with students' parents and their communities (U.S. Department of Education Office of Planning, Evaluation and Policy Development, 2010). The results of a study comparing student achievement of students from America, Canada, and Finland indicate that the role of the family and cultural background is a significant factor in student achievement regardless of whether the school is considered high or low performing (Liang, 2010). A study of public schools in Texas suggest that enabling parents to have opportunities to strongly support the school and students is one of the common traits of high poverty but high performing schools

(Thomas, 2003). According to Beach (1997), "Meaningful partnership between home and school can only strengthen the support for learners to achieve high state standards" (p. 7). Currently, educators are trying to meet the new requirements outlined in President Obama's educational reform. However, with any educational reform, the question remains if any of these reforms have actually made an impact on student achievement.

Studies on Educational Reforms and their Impact on Student Achievement

Since the 1980s, American educators have been made aware of the necessity to improve the quality of public education for their students. In 1983, the NCEE warned America that "history is not kind to idlers" (p. 4). Unfortunately, American educators were slow to respond. Margaret Spellings, Secretary of Education under the George W. Bush Administration stated, "If we were 'at-risk' in 1983, we are at even greater at risk now" (U.S. Department of Education, 2008, p. 1). The same areas of growth in the public education system that the Commission of 1983 began pointing out are still need to be addressed today.

In the meantime, countries such as Finland, the Republic of Korea, and Singapore have been revolutionizing their education system. According to Darling-Hammond (2010), "They are expanding educational access to more and more of their people, and they are revising curriculum instruction, and assessment to support the more complex knowledge and skills needed in the 21st century" (p. 5). The rest of the world has been successfully raising their standards and greatly improving their education systems. According to the NCEE (2007), other countries are not only able to educate more of their student population, but their students are also receiving higher quality education in comparison to the education American students are receiving. However, according to the

U.S. Department of Education (2008), some American educators insist that student achievement has been improving since the 1980s.

Several studies were done to assess how much improvement in student achievement has been attained since the *Nation at Risk* report was released over 25 years ago. The National Center for Education Statistics published the 2007 *Digest of Education Statistics*, which examined a representative sample of 20 students born in 1993 and who entered school as kindergarteners in 1998. Out of the 20 students, only 14 students graduated from high school on time. Only 10 students out of the 14 high school graduates entered college. Unfortunately, only five students actually completed college with a degree by the year 2007 (U.S. Department of Education, 2008).

The U.S. Department of Education (2008) also notes two other studies that were included in the 2007 *Digest of Education Statistics*. A research study examined 20 fourth grade students who were born in 1983, finding that only 6 out of 20 students were proficient in English and only 4 students out of 20 were proficient in math. Another study compared the results of students who were born 14 years later. This comparison study on 20 fourth graders who were born in 1997 showed a slight increase of 7 out of 20 students who were proficient in English and 8 students out of 20 who were proficient in math.

However, the increase in the number of students who have reached proficiency is still too small in comparison to the level of achievement that other students in other countries have gained. According to Secretary of Education Margaret Spellings, "the rising demands of our global economy, together with demographic shifts, require that we educate more students to a higher level than before" (U.S. Department of Education,

2008, p. 2). The success of reforms in the American public education system cannot compare to the success of emerging third-world countries who have succeeded in rising to the challenge to prepare their students to compete in a highly competitive global future workforce.

National and International Student Assessments

In 1983, the NCEE pointed out that as a nation, American educators should also be worried about the performance of American students on international tests. Since the late 1990s, the U.S. and other countries have been continuously taking part in these international evaluations. According to the U.S. Department of Education (2008), since the 1970s student outcomes on international assessments have not improved. The U.S. Department of Education further notes, "international tests show that United States at best is running at place, while other nations are passing us by" (p. 2). These assessments rank participating countries in the order of their students' average scores from highest to lowest. These evaluations also define the achievement level of American students in comparison to their peers in other countries. Darling-Hammond (2010) notes, "At a time when advances in science and technology fuel economic growth in East Asian and European nations, our students rank near the bottom of industrialized countries in math and science achievement" (p. 3).

The Program for International Student Assessment (PISA)

One of the most recent international achievement tests that the United States participated in was the Program for International Student Assessment (PISA). PISA measures the performance of 15-year-olds in reading, mathematics, and science literacy (Baldi et al., 2007). In 2000, the Organization for Economic Cooperation and

Development (OECD) began sponsoring the administration of PISA with the intention that this organization will continue to implement this assessment in a 3-year cycle (Baldi et al., 2007). OECD is an intergovernmental organization composed of 34 member countries that are aware of the impact of a global society has on education (Fleischman, Hopstock, Pelczar & Shelley, 2010). According to the OECD (2010), "in a global economy, the yardstick for success is no longer improvement by national standards alone, but how education systems perform internationally" (p. 4).

The objective of this international achievement test is to measure what students know as well as what students can do with their knowledge to solve the challenges of the world. In other words, it measures whether students have the "ability to use their knowledge and skills to meet real-life challenges" and be able to "analyze, reason and communicate their ideas effectively" (OECD, 2010, p. 18). In each cycle, PISA conducts an in-depth study of one of the three subjects to provide ongoing achievement data. The first cycle focuses on reading literacy, the second cycle focuses on mathematics literacy, and the third cycle focuses on science literacy (Baldi et al., 2007). According to the OECD (2010), the concept of literacy "refers both to students' capacity to apply knowledge and skills in key subject areas and to their ability to analyze, reason and communicate effectively as they pose, interpret and solve problems in a variety of situations" (p. 3).

The most recent cycle of PISA was proctored in 2009 and the subject assessed was reading literacy. There were 65 participants, composed of 33 countries who are members of OECD, 27 countries that were not members of OECD and 5 other education systems that participated in the 2009 cycle (Fleischman et al., 2010). Fleischman et al.

(2010) define other education systems participants as non-national entities such as Shanghai-China. Altogether, the 65 participating countries make up 90% of the world's economy (OECD, 2010). In the report, the results are distinguished by identifying if the countries are members of the OECD, non-OECD members, or identified as any other educational system (Fleischman et al., 2010).

In the United States, the Department of Education administered the proctoring of the PISA in 2009. The sample of American students who took the 2009 PISA were randomly selected as well as carefully weighted to accurately represent all students currently residing in the nation (Fleischman et al., 2010). A total of 165 private and public schools and 5,233 students participated in taking the PISA. Fleischman et al. (2010) also note that the "Differences described in [their] report have been tested for statistical significance at the .05 level, with no adjustments for multiple comparisons" (p. 5). The sample of students in other countries that participated in PISA was also randomly chosen to represent the 15-year old students living in each respective country (Dillon, 2010). For example, "About 5,100 15-year-olds in Shanghai were chosen as a representative cross-section of students in that city" (Dillon, 2010, para. 3).

The 2009 U.S. PISA Results

In 2009, the results from PISA show both the scores of the individual participating countries and also how these countries compare to each other. PISA uses a scale from 0 to 1,000 with an average score of 500 and a set deviation of 100 (Baldi et al., 2007). In 2009, American 15-year-olds received a mean score of 500 on the reading literacy assessment, which was slightly higher than the overall average score of 493 for all 65 participating countries (OECD, 2010). American 15-year-olds received a mean

score of 487 for math assessment, which was slightly lower than the overall average score of 496 for all 65 participating countries. In science assessment, American 15-year-olds received a mean score of 502, which was one point higher than the overall average score of 501 for all 65 participants.

The scores for American 15-year-olds have slightly increased overall since the last cycle. However, in comparison to their peers globally, the 2009 PISA reveals that 15-year-old Americans ranked 7th out of 33 OECD countries in reading literacy, 18th out of 33 OECD countries in math literacy and 13th out of 33 OECD countries in scientific literacy (Fleischman et al., 2010). The rankings for American students were much lower out of the combined 65 countries and other educational systems that participated altogether in the 2009 PISA. The United States was ranked 17th out of 65 countries in reading literacy, 31st out of 65 countries in math literacy, and 23rd out of 65 countries in science literacy (Dillon, 2010). The results show how other countries with less means have been able to utilize educational reforms to their advantage.

The PISA scores indicate that the amount of money spent on a country's educational system is not a reliable way to measure that country's quality of education. According to the OECD (2010), "the education systems that have been able to secure strong and equitable learning outcomes, and…mobilize rapid improvements, show others what is possible to achieve" (p. 3). Higher GDP per capita can only explain 6% of the difference among the countries that have an average score of student performance; the other 94% is based on the effectiveness of public policy (OECD, 2010). The OECD also notes that a nation's wealth and the amount of funding spent on education do not guarantee a better education system. The scores for American students do not reflect the

amount of money the government invests in education. The recent downturn in American economy has severely cut the budget that supports and funds public education. However, the United States still spends the most money per student in comparison to any other country in the world (U.S. Department of Education, 2008).

There are students in other countries, including developing countries that have been able to attain higher student achievement at lower cost. According to the OECD (2010), students from Shanghai-China, Republic of Korea, Finland, Hong Kong-China, and Singapore earned the top five highest reading literacy scores on the 2009 PISA. In mathematics assessment, students from Shanghai-China, Singapore, Hong Kong-China, Republic of Korea, and Chinese-Taipei surpassed all the other countries with scores also above the average. In science assessment, students from Shanghai-China, Finland, Hong Kong-China, Singapore, and Japan were the top five ranking countries.

The results from the last four cycles of PISA have proven that the notion of highly developed countries creating highly educated students and poor countries struggling to educate their students is obsolete. According to OECD (2010), "Overall, PISA shows that our image of a world divided neatly into rich and poor and badly-educated countries is out of date" (p. 3). PISA has been successful at "evaluating the quality, equity and efficiency of school systems in some 70 countries" (OECD, 2010, p. 3). PISA has made the following conclusions about education systems worldwide:

> In contrast, the best-performing education systems embrace the diversity in students' capacities, interest and social background with individualized approach to learning…Secondly, high-performing education systems embrace the diversity in student capacities, interest and social background with individualized approach to learning…Third, the quality of an education system cannot exceed the quality of teachers and principals, since student learning is ultimately the product of what goes on is classrooms…Last but not least, the most impressive outcome of world-

> class education system, such that every student benefit from excellent learning opportunities. (OECD, 2010, p. 4)

The Trends in International Mathematics and Science Study

The Trends in International Mathematics and Science Study (TIMSS), developed and implemented by the International Association for Evaluation Achievement (IEA), is another international assessment in which American students participate. In 2007, the IEA proctored the fourth round of TIMSS. The TIMSS measures mathematics and science knowledge of fourth and eighth graders in various participating countries. In 2007, 10,350 randomly chosen American fourth grade students from 257 public and private schools participated in TIMSS 2007, as well as 9,723 randomly picked American eighth grade students from 239 public and private schools (Gonzales et al., 2009). Both the fourth grade and the eighth grade students who participated were at the end of their school year. Gonzales et al. (2009) noted that "All differences described in [2007 TIMSS] report are statistically significant at the .05 level. No statistical adjustments to account for multiple comparisons were used" (p. 4).

Several methods are implemented to ensure that the test results from the TIMSS are valid. The International Sampling Referee carefully monitors the sampling of schools and students from other countries that participate in the TIMSS (NCES, 2009). Similar to the United States, each country uses a national probability sample and must submit and obtain an approval for their sample of schools as well as their sample of fourth and eighth grade students. There are also international quality control procedures by which countries must abide to ensure their sampling plan is properly implemented. For example, once a school from the sampling list has agreed to participate, a group or an entire class is randomly selected to take the TIMSS. There are also strict guidelines that

must be met before students can be excluded from the sample list as well as a maximum number of exclusions that schools must not exceed. Reasonable exclusions from the TIMSS guidelines state that students who have documented mental disabilities may be excluded from taking the assessment.

American students tend to score higher on the TIMSS than on PISA. According to Gonzales et al. (2009), similar to PISA, TIMSS also uses a scale score ranging from 0 to 1,000 with a set deviation of 100. In 2007, both American fourth and eighth graders scored higher than the overall TIMSS mathematic scale average score of 500. In science, both American fourth and eighth graders also scored higher than the TIMSS average score of 500. The 2007 scores for both grades in mathematics were also higher than average score of the American students who took the test in 1995. However, in science, the average score of fourth graders in 1995 was 542, while the 2007 score was three points lower. However, in 2007, the eighth grade science score was 520, a slight increase in comparison to the score of 513 in 1995.

Although American students scored higher than average in the 2007 TIMSS, the United States is still not among the top ranking countries for this assessment. According to Gonzales et al. (2009), based on the fourth grade average mathematics scores, the United States ranked 11th among 35 other countries and in eighth grade, the United States ranked ninth out of 47 other countries. The five countries that ranked the highest in fourth grade mathematics are Hong Kong Special Administrative Region (SAR) of the People's Republic of China, Singapore, Chinese-Taipei, Japan, and Kazakhstan. The top five countries that ranked highest in eighth grade mathematics are Chinese-Taipei, Republic of Korea, Singapore, Hong Kong SAR, and the Russian Federation. In 2007,

out of 35 countries, the United States' fourth grade ranked eighth in sciences on the TIMSS. The United States' eighth grade ranked 11th out of 47 other countries that participated in TIMSS 2007. The five countries that ranked the highest in the fourth grade science test results were Singapore, Chinese-Taipei, Hong Kong SAR, Japan, and the Russian Federation. The five countries that ranked the highest among eighth grade science test results were Singapore, Chinese Taipei, Japan, the Republic of Korea, and England (Gonzales et al., 2009).

Comparing International Assessments and the Nation's Report Card

The National Center of Education Statistics (NCES) provides a comprehensive manner of understanding TIMSS and PISA, in addition to comparing it to the United States' National Assessment of Educational Progress (NAEP). NAEP is more commonly known as the nation's report card for the United States' public school education system (NCES, 2009). NAEP is designed to measure fourth, eighth, and 12th grade students' performance in mathematics and in science. NAEP's main purpose is to meet both national and individual state data needs in regards to American curriculum and content standards.

A mandate of the reauthorization of ESEA is that it requires data regarding the students' academic performance broken down by race, ethnicity, and socioeconomic background to be transparent as well as be available to the public. Because of this mandate, NAEP now keeps track of the nation's student achievement information and can provide comprehensive data regarding the gaps in student achievement within grade levels (Manna, 2009). According to Manna (2009), "The expansion of NAEP to include all 50 states and developing urban NAEP assessment, which focuses on performance in

an increasing number of very large districts, are providing a consistent measure of achievement that facilitates cross-jurisdictional comparisons " (p. 570).

Both the international organizations, OECD and IEA, as well as the American organization, NAEP, share similar goals. IEA's goal for TIMSS is similar to NAEP's aim to measure students' achievement in comparison to the school-based curricula. However, IEA collaborates with many countries to gain a consensus to reflect a more international content on TIMSS. NAEP focuses on collecting data on national, state, and local levels in the United States (NCES, 2009). OECD also works with numerous countries to develop PISA to be an international assessment that can compare students with their international peers regarding their knowledge and what they are able to do with their knowledge (OECD, 2010). The students from countries that participate in taking the TIMSS may not be the same students from countries that participate in taking the PISA. A panel of educators did a comparison of the similarities of the frameworks addressed in PISA and in NAEP. According to Fleischman et al. (2010):

> The panel found that about 90 percent of both NAEP eighth- and twelfth-grade items fit PISA's cognitive categories tightly and well (that is, could be comparably classified on PISA), whereas about 80 percent of PISA items fit the NAEP cognitive categories tightly and well. (p. 56)

The difference between TIMSS and PISA lies in the goal of each specific assessment. According to Baldi et al. (2007), TIMSS seeks "to measure students' mastery of specific knowledge, skills, and concepts and are designed to reflect curriculum framework in the United States and other participating jurisdiction" (p. 3). In contrast, PISA does not focus on the outcome of curricula, but on the application of competencies of reading, mathematics, and science problems in a real-life context (Baldi et al., 2007). Barry McGaw, Director of Education of OECD (as cited in Schagen & Hutchison, 2007),

points out that TIMSS asks students, "What science have you been taught and how much have you learned?" while PISA asks, "What can you do with the science you have been taught?" (p. 2). Although both TIMSS and PISA measure different sets of skills, there is a strong correlation between the results. According to Rindermann (2007), who analyzed the results of TIMSS 1994, 1999, and 2003, as well as the results of PISA 2000 and 2003, "this means that in countries where pupils are good in mathematics, they are also good in science, and where they are good in sciences, they are also good in reading and in problem solving" (p. 679).

What Can American Educators Learn from PISA and TIMSS?

Some educators point out that although PISA and TIMSS have similarities, they have different features and frameworks and the results from each international assessment should also be studied separately. The data and results of both assessments contain important information from which American education policymakers can learn a great deal (Bybee & Stage, 2005). According to NCES (2009), instead of comparing the two different international assessments, each assessment should be utilized as a different point-of-view or be seen as viewing achievement through a different set of lens.

There is a huge disparity in American students' TIMSS scores compared to their PISA scores. Their TIMSS scores indicate that on an average, students are acquiring the skills outlined in American curricula. According to Bybee and Stage (2005), "The TIMSS results suggest that the country is on a good course in improving student knowledge of basic facts and procedures and should persevere with its current strategy" (p. 73). However, American students are far behind in comparison to the other students in other countries who are able to demonstrate the ability to use knowledge and skills to

solve real-world problems. One possible reason behind the low scores of American students on PISA is that American students lack the ability for higher-level understanding, critical thinking, and problem solving.

PISA scores indicate that American students do not possess the skills and ability to think critically and be able to solve problems in an innovative way. House and Telese (2008) note that this is a problem since there is a strong correlation between instructional strategies that incorporate problem-solving skills and understanding mathematics, such as Algebra. Mastering a subject like Algebra helps ensure students can successfully grasp acquire logical thinking skills. According to Brookins, "Because Algebra is a 'watershed' course for all of higher mathematics, it is essential that students have a proficient understanding of algebra concepts if they are to excel later in higher mathematics" (Young, 2011, p. 13). Catsambis (1994) also points out that success in Algebra is a necessary step in order to take higher-level mathematics and science courses in high school and college.

The higher test results of American students in TIMSS are a direct result of the emphasis that the public educational system has placed on ensuring that every student be able to acquire basic knowledge. According to Bybee and Stage (2005), one reason for this emphasis is to minimize the achievement gap among the different ethnic groups living in the United States. Unfortunately, this goal has also resulted in leaving very little time and resources for American students to also acquire higher-level skills in problem solving and application. Instead, the focus is on all students, including underachievers, being able to gain fundamental knowledge. Bybee and Stage note that "Each of these explanations account for some of the shortcomings in student performance, and each

must be considered as we look for ways to improve U.S. math and science education" (p. 72).

Successful Best Practices of International Educational Systems

Many researchers have used the data gathered from these two international assessments to empirically prove various hypotheses regarding educational best practices utilized inside and outside the classroom in other countries. The United States stands to learn a great deal from the perspectives of educators from other countries that are scoring high on both TIMSS and PISA. According to Bybee and Stage (2005), "Policymakers, business leaders, educators and parents look to these studies to gain some perspective on the quality of education systems throughout the world" (p. 70). Houlihan (2005) also notes that the educational systems of foreign countries can offer a fresh perspective on common problems that the United States and other countries also face. The educational best practices of other counties may be a useful resource for American educators and policymakers.

Length of time spent at school and on homework. Several studies have been done on the length of time students spend in school as well as the length of time students spend on their homework. Researchers are interested in learning about the correlation between hours spent on studying and student achievement. Students in Western Europe, Canada, Mexico, Republic of Korea, Japan, and Singapore spend an average of 701 hours per year in the classroom, compared to 1,100 yearly hours in America. Students in Finland, a country that scored 63 points above the average in the science portion of the 2006 PISA, only spend 600 hours in school yearly (Baines, 2007). Accordingly, there is

no empirical evidence linking longer days spent in school with higher performance on TIMSS (Schütz et al., 2008).

Some educators believe that one of the reasons that American students spend longer hours in classroom is due to the size of their textbooks. In comparison to the United States, the textbooks in other countries are much smaller and only focus on general ideas. According to Wallis, Steptoe and Miranda (2006), "America's bloated textbooks, by contrast, tend to gallop through a mind-numbing stream of topics and subtopics in an attempt to address a vast range of state standards" (p. 4).

Researchers have also studied the number of hours students spend specifically on math homework. They have found that other countries that continually outrank the United States on international assessments have their students spend less time on their math homework. For example, in the Republic of Korea, the average time an eighth-grader spends completing his or her math homework is 20 minutes less than the average time an American eighth-grader spends on his or her math homework (Baines, 2007). Even with the shorter amount of time spent on math homework, in the 2006 administration of PISA, 15-year-old South Korean students scored 547 in mathematics, well above the average and higher than their American peers (OECD, 2007). Furthermore, in the 2009 administration of PISA, South Korean students ranked in the top five countries with the highest score in math (OECD, 2010).

Success despite national poverty rate. These international assessments also provide data on how the poverty rate affects student achievement. The poverty rate in the United States is 12%, and there is a disparity in the level of achievement by students from low socioeconomic status backgrounds (Baines, 2007). However, other countries with

higher poverty rates do not share the same disparity in achievements by students from low socioeconomic status backgrounds. In the United States, "studies show that the performance of all children is negatively affected in schools with high concentration of poverty" (LeTendre, 2002, p. 109). In 2009, nearly 50-75% of American students who qualified for free and reduced lunch program and participated in PISA scored below the average mean score. The average score of American students from low socioeconomic status backgrounds is lower in comparison to their American peers from higher socioeconomic standards backgrounds (Fleischman et al., 2010).

American policymakers have not successfully addressed the predictable lower achievement scores of students who come from low socioeconomic status families. According to Baines (2007), educational policymakers have mandated an increase in achievement scores of low socioeconomic status students on state standardized exams. However, in order to meet these mandates, the content and standards are lowered for all students in order for low socioeconomic status students to show improvement on state standardized exams (Baines, 2007). According to Wallis et al. (2006), "An entire generation of kids will fail to make the grade in the global economy because they can't think their way through abstract problems, work in teams, distinguish good information from bad or speak a language other than English" (p. 1). Wallis et al. also note that the bar that Americans have set for their students is too low because the only objectives are to teach state standards in order for students to do well in state standardized assessments.

In comparison, the Republic of Korea has a poverty rate of 15%, which is higher than the poverty rate in the United States. However, the Republic of Korea consistently scores high on international assessments such as PISA. In addition, Canada and countries

in Europe have taken broader social initiatives and have focused on improving family support, such as tax-incentives for stay-at-home parents (Baines, 2007). This type of reform has helped Canada and Europe to continuously place in the top 10 countries on these international assessments (OECD, 2007).

Students' self-concept and its effect on student achievement. Another area of study involves the correlation between students' self-concept and their achievement results, specifically in mathematics and science. An empirical study conducted by Shen and Tam (2008) indicates that students who have high achievement scores in mathematics and science also enjoy learning mathematics and science. Shen and Tam also note that students who are fond of learning math and science have an easier time understanding concepts in both these subjects.

Some of the students who participated in TIMSS assessments have also been used as participants in empirical studies to demonstrate whether students' perceptions of science have influence their level of achievement in this subject. House (2008) conducted a study using a random sample of 4,006 Japanese students who also participated in the 2003 administration of TIMMS. House's study found that "students who held positive beliefs about their science ability earned higher test scores while students who expressed negative comparisons of themselves to other students showed lower science test scores" (p. 259).

Furthermore, House (2008) also explored whether classroom instructions in math and science also have an impact on student achievement. According to House, Japanese educators credit the cooperative learning method for its students' success in achieving high average scores in both math and science portions of the 2003 TIMMS. The students

who participate in cooperative learning are constantly engaging in curricula that are grounded in students' interests and experiences. Japanese educators also emphasize authentic instruction that enables students to connect what they learn in the classroom with real-world contexts and problems. Japanese students, who earned high marks in the science portions of the TIMMS, admit that they pay attention to their teachers during lectures. Japanese students are also given opportunities to work independently on problems related to the lessons. They possess the ability to provide explanations for the topics discussed during class. A significant result in this empirical study shows that both effective classroom instructional strategies have a significant effect on student achievement (House, 2008).

Another empirical study conducted by House used a sample of 5,125 South Korean students who also participated in the 2003 administration of TIMSS. In this study, House (2009) found a relationship between classroom instructions and students' interest in science careers. According to House, "Students who expressed interest in a science career reported that they frequently related what they were learning in science in their daily lives" (p. 13). Students who expressed interest in science careers have also gained the skills to solve problems independently, as well as being given the opportunity to design their own experiments. In the Republic of Korea, the high schools partner with local university outreach programs to provide authentic learning experiences for students and influence their interest in future science careers. Students who were exposed to experts in the science field also showed an increased interest in science careers (House, 2009).

Educators in the United Kingdom are also interested in promoting more of their students, specifically female students, to work in science related careers. A study completed in the United Kingdom by Sandow et al. (2009) revealed that young girls needed to see female role models with whom they could relate working in science careers in order to feel inspired to pursue a career in science. In order to stimulate the interest of female students as well as encourage them to consider science as a possible career, it is important for female students to see women working in the science field as real women with families and other interests besides their profession. Sandow et al. also note that educators in the United Kingdom are also purposeful in "teaching strategies that foster girls' self-confidence" (p. 2). Even at an early age, female students are encouraged to express their thoughts and feelings in the classrooms as well as to communicate their ideas. It is equally important for male students to see role models in science careers to whom they can relate in order to build self-confidence in their ability to understand science concepts.

Other best practices from high student achieving countries. Several empirical studies that examine various factors that affect student achievement such as technology, textbooks, early education, and teacher preparation have been conducted. The question of whether technology or the lack thereof in the classroom affects student achievement is an ongoing discussion among educators. According to Baines (2007), "In the 2003 administration of PISA, the factor most strongly associated with high scores in reading, problem solving, and mathematics was not the presence or absence of technology, but the number of books to which a student had access" (p. 100). The return on investment in student achievement is higher when resources are allocated for books than when

resources are allocated for technology. According to Schütz et al. (2008), prior research based on the 2000 TIMSS and PISA results shows that, on average, availability of books in the students' home is the most important predictor of student performance.

The high-ranking countries also have several methods to ensure that their teachers are prepared and qualified to teach their students. Besides a university degree and completing a credentialing program, teachers are also "required to pass an examination or complete one- to two-year supervised inductions to teaching" (Bybee & Stage, 2005, p. 73). For example, in Finland, only 10% of applicants passed the rigorous selection process to enter the national teacher-training program (OECD, 2004). Teachers in Finland are also required to obtain a Master's in Education.

Currently, the United States has no national curriculum, something that most countries that participate and do well in these international assessments possess (Bybee & Stage, 2005). A report conducted by the OECD (2004) revealed that the results from the 2000 PISA and from an integrated quantitative and qualitative study supported the success of a national curriculum in Finland. Students in Finland have been successful in scoring high on the PISA, continually placing their nation among the five highest ranked countries in the world. Finland's national curriculum has enabled students to receive a high quality education at low cost. Finland's national curriculum has also been able to support "high performance with a socially equitable distribution of learning outcomes" (OECD, 2004, p. 3). In the 2000 PISA results, students from Finland only had a 10% variation among their scores (OECD, 2004).

Houlihan (2005) believes that the United States will also benefit from a more cohesive system of preparing teachers for classrooms. There is vast a difference in the

amount of time allotted for American teachers to spend preparing their lesson plans in comparison to the amount of lesson-planning time given to teachers from high-ranking countries. In Finland, teachers spend an average of 15-23 hours teaching per week and the rest of the time preparing lessons or participating in in-services or trainings. Schools in Finland are expected to spend at least 1% of their payroll developing their teachers (OECD, 2004). In comparison, very little time is afforded to American teachers to prepare for their lessons or collaborate with other teachers. According to Darling-Hammond (2010), "Whereas teachers in high-achieving nations spend 40 to 60% of their time preparing and learning to teach well, most U.S. teachers have no time to work with colleagues during the school day" (p. 201). Darling-Hammond also notes that American teachers "typically receive only about 4 to 5 hours weekly in which to plan by themselves, and they get a few 'hit-and-run' workshops after school, with little opportunity to share knowledge or improve their practice" (p. 201).

Successful Best Practices of American Public Educational Systems

According to the National Center on Education and the Economy, the American public educational system is outdated. The National Center on Education (2007) states, "the core problem is that our education and training systems were built for another era, an era in which most workers needed only a rudimentary education" (p. 8). Since this era, the world has changed and American students must be able to demonstrate skills beyond rudimentary knowledge. According to Ghysels (2009), unfortunately, American high school graduates are being prepared to take lower paying jobs because the current school system heavily emphasizes teaching students only the skills and knowledge needed to pass state standardized tests. The American public education system must teach students

beyond state content and state standards. Darling-Hammond (2010) notes that schools need to teach curriculum that "focus on central concepts and help students learn how to think critically and learn for themselves, so that they can use knowledge in new situations and manage the demands of changing information, technologies, jobs, and social condition" (p. 4).

The students in the United States must also possess newly identified skill-sets that are prerequisites for the 21st century global workforce. According to Wallis et al. (2006), "There is nonetheless a remarkable consensus among educators and business and policy leaders on one key conclusion: we need to bring what we teach and how we teach into the 21st century" (p. 1). Despite the struggle for American educators to keep the public education system contemporary, some educators in the United States are already teaching their students the skill-sets needed to be able to compete in the 21st century international global arena.

These skills-sets are important to meet the demands of jobs in the 21st century. Wallis et al. (2006) identifies four new skills-sets that American educators should be teaching students. The first skill-set is for students to know about the evolving world in which they live. This involves knowledge beyond what is covered in history books. Mike Eskew, CEO of United Parcel Service (UPS; as cited in Wallis et al., 2006), discusses what he looks for in his employees: workers who are "'global trade literate, sensitive to foreign cultures, conversant in different languages'" (p. 2). The emerging global village has shown the need for the American workforce to be able to comprehend and be sensitive to cultures that exist beyond U.S. borders (Guerin, 2009). The second skill-set is to be able to think outside the box, to be innovative and creative in finding

solutions to problems that businesses will face in the 21st century (Wallis et al., 2006). The third skill-set is the ability to process all the information available to everyone on the Internet. According to Wallis et al., "In an age of overflowing information and proliferating media, kids need to rapidly process what's coming at them and distinguish between what's reliable and what isn't" (p. 2). Lastly, the fourth skill-set that students will need is to be able to relate to all types of people. Students will need to have a high emotional intelligence, which will be important for their success in the diverse workplace of the future.

Fostering creativity and innovation in students. The careers in the United States that cannot be outsourced or offshored will require innovation and creativity. Ongoing cuts to the educational budget have forced educators to scale back or completely eliminate art and music programs in schools. There are no short-term consequences for schools that must do so because questions regarding art and music knowledge do not show up on state standardized tests. However, studying art and music helps to foster creativity and innovation. According to the National Center on Education and the Economy (2007), "The employers the world over will be looking for the most competent, most creative, and most innovative people on the face of the earth and will be willing to pay them top dollar for their services" (p. 7). Eliminating art and music may have long-term consequences in the ability for students to become qualified candidates for careers that may be the only jobs left in the United States.

Some American educators, however, realize that learning about arts and music may help prepare students to compete for jobs in the 21st century workforce. According to Ghysels (2009), the Superintendent of Mountain View Whisman School District,

public schools in America are outdated in preparing students for the emerging world and educators must find a way to expose students to art and music. Ghysels believes there must be a balance, stating, "We have to continue to assess students against academic standards and provide opportunities for students' creativity to flourish" (p. 21). Superintendent Ghysels ensures that the schools in his school district include art and music classes for all students. According to Wallis et al. (2006), there needs to be a balance between "core knowledge and what educators call 'portable skills'—critical thinking, making connections between ideas and know how to keep on learning-" and learning art and music provide students with these 'portable skills'" (p. 4).

Fostering teamwork in teachers and in students. Another specific skill needed by students who will enter the workforce in the 21st century is teamwork. According to Ghysels (2009), "We need to check-in with some global realities and ask: In all the testing, are students learning how to work as a team, to use creativity and innovation?" (p. 21). In Ghysels' Mountain View Whisman School District, teachers and students are encouraged to work together as team members. According to Ghysels, together the teachers and students create a collaborative team similar to the teamwork that colleagues have in companies that value talent and skills. Collaboration and teamwork is the key to this school district's success. Recently, scores for Mountain View Whisman School district jumped 10 points in the California API. According to Superintendent Ghysels, the success of his school district is due to the teamwork environment that the teachers and students have forged inside and outside the classrooms. In this school district, students are allowed a voice and give their input in lesson development as well. Ghysels notes,

"They work together to examine feedback in which teachers are moving beyond the role of facilitators and collaborating with students" (p. 23).

Educators in the Mountain View Whisman School District also value the peer culture that teachers and staff create with their students. In this school district, Superintendent Ghysels (2009) notes that teachers and students "create a peer culture in which classroom goals are known and transparent and related to the essential standards directly linked and aligned to the school site plan, district goals and the state's standards" (p. 22). The students and faculty frequently discuss and communicate with each other to address problems, including evaluating the effective and ineffective use of instructional time. Cushman (2005) notes that utilizing and giving value to students' feedback also enhances the school environment.

Creating a school environment that empowers teachers, staff and students to feel that they are on the same team working together towards the same goal is critical to the success of the school. Findings from a study of a high performing urban charter high school that serves students identified as at risk of not completing high school attribute their success to collaboration. A charter school is an independently operated school that has a student base performance agreement with a school district, county of education, or state board of education (EdSource, n.d.a.). This high performing high school emphasizes collaboration among teachers and students, as well as collaboration with school leadership, teachers, and staff (Mayr, 2008). The teachers and students have a common purpose and work together towards the same goal: graduation for students who were at one point identified as potential high school dropouts. Mayr (2008) notes, "throughout the data collection phase of observations and interviews, an obvious sense of

collaboration among the staff was apparent, as they worked together to reach student goals" (p. 158). The teachers and leadership utilized staff meetings to solve problems together in a team setting.

Learning from Virginia's Study on High Performing Public Schools

In the state of Virginia, educators also credit teamwork for their success in attaining high student achievement. The high achieving public schools in Virginia emphasize teamwork and collaboration among their staff and students. Senior level administrators from these successful schools credits their high state standardized test scores to the fact that they believe in and practice teamwork with their staff and their students (Christie, 2004). However, according to Liang (2010), "there is more room for school improvement, particularly in the aspect of assessment practices, in the U.S. schools" (p. 228). Virginia's local assembly requested a study to collect the best practices used in their high-performing schools as well as in their high performing school divisions (districts; Christie, 2004). As a result, the schools in the state of Virginia participated in an empirical study to help improve their state standardized assessments.

A quantitative analysis was completed using senior level administrators as participants from schools that had high testing results on the Standard of Learning (SOL). SOL is Virginia's State Standardized testing proctored annually to its students. The research also found that the increase in test scores was highly affected by different factors, such as "differences in teacher qualifications and experience, family support and structure, school and division characteristics, and local fiscal conditions" (Christie, 2004, p. 565).

There were six major findings from interviewing senior level administrators of the schools and school divisions in Virginia. The following are descriptions of the employed practices in the public schools in the state of Virginia with high SOL test scores (Christie, 2004). First, schools with high SOL scores all agreed that having a strong principal leadership was a key to their success. The principal and leadership at these successful schools "recognize and address gaps between student needs and actual levels of support provided" (p. 566). Second, the environment that the administrators, teachers, and staff create in their schools is important in supporting student achievement. The senior level administrators and teaching staff "set high expectations for all students and [they] do not accept demographics as an excuse for low expectations" (p. 566). Third, professional development is available for new teachers. Christie (2004) points out that "Successful challenged schools provide useful staff development to ensure that their frequently inexperienced teachers are able to teach effectively" (p. 567).

Fourth, the schools only employ highly effective teaching staff, and administrators rely heavily on student achievement data to make their decisions. The administrators will not hesitate to dismiss ineffective teachers to ensure that the teaching staff is comprised of only qualified staff. Fifth, teachers also use student achievement data to identify students who may need extra remediation. Sixth, in order to ensure that students receive quality instruction, the typical school day in these successful schools has been revamped. The senior level administration at these schools "focuses on setting schedules and allocating time to address potential weakness or to provide for remediation" (Christie, 2004, p. 565).

Focusing on Science Technology Engineering Mathematics (STEM) Education

The warning that it is critical for students to learn math and science as well as to possess critical thinking skills has not completely fallen on deaf ears in the United States. Educators have heard Friedman's cautionary tale and believe that the United States will not do as well as it has in the past if students do not understand the value of innovation. One such educator is Peggy Brookins, who is the Creator and Director of the Engineering and Manufacturing Institute of Technology (EMIT) in Florida. Brookins (as cited in Young, 2011) asserts that "STEM is important because…new innovation [is] critical to our own industrial base and the improvement of our standard of living involves STEM education" (p. 3).

American educators like Brookins understand the importance of preparing students to enter post-secondary colleges, specifically to major in math and science fields. It is necessary for graduates entering the workforce to gain a solid foundation in mathematics, science, and engineering because of their importance in creating and sustaining new products (Young, 2011). According to Young (2011), "We know that even jobs such as being a mechanic, the heavy integration of mechanical, electrical, and computer engineering into vehicle design has increased the requirements for STEM-related knowledge" (p. 3).

The teachers at EMIT, a magnet high school in Florida, have been successful in teaching students math and science because these subjects are not taught in the same setting or in the same manner as in traditional classrooms. EMIT introduces technology to students by exposing STEM-related knowledge as a means to solve real-world problems (Young, 2011).

Brookins (as cited in Young, 2011) also emphasizes that school culture is an important factor of student success. According to Brookins (as cited in Young, 2011), "Perhaps more importantly, the environment we cultivate within EMIT allows for those students, who are simply interested in solving practical real-world problems, to be introduced to STEM subjects as tools to achieve their goals within an engineering framework" (p. 4). According to Darling-Hammond (2010), these instructional strategies are how math and science should be taught and introduced to students.

In the past, male workers have mostly populated STEM-related careers. Educators like Brookins have been educating female students to understand that they are as capable of excelling in math and science and entering STEM-related fields. Female students need to be introduced to math and science as early as kindergarten and develop confidence in these subjects by junior high school. According to Young (2011), "Expose them to inquiry at their readiness level in kindergarten; encourage them to freely explore, to create and to interact with materials, people, and things around them" (p. 5). Schools should create an environment where female students are expected to express their thoughts and ideas as well as be comfortable in making and learning from their mistakes.

In order for both male and female students to be highly skilled in math, science, as well as critical thinking, the curriculum must be effective for both male and female students. At EMIT, students understand the importance of learning STEM-related subjects and how their gained knowledge can be applied to real-world problems. They are constantly exposed to careers where STEM subjects are used on a daily basis (Young, 2011). The curriculum at EMIT ensures the success of both male and female students by encouraging them to apply the knowledge they learn in class to real-world problems.

Brookins (as cited in Young, 2011) has implemented "a curriculum that involves doing, understanding, recognizing, problem solving, critical thinking, and interdisciplinary approaches to issues and problems…to generate far better results and enthusiasm with students" (p. 5).

Professionals in STEM-related careers can be a resource for teachers and students. The students from EMIT have frequent interactions with professionals in STEM-related careers. According to Cushman (2005), "When you connect high school students with outside adults, both sides learn how much they can contribute to the other" (p. 23). Professionals who have succeeded in making a career out of their passions can answer students' questions as well as give them advice about how to obtain positions in STEM careers. Professionals also help teachers by keeping them abreast of real-world scenarios regarding STEM-related subjects (Young, 2011). For example, physics teachers can continue their professional development by learning from physicists in order to attract young people to the field (Sandow et al., 2009).

EMIT has been successful in its goal to prepare students for post-secondary education with an interest in math and science majors. EMIT graduates have pursued and received degrees in the diverse STEM fields such as engineering, quantum physics, architecture, and medicine (Young, 2011). These college graduates will have a higher likelihood of being prepared to enter the 21st century workforce that is increasing in its number of STEM-related employment opportunities. The National Science Foundation (2010) estimated that in 2003, there were 12.9 million scientists and engineers who stated their profession required at least a bachelor degree in science or engineering.

Understanding How California Public Schools Measure Student Achievement

Educators have different definitions by which to measure student achievement. According to Lipsitz and West (2006), "High performing schools are places where adults and children live, grow, and learn well" (p. 66). However, federal law mandates that every state adopt a systematic way to measure how well a school is performing as well as a means to define high performance based on student achievement data. The CDE is required to report to the public both state and federal student achievement results. Under the general heading of Accountability Progress Reporting (APR), the CDE measures student achievement and identifies high performing schools.

Accountability progress reporting (APR). The primary goal of California's APR system is to measure and report on the academic success of California public schools. According to the CDE (2010c), California is home to nearly 10,000 public schools in over 1,000 school districts and local education agencies (LEA). The APR system includes three major components: Adequate Yearly Progress (AYP), the API Report, and the Program Improvement (PI) Report.

Adequate yearly progress (AYP). Federal law has mandated that all California public schools obtain an AYP score. The AYP is weighted on the following criteria: (a) 95% of student participation on statewide tests, (b) 55.6% of the students score at the proficient level or above in English Language Art statewide test and 54.8% of the students score at the proficient level or above in mathematic statewide test, (c) API growth of at least 680 or show a growth of 1 point per school year, and lastly, (d) 90% graduation rate (CDE, 2010c). According to the CDE (2010c), the AYP target increases annually until the 2013-2014 school year. By this year, all schools must have "100% of

their students performing at or above the proficient level on the statewide test" (p. 1). Also by 2014, all students must either graduate from high school or be on track to graduate from high school and be prepared to enter a post-secondary education (Jennings, 2010).

Academic performance index (API). Most elementary and secondary public educational institutions in California have an API. This is true for all traditional schools, charter schools, small size schools, Alternative School Accountability Model (ASAM) schools, Special Education schools, and Local Educational Agencies (LEA; CDE, 2010c). This statewide measurement system began in 1999 with the passing of the Public School Accountability Act (PSAA), an act that mandates every public school to participate in the API system (CDE, 2010c). The PSAA was enacted to hold school districts, schools, and students accountable for improving student performance reported annually in their API scores (Education Data Partnership, 2010). The annual API reports given to all LEAs also meet the federal requirements mandated by ESEA for all states to have some form of accountability measurement of their student achievement (CDE, 2010c). According to the U.S. Department of Education (2008), "We have transformed ourselves from a nation at risk of complacency to a nation that is accountable and at work on its educational weakness" (p. 8).

The purpose of the API system is to measure the academic performance as well as the growth of each public school. According to the CDE (2010c), "The API is a single number, ranging from a low of 200 to a high of 1000, that reflects a school's, an LEA's, or a subgroup's performance level, based on the results of statewide testing" (p. 10). The ultimate target is for each school to reach an API of 800 and for those schools that have

already reached 800 to remain in the 800 range or to increase towards 1,000. The API from one year is compared to the API from the previous year to measure the school's improvement. The API does not look at students' achievement or progress through the years, but rather it "compares snapshots of the school or LEA's achievement result from one year to the next" (p. 10).

Each public school in California has an annual target goal that must be met. According to the CDE (2010c), "the growth (or change) in the API is the difference between the Base API and Growth API within a reporting cycle" (p. 16). There is a specific formula to calculate the target goal: "The minimum target is 5 percent of the difference between the school's or subgroup's Base API and the statewide performance of 800" (p. 16). In comparison, the federal mandate for all public schools is to increase their score to at least one point annually.

One of the many goals of API is to ensure educators are accountable for the academic achievement of the entire student population, including the students who fall under subgroups. Subgroups can be comprised of the students' race, ethnicity, socioeconomic background, or English Learner status, as well as students who are identified with disabilities. The API addresses the achievement gaps of students who fall into these subgroups. A disparity exists between traditionally higher scoring students and traditionally lower scoring students. Subgroups receive a different API score; "Numerically significant subgroups receive APIs as part of a school or LEA's report" (CDE, 2010c, p. 26). However, the same formula used to calculate the annual target growth for subgroups is also used to calculate the annul target growth for schools.

The student achievement results from state mandated tests and assessments are used to calculate API. Recently, the results from the California High School Exit Exam (CAHSEE) and the student testing system called Standardized Testing and Reporting (STAR) have been added to the schools' API score (Education Data Partnership, 2010). The CAHSEE results make up 18% of the overall API score, specifically 9% from English Language Arts exams and 9% from the math exam (CDE, 2010c). The rest of the score depends on students' performance on STAR, which is comprised of multiple subject tests aligned to the state's academic content and standards and the API system for measuring progress (Education Data Partnership, 2010). Except for seniors, all students enrolled in a public school in California must take the STAR on an annual basis. The weight of each STAR test is as follows: 27.1% on English Language Arts, 22.9% on science, 18.1% on math and 13.9 % on history (CDE, 2010c).

Program improvement (PI). Title I funded schools and LEAs that do not make their AYP goals for 2 consecutive years are formally designated under Program Improvement (PI). Title I schools and LEAs identified as PI must submit a detailed outline of their improvement plan for the next 5 years. The recommendations and requirements must also be included in a detailed timeline showing how the school or LEA will reach their goals within the next 5 years (CDE, 2011b).

California School Ranking System

The API system is also used to rank the schools in the state of California. California educational code section 52056(a) requires the API system to rank schools (CDE, 2010c). In California, there are two types of ranking system: (a) statewide rank, and (b) SSR. According to the CDE (2010c), the statewide rank compares all similar

types of schools in the entire state. The SSR compares 100 schools of similar demographics and characteristics with each other. According to the Education Data Partnership (2010), "These rankings are contained in the Base API reports but not in the Growth API reports" (p. 1). It is possible for a school to receive two different scores under the two different ranking systems (Education Data Partnership, 2010). However small schools, school districts, and ASAM schools do not receive either of the ranking scores (CDE, 2010c).

Statewide ranking system. The Statewide Ranking system breaks down public schools in California according to their type: elementary, middle, and high school. Each school type is ranked separately (CDE, 2010c). In order to determine the order of schools, ranks are established by dividing the API scores into 10 equal groups called deciles and 10% of the schools is placed in each decile (Education Data Partnership, 2010). Each of the 10 deciles is ranked from 10 being the highest to 1 being the lowest (CDE, 2010c). The school's statewide rank is the decile group that the school falls in.

Similar school ranking (SSR) system. The SSR system compares schools with similar characteristics. According to the Education Data Partnership (2010), the SSR system was enacted by the PSAA and required each state to create a system to rank schools using the school characteristic index (SCI). Using SCI enables a comparison of student achievement between schools that are facing the same challenges due to their student demographics as well as the characteristics of the school and the teachers employed in the school (Education Data Partnership, 2010). According to the Education Data Partnership (2010), "The lower a school's SCI value, the more likely the school is to

have low test scores because of challenges such as low average parent education level, high poverty rates, and high percentage of English learners" (p. 1).

Similar to the categories of the statewide ranking system, schools are also categorized by their type: elementary, middle, and high school. The schools are further divided in groups of 100 according to their SCIs. Their API scores are used to sort each group of 100 schools with the same SCIs. Again, similar to the statewide ranking system, each group is divided into 10 deciles and marked from 10 being the highest to 1 being the lowest. The school's SSR is the decile in which the schools falls (Education Data Partnership, 2010).

Summary

In order to safeguard America's foothold as a powerful nation, American policy leaders must begin to revolutionize the educational system to match the knowledge and skills needed in the 21st century workforce. Except for a handful of high achieving schools, most American classrooms are not producing students who will possess the knowledge and the skills necessary to be qualified for jobs in the international global arena. Since the 1980s, the Commission of Excellence in Education has been warning the nation that a security threat exists and the standard of living for future generation is in danger. According to the National Center on Education and the Economy (2007):

> If we continue on our current course, and the number of nations outpacing us in the education race continues to grow at its current rate, the American standard of living will steadily fall relative to those nations, rich and poor, that are doing a better job. (p. 8)

Since the warning from the Commission of Excellence in Education, numerous federal education reforms have been passed demanding more rigorous standards and curricula, yet American students have only managed to produce the same mediocre

results. Even though Americans students are learning what is outlined in their curriculum, the bar is set too low. Currently, in comparison to other countries, American students are either scoring just slightly above average or slightly below the average in reading, math, and science competency.

While the United States that spends the most money per student worldwide, the return on investment is low. Other high-ranking countries spend less money on education and are clearly surpassing the United States on international assessments. These countries are also successfully increasing the numbers of students graduating from high school as well as increasing the number of students who are enrolling in and graduating from post-secondary educational institutions. Ironically, the students in these high-ranking countries spend less time in school and doing their homework, including math homework. Most of these high-ranking countries also have a higher poverty rate than the United States. However, the gap in student achievement of students of lower socioeconomic background in the United States is wider compared to these countries.

Successful high-ranking countries and high achieving schools in the United States both found that early childhood education helps students become more prepared and more successful in school. Students from high-ranking countries as well as from high achieving American schools have access to professionals in the fields of math and science. Students in high-ranking countries as well as high achieving American schools possess a great deal of self-confidence in their ability to understand math and science and apply that knowledge to real world problems. Teachers from high-ranking countries and high achieving American schools introduce math and science concepts using real-world settings.

It is time to raise the bar for American students, from merely acquiring basic knowledge to possessing the skills-sets necessary to be qualified for the jobs in the 21st century. With all the information available on the Internet, students need to discern between reliable and false data. Throughout their education, students' emotional intelligence should be fostered. In today's global village, it is vital that employees are able to work in teams as well as be able to lead teams.

Educators in the United States should acknowledge that state standards are just the minimum knowledge their students need to acquire. The end goal should be to teach students to know how to learn independently, think critically and solve real-world problems using innovative means. It is time for the United States to stop jogging in place and join the race that began 2 decades ago. It is time to give America students an education worthy of the 21st century.

Chapter III: Research Design and Methodology

Introduction

This study examined how identified high achieving public high schools in California were successful in teaching students to become highly proficient in reading, math, and science literacies as well as in critical thinking skills. The phenomenon of the success of these high achieving public high schools was studied because the majority of the public schools in the United States have struggled to improve their standardized testing scores and graduating students prepared to enter STEM-related fields. The objective of this study was to collect and analyze data concerning the best practices in teaching STEM subject matter utilized by high achieving public high schools, particularly practices that have helped these high schools to become successful and be ranked in the top 100 schools in California. Lastly, the aim of this study was to provide knowledge to American educators, administrators, policymakers as they prepare students to successfully compete for jobs in the 21st century international employment arena.

Chapter Overview

This chapter describes the steps used to gather and to analyze data for this study. This chapter begins with the proposal of the research design and continues with an explanation of how the participants were chosen for the study. This chapter also discusses the interview process used during the in-depth interviews with the participants as well as the data analysis process used after each interview. The last two sections explain the limitations of the study as well as the summary of the entire chapter.

Research Design

The following elements are included in the description of the chosen research design: (a) identifying a model for the research, (b) qualitative research design, (c) grounded theory approach, (d) research questions and objectives, (e) protection of human subjects, (f) data modalities and instrumentation, and (g) role of the researcher.

Identifying a model for the research. The researcher completed an in-depth comparison among qualitative, quantitative, and mixed method methodologies. With the objective of the study in mind, the researcher determined that a qualitative methodology approach was the best-suited research model for this study. According to Creswell (2007), "We conduct qualitative research because we want to understand the contexts or settings in which participants in a study address a problem or issue" (p. 40).

Qualitative research design. Qualitative research involves collecting individuals' beliefs, thoughts and perceptions. Creswell (2007) defines qualitative research as "the study of research problems inquiring into the meaning of individuals or group ascribe to a social or human problem" (p. 37). Leedy and Ormrod (2005) note two commonalties of qualitative research; "First, they focus on phenomena that occur in natural settings – that is, in the "real world" (p. 133), and second, they involve "studying those phenomena in all their complexity" (p. 133). Leedy and Ormrod also explain, "When little information exists on a topic, when variables are unknown, when relevant theory base is inadequate or missing, a qualitative study can help define what is important – that is, what needs to be studied" (p. 134). Therefore, a qualitative research design was the method that could best enable the researcher to explore the phenomena that existed in

high achieving public high schools as well as in gathering data regarding best practices from the perspectives of the participants in this study.

The participants of this study were the main source for data collection. Based on the perceptions of the participants, the data gathered from the interviews helped to explain the relationships between the best practices that occurred in high achieving public high schools and the significant contributions of best practices toward student achievement. According to McMillan and Schumacher (2006), participants' perceptions are important to a qualitative research because "the researcher interprets phenomena [based on] the meaning that people assign to them" (p. 315). The participants' perceptions or beliefs included their feelings; their thoughts and their actions and each had equal validity and truth. McMillan and Schumacher assert that:

> Qualitative researcher is based on a constructivist philosophy that assumes that reality is a multilayer, interactive, shared social experience that is interpreted by individuals. Reality is a social construction; that is, individuals and group derive or ascribe meanings to specific events, persons, processed, and analyze. People form constructions to make sense of their world and reorganize these constructions as viewpoints, perceptions, and belief system. In other words, people perceptions are what they consider real and thus what directs their actions, thoughts, and feelings. (p. 315)

Grounded theory approach. In addition to understanding the phenomenon of how these high achieving public high schools were able to attain success, the researcher also wanted to generate a theory that revealed the nature of the multiple perspectives gathered during this study. Therefore, the approach taken for this study most closely resembled the procedures for conducting grounded theory research. According to McMillan and Schumacher (2006), "The term grounded theory is often used in a non-specific way to refer to any approach to forming theoretical ideas that somehow begins with data" (p. 27). The grounded theory approach enabled the researcher to go beyond

collecting descriptions of best practices and develop a theoretical model (Leedy & Ormrod, 2005).

Essentially, the grounded theory approach utilized the participants' experience because the participants' perceptions were relevant. According to Creswell (2007), "Participants in the study would all have experienced the process, and the development of the theory might help explain practice or provide a framework for further research" (p. 63). In other words, "the term grounded refers to the idea that the theory that emerges from the study is derived from and 'grounded' in data that have been collected in the field rather than taken from the research literature" (Leedy & Ormrod, 2005, p. 140).

Due to the nature of the study, it should be noted that the method used for this study closely resembled a grounded theory approach, but did not exactly meet Creswell's definition of a grounded theory for two reasons. First, Creswell (2007) notes that grounded theory should include 20 to 30 interviews. However, the researcher only sent out 40 invitations to the prospective participants requesting their involvement with the expectation of securing at least 10 to 15 participants for this study. Secondly, Creswell also points out that grounded theory approach should include several site visits by the researcher. The researcher visited each site only once to interview the participants in their natural settings. However, according to Creswell, the number of visits is irrelevant as long as "the categories of information become saturated and…the theory is elaborated in all of its complexity" (p. 64). The researcher felt that both the number of participants included in the purposeful sampling and the singular site visits were sufficient for this qualitative study to generate a theory. Moreover, the data gathered from the study

provided the researcher with a variety of perspectives regarding the phenomenon as well as enough information for the categories of information to become saturated.

Research Questions and Objectives

In order to explore and to determine the best practices in which the investigated high achieving public high schools had engaged, the following research questions were investigated during the study:

1. How does the use of the curriculum in high achieving California public high schools in California support critical thinking skills and promote reading, math and science literacy?
2. What specific programs are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?
3. What specific programs or practices are implemented at high achieving public high schools in California that foster or promote students to utilize innovative thinking?
4. What are the roles of the parents and the surrounding communities at high achieving public high schools in California?
5. What are the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?
6. What were the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

Protection of Human Subjects

The researcher followed and completed all the necessary requirements before inviting human participants to take part in this study. According to Creswell (2007), "Regardless of the approach to inquiry, permissions need to be sought from a human subjects review board, a process in which campus committees review research studies for their potential harmful impact on and risk to participants" (p. 123). The researcher completed the application review process and followed all the procedures and policies required when submitting the student research proposals.

The primary objective of the Pepperdine University Institutional Review Boards (IRBs) was to ensure that the welfare of human participants involved in the research was protected and respected. Both federal and state regulations guided the policies and procedures mandated by the Pepperdine University IRBs. The requirements set forth by the Pepperdine University IRBs included the ethical principles stated in the *Belmont Report* and were in accordance with the United States' code of Federal Regulations, DHHs (CFR), Title 45 Part 46 (45 CFR 46), entitled *Protection of Human Subjects*, and Parts 160 and 164, entitled *Standards for Privacy of Individual Identifiable Health Information* as well as the guidelines listed under the California Protection of Human Subjects regarding the Medical Experimentation Act (Code Section 2417024179.5) (Pepperdine University Institutional Review Boards, 2009). According to the Pepperdine University IRBs (2009), "A secondary goal of the Pepperdine IRBs is to assist investigators in conducting ethical research that is in compliance with DHHS regulations" (p. 8).

The researcher completed the on-line tutorial found on the Pepperdine IRB website as required by the Pepperdine University IRBs for all student research projects. According to the Pepperdine University IRBs (2009), "All Pepperdine faculty, students and staff involved with research activities must complete training on the federal guidelines for the protection of human participants/subjects" (p. 13). The certification of completion of the on-line tutorial is included in Appendix A.

In accordance with the IRBs review procedures, the researcher submitted an application for exempt research. The research proposal for this qualitative study met all the federal regulations applicable to be identified as an exempt research as approved by the Pepperdine University IRBs (See Appendix B). According to the Pepperdine University IRBs (2009), the following criteria were satisfied:

- It is clear that the nature of the proposed research fits one of the categories in 45 CFR 46.10.Ib.
- No implications for criminal or civil liability, employability, or damage to subject's financial standing or reputation would exist if data were outside the study.
- The research does not use a protected group as subjects (e.g. fetuses, pregnant women, mentally handicapped prisoners, minors in a survey or interview study, or minors in a participant observation study).
- The study does not present more than a minimal risk to subjects.
- The study does not involve deception (p. 24).

Informed Consent

The researcher also followed the requirements listed in the *Pepperdine University Protection of Human Participant in Research: Policies and Procedures* manual to ensure that participants were properly informed of their rights as volunteers in this study. According to the Pepperdine University IRBs (2009), "Informed consent is one of the primary considerations underlying research with human subjects" (p. 47). As mandated by the Pepperdine University as well as both federal and California state regulations, the researcher provided each of the participants with an informed consent form.

The informed consent form included all three required elements as stated by the Pepperdine University IRBs (2009). First, the participants must be aware of the intent of the research and their role as participant; "This involves 8 basic elements: (1) description of the researcher (purpose, duration, procedures); (2) risks; (3) benefits; (4) alternatives; (5) confidentiality; (6) compensation for injury; (7) who to contact; and (8) right to withdraw or refuse" (p. 47). Secondly, the participants must be able to fully comprehend all the information the researcher provided to them. Lastly, the participants must understand that their participation in the study is on a purely voluntary basis.

As stated earlier, the researcher protected the participants' confidentiality. The names of the schools were assigned pseudonyms in order to protect the participants' anonymity. A name of a former president in the order of presidency was assigned to each participant in the same sequential order of the interview. For example, the name of the school of first participant who was interviewed was referred to as Washington High School and the name of the school of second participant who was interviewed was referred to as Adams High School.

The researcher obtained approval to conduct the research within 1 year of the date that the full IRB committee had approved the application. The researcher conducted all the interviews within the 1-year guideline. The research records were readily accessible in the event that a member of the Pepperdine University IRBs made a request to view them. The data gathered from this study were saved daily on a flash drive and also on the researcher's computer hard drive. As a backup, data were also stored on a second flash drive and updated on a weekly basis. All the signed informed consent forms, audiotapes, and other hard copies of all data were kept in a locked drawer in the home of the researcher. Also according to the Pepperdine University IRBs (2009), the researcher will "maintain research records for at least three years after the completion of the research" (p. 33). After 3 years, the researcher will shred all forms of documents as well as any data obtained during this study. The researcher will also delete all saved data on both the flash drives as well as on the hard drive of the computer used during this study.

Data Modalities and Instrumentation

The researcher followed Creswell's (2007) guidelines for creating the instrument protocol used during the interviews. Creswell notes, "One might view interviewing as a series of steps in a procedure" (p. 132). The researcher also completed a series of steps to ensure that the questions used during the interviews were effective in obtaining the data needed to achieve the objective of the study.

Creswell (2007) recommends using what he calls *process* or *procedural* type sub questions when conducting grounded theory studies. The sub questions lead participants to share the processes and procedures they experienced regarding the topic of the questions. Creswell also explains, "Qualitative research questions are open-ended,

evolving, and non-directional; restate the purpose of the study in more specific terms: start with a word such as "what" or "how" rather than "why" and are few in number (five to seven)" (p. 107).

Interview Protocol Form

During the interview, the researcher used an interview protocol form as an outline to ensure that the same procedures were followed for each interview. According to Creswell (2007), the interview protocol form should help "a researcher organize thoughts on items such as headings, information about starting the interview, conducting ideas, information on ending the interview, and thanking the respondent" (p. 135). Using Creswell's guidelines, the interview protocol form became a tool for the researcher. In the header of the form, the researcher included the purpose of the study and a note that served as a reminder to discuss confidentiality with the participants as well as to obtain a signed informed consent form from each of the participants. In the footer of the interview protocol form, closing statements were included to ensure the researcher thanked the participants for their time and obtained further approval should the researcher need to ask follow-up questions.

The interview protocol form was also used to take written notes during the interview. Creswell (2007) recommends designing the interview protocol form with enough space between questions in order for the researcher to write the responses of the participants. Creswell also recommends for researcher to limit the number of questions to four or five per page. A copy of the interview protocol form is included in Appendix C.

Validity of Instrument

A panel of experts was formed to help validate the interview questions. They helped to ensure that the interview questions solicited responses from the participants that corresponded to the phenomenon examined in this study. The panel's validation of the interview questions also made certain that the researcher and participants shared a mutual understanding of the phenomenon under investigation. According to McMillan and Schumacher (2006), "Validity refers to the degree of congruence between the explanation of the phenomena and the realities of the world" (p. 324). Validating the questions also help ensure that "the researcher and participants agree on the description or composition of events, and especially the meanings of these events" (p. 324).

The members of the panel of experts were chosen for their extensive background and knowledge in the field of education. Three educators made up the panel of experts, each of which had an extensive number of years working in the field of education. Each of the members volunteered to validate the interview questions without receiving any compensation.

Dr. Kelley Mayr received her Bachelor of Science Degree from California State University-Fullerton. She received her Masters of Arts degree from the University of La Verne. Dr. Mayr received her doctoral degree from the Urban Leadership Program at the University of Southern California. She also holds a current California Clear Administrative Credential. Currently, Dr. Mayr is the Director of Instruction at one of the largest independent study public charter schools in Southern California. She has been working in the education field for 17 years, specifically in charter schools serving students at risk of not completing high school. Part of her responsibilities as Director of

Instruction is supervision of various departments that support the day-to-day operations of the learning centers in her charter schools. Dr. Mayr also has direct oversight of all curriculum and instruction given to the students. Under her tutelage, the overall student achievement including API scores, percentage of CAHSEE passage rates as well as graduation rates has steadily risen for all the areas that she supervised. Dr. Mayr's area of expertise is in urban teaching as well as variety of other fields including, but not limited to, charter schools, public school management, and educational professional development.

Mr. Joshua Sherod received his Bachelor of Arts degree from University of La Verne. He received his Master of Arts Degree from the Educational Leadership Academy at the Pepperdine University. He currently holds a California Preliminary Administrative Credential. Mr. Sherod has an extensive background in curriculum writing and development for the middle school and high school levels. Currently, he is the English Language Arts Coach, responsible for the professional development and mentoring of English Language Arts teachers, at an independent study public charter school. In his previous position as Curriculum Manager, his department was responsible for revising all existing curriculum to align with and to meet all California State standards requirements. Mr. Sherod also supervised the revision of his school's curriculum to be more rigorous and to systematically increase the students' level of higher order thinking skills. Also under Mr. Sherod's supervision, numerous curricula were approved by the University of California's A-G approval process, thereby providing his school with curriculum that enabled students in meeting the entrance requirements for the University of California Colleges, California State Universities, and other private universities.

Ms. Zepur Shahonian received her Bachelor of Arts degree at University California, Santa Barbara, as well as a Master of Arts degree from Pepperdine University. She holds a current California Clear Administrative Credential. Ms. Shahonian is currently a vice-principal at a charter school in Southern California. She is responsible for the day-to-day operations of two learning centers. She also supervises numerous teachers and staff and is responsible for managing programs that help her school gradually increase student achievement as well as progress students toward graduation.

Initially, each panel member was approached in an informal manner by the researcher and inquired if he or she was willing to participate and become a member of the panel. Upon receiving a verbal acknowledgement of participation, the members were sent an email with two attachments. The first document was a letter (see Appendix D) formally requesting their participation. In the body of the email, the researcher also included the contents of the letter. The Validity of Instrument Survey was attached with a list of the interview questions (see Appendix E). The members were instructed to choose one of the three choices listed underneath each of the interview questions: (a) the interview question, as stated, adequately supports the research question and should be retained on the protocol; (b) the interview question does not adequately support the research question and should be deleted from the protocol; or (c) the interview question should be modified to adequately support the research question – revise the interview questions as follows. A space was included for their recommended changes if they chose the third option.

The researcher did not modify an interview question when all three members of the panel agreed to keep it as-is. The researcher deleted an interview question when at

least two of the three members agreed to delete the question. If only one member chose to delete the question, the researcher discussed the question with the Dissertation Chair. When any of the members of the panel chose the third option and recommended a revision to a question, the researcher also discussed the recommendation with the Dissertation Chair. A copy of the validated interview protocol is attached in the Appendix section (see Appendix F)

The following changes were made to the interview protocol form as recommended by the panel of experts. Question 1a was changed to, "What educational experiences do you seek to provide to the students with your math and science curriculum?" Question 1b was changed to, "How do you measure and/or assess if your math and science curriculum are providing the experiences that you described?" Question 1d was changed to, "What are the specific practices employed by your school that leads to increasing your student' reading, math and science literacy level?" Question 1f was changed to, "What specific programs do your school employs to prepare your students for the California's state mandated exams such as CAHSEE and STAR testing?" Question 2b was changed to, "What resources or preparations do you provide students who plan to enroll in a four-year university, specifically for those majoring in a STEM-related field?" Question 3b was changed to, "How is the students' innovative skills formally assessed or measured?" Question 4a was changed to, "Describe any formal and or informal parent groups that exist in your campus." Question 4d was changed to, "How have local businesses been encouraged to interact and support your school community?" Question 5b was changed to, "What opportunities exist at the school for teacher to become more effective teachers?" Question 5c was changed to, "What opportunities

exist for teachers to partner with professionals who work in STEM-related careers?" Question 5e was changed to, "What opportunities exist at the school for school leaders to become more effective school leaders?" Question 6b was changed to, "What programs exist for students who are in danger of not completing their high school graduation requirements?"

The panel of experts also recommended changes to the research questions. The following changes were made to the research questions. The first research question was changed to, "How does the use of the curriculum in high achieving public high schools in California support critical thinking skills and promote reading, math and science literacy?" No changes were made to the second research question. The third research question was changed to, "What specific programs or practices are implemented at these high achieving public high schools in California that foster or promote students to utilize innovative thinking?" No changes were made to the fourth research question. The fifth research question was changed to, "What are the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?" The sixth research question was changed to, "What are the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

Role of the Researcher

The role of the researcher depends on the method of the research study. Creswell (2003) believes that "qualitative research is interpretative research" (p. 184). Therefore, the interpretation became the researcher's main responsibility during the study. According to Leedy and Ormrod (2005), "Qualitative researchers believe that the

researcher's ability to interpret and make sense of what he or she sees in critical for understanding any social phenomenon" (p. 133).

In other words, during a qualitative research study, the researcher becomes an instrument. More specifically, according to McMillan and Schumacher (2006), the researcher usually takes on the role of the interviewer when conducting a grounded theory approach. This role began when the researcher made the initial contact with the participants and requested the interviews.

Participants

Correctly identifying the public high schools in California that ranked the highest among the high schools was a necessity for this study. The researcher selected potential participants for the in-depth interviews based on their possession of the most knowledge regarding the topic of the study. In this study, the schools' attributes were used to select the participants of this study. The criteria used for selecting the participating schools targeted in this study were: (a) school is designated as a high school, serving 9th-12th grade students, (b) school must have an API score of 800 or above, and (c) school has a SSR Score of 8 or above. The principals of the schools that met the criteria were invited to participate in the study.

Site selection process. The researcher used the site selection process for sampling. According to McMillan and Schumacher (2006), "Site selection, by which a site is selected to locate people involved in a particular event, is preferred when the research focus is on complex micro processes" (p. 319). Since the objective of the study was to research the best practices of high achieving public high schools, the researcher's choice in implementing the site selection process was the most effective way to decide

which participants to include in the study. McMillan and Schumacher further elaborate that "Choosing a site is a negation process to obtain freedom of access to a site that is *suitable* for the research problems and *feasible* for the researcher's resource of time, mobility and skills" (p. 342).

The researcher utilized the CDE's online database available to find schools that fit the conditions for selecting the participants. On the website (http://www.cde.ca.gov), the Accountability Progress Reporting (APR) is available to the public and specific reports can be generated. Using the database, the researcher requested a report that included a list of all the public schools in Los Angeles County. The list of schools was categorized and sorted alphabetically by school districts. The list also included the 2010 Academic Progress Indicator (API) growth score and 2009 API Base score for each school. The researcher narrowed down the list by excluding any elementary and middle schools, concentrating only on high schools that served 9th-12th grade students. The researcher located the high school with the highest API score and received a SSR Score of 10. Still using the same database, the researcher requested a second report, the SSR report. This report included the 99 other high schools with the closest attributes to the school with the highest API score. Therefore, all the schools on the second list met all the aforementioned criteria.

Purposeful sampling. The list of 100 similar schools became the sampling frame for the purposeful sampling. According to McMillan and Schumacher (2006), there are no existing detailed procedures for purposeful sampling and only guidelines exist; "remember, purposeful sampling is a strategy to choose small groups or individuals likely to be knowledgeable and informative about phenomenon of interest" (p. 343). The

researcher used purposeful sampling to increase the effectiveness of information gathered from a small number of participants.

Among the 100 schools, 30 high schools with the closest proximity to the home or work of the researcher were chosen with the goal of obtaining at least 10-15 participants to be included in the study. McMillan and Schumacher (2006) note, "the logic of the sample size is related to the purpose, the research problem, the major data collection strategy and the availability of information" (p. 322). The researcher's decision in choosing 10 to 15 participants was relevant because purposeful sampling can range from 1-40 participants (McMillan & Schumacher, 2006).

The principals or heads of school were targeted as the participants for the interviews. The principals or heads of school were the best resources and key informants in gaining knowledge of best practices utilized at high achieving public high schools. McMillan and Schumacher (2006) clarify that "Key informant interviews of individuals who have special knowledge, status, or communication skills that they are willing to share with the researcher" (p. 351).

The researcher followed several steps in gaining the approval of participants interviewed. The initial request to participate in the study was sent by mail (see Appendix G). Two weeks after the request was sent, the second round of requests was sent via email to participants who had not responded. The researcher made one last attempt by calling the participants who had not responded 2 weeks after the emails were sent. In all the request forms, the researcher included several methods by which the participants could contact her. The researcher repeated these steps until 15 participants had agreed to participate in the study.

In all forms of correspondence with the participants, the researcher included a detailed description for the purpose of the study. The researcher also included the informed consent form as well as a copy of the questions that were to be used in the interview. The researcher requested two convenient dates and times during which the participants were available to meet face-to-face for 90 minutes at their school location with the explanation that participation in the study only required one meeting. Also included in all the correspondence was the researcher's contact number in case the participant preferred to call to set the date of the interview. The researcher chose one of the two suggested dates and time that was most convenient given her travel constraints.

Interview Process Overview

The researcher conducted in-depth interviews for the data collection for this study. McMillan and Schumacher (2006) define in-depth interview as "open-response questions to obtain data of participants meaning- how individuals conceive of their world and how they explain or made sense of the important event in their lives" (p. 350). During the in-depth interviews, the researcher employed a conversational tone, memorized the questions in order to maintain eye contact, and expressed understanding and acceptance of each participant's perspective. The researcher also followed McMillan and Schumacher's instruction to hold the in-depth interviews in the participants' natural setting.

Staying true to a qualitative study, the researcher used the same open-ended questions for each interview to established congruency among participant responses. Although standardizing the open-ended interview left the researcher with little flexibility, the researcher was still able to accomplish the following recommendations by McMillan

and Schumacher (2006): "Establishing trust, being genuine, maintaining eye contact, and conveying through phrasing, cadence, and voice tone that the researcher hears and connects with the person elicit more valid data than a rigid approach" (p. 353). In addition to following standardized open-ended questions, the researcher also followed the following guidelines:

1. Interview probes elicit elaboration of detail, further explanations, and clarification of responses.
2. Statements of the researcher's purpose and focus are usually made at the outset.
3. Order of questions varies, although most researchers make choices that enable them to obtain adequate data for each question from the informants efficiently.
4. Demographic questions maybe spread throughout the interview or presented in concluding remarks.
5. Complex controversial and difficult questions are usually reserved for the middle or later periods in the interview, when the informant's interest has been aroused (McMillan & Schumacher, 2006, p. 345).

Data Analysis

Data analysis involved several steps that began and continued throughout the study. According to Creswell (2003), data analysis "involves preparing the data for analysis, conducting different analyses, moving deeper and deeper into understanding the data, representing the data, and making an interpretation of larger meaning of the data" (p. 190). The researcher followed a rigorous and systematic set of procedures to produce a legitimate and sound theory.

The researcher conducted the following steps after each interview. According to Creswell (2003), the first step entails organizing and preparing the data by transcribing the data and typing field notes. The second step is reading the data and obtaining "a general sense of the information and reflect on its overall meaning" (p. 191). The third step involves coding the data and the fourth step after data has been coded is generating categories or themes to begin analyzing the data. The fifth step is generating a narrative passage to represent the constant comparative model used in this study. The final step is interpreting or generating meaning from the data. Both the fifth and the final steps are described in detail in Chapter IV.

Organizing the data. In order to capture every nuance of the participants' responses to be used as data, the researcher used a tape recorder during the interview. According to McMillan and Schumacher (2006), "Tape recording the interview ensures completeness of the verbal interaction and provides material for reliability checks" (p. 355). In addition to the tape recorder, the researcher also took notes using the interview protocol structure as a form. The researcher also made notes of any nonverbal communication exhibited by the participant.

Since the interviews became the main source of data for this study, it was essential for the researcher to transcribe every word of the participants' responses. According to McMillan and Schumacher (2006), "The primary data of qualitative interviews are verbatim accounts of what transpired in the interview session" (p. 353). Immediately after the interviews, the researcher typed the handwritten notes from the interview protocol form and transcribed the responses from the tape recorder.

The researcher also checked the transcribed documents for any typing errors or mistakes. Therefore, "The final records contain accurate verbatim data and the interviewer's notation of nonverbal communications with initial insight and comments to enhance the search for meaning…and the final form also included the date, place and informant identity code" as instructed by McMillan and Schumacher (2006, p. 356).

Reflecting on the data. After each interview, the researcher read through the data. According to Corbin and Strauss (2007), "A first general step is to obtain a general sense of the information and to reflect on its overall meaning" (p. 191). The researcher also took the time to reflect on the significant occurrences during the interviews. According McMillan and Schumacher (2006), elaboration such as self-reflection helps to establish quality control for validity of the data. Therefore, the researcher included her reflections in the final documents, specifically the rapport that the researcher had with each of the participants, the reactions of the participants, and any non-verbal communication that the participants might have expressed during the interviews.

Coding the data. More specifically, the researcher followed the data analysis procedure known as *constant comparison*. Leedy and Ormrod (2005) define the constant comparative method as "The process of moving back and forth between data collection and data analysis, with data analysis driving later data collection" (p. 141). Creswell (2003) and McMillan and Schumacher (2006) recommended the constant comparison when conducting a grounded theory study. According to McMillan and Schumacher, "Using a constant comparative method, the data analysis simultaneously employs techniques of induction, deduction and verification" (p. 27). According to Creswell, "These [systematic steps] involve generating categories of information (open coding),

selecting one of the categories and positioning it within a theoretical model (axial coding), and then explicating a story from the interconnection of these categories (selective coding)" (p. 191).

Creating categories or themes. For the fourth step of the data analysis process, the researcher used content analysis to help develop a sound theory. Corbin and Strauss (2007) define constant analysis as "The analytical process of comparing different pieces of data for similarities and differences" (p. 65). This detailed and systematic process was completed to compare and contrast each incident. The researcher sorted incidents that were similar, which allowed the researcher to create different categories/themes. According to Corbin and Strauss, "Each incident has the potential to bring out different aspect of the same phenomenon" (p. 74).

A second rater also coded the data and identified categories and themes. The findings of the researcher and the second rater were compared for similarities and dissimilarities. The similarities that were found to be consistent were kept as data. The researcher and the second rater discussed the inconsistencies in their findings. The differences were resolved through discussions and mutual revisions were made. However, the Dissertation Chair made the final decision on any inconsistencies that were not resolved by the researcher and the second rater.

Limitations

Creswell (2003) points out that it is often difficult for the researcher to identify all the limitations of the study. As mentioned earlier in this chapter, the study was limited to one face-to-face interview with the principal or head of school, which also meant that

the researcher only visited the school site once. This one time visit gave the researcher a very limited assessment of the school environment and its culture.

Statement of Researcher Bias

The researcher played various roles during the different stages of this study. The same person fulfilled the roles of the researcher, interviewer, and analyzer of the data and findings; therefore, the researcher's personal bias was included during all stages of this study. According to Creswell (2003), researchers should "identify their biases, values, and personal interest about their research topic and process" (p. 184).

Although several methods of validating the study were put in place such as assembling a panel of experts to validate the instrument and seeking a second rater to validate the coding of the data, the researcher's personal bias still existed throughout the study as well as in the findings of the study. For example, the researcher assumed that all the participating schools were purposely preparing their students to enter a STEM-related field in a post-secondary educational institution. The researcher also assumed that all high-ranking public high schools were preparing their students to be successful in the 21st century international workforce.

Summary

This chapter described the research methods that the researcher utilized in studying the best practices of high achieving public high schools in California. This chapter began with the description of the chosen qualitative research design, specifically the grounded theory approach. The research questions were also discussed, as well as a detailed description of how the researcher ensured that the participants' rights as human

subjects were upheld. Summaries of the data modalities and instrumentation as well as the role of the researcher were also included.

This chapter also included a detailed description of how the researcher identified the public high schools in California that were invited to participate in the study. The selected participants were public high schools that ranked the highest among all other high schools in California, specifically obtaining a SSR score of at least 8 and API Score of at least 800. The researcher selected the participants using the site selection process and purposeful sampling.

This chapter also explained how the researcher conducted the in-depth interviews with the participants. The researcher described the overall interview process as well as the process completed after each interview that included reflection and transcribing the recorded interviews. The chapter also included a description of the data analysis as well as the content analysis, including using the constant comparative model. Lastly, the researcher also discussed potential weaknesses of the study due to the one-time visit with the participants and the school sites. The researcher also discussed the personal bias that she brought to the study.

Chapter IV: Findings

Restatement of Purpose of Study

The purpose of this qualitative study of high achieving public high schools in California was to investigate the best practices currently utilized as programs or practices to help students perform at a high level. The criteria for the high schools included in this study were: (a) serving 7th-12th grade students, (b) current API of a minimum of 800 out of 1000, and (c) a minimum SSR score of 8 out of 10. API is a measurement of a school's academic performance based on a variety of mandated standardized tests. To generate an SSR, 100 similar schools with the same opportunities and facing the same challenges are grouped together based on their API score (Education Data Partnership, n.d.).

Participants in the Study

The researcher sent out 40 letters inviting principals to participate in this study. Twelve principals agreed to voluntarily participate in the study. Seven of the interviews were conducted face-to-face at their school sites. The rest of the interviews were done over the phone. The interviews lasted an average of 46 minutes.

The 12 high schools that were included in the study were assigned the names of American Presidents in order to uphold their anonymity. The high school of the first principal interviewed was referred to as Washington High School, named after the first president of the United States. Given that the second and fourth American presidents had the same last name, the second high school was referred to as Adams High School and the fourth high school was named after the fifth president, James Monroe.

The student demographic information for the high schools whose principals volunteered to participate in this study was obtained from the CDE's website, specifically from the 2010-11 Accountability Progress Reporting database available to the public. The number of students listed by ethnicity may not add up to the total number of students who were counted in the 2011 API due to responses such as other, multiple, declined to state, or the student simply did not respond to the question regarding his/her ethnicity (CDE, 2011a). Student demographic information is listed in Table 1.

Table 1

Participating Schools' API Scores and Student Socio-Demographics

			Student Ethnic Background and Student Classification					
Name of Participating High School	County	# of students included in 2011 API	Black or African American	American Indian or Alaskan Native	Asian	Filipino	Hispanic/ Latino	Native Hawaiian/ Pacific Islander
Washington	Los Angeles	1687	9	4	447	5	153	0
Adams	Orange	1843	88	11	543	123	361	14
Jefferson	Orange	1378	9	8	656	39	69	3
Madison	Orange	1314	51	10	596	48	155	6
Monroe	Orang	1727	31	8	815	43	114	5

	e							
	Orang							
Jackson	e	1576	40	10	511	37	180	8
	Los							
	Angel							
Van Buren	es	845	23	1	594	93	82	6
	Los							
	Angel							
Harrison	es	417	27	0	41	7	121	0
	Orang							
Tyler	e	941	16	0	564	96	133	9
	San							
Polk	Diego	209	2	6	3	1	19	1
	Contra							
Taylor	Costa	909	10	0	145	14	49	6
Fillmore	Fresno	365	3	0	5	0	42	0

Data Collection Process

The researcher completed a series of steps in order to find the common best practices that were currently in place at the 12 participating high achieving public high schools in California. The researcher analyzed the data by completing the following six steps for each participating high school. First, the researcher completed the transcriptions from the recordings of each interview. Second, the researcher made a list of programs and practices taken from the individual transcripts to eliminate any anecdotal replies from

the data. Third, the researcher created a chart and organized the list of programs and practices that were the best match to the corresponding interview questions. Fourth, the researcher created a theme that best summarized similar programs or practices described by the participants. Fifth, Mr. Sherod was solicited to be the second rater to evaluate the researcher's findings. Mr. Sherod also participated in validating the research and interview questions. As the second rater, Mr. Sherod coded the data and identified categories and themes. The researcher and the second rater discussed any inconsistencies in their findings to reach a mutual resolution. Sixth, for each interview question, the researcher created a graph to chart the number of times similar programs or practices were mentioned by the participants. The graphs were used to determine the point of precipitous drop in the number of similar programs and practices mentioned. The researcher concluded that a key common best practice among the high schools was indicated by the similar responses prior to the precipitous drop.

Data Collection Results

The following common best practices were based on the data collected in this study. These best practices were utilized by the teachers, staff, and administrators of the 12 participating high achieving public high schools to accomplish the objectives described in each of the research questions.

First research question. How does the use of curriculum in high achieving public high school in California support critical thinking skills and promote reading, math, and science literacy?

The practice of high expectations. Figure 1 presents the number of similar participant responses to the interview question regarding what educational experiences

they seek to provide students with their math and science curriculum. The practice of high expectation was confirmed by all 12 principals who stated that the culture in their schools had a high expectation of their students to master and to apply their math and science knowledge. According to the principal of Jackson High School:

> That's probably one of the biggest reasons why we are successful and why kids are so high achieving. The standards here are so amazingly high, the expectations on the work that they are going to do, their exposure to the work, the critical thinking that we want them to do. We have a culture of success. (personal communication, December 6, 2011)

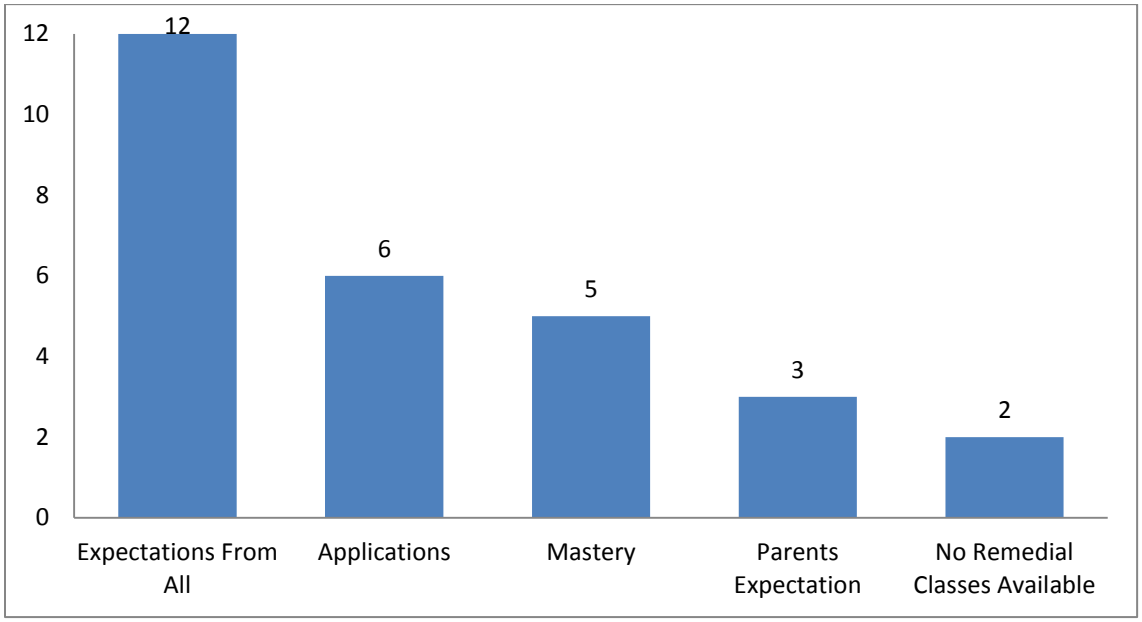

Figure 1. Objectives for math and science curriculum.

An example of a strategy that teachers used to help students master the knowledge in their math and science classes was teaching students at a high level and expecting them to be able to explain on a deeper level of understanding. According to the principal of Van Buren High School:

> Teachers expect higher level of answers from students. So if your answer is basic, the next questions will follow up with is how and why and they [the teachers] don't just move to the next student. They stay with that specific student until he can explain this is how it works, why and how…they ask every student to dig deeper. (personal communication, December 8, 2011)

Principals also held high expectations of students' ability of students to apply their math and science knowledge. For example, the principal of Jackson High School explained that their science curriculum created opportunities for students to apply their subject matter knowledge to real-world scenarios; "the science is built so students are able to understand how to practice science, not only understand science from a textbook manner, but actually do lots of lab work and spend time applying that knowledge" (personal communication, December 6, 2011).

The practice of frequent assessment. Figure 2 presents the number of similar participant responses to the interview question regarding how the objectives for math and science curriculum were measured or assessed in their schools. Nine out of the 12 principals described practices in which students were formally assessed on a frequent basis to measure their knowledge and to ensure they were attaining the learning goals expected of them. The principal of Adams High School described their practice of assessing their students every 4-5 weeks as "a benchmark exam which is basically a unit test. The teachers all give the tests at the same time. It is a common assessment across the department. We do it school-wide in every core academic area" (personal communication, November 15, 2011).

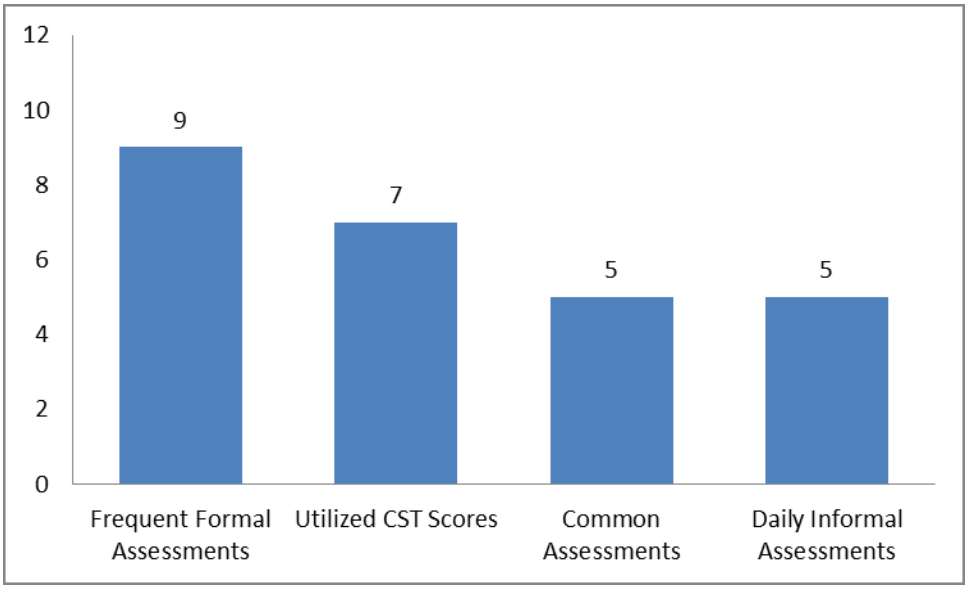

Figure 2. Method of assessing whether the objectives in math and science curriculum are met.

The teachers also utilized the data from their common assessments to determine the areas where students have not mastered the content. The teachers are expected to reteach their lessons. According to the principal of Monroe High School:

> We employ common assessment, across just about every class, where teachers of the same subject plan to give a common exam, quiz, test or final and then they bring back those results and meet together and compare results and student achievement. Then, based upon how the kids did in each of the classes, the teachers make individual adjustment accordingly as they strived to reach out and discover what best practices might be employed. (personal communication, December 5, 2011)

Additionally, 7 out of the 12 principals also mentioned that their teachers and administrators utilized the CST's cluster scores when studying areas of strength and weakness in their curriculum. The principal of Madison High explained that their students' low CST scores played an important role in revising their math curriculum; "Several years ago it was our CST scores that sort of brought fourth that there were was an issue with our curriculum; it was the impetus for changing our curriculum" (personal communication, November 30, 2011).

The practice of increasing student confidence and knowledge. Figure 3 presents the number of similar participant responses to the interview question regarding what specific practices were employed at their schools to increase students' self-confidence and knowledge in math and science. All 12 principals described various student-centered practices such as student competitions and hands-on lab assignments that helped students build their confidence and knowledge in math and science. The principals believed that the students gained confidence when they were able to apply their knowledge. The principal of Van Buren High School stated, "our science classes are so hands-on that you can watch them gain confidence" (personal communication, December 8, 2011).

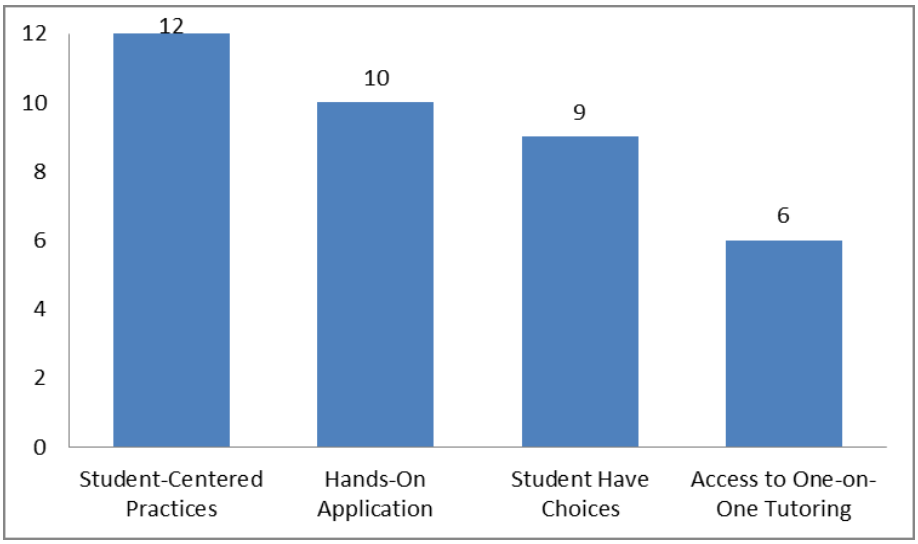

Figure 3. Practices employed to increase student confidence and knowledge in math and science.

Specifically, 10 out of 12 participants mentioned project-based assignments as well as student competitions that also helped to build student confidence and knowledge in math and science. The participants believed that when their students were able to win competitions not just on a state level but on a national level, their confidence in their ability and knowledge were confirmed:

> When you have kids that are doing mathematics outside of just the classroom, we take part in a lot of math competitions . . . there's Science Bowl and Science Olympia and all of these different competitions outside of school. They [student] are building confidence about their ability to work with the material and understand the material and apply the material. When you teach it that way, the kids become self-confident about what they are doing. (principal of Jackson High School, personal communication, December 8, 2011)

Nine of the 12 principals also mentioned various opportunities for students to make their own choices regarding their education. Several of the principals mentioned that their students were able to choose the level of their math and science courses. The principal of Washington High School stated, "I think the first thing is access. We have open enrollment in our math and science courses. The students, if they have the interest, they can challenge themselves by taking the courses" (personal communication, November 9, 2011).

The practice of mastering state standards. Figure 4 presents the number of similar participant responses to the interview question regarding the specific practices employed at their schools that led to increasing their students' literacy level. Seven out of 12 principals stated that teachers in their schools used the California state standards as a resource and guideline to increase students' reading, math, and science literacy levels. The principal of Tyler High School explained that the state standards provided a foundation for their curriculum; "We teach beyond standards, so we make sure that we are teaching the standards plus, so our kids do really well on the CST" (personal communication, January 13, 2012). Several participants mentioned feeling comfortable with their students' scores on standardized tests because they have identified the vocabulary used in the California standards tests and incorporated them in their curriculum and in lessons. According to the principal of Adams High School, "We've sat

down and analyzed the Standards. We've selected the vocabulary that our kids must know and infused that vocabulary into our daily lessons" (personal communication, November 15, 2011).

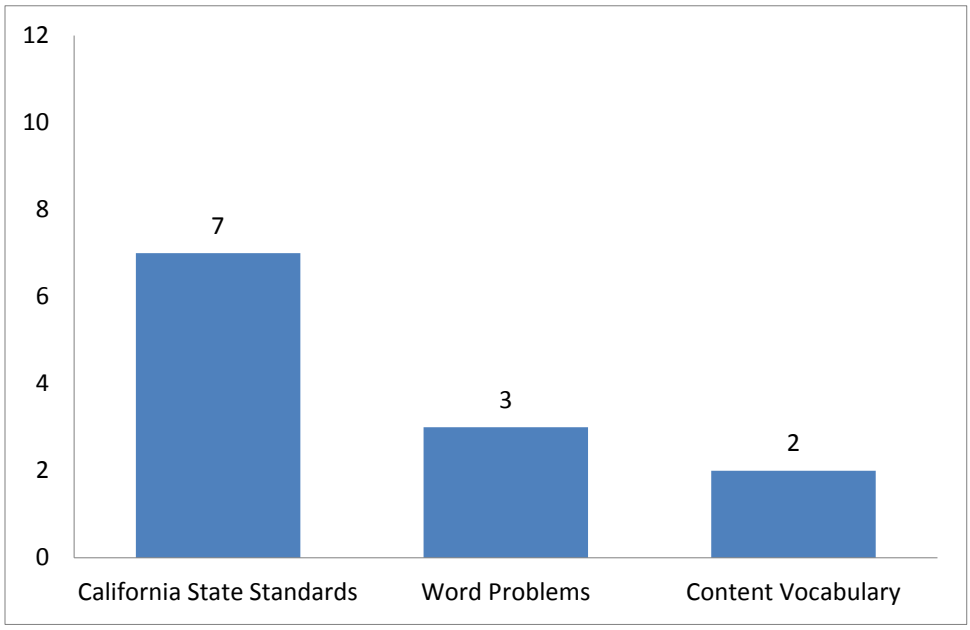

Figure 4. Practices utilized to increase students' literacy level.

The practice of thinking through writing. Figure 5 presents the number of similar participant responses to the interview question regarding the specific practices employed at their schools that led to increasing their students' critical thinking skills. Six out of 12 participants mentioned that teachers utilized writing to increase their students' critical thinking skills by having students write about their knowledge. For example, at Tyler High School, the students are required to explain in writing how they solved mathematical problems including using the proper content vocabulary:

> The kids have actually written their knowledge down and we find that it does make a difference for our kids . . . for instance like in math, math teachers will have their kids write out their solution and describe why. They just can't solve it mathematically with numbers. They have to solve it in words . . . the lab reports are pretty detailed, a lot of writing. They are critically speaking what they just learned and why the experiment did worked or didn't work. (principal of Tyler High School, personal communication, January 13, 2012)

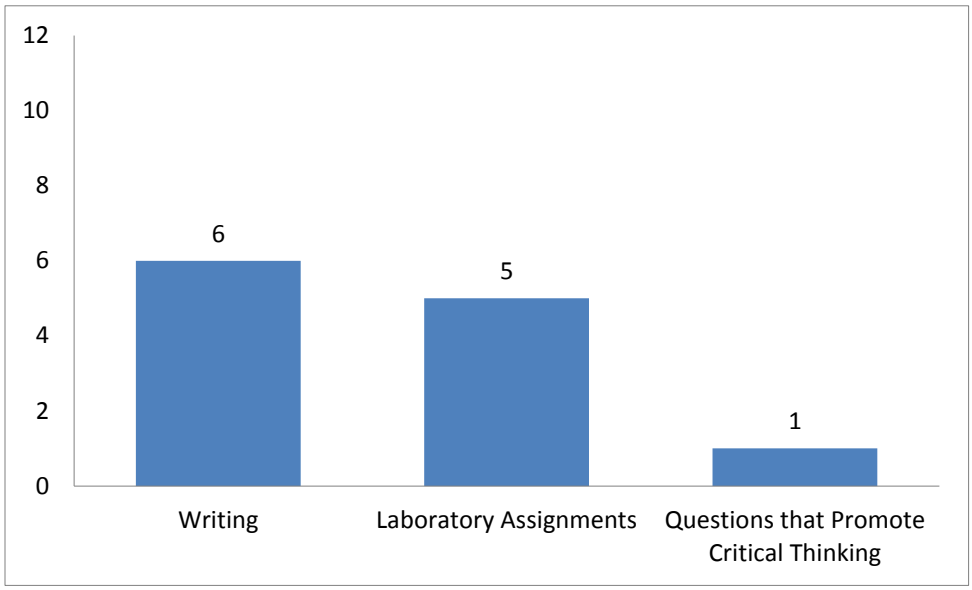

Figure 5. Practices employed to increase students' critical thinking skills.

Students were also asked to analyze their knowledge through writing across curriculum. According to the principal of Monroe High School, "We believe that the more students can write, the more they can display the critical thinking that they are going through" (personal communication, December 5, 2011).

The practice of higher objectives. Figure 6 presents the number of similar participant responses to the interview question regarding what specific programs were employed at their schools to prepare their students for the California state mandated exams such as CAHSEE and STAR testing. All 12 participants stated that there were no existing programs to prepare students for any of the California state standardized tests because achievement on these tests was not their end goal for educating their students. For example, the principal of Monroe High School described how the annual CST was perceived in her school:

> Over the last five years, the CST aspect of our numbers has been going up and we are trying to move away from the CST focus and looking at our own internal assessments because we really do believe that our rigor is probably a little bit

higher than what the CST is assessing and so to us that would be more important. (personal communication, December 5, 2011)

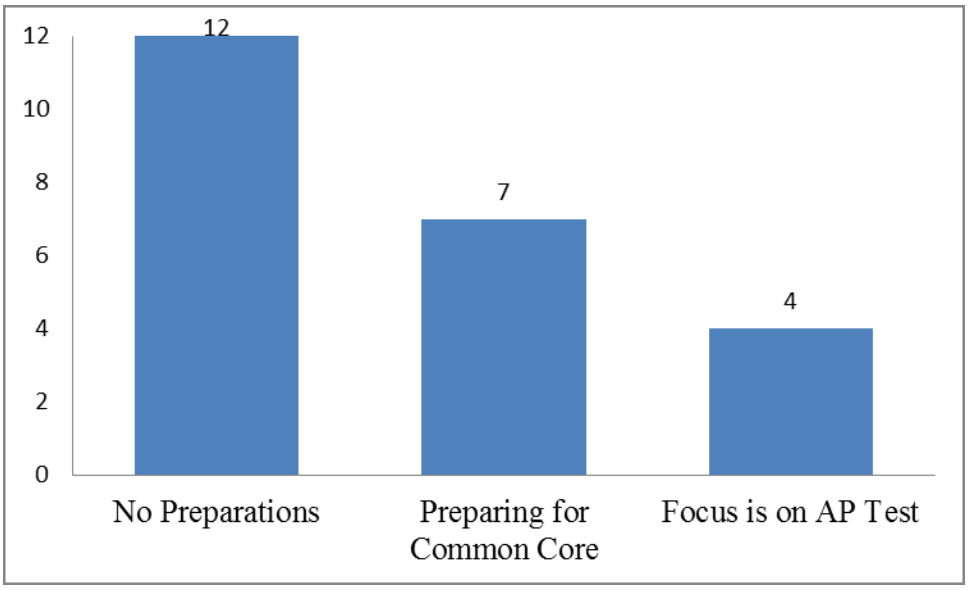

Figure 6. Programs employed to prepare students for California state mandated exams.

Several other participants mentioned that the rigor of their curriculum was also higher than what was measured in state standardized tests. According to the principal of Madison High School, "if we are being more successful within our own internal assessments then the CST piece should take care of itself" (personal communication, November 30, 2011). According to the principal of Van Buren High School, the reason "why the STAR testing [results] are so high [is] because we never even look at what is entailed in that because we are so busy training them [students] early for the AP test" (personal communication, December 8, 2011).

Additionally, 7 out of the 12 participants mentioned that their teachers and staff were already preparing for the newly state adopted Common Core Standards. The principal of Jackson High School was already preparing his teachers to review the objectives of their curriculum in anticipation of the Common Core Standards being adopted:

> We have had a little bit of shift in preparing for the Common Core…with a focus more about application of math and moving away from the old of concept of drill and kill…The goal of these new standards was to prepare students to be successful in college, in their careers and for the competitive global economy. We were doing this prior to the Common Core really being adopted. But we knew there was going to be some changes in how they expected math to be taught. (principal of Jackson High School, personal communication, December 6, 2011)

The state standardized assessments in conjunction with measuring the new Common Core standards are scheduled to be implemented in the 2014-2015 school year (CDE, 2011c).

Second research question. What specific programs or practices are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from post-secondary educational institution, specifically majoring in Science, Technology, Engineering, and Mathematical (STEM)-related fields?

The practice of assuming. Figure 7 presents the number of similar participant responses to the interview question regarding specific programs or practices employed at their schools to formally identify students who planned on attending a 4-year university as well as identify students who planned on pursuing a major in a STEM-related field. Eleven out of 12 principals mentioned a practice of expecting all their students to enroll in a post-secondary educational institution, specifically a 4-year university. The principal of Fillmore High School stated, "There is just a baseline expectation that everyone is going to college" (personal communication, February 2, 2012). The general assumption that every student will enroll in a college has proven to be successful. At Monroe High School, most of the students do enter college. According to the principal of Monroe High School, "We put students on a 4-year plan and 98% of those 4-year plans are all designated to go onto a college track" (personal communication, December 5, 2011).

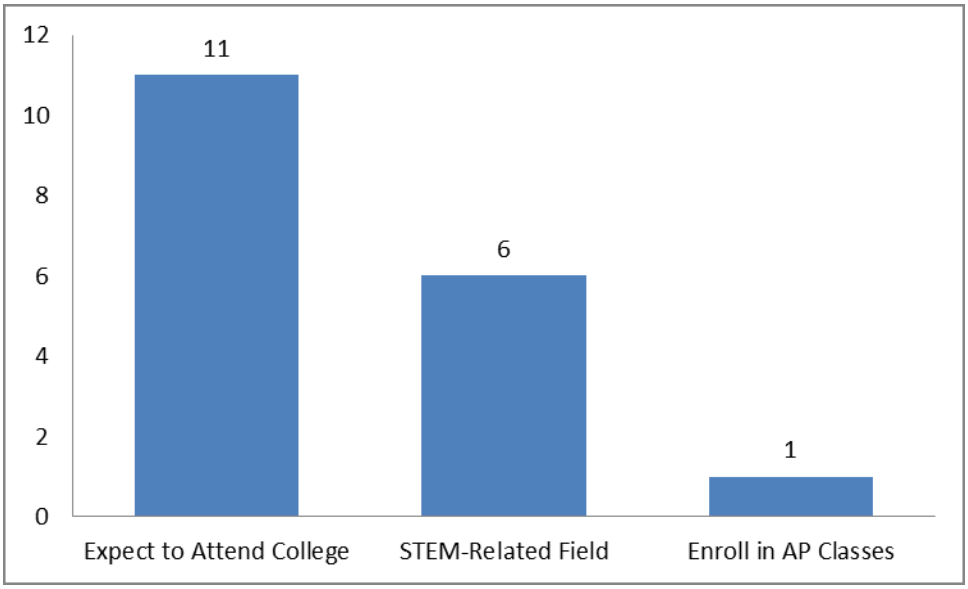

Figure 7. Programs to identify college-bound students as well as identify students who will major in STEM-related field.

Six out of 12 principals also mentioned that their students either had internal motivation or were externally motivated by their parents to pursue a math or science major in college. According to the principal of Van Buren High School, the parents and the surrounding community expected their students to pursue a STEM-related career. The students "want to go in the field of science and mathematics. It's the focus of the community so we don't have to pursue kids in that direction. They already want to go there" (personal communication, December 8, 2011).

The practice of early preparation. Figure 8 presents the number of similar participant responses to the interview question regarding the resources and preparations their schools provide students who plan on enrolling in a 4-year university, as well as for the students who plan on majoring in STEM-related field. All 12 principals described a practice where students work on meeting the enrollment requirements of their chosen university as early as their freshman year. The principal of Washington High School described the practice at her school thusly: "Right away when they come into the high

school, they are working on their 4 year plan" (personal communication, November 9, 2011). The graduation requirements in some of the high achieving public high schools were as rigorous as the requirements for 4-year colleges. According to the principal of Tyler High School:

> Ninety-nine percent of our kids graduate meeting A-G requirements [entrance requirements for University of California colleges]. We say that you have to take 3 years of science, 4 years of math, 4 years of English, at least 3 years of foreign language. We have more requirements to pass than the typical the high school…The counselors meet all the parents of ninth graders and students and develop a 4-year plan. (personal communication, January 13, 2012)

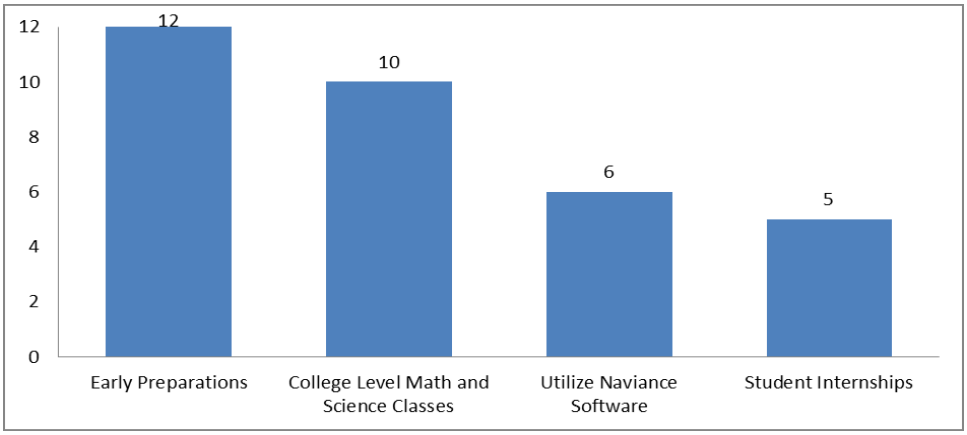

Figure 8. Resources to prepare students for college as well as majoring in STEM-related field.

Ten out of 12 principals mentioned offering college-level math and science courses in their schools to help prepare students who plan on majoring in STEM-related field. In some schools, the demand of college-level classes was so high, "I would venture to say just looking at the high school level probably 70% of our population is in an AP class of some sort. It could be higher than that" (principal of Van Buren, High School, personal communication, December 8, 2011).

The practice of utilizing personal connections. Figure 9 presents the number of similar participant responses to the interview question regarding programs or practices

utilized in their schools to involve professionals who work in STEM-related field to work with students. Seven out of 12 principals mentioned that their teachers used their personal connections to create opportunities for students to work with STEM-related professionals. At Jackson High School, personal connections of the teachers were used as a resource to bring in STEM-related professionals to speak to their students, "There are one or two particular teachers who have a connection with somebody at UCI [University of California Irvine] so they get people to talk about what they are doing" (principal of Jackson High School, personal communication, December 6, 2011). At Jefferson High School, personal connections of the teachers were also used to create opportunities for internships in STEM-related fields. "A lot of our kids, our high-end science kids will end up at universities doing summer research projects or things like that which mostly come from science teachers pushing something like that" (principal of Jefferson High School, personal communication, November 21, 2011).

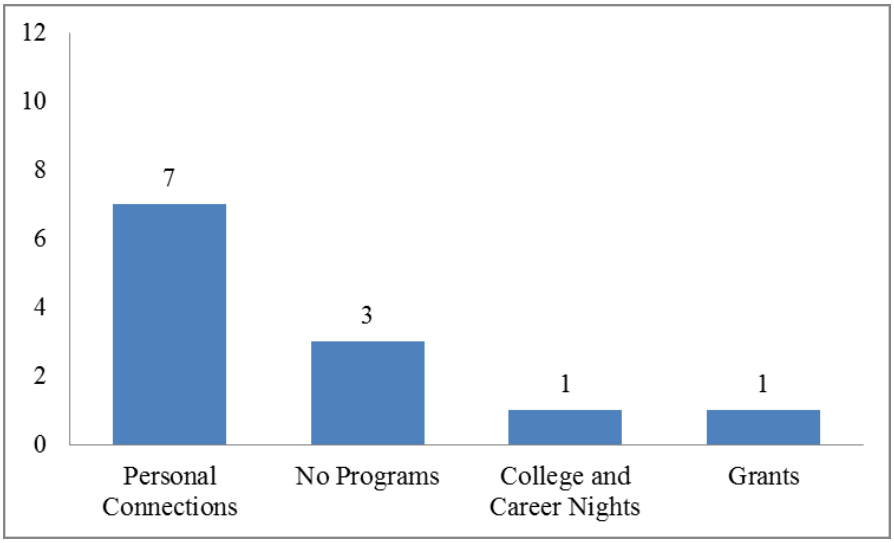

Figure 9. Practices utilized to partner with STEM-related professionals.

The practice of utilizing the method of word-of-mouth. Figure 10 presents the number of similar participant responses to the interview question regarding the programs

or practices utilized in their schools to inform students about STEM-related fields and careers. Eight out of 12 principals relied on their teachers to use word-of-mouth to inform students about STEM-related fields and careers. This study found a lack of formal practices to inform students about STEM-related fields and careers. The principals responded that they relied on teachers to communicate any STEM-related information. According to the principal of Jefferson High School, "Our teachers, specifically our science teachers try to talk a lot about career options for kids, bring-in people when they can" (personal communication, November 21, 2011).

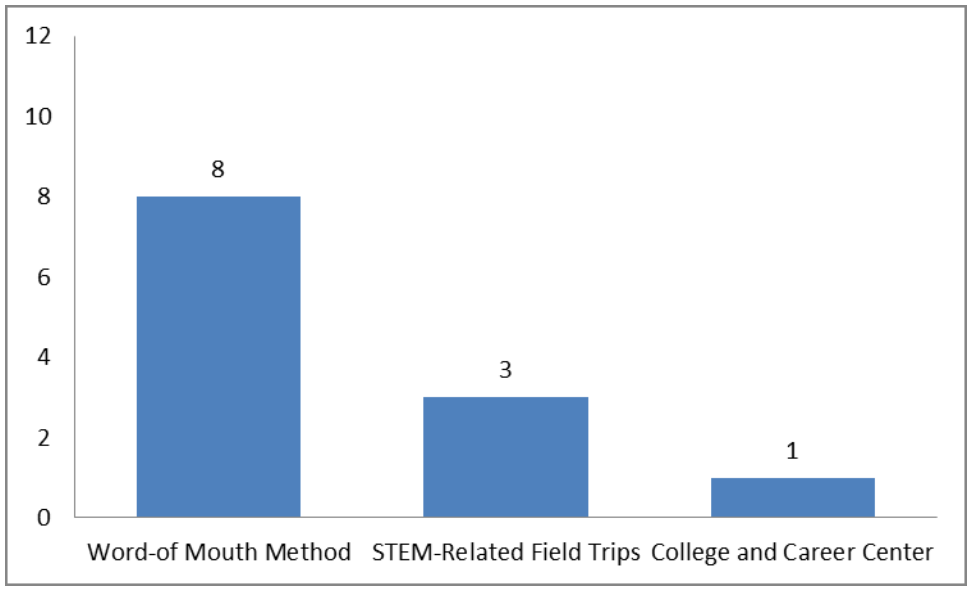

Figure 10. Practices utilized to inform students about STEM-related careers.

Specifically, the math and science teachers targeted students who they knew were already interested in STEM-related careers. According to the principal of Jackson High School:

> A lot of our high level teachers in terms of our AP Chemistry teachers, Honors Chemistry teachers and math teachers, they know the kids who are really interested in science and they really work with them and try to get them to understand different places they can go and different things that they can do. (personal communication, December 6, 2011)

The teachers who had previous careers in STEM-related field became an important resource because they were able to share their firsthand experiences with their students. The principal of Tyler High School shared about teachers who entered education as their second career. Prior to teaching, "they were in engineering and worked in STEM-related fields. They share when they were engineers at Boeing or their experience" (personal communication, January 13, 2012).

Third research question. What specific programs or practices are implemented at these high achieving public high schools in California that foster or promote students to utilize innovative thinking?

The practice of group work and group projects for students. Figure 11 presents the number of similar participant responses to the interview question regarding opportunities for students to become innovative. Ten out of 12 principals described various opportunities such as group projects that required students to work with each other and fostered or promoted the use of their innovative thinking. Several principals described cross-curricular assignments that required students to work as a team. At Polk High School, the principal believed "the assignments that the teachers provide students build critical thinking and innovation" (personal communication, January 18, 2012). Their curriculum switched over to a more project-based approach when their students were done preparing for their Advanced Placement tests. Students work together in teams to apply their math and science knowledge to solve real-world problems.

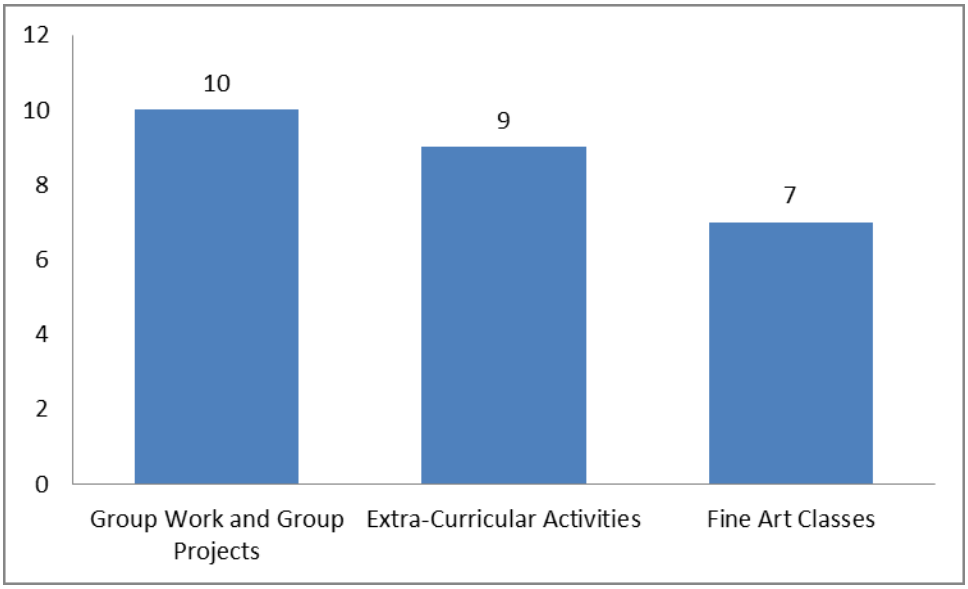

Figure 11. Opportunities for students to use innovative thinking.

Additionally, 9 out of the 12 principals mentioned extra-curricular activities such as science clubs and competitions that allowed students opportunities to show their knowledge through creativity and innovation. Several of the principals described robotics and engineering clubs where students were asked to create their own robots and build their own bridges. Most of time, the students enter their innovative creations in competitions. The principal of Van Buren High School described the STEM program at her school thusly:

> I think the science competition, the robotics program, we do have a STEM program on campus and we call it a STEM club and they do innovative things so through our clubs and organization it promotes innovation for our kids. (personal communication, December 8, 2011)

The practice of not measuring innovative skills. Figure 12 presents the number of similar participant responses to the interview question regarding how their students' innovative skills were formally assessed or measured. Ten out of 12 principals mentioned that there were no formal assessments established in their schools to assess students' innovative skills. Several of the principals responded that innovation should

not be assessed; “To me and you, innovation might be different and you really can’t have a rubric for innovation” (principal of Jackson High School, personal communication, December 6, 2011). In competitions, the best innovative idea would likely belong to the winner; “If it’s in academic competition, then they’re winning” (principal of Jefferson High School, personal communication, November 21, 2011). The principal of Harrison High School also acknowledged that his school currently did not formally assess innovation. Instead, the teachers relied on checking for certain criteria when assessing student work. The principal stated, “so little of our assessment infrastructure is on innovation. It’s on all check the right box” (principal of Harrison High School, personal communication, December 9, 2011).

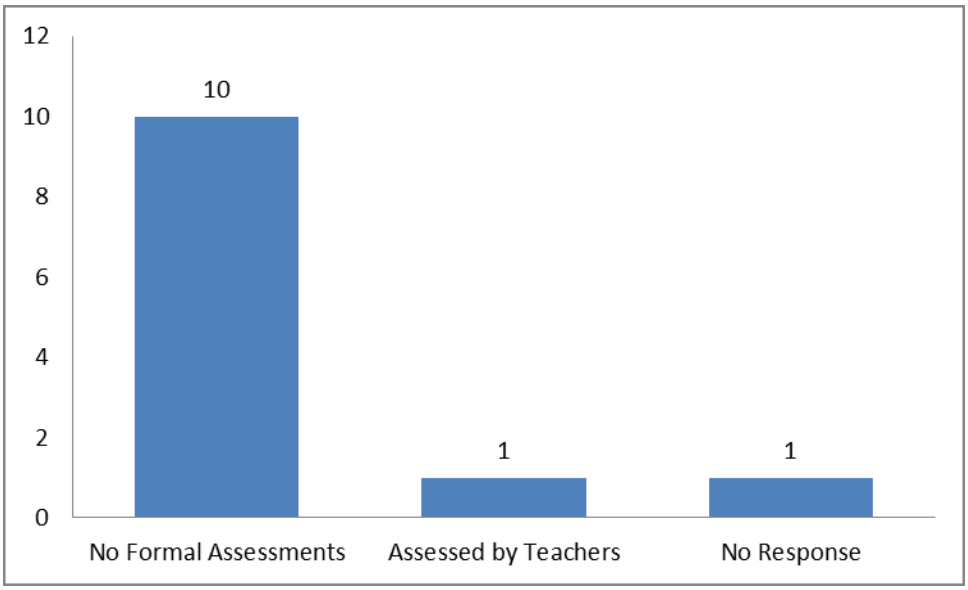

Figure 12. Formal assessments to measure students’ innovative skills.

Fourth research question. What are the roles of parents and the surrounding community at high achieving public high schools in California?

The practice of relying on parents for support. Figure 13 presents the number of similar participant responses to the interview question regarding descriptions of formal or

informal parent groups that existed in their school campuses. All 12 principals believed that the role of formal and informal parent groups on their school campus was to support the school. The parents are heavily relied on to help in many ways. For example, at Tyler High School, the principal described their Parent Teachers Student Association (PTSA) as "very active and what we call our 'worker bees' of our school. These are the parents who do a lot of volunteering, go on field trips and help with different activities on campus" (personal communication, January 13, 2012).

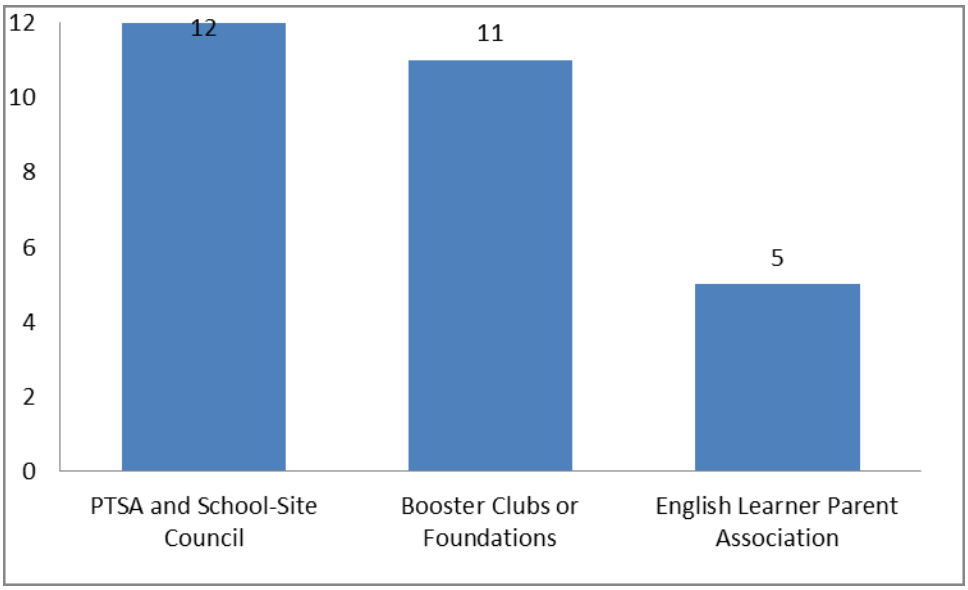

Figure 13. Formal and informal parent groups.

Specifically, 11 out of 12 participants mentioned their schools had booster clubs and or an educational foundation to help raise money for the schools. Almost all the participants relied on their parent groups to help raise money to support extra-curricular programs. The parents have created booster clubs to help support their students' clubs and teams; "Anywhere where funds need to be raised, there is a booster club" (principal of Madison High School, personal communication, November 30, 2011).

Ten out of 12 principals mentioned their schools had a School Site Council and PTSA that were involved in making decisions regarding the budget and school improvement plan. The School Site Council is made up of parents, teachers, students, and administrators who were selected by their peers to contribute to the school improvement plan (EdSource, n.d.b.). The PTSA is a volunteer organization dedicated to improving the education of children (California Parent Teacher Association, 2011).

The practice of including parents in the school community. Figure 14 presents the number of similar participant responses to the interview question regarding the opportunities for parents and members of the local community to participate in their schools' decision-making process. Eight out of 12 principals believed that opportunities for parents and members of the community to participate in school decision-making processes depended on their personal philosophy regarding the ability of parents and members of the community to make decisions on behalf of the school. Eight principals believed in the importance of partnering with the parents as part of their school culture. The principal of Madison High School held a meeting with the parents of her school twice a year:

> "Coffee with the Principal" where parents have an opportunity in a non-agenda [meeting] to share what their thoughts are, concerns and ideas. We take and review to see if those are the areas that we want to investigate. We are very much about partnering with our parent community. (personal communication, November 30, 2011)

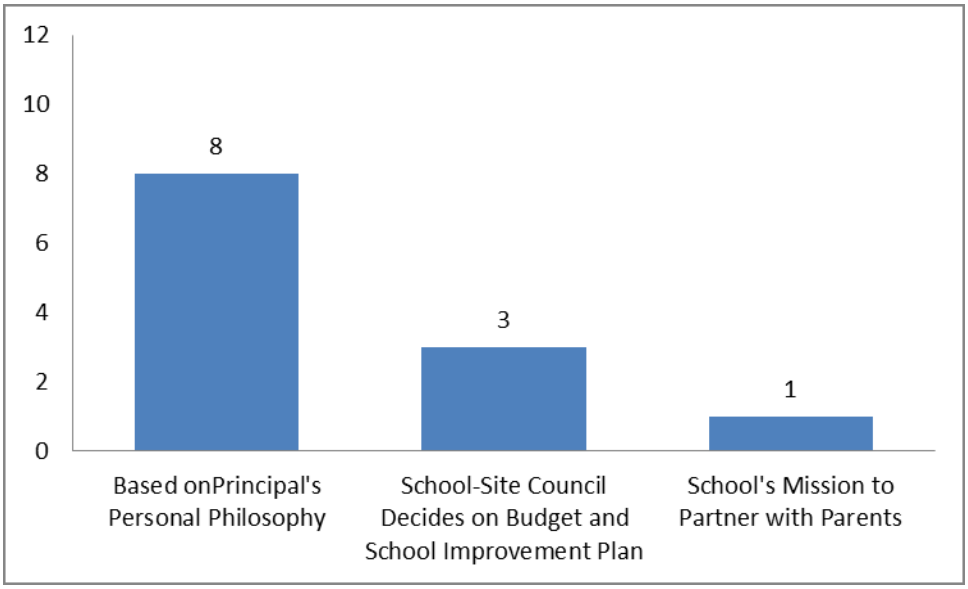

Figure 14. Opportunities to be involved in school-decision making process

In contrast, other principals responded that parents were not prepared to make decisions for the school because their schools heavily relied on data to make well-informed decisions. According to the principal of Jackson High School:

> With all the data and all these different things, it is almost too difficult for some parents, to be truly involved in the decision-making process because it is hard for them to grasp what the data says, what the data even shows them. (personal communication, December 6, 2011)

The practice of using student-related activities to promote school community.

Figure 15 presents the number of similar participant responses to the interview question regarding opportunities their school offered to the members of the surrounding community to become partners in their schools. Ten out of 12 principals stated the members of surrounding communities were given opportunities to participate in student-related activities. According to the principal of Van Buren High School, "When we have 'Principal for the Day,' a person from the community comes to do that" (personal communication, December 8, 2011). At Tyler High School, community members were asked to be panel members during student presentations; "The main thing we do every

year is that seniors have a portfolio exit at the end of the year. We bring in community members to be the panelist to listen to the kids present their portfolio" (principal of Tyler High School, personal communication, January 13, 2012). At Fillmore High School, members of the community were given opportunities to teach elective classes; "We have elective sessions that fall in between our regular semesters and when we have elective sessions, we will bring in folks from the community to teach classes to our students as electives" (principal of Fillmore High School, personal communication, February 2, 2012). All of these practices contributed to helping the schools build partnerships with the local community.

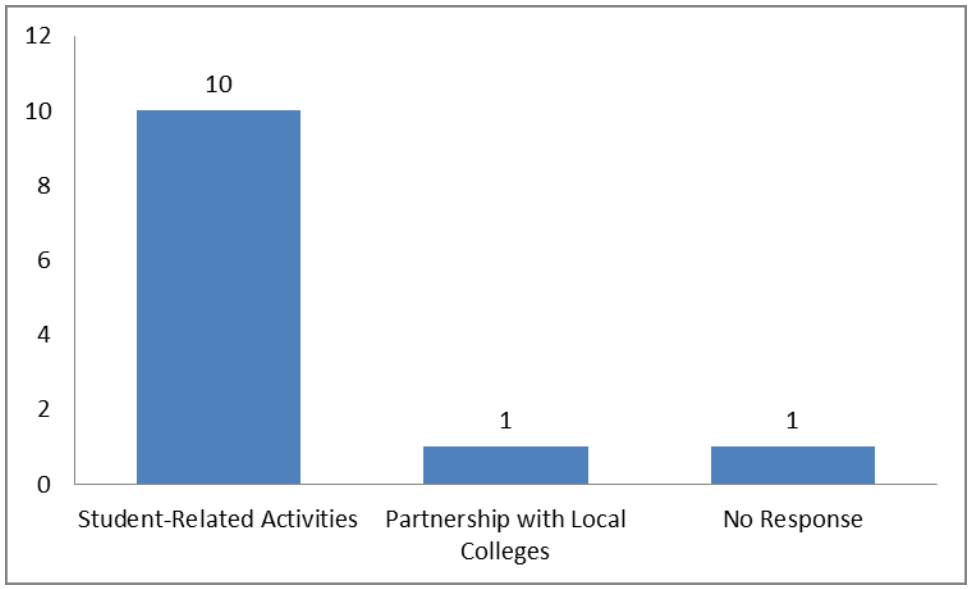

Figure 15. Opportunities to become partners in the school community.

The practice of relying on local business for financial support. Figure 16 presents the number of similar participant responses to the interview question regarding how their schools had encouraged local businesses to interact with and support their school community. Eleven of the 12 principals believed that local businesses near or around their schools were needed to help support their schools financially. The parent

groups were relied on to solicit financial support from local businesses. According to the principal of Jefferson High School, "every parent group is after them [local business] for their money" (personal communication, November 21, 2011). The principal also described educational foundations that were established to help obtain financial support from larger businesses; "We have a big foundation, a district-wide foundation. They go out and solicit the big donors and my PTSA and our local groups spend a lot of time getting the small donators" (principal of Jackson High School, personal communication, December 6, 2011).

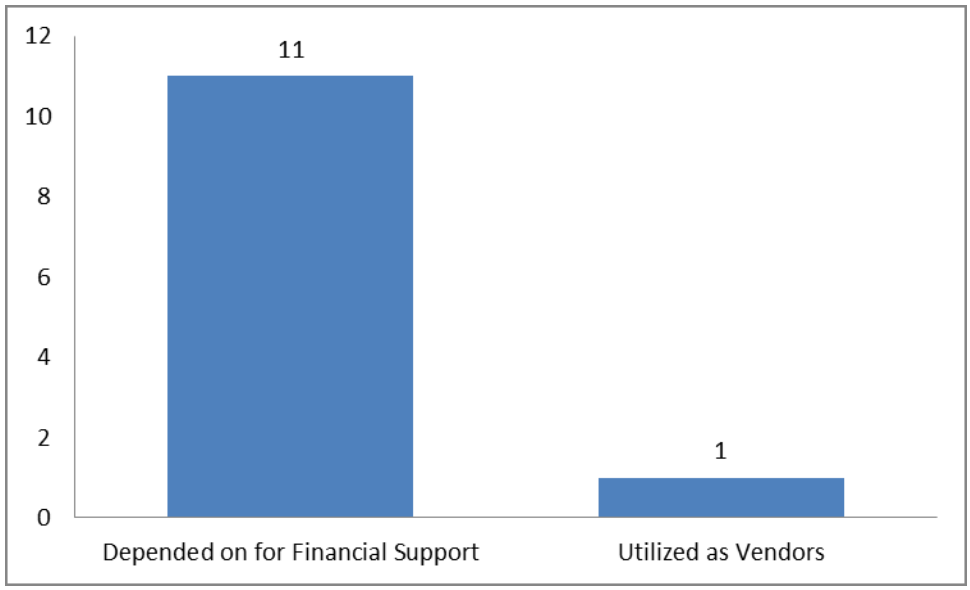

Figure 16. Relationships with local businesses.

Fifth research question. What are characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?

The practice of engaging and reflecting. Figure 17 presents the number of similar participant responses to the interview question regarding the definition an effective teacher. Ten out of 12 principals defined an effective teacher as engaged with students and reflective about his or her practice as an educator. According to the

principal of Monroe High School, "The effective teacher is measured by student engagement in the class, the results of the students, how often we see him check for understanding that's going on in the classroom and how reflective the teacher is" (personal communication, December 5, 2011). The principals also responded that effective teachers at high achieving public schools needed to engaged their students with the goal of mastery and application of knowledge at higher levels of Bloom's taxonomy. According to the principal of Tyler High School, "To be proven effective, their whole goal in teaching their content is to make sure students are engaged in their learning and are learning at high level" (personal communication, January 13, 2012).

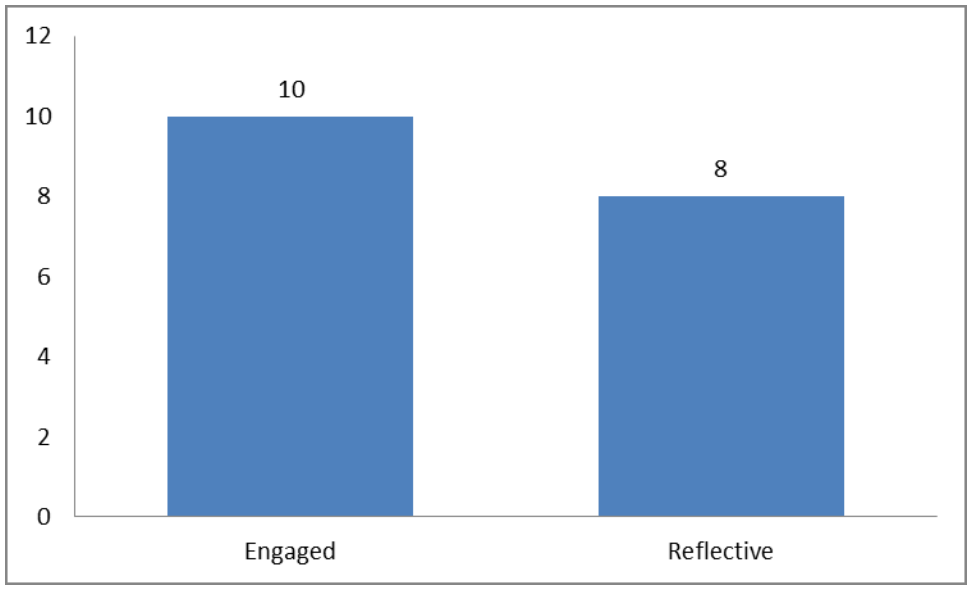

Figure17. Definition of an effective teacher.

Additionally, 8 out of 12 principals also mentioned that an effective teacher had the ability to reflect on his or her strengths and weaknesses. The participants also responded that it was necessary for teachers to continually ask the following questions in order to be reflective; "'how could I have done that differently? What went well?' It was not enough for teachers to say, 'Well, I'm a good teacher, I figured out how to be a good

teacher 5 years ago and I haven't changed since'" (principal of Harrison High School, personal communication, December 9, 2011).

The practice of a Professional Learning Community. Figure 18 presents the number of similar participant responses to the interview question regarding opportunities that existed for schoolteachers to become more effective. All 12 principals mentioned a Professional Learning Community where teachers collaborated and learned from each other, helping teachers become more effective. At Madison High School, a Professional Learning Community was established 5-6 years ago to "recognize that some of the best practices and some of the experts in what [is] considered to be an exemplary teacher are right here on this campus" (principal of Madison High School, personal communication, November 30, 2011).

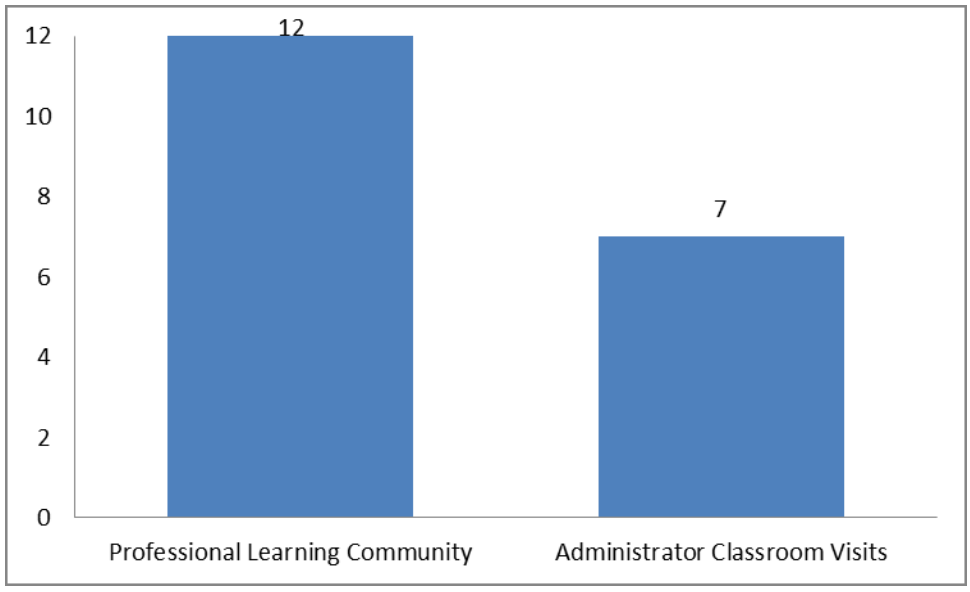

Figure 18. Opportunities for teachers to become more effective.

Additionally, 7 out of 12 principals mentioned that administrators often visited the classrooms and gave feedback to teachers. This also helped teachers to become more effective. At Adams High School, the principal and assistant principals were given time

to visit classrooms and give feedback to the teachers. According to the principal, "We can do our work in the classroom. We can answer email and we can email each other, but we also leave feedback with teachers" (personal communication, November 13, 2011).

The practice of teachers initiating opportunities. Figure 19 presents the number of similar participant responses to the interview question regarding opportunities that existed for teachers to partner with professionals who work in STEM-related careers. Nine out of 12 principals responded that their teachers initiated their own opportunities to partner with professionals who work in STEM-related careers. At Jefferson High School, teachers had the opportunity to voluntarily participate in programs at the local college; "teachers who work in the Cosmos program at UCI [University of California Irvine]. They have connected with professors over there, specifically in Science. That's probably most of it; randomly, somebody has a connection to somebody" (principal of Jefferson High School, personal communication, November 21, 2011). Some of the participants indicated they had teachers who were also employed at local colleges. For example, the principal of Van Buren High School indicated that one of her teachers worked at the science laboratories at California State Long Beach and another teacher worked at University of Southern California. "We have kids go out there [colleges] and do some internships" (personal communication, December 8, 2011). While other teachers may not have personal connections to local colleges, they were still motivated to find opportunities to work with professionals in STEM-related fields. According to the principal of Taylor High School, "The teachers themselves can go out and seek and secure those opportunities to partner in a grant or some research base or some sort of

invitation or field trips with STEM-related profession" (personal communication, January 31, 2012).

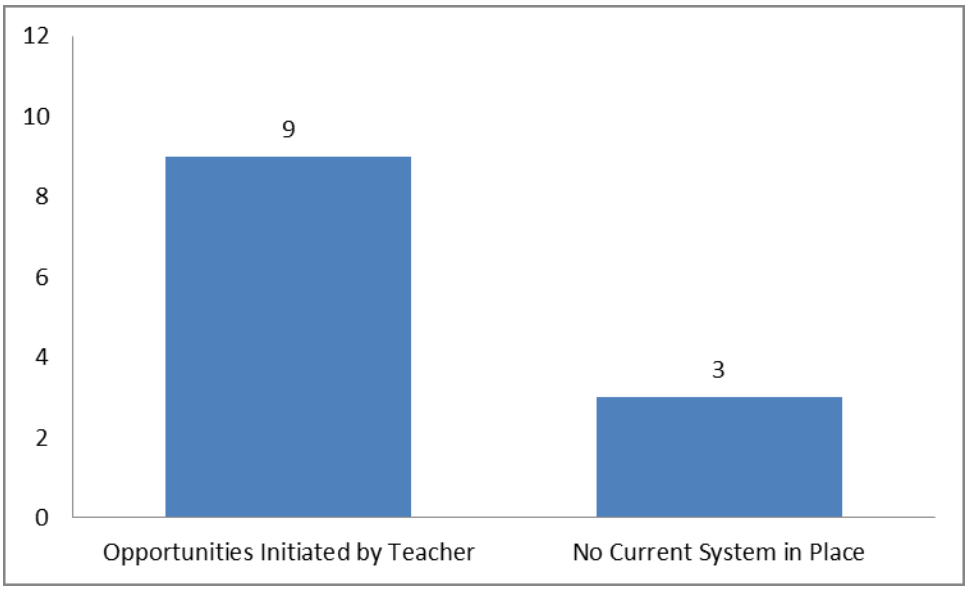

Figure 19. Opportunities for teachers to partner with STEM-related professionals.

The practice of growing others. Figure 20 presents the number of similar participant responses to the interview question regarding their definition of an effective school leader. Ten out of 12 principals defined an effective school leader as someone who was intentional about cultivating the educational growth of teachers. The principals also explained that hiring the best teachers was the responsibility of an effective school leader, as well as supporting them to continue being the best. An effective school leader will "hire the best and the brightest and support them so that they can use creativity to develop a program that meet the needs of their students whether they are high performing, average or low achieving students" (principal of Polk High School, personal communication, January 18, 2012).

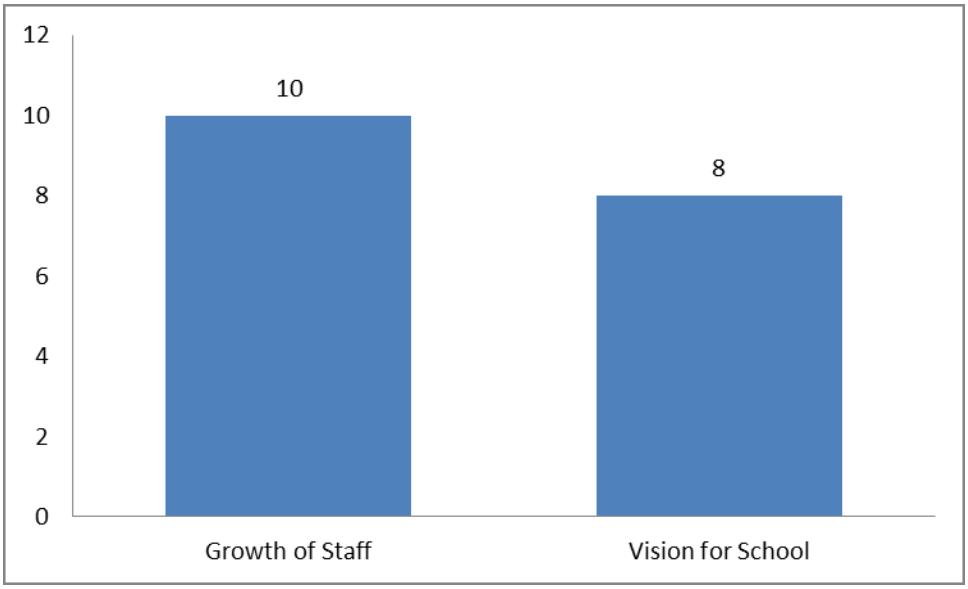

Figure 20. Definition of an effective school leader.

The principal of Jackson High School described his practice of continuing to grow the teachers that he hired:

> I believe that I try to hire people, the best people but at the same time just because you were the best 15 years ago or 5 years ago doesn't mean you are the best anymore and if you are not willing to constantly be the best then that's a problem. As an effective leader, I need to work on identifying those people who are the best and try to team them with people who are not working to their potential and try to get them there. (personal communication, December 6, 2011)

Additionally, 8 out of 12 principals also mentioned that an effective teacher had a vision for the school. An effective school leader is "Somebody who can identify a vision for everybody, teachers and the community can buy into and believe in" (principal of Madison High School, personal communication, November 30, 2011).

The practice of school leaders initiating opportunities. Figure 21 presents the number of similar participant responses to the interview question regarding opportunities for school leaders to become more effective. Eight out of 12 principals created their own opportunities to become more effective school leaders. Some principals, such as the principal of Adams High School, responded that they were self-reliant in becoming more

effective; “For me personally, it is all what I do on my own” (personal communication, November 13, 2011). Other principals, like the principal of Jefferson High School, were able to become more effective by having dialogues with their colleagues; “Again, I think about my own growth as an administrator, it seems like so much of it just came from talking with people who have different ideas” (personal communication, November 21, 2011). Most importantly, effective school leaders understand that they can use any opportunity to become more effective. According to the principal of Harrison High School, “It’s important I think in a position of school leadership to understand that your own initiative will determine what opportunities exist” (personal communication, December 9, 2011).

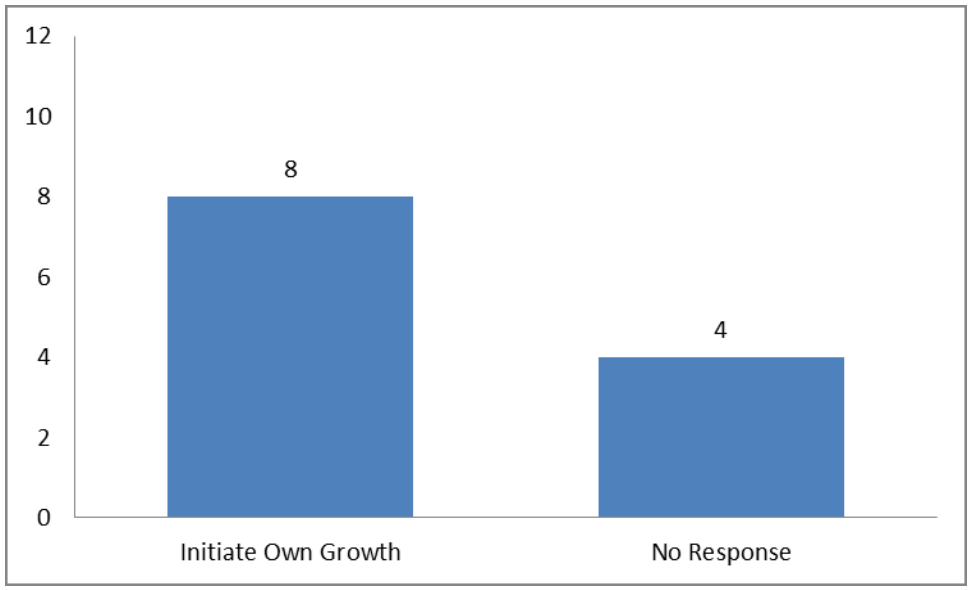

Figure 21. Opportunities for school leaders to become more effective.

Sixth research question. What are the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

The practice of continually becoming better. Figure 22 presents the number of similar participant responses to the interview question regarding challenges that their

schools have had to overcome in order to become successful in attaining a higher student achievement. Nine out of 12 principals described a similar challenge of needing to motivate all stakeholders to continue to improve despite being recognized as successful schools. Several participants claimed that they had to motivate their teachers not to depend on their current level of achievement. The principal of Washington High School stated:

> The biggest challenge is that we are already very high achieving and so people have the tendency to rest on their laurels. Really, I think that's been our biggest challenge just motivating people that even though we are already good to want to do better. (personal communication, November 9, 2011)

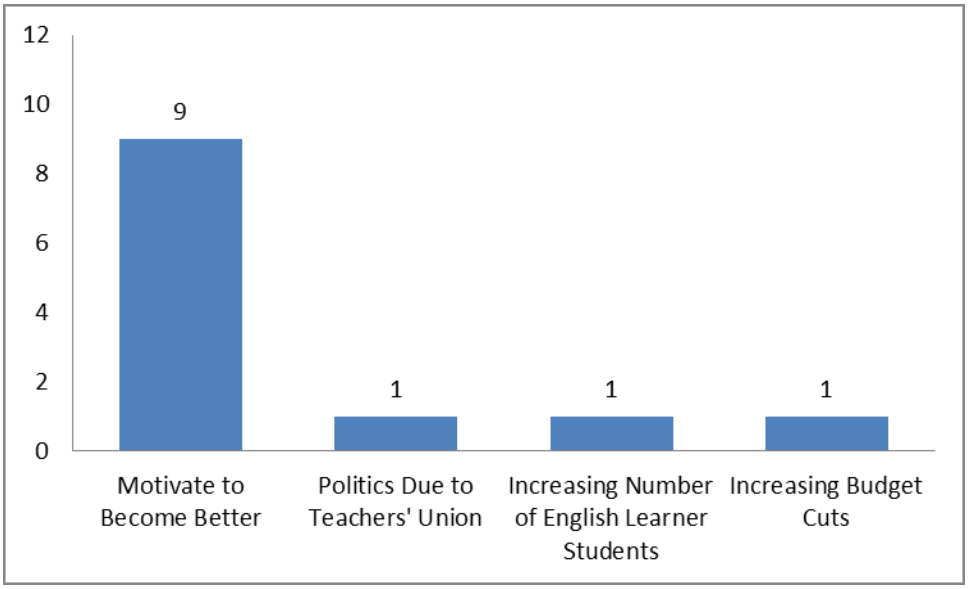

Figure 22. Challenges of high achieving public high schools.

In addition to wanting to continue to improve, teachers, staff and administration must also be able to reflect on strengths and weaknesses of their schools. According to the principal of Monroe High School, "a big challenge is getting past our own arrogance and really [looking] at how we might do things better" (personal communication, December 5, 2011). The principals needed to make all stakeholders understand that high

achieving public high schools need to continue to do better or they will no longer be successful:

> The enemy of great is good and so when you become good it's hard to be motivated to get to the next level . . . It's not even just within school itself that people think we don't need it, it's the outside world that says the same thing to you, "oh, you guys are good enough, you don't need it [money]. Well, yes we do, you can't ever be satisfied with good. You always need to be better at where you're at. I coin the term that we always use, 'accelerating excellence', and its movement. Excellence isn't an arrival. We have to accelerate and continue to move because when we stop we're not excellent anymore. (principal of Van Buren High School, personal communication, December, 8, 2011).

The practice of early identification. Figure 23 presents the number of similar participant responses to the interview question regarding programs that existed for students who were in danger of not completing their high school graduation requirements. Ten out of 12 principals responded that the teachers, counselors, and administrators had a system to immediately identify students in danger of not completing their high school graduation requirements, such as awareness of students who received a failing grade in any of their classes.

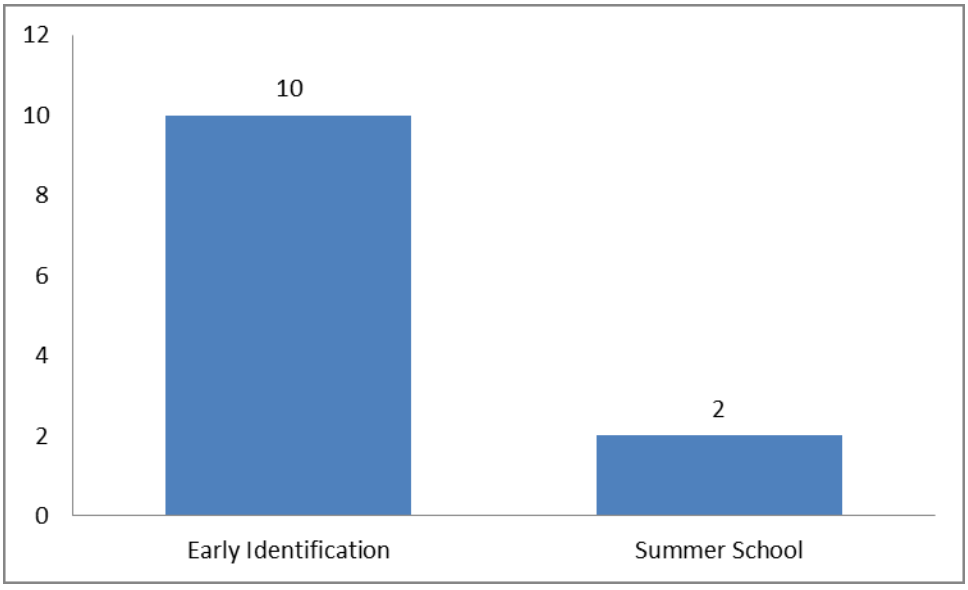

Figure 23. Prevention of student dropout.

According to the principal of Washington High School, "Right away, we track students who are in danger starting when they are in ninth or 10th grade and they work with counselors, they work with the administrators, and they work with teachers" (personal communication, November 9, 2011). Some principals had their staff identify students who received below average grades "We are constantly monitoring Ds and Fs at every major marking period" (principal of Jefferson High School, personal communication, November 21, 2011). Once these students were identified, the teachers, counselors, and administrators worked together as team with the student and his/her parents to implement proactive measures such as one-on-one tutoring to ensure all students graduate. At Harrison High School, the principal responded, "We've really tried to identify early the kids who may need additional support and be relentless on how we intervene" (personal communication, December 9, 2011).

Summary of Findings

Several common best practices were identified in this study. Among these common best practices were programs and practices utilized inside and outside the classrooms. Some of the best practices were directed at teachers and educational leaders who work at these high achieving public high schools. Other best practices helped to establish positive relationships with parents and members of local communities.

These high achieving public high schools also had various student-centered activities both inside and outside the classrooms that helped build and support students' confidence and knowledge in math and science. Students had a variety of opportunities to work with each other in order to foster and to promote innovative thinking. In some schools, group projects were assigned to students in their classes as well as in their extra-

curricular activities that also promoted opportunities for students to innovate. No formal rubrics or assessments existed to measure students' innovative skills. Programs designed to prepare students for any of the California standardized tests were not necessary because the rigor of the curriculum at high achieving public high schools far exceeded the knowledge and skills that were measured in those standardized tests.

All students at these high achieving public high schools in California were expected to enroll and to graduate from post-secondary institutions, specifically majoring in STEM-related fields. In their freshman year, students worked with counselors and their parents to individually plan their high school courses in order to meet the college requirements of their choice. The students also took Advanced Placement and college-level courses in order to prepare them to meet the rigor of college-level classes.

The teachers, staff and administrators at these high achieving public high schools in California increased student critical thinking skills and promoted reading, math, and science literacy by having high expectations for students to master and apply their knowledge. On a frequent basis, teachers formally assessed their students' knowledge to ensure that progression and attainment of the learning goals were successful. The teachers were expected to teach beyond the California state standards to increase students' reading, math, and science literacy levels. Students were asked to write in all of their classes to increase students' critical thinking skills.

Seven out of the 12 participants responded that the teachers used their own personal connections in order to create opportunities for students to work with professionals in STEM-related careers. The teachers were usually relied on to inform

students about STEM-related fields and careers. The teachers initiated their own opportunities to work with professionals in STEM-related field.

The principals at these high achieving public high schools defined effective teachers as teachers who had the ability to engage students in their lessons as well as be able to reflect on their practice as educators. To continue being effective, teachers could collaborate and share their best practices with each other in Professional Learning Communities. The principals at these high achieving public high schools defined effective school leaders as principals who had the intention to cultivate the educational growth of teachers and staff. The principals also mentioned that effective school leaders had a vision for the direction of the school. The principals believed that effective school leaders were accountable for initiating their own opportunities to continue growing as educators and as leaders.

The role of parent groups at these high achieving public high schools was mainly to support the schools. The amount of opportunities for parents and for members of the community to share in the school decision-making process depended on the principal's personal perspective on the ability of parents and members of the community to be able to make well-informed decisions on behalf of the school. Opportunities for community members to participate in student-related activities helped to build partnerships between the local community and the school. Local businesses are heavily relied on for financial support to help fund student activities and reduce class sizes.

Programs existed to identify students who received below average grades and were not passing their classes: students in danger of not completing all of their high school graduation requirements. These students worked closely with their counselors,

administrators, and parents to obtain one-on-one tutoring as well as to create plans to make up for the classes they did not pass. A common challenge that existed in these high achieving public high schools was the need for all stakeholders to understand that in order to continue being high achieving, these schools needed to continue to improve the education they provide to their students.

Chapter V: Conclusions

Introduction

A high standard of living will be impossible if American students do not graduate with the ability to think critically as well as excel in math and science. Math and science are necessary for innovation, which the United States has relied on as a successful strategy to secure its economic growth. The purpose of this study was to understand how high achieving public high schools in California have been able to overcome challenges, rely on their parents and members of the local community, as well as utilize their curriculum, effective teachers and effective school leaders to promote innovative and critical student thinking in order to prepare them for post-secondary educational institutions and major in STEM-related subjects in college. Furthermore, the researcher's intent for this study was to contribute to a better understanding of the phenomenon of why some public high schools in California are able to still perform well while other schools seemed to be falling behind.

Research Questions

This study explored and determined the best practices in which high achieving public high schools were engaged. The following research questions were investigated during the study:

1. How does the use of the curriculum in high achieving California public high schools in California supported critical thinking skills and promoted reading, math and science literacy?
2. What specific programs are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from

post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?

3. What specific programs or practices are implemented at high achieving public high schools in California that foster or promote students to utilize innovative thinking?
4. What were the roles of the parents and the surrounding communities at high achieving public high schools in California?
5. What were the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?
6. What were the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

Conclusions

This study found several common best practices that existed among the high achieving public high schools in California. The participants in this study stated that the following 23 common best practices contributed to success of their schools:

1. Principals and teachers upheld an expectation for students to master and be able to apply their math and science knowledge.
2. Students were formally assessed on a frequent basis to measure their knowledge and to ensure that they were attaining the learning goals expected of them.
3. Various student-centered practices helped students build and support their confidence and knowledge in math and science.

4. The California state standards were used as a platform to increase students' reading, math, and science literacy levels.
5. Writing was used to increase students' critical thinking skills.
6. There were no existing programs to prepare students for California state standardized testing because achievement on these tests were not the end goal for educating students.
7. All students were expected to enroll in a 4-year university, specifically to pursue a STEM-related major.
8. The students worked on meeting the enrollment requirements of their chosen universities early on in their high school career. They took college-level math and science courses to prepare them to enter and graduate with a STEM-related major.
9. The teachers used their personal connections to create opportunities for students to work with STEM-related professionals.
10. Word-of-mouth was used to inform students about STEM-related fields and careers.
11. Students had various opportunities to work with each other that fostered and promoted their use of innovative thinking.
12. No formal assessment was established to assess students' innovative skills.
13. The role of formal and informal parent groups that existed on school campus was to support the school.
14. The opportunities for parents and members of the community to participate in school decision-making process depended on the principal's personal

philosophy of the ability of parents and members of the community to make well-informed decisions on behalf of the school.

15. The members of local community participated in student-related activities that helped build partnerships with the school.
16. The local businesses near or around high achieving public high schools were needed to help support the schools financially.
17. Effective teachers were engaged with students and reflective about his or her practice as an educator.
18. Professional Learning Communities existed to help teachers become more effective.
19. The teachers initiated their own opportunities to partner with professionals who worked in STEM-related careers.
20. Effective school leaders were intentional about cultivating the educational growth of teachers and staff.
21. Effective school leaders created opportunities to become more effective.
22. The challenge that all high achieving public high schools had in common was motivating all stakeholders' desire to continue to be better.
23. Early identification of students in danger of not completing their high school graduation requirements and implementing proactive measures ensured that students would graduate from their high achieving high schools.

Key Findings

The key findings of this study indicated the importance of the role of school culture in students' achievement level. All school stakeholders shared a common

principle of high expectations that had become part of the school culture. As a result, the school culture helped raise the level of expectations from the students as well as from the teachers. At these high achieving public high schools, teachers and students met these high expectations by setting their learning goals at higher levels.

School culture might also be utilized to increase the number of students who enroll in post-secondary institutions. Part of the culture at these high achieving public high schools was the expectation and assumption that all students would enroll in post-secondary institutions, including majoring in STEM-related fields. Therefore, the students prepared for their post-secondary goals as early as their ninth grade year by taking the appropriate classes required to qualify them for entry to a 4-year university.

The students enrolled in Advanced Placement courses and college-level math and science courses as part of their preparation to enter and qualify for their chosen colleges. The focus of the teachers was shifted to prepare students to pass their Advanced Placement tests. The culture of high expectations was reinforced as a result of providing more rigorous courses that were the same level as college courses. Therefore, the level and rigor of the curriculum at high achieving public high school were above what the California state standards has dictated the students must learn. According to the principal of the high school with the highest API score in California when this study was conducted, preparing students to pass their AP exams was one of the major reasons why their students scored well in state standardized tests because students were learning above the level of what was being measured in these assessments.

The school culture of high expectations from all school stakeholders played an important role in their achievement. The practice of expecting and assuming that all

students will enroll in post-secondary institutions gave all stakeholders a different objective aside from the students' performance in annual state standardized tests. As part of preparing students for post-secondary institutions including preparing students to major in STEM-related fields, students often took college-level math and science courses, which made them more prepared and qualified to compete in the 21st century workforce.

Implications of the Study

Hopefully, the findings of this study have contributed to the body of knowledge on how to successfully progress students towards completing their high school requirements with a high degree of proficiency, as well as how to support students in excelling in reading, mathematics, and science literacy. Included in the study are common best practices utilized by several high achieving public schools to increase students' self-confidence in their ability to apply their math and science knowledge to the real world. The researcher hoped to communicate how these high achieving public high schools have been able to enhance students' interest and confidence to go into post-secondary institutions and to prepare them to enter STEM-related degrees. From this study, educators may be able to learn best practices on how to provide their students with world-class curriculum that supports and promotes critical and innovative thinking, to grow effective teachers and administrators, and to create a working partnership with parents and the community. Educators may also be able to learn from high achieving public schools about how to prepare their graduates to compete with their global peers in the 21st century international job market. Finally, educators can learn from the principals who participated in this study and who have been able to overcome challenges that their schools faced, enabling them to bring their vision of high student achievement to fruition.

The intention of this study was not to solve the problems of the public educational system in the United States. However, the findings of this study might help educators improve their schools' achievement level, specifically the academic performance level. Educators and administrators have a great deal to learn from the school leaders who have shared their schools' best practices in this study. Information on best practices will also give educators an opportunity to be able to reexamine and compare their educational policies and practices.

Implications for school leaders. The key findings from this study can be important for educational leaders of both low and average performing American schools to study and learn best practices from these exemplary schools. The findings of this study indicated that effective school leaders must be purposeful about cultivating the growth of teachers and staff. Several of the participants believed that one of their most important responsibilities as principals was to hire the best teachers who could engage students in their lessons as well as be able to reflect on their practice. They also believed that it was also their responsibility to encourage teachers to continuously work on their strengths and weaknesses as educators in order to remain the best in their field. The principals pointed out that a Professional Learning Community model enabled teachers to collaborate and learn from each other, contributing to their growth.

This study also found that it was important for school leaders to have a vision for the direction of the school: a vision that school leaders can share with teachers and staff in order to work together towards an improvement of the quality of the education they provide to students. The vision also needs to include a shared responsibility by all teachers, administrators, and staff for the success of each student. For example, the

principal of Van Buren High School shared her vision for her school; "You have to constantly find the most innovative and creative think to keep us moving, like a new building, a new grant, a new STEM club" (personal communication, December 8, 2011).

The teachers who had personal connections to professionals in STEM-related careers were effective resources, creating opportunities for students to work with professionals in STEM-related fields. The teachers who were internally motivated found opportunities for themselves to work with professionals in STEM-related fields. The teachers who were passionate about or had prior careers in STEM-related fields were more likely to provide students with information about STEM-related careers.

Implications for educational policymakers. This study found that few explicit programs or practices existed in these high achieving public high schools to communicate, promote, or educate students about STEM-related careers. Local educators must be made aware of STEM-related careers and their role in the 21st century workforce. Science-related competitions on state and national levels were used as resources for students to increase their self-confidence and as opportunities to apply their math and science knowledge. These competitions also gave students chances to be exposed to and work with STEM-related professionals.

Implication on curriculum developers. This study found that frequent assessment of student knowledge was an important factor of student achievement. The principals at high achieving public high schools still regarded the California state standards as an effective resource to increase critical thinking skills and literacy levels. The principals asked teachers to utilize the state standards as a foundation for what students should know. The teachers taught students mastery and application of concepts

above and beyond what the state standards dictated. Common assessments created by teachers teaching the same subject were used to measure students' knowledge and level of mastery. The teachers at these high achieving public high schools utilized the data from these common assessments to reteach any concepts or skills students had not yet mastered. The teachers also utilized writing as a means for students to increase their critical thinking skills. The participants believed that writing encouraged students to synthesize and express their knowledge.

Findings also indicated that project-based assignments gave students the opportunity to work with each other and helped them to build self-confidence and knowledge in math and science. Fine arts classes and extra-curricular activities that involved competitions also created opportunities for students to work together and use their innovative skills. These hands-on group assignments also enabled students to apply their knowledge in innovative ways.

Implications for parents and business owners in local community. This study found that parents were needed to help schools both financially as well as to volunteer their time supporting student-related activities. Parents and members of the local community were great resources for the school, regardless of the principal's personal view on the level of involvement that parents and the local community should have in the school's decision-making process. Participants asserted that it was important for schools to have a relationship with local businesses since they relied heavily on the businesses to help fund student-related activities and reduce class sizes. It was also important for members of the local community to be involved in the school community by giving them opportunities to participate in and support student-related activities.

Researcher's Observations

The researcher observed the following trends. Most of the high schools explored in this study were recipients of the California Distinguished School Award. The CDE gave this award to honor California's most exemplary and inspiring public schools. The schools selected for the Distinguished School Award demonstrated significant gains in narrowing the achievement gap (CDE, 2011d). On numerous interviews, the researcher observed this particular award in the offices of the participants.

The researcher noticed that most of participants were highly aware of the areas of strength as well as the areas of weakness in their school programs. The principals answered with pride when the interview questions implied areas of strength in their school. At the same time, the principals also admitted when interview questions touched on areas of growth on which their teachers and staff still needed to work.

Several principals declined the request to participate in this study due to the difficulty of the interview questions. At least 3 principals responded that the questions were too difficult for them to answer. Another 2 principals mentioned that it would take too much time to research the answers to the interview questions. Another principal noted that it was her first year as a principal at the selected school and she did not yet have the knowledge to answer the interview questions. One principal who did participate in the study mentioned several times during the interview that the questions were hard. Twelve participants were ultimately included in this study. All of the schools had a Statewide Ranking of 8 or above. Ten of the schools had a SSR score of 8 or above.

Recommendations for Future Research

This study was only able to identify key common best practices being utilized in high achieving school, and was limited in its scope and approach. Further studies are recommended to continue increasing the body of knowledge regarding how to effectively educate students and prepare them for the 21st century workforce. The following are recommendations for future studies:

- A more in-depth study including student data and student work in addition to interviews in order to add to the knowledge of how high achieving public high schools are able to perform well.
- A study on student motivation, specifically regarding internal or external factors influencing motivation.
- A study on the increasing trend of international students entering the United States and enrolling in public schools located in affluent areas. Several participants from schools in affluent areas mentioned they were receiving an increasing number of students from other countries.
- A study on the school's responsibility in matching students with their best career despite their parents' personal goals for their children.
- A study on the necessary skill set students must master to be prepared to work in the 21st century work force.
- A study on teachers teaching students to pass state standardized tests in comparison to teachers teaching beyond the level measured in state standardized tests.

- A study of high performing public high schools in United States in comparison to high performing public schools in developing countries.
- A study on the level of accountability of students' behavioral expectations in low performing public high schools in comparison to high performing public high schools.
- A study on schools with a focus on STEM-related subject matter and their best practices for preparing their students for post-secondary institutions, specifically majoring in STEM-related majors.

Final Thoughts

The researcher's personal bias as an administrator and a school leader was evident as she analyzed the data. The researcher believed that the following additional programs or practices were also relevant to the success of high achieving public high schools in California as well as helpful in increasing the performance level of low performing schools. However, the number of times these programs and practices were mentioned by the participants was too few to be counted as key common practice.

Five out of 12 participants mentioned that the teachers utilized informal student assessments on a daily basis. Five participants out of 12 mentioned using common subject assessments for their formal assessments. Six out of the 12 participants mentioned that students had opportunities to obtain one-on-one help from their teachers or tutors outside the classrooms. Six participants out of 12 mentioned using a college and career software called Naviance. Five participants out of 12 mentioned student internship opportunities in STEM-related field. Three out of 12 participants mentioned field trip

opportunities in STEM-related fields. Five out of 12 participants had parent groups that existed on their campus to support parents of English Language Learner students.

Other world leaders have reformed their education systems and prepared their students to be resources to help them compete in a global world where the economic growth will rely on human talent and innovation in STEM-related fields. Math and science knowledge are necessary in order to develop an innovative workforce to fill STEM-related careers. Unfortunately, since the 1980s, education in United States has become inferior to the educational progress of other nations.

In a 2009 comparative studies of mathematics, science, and general literacy, American students were scoring in the middle or last in comparison to their peers in other developed countries. However, this study was able to contribute to the limited resources currently available on how some schools were still able to perform well when many have fallen behind. There is still much to learn about how schools can prepare students to have mastery of math and science knowledge, critical thinking skills, as well as innovative skills in order to compete in the 21st century workforce.

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APPENDIX A

Protecting Human Research Participants – Certification of Completion

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Rhea Sanchez** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 10/22/2009

Certification Number: 325468

APPENDIX B

Approval of Exempt Application

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

October 25, 2011

Rhea Sanchez
[redacted]

Protocol #: E1011D02
Project Title: *A Qualitative Study on High Achieving Public High Schools in California*

Dear Ms. Sanchez:

Thank you for submitting the revisions requested by Pepperdine University's Graduate and Professional Schools IRB (GPS IRB) for your study, *A Qualitative Study on High Achieving Public High Schools in California*. The IRB has reviewed your revisions and found them acceptable. You may proceed with your study. The IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations 45 CFR 46 – http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(1) states:

> (b) Unless otherwise required by Department or Agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:
>
> Category (1) of 45 CFR 46.101, research conducted in established or commonly accepted educational settings, involving normal educational practices, such as, research on regular and special education instructional strategies, or research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit a Request for Modification Form to the GPS IRB. Because your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the GPS IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy materials" at http://www.pepperdine.edu/irb/graduate/).

Please refer to the protocol number denoted above in all further communications or correspondence related to this approval. Should you have additional questions, please contact me. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Jean Kang, CIP
Manager, GPS IRB & Dissertation Support
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Graduate School of Education & Psychology
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cc: Dr. Lee Kats, Associate Provost for Research & Assistant Dean of Research, Seaver College
Ms. Alexandra Roosa, Director Research and Sponsored Programs
Dr. Yuying Tsong, Interim Chair, Graduate and Professional Schools IRB
Ms. Jean Kang, Manager, Graduate and Professional Schools IRB
Dr. Farzin Madjidi
Ms. Christie Dailo

APPENDIX C

Interview Protocol Form

Objective: My dissertation is a qualitative study of the high achieving public high schools in California. Its purpose is to investigate the best practices employed by these successful high schools. The intent is to collect, summarize and report these practices for the benefit of other educators, educational leaders, and policy makers. While I will maintain full confidentiality of this interview, I will be tape-recording this interview as well as taking notes. The audiotapes and my notes will be kept at my home and deleted after five years.

Date of Interview:

Time of Interview:

Location of Interview:

Name of Participant:

Position of Participant:

☐ **Obtain a Singed Participant Consent Form**

1.) ***How does the use of the curriculum in high achieving public high schools in California support critical thinking skills and promote reading, math and science literacy?***

1a.) What educational experiences do you seek to provide to the students with your math and science curriculum?

1b.) How do you measure and/or assess if your math and science curriculum are providing the experiences that you described?

1c.) What are the specific practices employed by your school to increase students' self-confidence and knowledge in math and science?

1d.) What are the specific practices employed by your school that leads to increasing your students' literacy level?

1e) What are the specific practices employed by your school that leads to increasing your students' critical thinking skills?

1e.) What specific programs do your school employs to prepare your students for the California's state mandated exams such as CAHSEE and STAR testing?

2.) What specific programs are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?

2a.) What specific programs or practices are currently implemented at your school to formally identify students who plan on entering a four-year university and specifically major in a STEM related field?

2b.) What resources or preparations do you provide students who plan to enroll in a four-year university, specifically for those majoring in a STEM related field?

2c.) What are the programs or practices that you utilize in your school to involve professionals who work in STEM related careers?

2d.) What are the programs or practices that you utilize in your school to inform students about STEM related fields and careers?

3.) What specific programs or practices are implemented at these high achieving public high schools in California that foster or promote students to utilize innovative thinking?

3a.) What opportunities do you offer students to become innovative?

3b.) How are the students' innovative skills formally assessed or measured?

4.) What are the roles of the parents and the surrounding community at high achieving public high schools in California?

4a.) Please describe any formal and or informal parent groups that exist in your campus.

4b.) Please describe any opportunities for parents and/or members of the communities to participate in school decision-making process.

4c.) What opportunities do you offer to members of the surrounding communities to become partners in the school community?

4d.) How have local businesses been encouraged to interact and support your school community?

5.) What are the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?

5a.) How do you define an effective teacher?

5b.) What opportunities exist at the school for teacher to become more effective?

5c.) What opportunities exist for teachers to partner with professionals who work in STEM-related careers?

5d.) How do you define an effective school leader?

5e.) What opportunities exist at the school for school leaders to become more effective?

6.) What are the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

6a.) Please describe any challenges that this school has had to overcome in order to become successful in attaining a higher student achievement?

6b.) What programs exist for students who are in danger of not completing their high school graduation requirements?

Final Note: Thank the individual for participating in this interview. Request permission to contact the participant if further clarification on his/her responses.

APPENDIX D

Letter to the Panel of Experts

May 2011

Dear Ms. XXXXXXXX

I am a doctoral student in the Organizational Leadership Program at Pepperdine University. Currently, I am working on my dissertation as part of the requirement to obtain my degree. The purpose of this letter is to formally request your assistance in strengthening the interview questions I plan to use for the data collection portion of my dissertation.

My dissertation is a qualitative study of high achieving public high schools in California. The purpose of this study is to investigate the best practices that they have been employing to be successful. My goal is to formulate a grounded theory based on the data gathered from the interviews that I will be conducting.

I have identified 100 high schools with API scores of 800 or above and a similar ranking score of 8 or above. Out of these 100 high schools, my intent is to interview at least 15 – 20 principals or head of schools. My hope is that the data gathered from the responses will provide insights and valuable lessons as to how these high schools are successful in graduating students who have high critical thinking skills as well as highly proficient in their reading, math and science literacy.

I seek your knowledge and expertise as an educator to validate my interview questions. I am requesting that you evaluate them to ensure that I am successful in obtaining the appropriate responses from the participants of the study.

In order to validate my interview questions, please complete the following steps:

- Read the research questions
- Read the interview questions listed under each research question
- Please select one of the three choices listed under each interview question

I have attached a worksheet of the research questions, interview questions and the choices to select from. Thank you in advance for your time and willingness to assist me in this endeavor. If you have any questions, please feel free to contact me at XXXXXXXX or at XXXXXXXX.

Sincerely,

Rhea Sanchez

Doctoral Student

APPENDIX E

Validity of Instrument Survey

In order to explore and determine the best practices that these high achieving public high schools have employed, the following research questions and corresponding interview questions will be explored during the research. Please choose one of the following choices below each interview question.

1) ***What is the content of the curriculum in these high achieving public high schools in California, specifically the set of courses that support critical thinking skills as well as reading, math and science literacy?***

a) What specific educational purpose and experiences do you seek to provide the students with your math and science curriculum?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) How do you measure and/or assess if your math and science curriculum are providing the purpose and experiences that you described?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

c) **What are the specific practices employed by your school to increase students' self-confidence and knowledge in math and science?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

d) **What are the specific practices employed by your school that leads to increasing your students' reading literacy level?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

e) **What are the specific practices employed by your school that leads to increasing your students' critical thinking skills?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

f) **Do you have any specific programs to prepare your students for the California's state mandated exams such as CAHSEE and STAR Testing?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

2) ***What specific programs are implemented at these high achieving public high schools in California to prepare the students to enter and graduate from post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?***

a) **What specific programs or practices are currently implemented at your school to formally identify students who plan on entering a four-year university and specifically major in a STEM related field?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) What resources do you provide students who plan to enroll in a four-year university, specifically majoring in a STEM related field?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

c) **What are the programs or practices that you utilize in your school to involve professionals who work in STEM related careers?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

d) **What are the programs or practices that you utilize in your school to inform students about STEM related fields and careers?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

3) ***What specific programs are implemented at these high achieving public high schools in California that foster the skills of the students to acquire an innovative spirit?***

a) **What opportunities do you offer students to become innovative?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) **Are there any formal assessments implemented in your school to measure students' innovative skills?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

4) ***What are the roles of the parents and the surrounding community at these high achieving public high schools in California?***

a) Describe any formal parent groups that exist in your campus?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) Please describe any opportunities for parents and/or members of the community to participate in school decision-making process.

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

c) **What opportunities do you offer to members of the surrounding communities to become partners in the school community?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

d) **Do you use any local businesses in the community as vendors for school related needs?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

5) ***What are the characteristics of effective teachers and effective school leaders at these high achieving public high schools in California?***

a) **How do you define an effective teacher?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) **What professional development opportunities or programs exist for the teachers?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

c) **Are there any opportunities for teachers to partner with professionals, who work in STEM related careers?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

d) **How do you define an effective school leader?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

e) **What professional development opportunities do you provide to the school leaders?**

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

6) ***What are the existing challenges that need to be overcome at these high achieving public high schools in California in order to achieve success?***

a) Please describe any challenges that this school has had to overcome in order to become successful in attaining a higher student achievement?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

b) Do you have existing programs for students who are in danger of not completing their high school graduations requirements?

☐ The interview question, as stated, adequately supports the research question and should be retained on the protocol.

☐ The interview question does not adequately support the research question and should be deleted from the protocol.

☐ The interview question should be modified to adequately support the research question, revised the interview question as follows:

APPENDIX F

Validated Research Questions and Interview Questions

1.) How does the use of the curriculum in high achieving public high schools in California support critical thinking skills and promote reading, math and science literacy?

1a.) What educational experiences do you seek to provide to the students with your math and science curriculum?

1b.) How do you measure and/or assess if your math and science curriculum are providing the experiences that you described?

1c.) What are the specific practices employed by your school to increase students' self-confidence and knowledge in math and science?

1d.) What are the specific practices employed by your school that leads to increasing your student' reading, math and science literacy level?

1e.) What are the specific practices employed by your school that leads to increasing your students' critical thinking skills?

1f.) What specific programs do your school employs to prepare your students for the California's state mandated exams such as CAHSEE and STAR testing?

2.) What specific programs are implemented at high achieving public high schools in California to prepare the students to enter and to graduate from post-secondary educational institutions, specifically majoring in Science, Technology, Engineering and Mathematical (STEM) related fields?

2a.) What specific programs or practices are currently implemented at your school to formally identify students who plan on entering a four-year university and specifically major in a STEM related field?

2b.) What resources or preparations do you provide students who plan to enroll in a four-year university, specifically for those majoring in a STEM related field?

2c.) What are the programs or practices that you utilize in your school to involve professionals who work in STEM related careers?

2d.) What are the programs or practices that you utilize in your school to inform students about STEM related fields and careers?

3.) What specific programs or practices are implemented at these high achieving public high schools in California that foster or promote students to utilize innovative thinking?

3a.) What opportunities do you offer students to become innovative?

3b.) How are the students' innovative skills formally assessed or measured?

4.) What are the roles of the parents and the surrounding community at high achieving public high schools in California?

4a.) Please describe any formal and or informal parent groups that exist in your campus.

4b.) Please describe any opportunities for parents and/or members of the community to participate in school decision-making process.

4c.) What opportunities do you offer to members of the surrounding communities to become partners in the school community?

4d.) How have local businesses been encouraged to interact and support your school community?

5.) What are the characteristics or practices of effective teachers and effective school leaders at high achieving public high schools in California?

5a.) How do you define an effective teacher?

5b.) What opportunities exist at the school for teacher to become more effective?

5c.) What opportunities exist for teachers to partner with professionals who work in STEM-related careers?

5d.) How do you define an effective school leader?

5e.) What opportunities exist at the school for school leaders to become more effective?

6.) What are the challenges that needed to be overcome at high achieving public high schools in California in order to achieve success?

6a.) Please describe any challenges that this school has had to overcome in order to become successful in attaining a higher student achievement?

6b.) What programs exist for students who are in danger of not completing their high school graduation requirements?

APPENDIX G

Letter of Request for Participants

Dear Sir or Madam:

I am a doctoral candidate in the Organizational Leadership Program at Pepperdine University.

I am currently working on my dissertation as a requirement in obtaining my degree. I am formally requesting your esteemed participation on the data collection segment of the study.

My dissertation is a qualitative study of the high achieving public high schools in California. Its purpose is to investigate the best practices employed by these successful high schools. The intent is to collect, summarize and report these practices for the benefit of other educators, educational leaders, and policy makers.

Your school has been identified as one of the top 100 high schools with an Academic Performance Index score of 800 or above and a similar ranking score of 8 or above in California. As such, you have been selected to participate in the study. Your contribution to this study and to the field will be invaluable to practitioners and other researchers in the field.

I would like to invite you to participate in an hour-long interview to discuss the intricacies of your program. I have enclosed a list of questions that I will be asking you during this interview as well as a copy of an Informed Consent form outlining the purpose of my research and your involvement in the study.

The interview will be scheduled according to your availability and at your school location or by telephone. I have provided a reply form with which to inform me about your decision to participate. Kindly fill out the reply form and mail it back to me. I have also provided self- addressed stamped envelope.

Thank you in advance for considering to assist me in this endeavor. If you have any questions or concerns, please feel free to call me, Rhea Sanchez, at:

- Contact Phone Number: XXXXXXXX
- Contact Phone Number: XXXXXXXX
- Email Address: XXXXXXXX

Sincerely,

Rhea Sanchez
Doctoral Candidate