Copyright

by

Jorge Luis Arredondo

December 2014

STUDENT LEARNING OUTCOMES AND ADVANCED PLACEMENT PROFESSIONAL DEVELOPMENT: IMPLICATIONS FOR SCHOOL LEADERS

A Doctoral Thesis Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Education
in Professional Leadership

by

Jorge Luis Arredondo

December 2014

STUDENT LEARNING OUTCOMES AND ADVANCED PLACEMENT

PROFESSIONAL DEVELOPMENT: IMPLICATIONS FOR SCHOOL LEADERS

A Doctoral Thesis for the Degree

Doctor of Education

by

Jorge Luis Arredondo

Approved by Doctoral Thesis Committee:

_____
Dr. Angus MacNeil, Chairperson

_____
Dr. Steven Busch, Committee Member

_____
Dr. Michael Wayne Emerson, Committee Member

_____
Dr. Robin McGlohn, Committee Member

_____
Dr. Robert Borneman, Committee Member

_____
Dr. R. Joseph Rodríguez, Committee Member

_____
Robert McPherson, Dean
College of Education

December 2014

Dedication

This endeavor is dedicated to my loving and supportive family. Without their constant love and energy, this academic journey would not have been as special and memorable. Moreover, I dedicate my labor to my grandparents Gregorio Martinez Arredondo and Consuelo Arredondo, my parents, Eventino M. Arredondo and Orfelinda S. Arredondo, and my brothers Eventino Jr. and David Arredondo. They have always encouraged me to do my best in my academic and professional pursuits. They made many sacrifices along the way to give me the opportunities they never had. Despite the long hours with my career and meeting my family responsibilities, I accomplished this research with hard work and an achievable goal in my vision.

My wife and confidant, Veronica Almanza Arredondo, and my children—Jorge Antonio, Leonardo Ray, and Vivian Jiselle inspired me and kept me grounded toward the long home run. Thank you for your support and for making me proud. Veronica, thank you for encouraging and supporting me as wife, mother, teacher, and leader. I especially thank you for bringing our children to the M.D. Anderson Library at the University of Houston, so they could experience what researchers do and how we can make a difference in our education work. I love you all, and I realize you are always beside me, even during the last phase of my research and defense. Remember, anything is possible when there is a strong belief in oneself, and one dedicates the time and effort to learn and succeed.

Acknowledgement

I am grateful to my advisor, Dr. Angus MacNeil, for his steady support and encouragement. He challenged and assisted me to keep moving forward in my research. Also, my committee members understood and supported my research: Drs. Robert Borneman, Steven Busch, M. Wayne Emerson, Robin McGlohn, and R. Joseph Rodríguez. Each one of them provided unique insight into my research and shared feedback that was actionable to strengthen my research questions, literature review, and critical analysis. My colleagues and administrative team make a positive difference every day in the the lives of young people. I have witnessed how their teaching, learning, and leadership change lives.

This academic journey began in 1998 when I began my career as a as a public school teacher in Houston. Therefore, I would like to acknowledge my high school teacher mentor, Walter Sampson, and the teachers who shared their experiences to guide my research in Advanced Placement instruction: Diane Franz, Bernard Jackson, Magdalena Strickland, and Christopher Wood. Alongside these teachers, stand the students who transform our thinking and challenge us as educators and leaders. Daily I learn with them, and I believe we benefit as a result of our shared learning and teaching experiences.

The following thinkers assisted me in gathering research data and asked the right questions to think about the population under study: Carol Bedard, Luellen Bledsoe, Kevin Briand, Lupita Hinojosa, Deborah L. Muñiz, and Carla Stevens.

For my professional growth, I thank all the teacher participants who contributed to the focus group and shared their instructional perspectives and practices. Adelante!

STUDENT LEARNING OUTCOMES AND ADVANCED PLACEMENT

PROFESSIONAL DEVELOPMENT: IMPLICATIONS FOR SCHOOL LEADERS

An Abstract
of a Thesis is Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Education
in Professional Leadership

by

Jorge Luis Arredondo

December 2014

Arredondo, Jorge L. "Student Learning Outcomes and Advanced Placement Professional Development: Implications for School Leaders" Unpublished Doctor of Education Thesis, University of Houston, December 2014.

Abstract

Educational leaders are faced with the challenge of preparing more students than ever to be college ready. Many school districts in the US have turned to offering the Advanced Placement (AP) program to add rigor to the curriculum. Focusing on one urban district in the Southwest, this study examined students achieving a qualifying score of 3 or higher (AP student achievement) on AP exams, and examined variances in AP student achievement across different high schools over a seven-year period. Also, the study examined whether AP student achievement showed differences between teachers with varying attainment levels of hours of professional development (PD) training over a six-year period. The study further conducted several analyses of AP student achievement and examined the differences between other dependent variables: student potential (student PSAT score), school characteristic (school mean PSAT), and student backound as a participant (low SES) or non-participant (high SES) in the free or reduced lunch federal program. Lastly, the study collected responses from teachers in a focus group about the quality and utility of their PD experiences. The analysis revealed overall increases in student participation in AP exams by 75% from 2007 to 2013. However, the percent of AP exams taken that scored a three or higher decreased from 47% of the total number of exams taken in 2007 to 33% in 2013. The results also revealed differences in student achievement between students identified as low SES even when controlling for student potential (student PSAT Index), and levels of teacher PD. Findings from the

study should inform best practices to develop PD experiences for teachers involved in the AP programs and create more successful learning experiences for AP students.

Table of Contents

Chapter Page

I. Introduction 1

Background of the Problem 4

Statement of the Problem 8

The Purpose of the Study 10

Significance of the Study 11

Research Questions 12

Hypothesis 13

Research Design 14

Theoretical Framework 15

Assumptions, Limitations, and Scope 17

Definition of Terms 20

Summary 22

II. Literature Review 24

Historical Background of Advanced Placement 24

Advanced Placement Between 2008 to 2012 27

Advanced Placement Research 28

Measuring AP Contribution 33

Advanced Placement and PD 34

PD Learning Models 38

Traditional PD 46

Changes in PD 48

Teacher Training and Effectiveness 49

Limitations of Teacher Training Hours 53

Limitations of Taking AP Courses 57

Dual Credit Gaining Political Support as Alternative to AP 59

Socio-Economic Status and School Achievement Factors 61

Increase in Diverse Participation 64

Is the Increase of Diversity and AP Significant Enough? 65

School Leadership, AP and Urban Schools 70
What is the role of the administrators in teacher PD? 75
Culture and Environment of Support 80
School-Level Factors 81
Successful Leadership 84
III. Methodology 86
Research Questions 86
Research Design 86
Setting 89
Students by Ethnicity 89
Selection of Participants 89
Instrumentation 91
Procedures and Time Frame 91
Variables 93
Data Analysis 94
Methods 95
Limitations 96
Summary 97
IV. Results of the Study 99
Research Questions 99
Data Analysis 100
Data Analysis for Research Questions: 100
AP District Summary Data by Student Group 102
Summary of Combined Scale Score of PSAT Score 107
Research Question Two: 109
Overall Effect of Training Hours 109
Pairwise Comparisons 111
Analysis of PD Activity and Social Economic Status (SES) 112
Campus Level PSAT 114
Comparison of All AP, Teacher Training by Campus Level 117
“Selected” AP Exams, PD Training and School PSAT 118

Select AP Exams, PD Training and SES 120
Selected AP Exams Outcomes (DV), PD and SES (Independent Variables) Analysis (No Covariant) 122
AP Training and SES (no covariant) Includes Tests: AP US History, Biology, English and Spanish 124
AP Teacher Training, PSAT School, Five AP Exams 126
Research Question Three: 129
Focus Group Summary 131
Summary 132
V. Conclusion 133
Introduction 133
Discussion of Results 133
Implications for School Leaders 135
Implications for Further Research 136
Conclusion 140
References 144
Appendix A Teacher Focus Group 157
Appendix B Letter to Assistant Superintendent 159
Appendix C Approval Letter from Assistant Superintendent 161
Appendix D Course Data Table 164
Appendix E Approval from the University of Houston Human Subjects Research Committee 166
Appendix F Solicitation Script 168

List of Tables

Tables Page

1. 2013 District Summary of AP Participation and Performance by Student Group in Gr. 9-12 102
2. 2013 Comprehensive High Schools for AP Participation and Passing..... 104
3. Magnet Schools PSAT College Readiness, AP Participation and Performance of Students Scoring 3 or higher. 105
4. Summary of AP Percentage for both Magnet and Non-Magnet Schools 106
5. Summary of Combined Scale Score of PSAT Score 107
6. Descriptive Statistics of PD (PD) Activity, Percent Passed (3 or higher) AP Exam, and Number of Students 110
7. Descriptive Statistics of PD (PD) Activity, Percent Passed (3 or higher) AP Exam, and Number of Students, included covariate. 110
8. Descriptive Statistics PD Training and SES 113
9. Campus, PSAT Mean and Identification of High and Low PSAT 116
10. AP PD Activity, Campus PSAT as Independent Variable 117
11. Select AP Exams, PD Training and School PSAT 120
12. Analysis of AP in five subjects, PD Activity and School Characteristic PSAT Level 121
13. Select 5 AP Exams, PD and School PSAT (no covariant) 123
14. Teacher Training versus SES..... 125
15. Descriptive Statistics Teacher PD, School PSAT and Exam..... 128

List of Figures

Figure 1. AP Participation and Performance from all high schools 2007-2013..... 101

Figure 2. Percent AP Passing. AP by Magnet Campus Percent Scoring a 3 or Higher. 107

Figure 3. Percentage of PSAT Readiness Index and AP School Percentage 3 or Higher.. 108

Figure 4. Percent AP Passed and Hours Trained. 112

Figure 5. Hours PD and SES (with covariate)..... 114

Figure 6. All AP Exams Hours of PD by School PSAT (with covariate)..... 118

Figure 7. Selected Tests: AP US History, Biology, English and Spanish Hrs PD by School PSAT (with covariant)..... 119

Figure 8. Selected AP Tests: AP US History, Biology, English and Spanish Hours PD Training by SES (with covariant)..... 122

Figure 9. Hours PD Training, School PSAT: AP US History, Biology, English, Calculus, and Spanish 124

Figure 10. Teacher Training and AP Achievement. Includes Tests: AP US History, Biology, English, Spanish and Calculus: Hours PD Trained by SES (no covariant) 126

Figure 11. Select AP Exams. Hours PD Trained by School PSAT by AP Test (no covariant).. 129

Chapter I

Introduction

Many U.S. public high schools have implemented the College Board's Advanced Placement (AP) program in an effort to improve student learning outcomes and increase college readiness (Sadler, 2010; Lacy, 2010, College Board, 2014). In the 1950s, the beginning of the AP program served about 1,021 students; however, by 2003, 514,163 were enrolled in an AP course (Lacy, 2010; College Board, 2014). By 2013, the number of students participating in an AP course reached 1.3 million, almost double the number from the class of 2003 (College Board, 2014). Even with such increases, high school educators have, "faced pressure to expand the AP program further" (Christiansen, 2009, p. 1). During the same period, the College Board reported participation of low-income students more than quadrupled from 2003 to 2013 with 58,489 to 275,864 (College Board, 2014). The expansion of student participation has led many educational leaders to advocate and support the proper training of teachers since the teacher serves as the, "pivotal player in this complex enterprise" of providing entry-level college courses to high school students (Paek, Braun, Ponte, Trapani, & Powers; p. 63). Subsequently, secondary schools have enhanced the quality of professional development (PD) for campus leadership and classroom teachers in an effort to provide support that will directly influence student learning (Leithwood & Louis, 2012; Guskey & Huberman, 1995; Guskey, 2000; Drago-Severson, 2009).

Student achievement can be influenced by classroom instruction delivered by effectively trained teachers (Leithwood, Louis, & Anderson, 2012; Lunenberg & Willemse, 2006). By extension to this belief, the College Board recommends that

teachers attend AP and Pre-AP Summer Institutes that offer 30-plus hours of subject-specific PD to equip teachers with content and resources to enhance their teaching in AP courses. The summer institutes include opportunities for teachers to exchange ideas and information with peers worldwide (College Board, 2013).

Another factor influencing student achievement is the quality of leadership at the district and school level. Strong leadership may potentially increase organization capacity toward a culture of learning and achievement across content areas and teacher interests. In a five-year study, Leithwood, Louis and Anderson (2012) could not find a single documented case of a school that managed to turn around its student achievement trajectory in the absence of talented leadership. Their study examined all types of leaders, school principals, teacher leaders, and district-level curriculum personnel. The district-level curriculum personnel were responsible for writing the AP curriculum, ensuring implementation, and evaluating the effectiveness of the program. The authors also looked carefully at each organizational level in the school system classroom, school, district, community, and state (Leithwood, Louis, & Anderson, 2012). The need for effective leadership that can support teacher development and teachers themselves are critical for higher levels of student achievement (Drago-Severson, 2009; Marzano, Waters, McNulty, 2005).

Offering a quality AP Program has some challenges in implementation and student outcomes. In order to provide AP teacher development, the training must meet the needs of a diverse teacher and student population. Even with extended time in summer training, conducting the training in isolation of the context and leadership of the school and the students has some disadvantages. Thus, teachers often face administrators

with different expectations and students with varying interests and needs, which make implementing the newly learned teaching strategies more difficult. Moreover, a quality AP program depends on AP teachers with teaching experience that are proficient in differentiating instruction, assessing for understanding, and executing other pedagogical moves that can influence student learning and achievement (College Board, 2013).

To implement an effective AP program that produces high levels of students achieving a qualifying score of 3 or higher on an AP exam (AP student achievement), an effort also needs to be made to develop the skill level of students, particularly students from diverse backgrounds who may not have support from home or may be identified as first-generation, college-bound students (Hallett & Venegas, 2011; Sadler, 2010; Prince, 2004). According to Prince (2004), who wrote a guide for the American Association of School Administrators (AASA) on closing the achievement gap, "Strategies to increase the number of students who complete challenging coursework are also more likely to work if students receive extra help with study skills and other types of social and academic supports" (p. 49). The College Board (2010) promotes the AP program with materials that state, "AP isn't just for top students or those headed to college. AP offers something for everyone." Yet, according to Sadler (2010), the research does not conclusively show that students who take an AP course in any subject and fail its AP exam benefit toward a college-going culture.

According to Dougherty, Mellor and Jian (2006a), after controlling for academic ability, as measured by eighth grade test scores prior to entering high school, students who earned a qualifying score of 3 or higher on at least one AP exam in English, mathematics, science, or social studies were more likely to graduate from college in five

years than students who took no AP exams, or who received a score of 1 or 2, or who took an AP course but not the corresponding exam. Therefore, educators should be aware that only offering AP courses, with few students scoring a qualifying score of 3 or higher, may not be necessarily contributing to preparation of students for college readiness and admission (Dougherty, Mellor & Jian 2006a).

Another factor to consider is the fidelity of implementation as it can be challenging to maintain similar levels of high-quality instruction from the same courses offered (Dougherty, Mellor & Jian 2006b). To explain, Keller-Margulis (2012) states, "Fidelity of implementation, often called treatment integrity, is the act of monitoring whether all elements of an intervention or plan were implemented as originally intended" (p. 344). This *monitoring* within schools that offer AP courses rests mainly on the teacher and the school leadership. However, there is research that has shown that the culture of the school may also be influencing student learning. For example, Deal and Peterson (2009) insist there is evidence to support the positive impact of school culture on student achievement.

Background of the Problem

Superintendents, policy makers, and other school leaders consider the implementation of AP programs as a gateway to college readiness and access for all students, in particular for those of low-income, working-class backgrounds (Dougherty & Mellor, 2009; Dougherty and Mellor, 2010; Posthuma, 2010; Prince, 2004). In some instances, school leaders implement policies to "increase the number of AP courses offered and to equalize them across schools" (Prince, 2004, p. 47). Through the process of implementing an AP program, school leaders face the challenge of providing effective

PD for teachers to learn about curriculum, instruction, and assessment to prepare them for the rigor and scope of the AP courses. It is through efforts in PD that teachers will gain essential knowledge, skills, and research on college-level expectations and the teaching of higher-order thinking skills (College Board, 2012).

Currently, the AP program has over 30 courses, from Studio Art, to Biology, to Calculus, and offers students a unique opportunity to take more advanced courses during high school toward an early college curriculum (College Board, 2013). Each course has an end-of-year criterion-referenced exam. Students who score a qualifying score of 3 or higher may receive college credit. Even though each college/university sets its individual credit policy standards, the opportunity to gain college credit via standardized examinations can make college more affordable for many students and their families. Students enrolled in AP courses also have the opportunity in most high schools to receive additional value on their grade point average since AP courses usually are awarded an extra point value as compared to regular courses. The college savings, along with the incentive that students gain by being in the challenging courses, along with the added value to their grade-point average and other academic and financial incentives, make taking AP courses an attractive option for high school students.

Since the 1990s, the College Board initiated, "Equity and Access for All Students" which was an initiative intended to, "push for more participation in AP classes and AP exams," (Christiansen, 2009, p. 4). With so many different variables for consideration, many school leaders are faced with making decisions on what to focus on when implementing a strong AP program. When considering, "average startup costs for PD, textbooks, supplemental reading, and materials and equipment can range between

$3,200 and $10,000," it is important that leaders understand the variables that will yield better student learning outcomes (College Board, 2013a).

A review of the research yielded several recommendations on how to effectively implement AP programs. According to a report by Hansen (2005), school administrators should pay attention to several recommendations that have been supported by studies. The following are some recommendations:

1. Focus on student preparation,
2. Adequately prepare teachers for instruction in AP courses,
3. Provide materials and a system of support for teachers. Consider the teacher and student incentives to increase performance, and
4. Create high standards and high expectation for all students. (p. 3)

The PD is recommended as *essential* for teachers to prepare lessons effectively that align with the college-level curriculum. As stated earlier, the College Board recommends that all new AP teachers attend a specialized one-day training and a five-day Summer Institute. They additionally recommend that schools provide release time and supplemental pay for mentoring, networking, collaborating and reading research to stay current with the latest academic technologies. All of these critical processes, coupled with an emphasis on proper PD and support from coordinators and administrators, bring to the attention the large investment that is necessary to the implementation of the AP program. Without such a comprehensive approach, that includes the proper monitoring, implementation and assessment, the AP program may not yield student achievement results needed for college and career readiness.

Therefore, district-level administrators and school-level leadership have an important role in teacher effectiveness in implementing an effective AP program. For example, research showed that teachers in lower-performing AP classes reported significantly more often that there was little pressure from administration to achieve high scores, while teachers of high-performing students indicated more often that they experienced pressure from administration (Hansen, 2005). Furthermore, another study showed the principal's attitude contributed to higher-performing classes, particularly in "lower SES schools" (Hensen, p. 2).

School level leadership plays an important role in the effectiveness of student achievement, particularly as "adult developers" and PD leaders (Drago-Severson, 2007, p. 70). The researcher points out that principals, although to different degrees, employ, "initiatives aimed at supporting adult learning" called, *Learning-Oriented Model of School Leadership* (Drago-Severson, 2007, p. 87). These four pillar practices (Drago-Severson, 2007) include: "(1) Teaming/partnering with colleagues within and outside the school, (2) Providing teachers with opportunities to take on leadership roles, (3) Engaging in collegial inquiry, and (4) Mentoring" (p. 87).

Drago-Severson calls to attention the importance of making stronger connections between the adult learning and adult development theories that "inform" PD programs. She concludes, "Principals who create professional learning opportunities that renew adults' passion for learning while intentionally attending to how they make meaning of their experiences will support adult growth and enhance teaching" (p. 118). For that reason, the principal's role as an instructional leader has been suggested to be linked to academic achievement.

Aside from effective school level leadership, district level leadership also plays a role in student achievement (Leithwood, Louis, Anderson, & Wahlstrom, 2004). In *Linking Leadership to Student Learning*, Leithwood and Louis (2012) indicate how school leadership improves student achievement. The research is based on a five-year study of 43 districts, across nine states, and included 180 elementary, middle, and secondary schools. They examined leadership at each organizational level in the school system—classroom, school, district, community, and state.

Statement of the Problem

Many school districts and individual schools understand the importance of promoting college pathways and access to more students than ever before, and many leaders have accepted the challenge by implementing the AP program. The program includes investing in teacher training and encouraging more students to take AP courses and corresponding exams. Some urban schools have also formed partnerships with community colleges and universities to provide dual-credit college courses to strengthen networks and opportunities for students and their families. Stakeholders and educators view the cost savings to students and the building of a college-bound culture as a significant benefit to students. However despite these efforts and increases in overall district AP participation, some urban schools are still experiencing little success, as the number of students scoring a qualifying score of 3 or higher is not increasing in equitable numbers among high schools (College Board, 2001; 2013).

Consequently, many school districts are interested in the factors, such as the level of PD, leadership support and distribution of resources, which may influence improved student learning and AP achievement outcomes. Furthermore, although

districts and schools understand the importance of PD, the gap in knowledge occurs in the proper activity amount of PD that lead to quality PD for teachers to help *all* students experience success in AP student achievement. According to the *Commission on the Future of the Advanced Placement Program* (2001), they reported, "the need to channel resources to support growth into underserved areas by advocating access and equal opportunity for all students, regardless of race, socioeconomic status, geography, size of school or other factors" (p. 7). Hence, the need to investigate the progress of one particular urban district by reviewing differences in AP student achievement among different schools as well as research contributing factors of teacher PD that may be supporting or not supporting a successful AP program.

While much of the research has provided evidence to demonstrate that more overall numbers of students benefit from being enrolled in AP courses, more research is needed toward studying the percentage of students scoring a qualifying score 3 or higher (AP student achievement), and examining characteristics of students and schools that may or may not being experiencing success (Dougherty and Mellor, 2010; Sadler, 2010). Important variables that contribute to AP student achievment may be teacher training hours, teachers' perspective on student success background, leadership at the school and district level, student potential, and development of students from diverse populations.

All of these are important factors that can support a college-going culture that can benefit students, families, and teachers. This study described the frequency of student participation and success on AP exams, compared teacher training activities (training hours) between teachers from different urban high schools, and gathered teacher

perceptions to provide recommendations for teacher professional growth and teaching experiences.

Specifically, the following study examined the participation of high school students taking AP exams and the number earning a qualifying score of 3 or higher for the last five academic years (Fall 2008–Spring 2013) in a large, urban school district in the Southwestern United States. Also, the study examined the difference between PD activity and student learning outcomes on the number of students earning a 3 or higher in five subject areas: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. Finally, the study collected responses from a teacher focus group. The questions targeted the teachers' insights on their previous attended training and other learning experiences on campus or off campus.

The Purpose of the Study

Educational leaders are faced with the challenge of supporting highly qualified teachers in their effort to prepare more students to be college ready. Many public school districts have turned to offering the AP program to further this effort. The purpose of this study was to review and describe the implementation of the AP program in an urban district. Specifically, the study described the student participation in a large, urban district located in the Southwestern United States with students who took AP exam(s) and earned a qualifying score of 3 or higher for a seven year period (Fall 2006–Spring 2013). Another purpose of the study was to determine during a six-year period (Fall 2007-Spring 2013) any differences in the amount of teacher PD activity (training hours) and AP student achievement, specifically AP exam scores in five subject areas: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History.

Lastly, teacher perceptions were collected via a focus group to gain teacher voice and perspectives on professional growth and development in their content areas.

Significance of the Study

With the upward trend of AP exams being administered in American high schools across the country, the important role the results play on school rankings, and the current expectation to prepare more students for college rigor, it is prudent for educators to review the degree of impact the AP program is having at different campuses and for all learners including those from diverse backgrounds.

There are some assumptions by school and district leaders that implementing the AP program in itself will help yield positive results for all students at all campuses. This assumption may have some face validity in offering students rigorous courses; however, it is important for policy makers and school leaders to examine the degree of success by measuring the percentage of those students scoring a qualifying score. As Sadler (2010) stated, "The only accurate gauge of whether AP courses in a school are successful is if students take and pass (3 or higher) the AP exams." He continued, "AP courses in which few students take or pass the exam are not effective, and the resources, both material and personnel, should be considered for reallocation to improve lower level courses" (p. 267). Henceforth, it is important for school leaders to gather more information on schools that are more successful in increasing student AP participation and increasing AP student achievement. As Sadler (2010) states,

> Failure indicates that the students are unprepared or not up to the challenge, or the course does not have a proficient teacher or is lacking in resources. PD for teachers can help immensely, as can teachers taking a refresher course in the

> subject at a local college or university to relearn the content and experience the coverage that AP courses seek to emulate. (p. 267)

The importance of PD for AP teachers cannot be overstated, as it is one of the largest expenses of operating a school, next to teacher compensation (Joyce and Calhoun, 2010).

Equally central, PD done appropriately by the campus leadership and implemented by the teacher has the influence to positively "transform" student learning (Drago-Severson, 2007). School and district leaders must examine the various models of PD to give educational leaders more information on how to appropriately support teachers to improve student achievement. Although there is research to show that there are other important variables that may yield success in students scoring a 3 or higher on AP exams, the research confirms that teacher training is important and helpful in improving student academic achievment (Drago-Severson, 2007; Leithwood and Louis, 2012; Joyce and Calhoun, 2010). For example, in a national study, 1,200 teachers participated by completing a survey in which they identified differences between highly successful and less highly successful AP Biology teachers. A key difference was found to be teachers' PD; PD was a consistent predictor of student performance on the AP exam. School and class contexts were also found to be significant, with smaller class sizes and daily class meetings (rather than block scheduling) also emerging as predictors of student success on the exam (Paek, Braun, Ponte, Trapani & Powers, 2010).

Research Questions

1. *In an urban school district, how has the student participation increased and student performance improved on AP exams over a seven-year period between 2007 and 2013?*

2. *What is the difference between the quantity of completed teacher training PD and the rate of students achieving a qualifying score of 3 or higher on the following AP subject exams: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History?*
3. *Which factors of professional teacher training do teachers believe influence student performance on AP exams?*

Hypothesis

The first hypothesis was that schools over a seven-year period with higher than district average success on student AP participation and AP student achievement, will demonstrate similar increases over the seven-year period in AP participation and AP student achievement. However, schools that had a low number of students participating on AP exams and low AP student achievement will demonstrate increases in AP student participation but low AP achievement in a seven-year period.

The second hypothesis was that teacher training (independent variable) would have a main effect on AP student achievement (dependent variable). That is, when controlling (use of a covariant) for the student potential on the Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT), students will have differences in outcomes on AP achievement when teacher PD participation activity (none, low or high) was higher. Furthermore, students with teachers from low activity levels of PD participation would have lower outcomes in AP student achievement (by scoring a qualifying score of 3 or higher) than students with teachers from high levels of PD participation (high PD). Lastly, students from backgrounds of participating in free and reduced lunch (low SES)

will show higher AP student achievement when taught by a teacher with high PD activity as compared to none (none PD) or low PD.

In other words, the last hypothesis was that there would be a significant difference between and teacher training activity (Independent variable) and students scoring a qualifying score of 3 or higher (AP student achievement) when controlling (co-variant) for the student potential factor such as the composite average PSAT scores by schools in spite of different mediating variables such as free and reduced lunch and school characteristic (low PSAT school).

Research Design

An explanatory sequential mixed method study was conducted (Creswell, 2014). The first part included a descriptive quantitative study that documented the participation of students taking AP courses and the number of students scoring a qualifying score of 3 or higher (AP student achievement) in an urban district from the school years of 2007-2013. This descriptive quantitative component documented the difference that exists among high schools in relation to the AP course offerings, AP student participation and AP student achievement.

The second part consisted of a quantitative view to assist in finding variances between the amounts of PD activity (hours) teachers attended and student AP student achievement. Specifically, the study examined the impact of the students scoring a qualifying score of 3 or higher by the different number of hours of PD (none, low, and high PD) AP teachers participated in an urban district. The study attempted to focus on the following AP exams: Biology, Calculus AB, English Language and Composition,

Spanish Language, and U.S. History. Yet, data were collected from all subjects tested by the district.

Lastly, the third part of the study utilized qualitative methodology to gather explanatory factors on what teachers attribute as important for effective professional growth and development. The questions asked teachers to detail the PD factors they felt attributed to student achievement. Responses from open-ended questions from teachers were gathered and used to "…help explain the in more detail the quantitative results" (Creswell, 2014, p. 224).

The Bayou Independent School District had a total of 43 high schools, which included three kinds of site schooling: school-wide magnet schools, small charter schools, and comprehensive schools. For the purpose of this study, data were collected from all schools for the first researcher question; however, 23 comprehensive schools and two magnet schools (25 total high schools) were included for the second research question that gathered data on teacher training and student AP achievement. There were originally 24 comprehensive high schools; however, one school was eliminated from the analysis since it was recently founded and the school did not have sufficient years in existence to be added to the analysis and appropriately compared. The study collected the following data: student historical PSAT score averages, AP course exam scores, student participation of free or reduced lunch, and teacher PD participation courses and hours completed for each school year.

Theoretical Framework

Several theories guided the framework of this study. For example, it is important to consider theories of PD and trainings. Thomas Guskey (2000) has written extensively

in this area and has several models that explore the importance of PD and link it to classroom practice. Guskey's research provides a critical contribution on the role that PD and school leadership can have on student achievement. He discusses levels that are important when delivering effective PD, and he asserts that leadership that supports adult learning is directly tied to improving teaching and fostering student development and achievement. Those levels are (1) participants' reactions; (2) participants' learning; (3) organizational support and change; (4) participants' use of new knowledge and skills; and (5) students.

Drago-Severson (2007; 2009) has also worked in the area of PD. Notably, the researcher explores how PD and adult learning factors contribute to effective teaching practices. The research on PD learning relies on the constructivist development theory or perspective that contends that learners acquire new knowledge by constructing it for themselves (Drago-Severson 2009; Mezirow, 2000).

There are also theories of leadership and student achievement that provided contextual support on how leaders of learning partake an important role although indirect, to student achievement. Leithwood and Louis (2012) wrote extensively in this area. In the study, *AP: A Critical Examination of the Advanced Placement Program*, Sadler (2010) challenges some of the proponents of the AP program. Sadler (2010) counters those that advocate the AP program with sweeping claims about the broad impact on students: they graduate earlier, switch college majors less often, and are better prepared. Instead, he asserts there is little evidence to support these claims. Sadler claims that the involvement in AP courses does not appear to bestow these benefits on participating students beyond the habits and motivations that students already possess by enrolling in

advanced high school courses. He argues, "AP is not effective in universally countering the effects of poor preparation or lack of effort in making a college education more affordable" (p. 264). Consequently, "there is little to recommend any benefit accruing to students who take and fail an AP exam" (p. 265). Sadler's research was used to counter some of the claims made by College Board and to add to the discussion of AP research in urban school districts.

Assumptions, Limitations, and Scope

The first assumption is that data reported by the school district regarding AP participation, AP passing rate, and teacher training hours are accurate and reliable. The second assumption is that the data collected from the school district and the Texas Education Agency (TEA) regarding school name, demographic information, and rate of students on free and reduced lunch, as well as information on PSAT scores is accurate and reliable.

Furthermore, the study assumes there is a heterogeneous grouping of students within the schools with similar preparation, motivation, and ability.

Research Question (RQ-1),

In an urban school district, how has the student participation increased and student performance improved on AP exams over a seven-year period between 2007 and 2013?

For the first research question, the study only collected data for the last seven years to show the extent of increase in AP participation and percent of students scoring an AP qualifying score of 3 or higher (AP student achievement). The school data were collected by total number of AP students enrolled in a course and taking corresponding

AP exam. It could be possible that looking at the data for a longer period would have showed other differences. The data also did not account for other potential external factors that may have contributed to the participation such as school leadership, district initiatives, or other incentive programs that could have added or subtracted resources necessary for students, teachers and schools. The data also did not collect information such as teacher experience levels or teachers absences or on leave during the school year which may have affected AP student achievement.

Research Question (RQ-2),

What is the difference between the quantity of completed teacher training PD and the rate of students achieving a qualifying score of 3 or higher on the following AP subject exams: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History?

For the second research question, the data included 23 comprehensive high schools and two magnet schools. The study attempted to control variables by comparing schools with similar student populations. Despite the fact that the selected high schools had similar student populations, it is understood that not all variables which may influence student outcomes on AP exams were controlled. Another factor to consider is that all of the PD sessions were not necessarily similar in content, and the study was limited by collecting solely the amount of hours of the PD training completed. Thus, it did not measure the quality and rigor of the sessions and the instructors' ability and experience in training other teacher colleagues. Furthermore, it is unreliable to assume that there were equal amounts of fidelity of implementation of the classroom practices, planning, and assessments as a result of similar PD trainings as this study was limited to

measuring these important variables. The study also was limited in that it did not collect information about teacher experience that may influence the quality of the classroom experience (Hansen, 2005). Lastly, the data did not gather information about teacher absences or on leave during the school year which may have affected AP student achievement.

Research Question (RQ-3),

Which factors of professional teacher training do teachers believe influence student performance on AP exams?

For the third research question, there are limitations to the focus group methodology in gathering teacher responses to open-ended questions. Teacher participants were provided one opportunity to respond, and several factors may have influenced their participation and comments including outside pressures or peer pressure to respond freely. A small sample of 15 participants may also not have been representative of the entire district or other districts, so it is hard to draw larger generalizations. During the focus group activity, teachers were asked about their training experience. Furthermore, there was no gathering of other factors that may influence high student outcomes such as teacher experience, high student motivation, relevant and effective teacher training, and supportive school leadership environment. Teachers from schools with lower than average student success may be affected by teachers' limited qualifications, students' indifference to the test, limited teacher training, absence of school leadership support, and absence of rigor in school course offerings. The focus group was limited in that it did not gather this background or demographic information from the teachers participating in the focus group. Lastly, data were collected in one

urban district in the southwest part of the United States and should not be generalized to other areas.

Definition of Terms

For the purpose of this research, the following definitions will be utilized to clarify terminology usage and meaning.

Achievement Gap: The commonly referred phrase that describes the disparity found between White and non-White students in academic and social achievement (Olivos & Quintana de Valladolid, 2014).

Advanced Placement (AP) Program: A program that offers students the opportunity to take college-level Pre-AP –Advanced Placement courses between 6th and 12th grade. The courses are aligned with similar curriculum and instruction to prepare students for Advanced Placement courses by specific subjects (College Board, 2013).

AP Student Achievement: Students scoring a qualifying score of 3 or higher on an AP exam.

AP Courses: Advanced Placement courses are college-level courses offered to high school students. The College Board provides end of year courses exams in May and students that score a 3 or higher may be granted college credit. They are offered in over 30 subjects in the categories of Arts, Math and Computer Science, English, Sciences, History and Social Science, and World Languages (College Board, 2013).

AP Potential: An online tool sponsored by the College Board that provides educators with an objective, data-driven method for identifying students who are likely to succeed in a particular AP course (Millsap, Camara, & Ewing, 2006, p. 7). According to the College Board (2013), it provides reliable predictions for 23 AP exams.

PSAT/NMSQT College Readiness Benchmark is the score on each section that at a student should meet or exceed to be considered on track to be college ready. Separate benchmarks are provided for grades 10 and 11. The study used the 11th-grade composite score of students. The PSAT benchmarks are provided for each section and the composite scores in reading, mathematics, and writing. It was developed based on the SAT College Readiness Index, which was computed as part of a SAT validity study.

College Board: College Board is the parent company of Advanced Placement. The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand the access to higher education. The membership association is made up of over 6,000 of the world's leading educational institutions and is dedicated to promoting excellence and equity in education (College Board, 2013).

Dual Credit Courses (DC): Courses that allow students to earn college credit and fulfill high school graduation requirements while still in high school (Roman, 2013). Dual-credit courses are college courses offered to secondary school students who receive college credit and credit toward secondary school graduation with the same courses (Marshall & Andrews, 2002).

Equity and Access Policy: The policy refers to the College Board guiding principle that strongly encourages educators to make equity and access a guiding principle for their AP programs by giving all willing and academically prepared students the opportunity to participate in AP. The College Board recommends the elimination of barriers that restrict access to AP for students from ethnic, racial, and socioeconomic groups that have been traditionally underserved (College Board, 2014).

International Baccalaureate (IB): The IB Diploma Programme (DP) is an academically challenging and balanced program of education with final examinations that prepares students, aged 16 to 19, for success at university and life beyond. It has been designed to address the intellectual, social, emotional and physical well-being of students (International Baccalaureate Organization, 2014).

PD: PD or some training or workshop. As described by Guskey (2000), "those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p. 16).

PSAT: The Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT/NMSQT) is a program cosponsored by the College Board and National Merit Scholarship Corporation (NMSC). The Preliminary SAT (PSAT) is a national examination administered in October of each year by the College Board. It is a standardized test that provides firsthand practice for the SAT. It also gives students a chance to enter NMSC scholarship programs and gain access to college and career planning tools. The PSAT/NMSQT measures: Critical Reading skills, Math problem-solving skills, and Writing skills. It is also used as a measure to predict success in AP courses (College Board, 2013).

Summary

School districts offer AP courses and teachers and staff hope that students who take the courses and AP exams are sufficiently prepared to succeed in obtaining a 2-year or 4-year degree. The study examined the participation and performance students taking AP exams over a seven-year period in one urban school district. The study also

examined the differences between the PD activity and student outcomes on the number of students scoring a qualifying score of 3 or higher from the following groups: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. Finally, the study conducted a teacher focus group to collect their perceptions through open-ended question responses. The teacher responses detailed the PD factors that contributed to positive student achievement.

Chapter II

Literature Review

This chapter looks at the background literature and examines the research that describes the emergence and significance of the Advanced Placement (AP) Program. Over the last ten years, limited teacher capacity has "threatened the quality" of the AP program (Christiansen, 2009, p. 37). For that reason, the study explores the literature on teacher training and PD (PD) that is available as well as the literature on the essential characteristics of adult learning, and elements that yield changes in teacher behavior which ultimately lead to positive student learning and achievement. Furthermore, the literature review examines the education level of students from diverse backgrounds and their varying achievement levels, particularly students from ethnic minority groups as well as students from low-income backgrounds. Lastly, the literature review looks at the school contextual factors, such as school leadership, school environment, and school culture, which contribute to the success of teachers and students alike (Leithwood and Louis, 2013; Hallinger & Huber, 2012; MacNeil, Prater, & Busch, 2009).

The databases used for the literature search included, the University of Houston Library One Search, EBSCO Host, and ERIC databases and current information from the College Board. In searching the literature, the following keywords were used: Professional Development, PD, Advanced Placement, AP, Teacher Trainings, Challenges in AP, and Leadership and AP.

Historical Background of Advanced Placement

In 1951, the Ford Foundation founded the Fund for the Advancement of Education which eventually became part of the College Board's Advanced Placement

Program (Lacy, 2010). The Ford Foundation was interested in supporting certain high school students that were capable of college work (Christiansen, 2009). In the academic year, 1955-1956, the College Board began the Advanced Placement (AP) program and "…participation included 104 schools, 1,229 students taking exams, 2,199 exams taken, and 130 colleges entered" (Lacy, p. 30). The AP program offered AP English and AP Calculus and was intended to be an elite program for the best and brightest students (Sadler, 2012). A few years later, in the 1959-1960 school year, 10,531 students took AP exams (Lacy, 2010).

Participation in the AP program grew greatly between the 1960 and 1975 (Lacy, 2010). When the Soviet Union launched the first Sputnik satellite in 1957, it shocked America and the general reaction spurred a reevaluation of the quality of American schooling and support for higher standards in secondary schools, particularly in mathematics and science (Lacy, 2010). This is considered one of the factors that impacted participation in AP courses, and "student participation grew from 10,531 to 55,442, with the number of examinations taken rising from 14,158 in 1959-1960 to 71,495 in 1970" (Lacy, 2010, p. 33). The participation growth began to level off in the early 1970s. In 1973, there were 54,778 students taking exams, which was only about 1,200 students more than 1969 (Lacy, 2010).

Nevertheless, the AP program continued moving forward. By 1972, new examinations in French, music, studio art, and art history were added (Lacy, 2010). In 1969, only about 14 percent of the nation's high schools offered AP exams, yet by about by the mid-1990s, half of the U.S. secondary schools were involved with AP. Student participation went from 65, 635 in 1974-1975 to 704,298 in 1998-99, and the number of

examinations taken by students increased from 85,786 to 1,149,515 in the same period (Lacy, 2010).

During this growth, there were economic, political, and social factors that contributed to the growth of AP participation. In terms of economics, there were changes in costs of exams, but financial assistance was provided to students with financial need. For example, in 1975, the fees were $6 for registration and $20 per exam. By 1995, the maximum fee was $72 and students with financial need could receive a reduced fee to $43. Despite the College Board's AP fee increase during this period, actuals fee costs to students were lower as a result of the positive political support that reduced actual student costs through vouchers and financial assistance. Several states, such as Florida and Texas, began to subsidize fees to states to reduce the amount to students (Christiansen, 2009). Similarly, the U.S. Department of Education began to subsidize AP exam fees through grants to states and reducing fees to students (States News Service, 2012; Rhodes, 2007; Klopfenstein & Thomas, 2009).

In terms of social factors, by the 1980s, public and societal factors contributed to the AP program's popularity. Films such as *Stand and Deliver* (1998) promoted the AP program. *Stand and Deliver* told the true story of Jaime Escalante, a Garfield High School math teacher in Los Angeles, who increased the number of students participating in AP Calculus and passing the exam in an urban high school. Some controversy and disparities were at the forefront as investigations took place after the students administered the examination outperformed their peers at higher-performing schools and neighborhoods nationwide. The test results were confirmed with no discrepancies. Likewise, the 1980s also represented for the College Board's AP program an increase in

student diversity with a “substantial movement toward racial, ethnic, national and age democratization among examinees” for equal access and to reduce bias and barriers to a college-going culture (Lacy, p. 35).

In the 1990s, the continued growth brought particular concerns about the quality of the AP program, and there were some views that were shifting as criticisms emerged. For example, researcher Sadler (2010) point outs concerns in the area of teacher quality, course equity, and a shortage of evidence about the efficacy, cost, and value of the AP program. Conversely, in 2006 President George W. Bush called for more AP teachers in mathematics and science and advocated for training for an additional 70,000 high school teachers (Bush, 2006 as cited by Sadler, 2010; Christiansen, 2009). Despite the criticism of the program, there was evidence to suggest that students needed access to rigorous standards provided by the AP courses in an effort increase enrollment and performance and it was important to have the development of comprehensive programs that included intense teacher training, student study sessions, school equipment, reduced exam fees and monetary incentives for students and teachers (Ramsey, 2012).

Advanced Placement Between 2008 to 2012

The U.S. Department of Education (2010) reported that in 2008 over 1.5 million U.S. students took at least one Advanced Placement (AP) exam, which represented double the amount from the previous ten years. Furthermore, the number of students taking an AP exam increased for all racial and ethnic groups, the largest relative increase in AP exam taking was for African-American students. Just over 31,000 African-American students participated in 1999 while more than 108,500 African-American students participated in 2008. In addition, “Hispanic-American student participation in

AP exams tripled over the same period, increasing from 62,900 to 209, 700 students" (p. 76). Consequently, the increase in participation in the AP Program in high schools has shown to be beneficial for school districts to meet the students' access to higher education and preparation for the college experience (Sadler, 2010; Venezia & Kirst, 2005).

According to College Board's *9th Annual AP Report to the Nation*, the number of graduates leaving high school in 2012 having taken an AP exam was 954,070 or 32% of students in the U.S., which is an increase from 2002 when the number of graduates leaving high school having taken AP exam was 471, 404 or 18% of students in U.S. public high schools (2013). The number of graduates scoring a 3 or higher on an AP exam during high school in 2012 was 573, 472 or 19.5%, up from 2002 when the number was 305, 098 or 11.6% (College Board, 2013). Both of these figures show a steady increase in the past ten years. In a review of the national data, the average percent increase was 7.9 percent between 2002 and 2012. Furthermore, The College Board (2013) reported, "Twenty states had a larger percentage point change over time than the national average with Maryland at the highest at 29.6 % of the students scoring a 3 or higher on an AP exam during high school" (p. 17).

Advanced Placement Research

Even though there was an increase in participation in AP, criticisms emerged. Critical areas of concern were identified by Education Partnership in their research brief, *Success in Advanced Placement Courses* (2005). Included in the report was the fact that although Advanced Placement was experiencing an increase in AP courses or participation, almost half (43%) of high schools were not offering AP courses.

Furthermore, the researcher showed that there existed disparities in AP courses among urban, rural and schools with high percentages of students from lower socio-economic status.

There were other concerns brought up by the "Commission on the Future of the Advanced Placement Program" (2005). The Commission cited the shortage of qualified teachers and an increased need for more resources. It recommended that:

- There be sufficient numbers of dedicated well-trained teachers,
- All students should have access to AP courses and have the chance to acquire the skills needed to succeed in them. There should be a focus on underserved schools and populations,
- Attention should be given to adequate student preparation to enter AP courses,
- Teachers need more instructional resources. Teacher's needs were identified as paramount,
- A system of support for needs to be in place before a rapid expansion of the number of AP courses occurs in schools.

Again, there was attention to PD as the focus on improving outcomes for AP student success. Such PD was seen as "essential." Equally, there was attention to developing and preparing all students adequately as well as providing instructional resources. In addition, the report (2005) offered factors that contributed to the success of the AP courses provided in the state of California. Those included:

- The teachers meet with feeder schools for vertical alignment,
- Teachers in lower-performing classes were more likely to perceive large gaps in student preparation for the Advanced Placement class.

- Teachers in high-performing classes were more likely to deny admission to Advanced Placement courses for unqualified students.
- In lower SES schools, teachers of higher performing classes more often reported strong support from the Principal. In higher SES schools with high performing Advanced Placement classes, there wasn't an association between teachers' views of the principal and student performance.
- Teachers in lower performing Advanced Placement classes reported significantly more often that there was little pressure from administration to achieve high scores while teachers in high performing courses indicated more often that the experienced pressure from administration.
- Higher performing classes have teachers with more years of experience teaching the Advanced Placement subjects than teachers in the lower-performing classes,
- In higher SES schools, there was a link between high-performing classes and the teacher's possession of a doctorate. (p. 2)

The author found that when teaching minority students in Advanced Placement classrooms, the same strategies for successful teaching of minority students in regular classes seem to be related to those strategies in the Advanced Placement classroom. Some of those strategies included high expectations for all students, awareness of background and cultural resources of students as well as prevailing culture of the school, an ability to engage students in meaningful learning tasks as well as to personalize and adapt instruction to the needs of the students, use of a broad array of teaching strategies to foster cooperation and communication between the teacher, students, and parents.

This brief provided some significant findings that contribute some important elements in the implementation of the AP program.

Testing Service reported in 2008 on a study, *Access to success: Patterns of Advanced Placement participation in U.S. High Schools,* which merged the College Board's Advanced Placement program data for the 2003-2004 school year with data from the U.S. Department of Education for all U.S. high schools (Handwerk, Tognatta, Coley, & Gitomer, 2008). The merged U.S. Department data contained more demographic information about public high schools such as, "school size, locale, and socioeconomic status (p. 2). Conclusions from the study described the availability of AP across public high schools, but cautioned that the fact that students attend schools that offer the AP program did not equate to mean that students participated equally. They further discussed that reporting should include the participation of different student socioeconomic, racial/ethnic, and geographic characteristics. The reasoning behind this approach, according to Handwerk et al. (2008),

> [is that] by examining only data on overall average rates of participation and performance in the AP program [it] can mask important differences in the availability of educational opportunity to students attending different types of schools. (p. 3)

The authors aimed to answer the following three questions about students in grades 9 through 12:

1. What is the availability of the Advanced Placement program in the nation's public high schools?
2. How many students participate in Advanced Placement?

3. How many students are eligible for advanced placement or college credit?

Some of their findings include that while most (85%) of students attend schools that offer AP exams, few students participate in the program by taking exams and even fewer score high enough to earn college credit or placement. Furthermore, they found that urban schools were more likely to offer AP than rural schools. They found that public high schools are similar in that Black/African American students are much less likely to participate in the program by taking an exam than the other racial/ethnic groups. Lastly, they found that poor and underrepresented minority students consistently lag behind their peers in AP exam participation and performance.

For these reasons they recommend the following:

> For more students to reap the benefits of Advanced Placement program participation by taking and doing well on the exam in addition to taking the course, schools need to do more to broaden their programs and create an "*Advanced Placement*" culture within their schools. Underrepresented students in particular are more likely to participate in the Advanced Placement program in schools that offer more Advanced Placement sources. Small, rural, low-income schools are less likely than other types of high schools to participate in the Advanced Placement program, and underrepresented minority and low-income students are particularly underserved by the program. The availability of the Advanced Placement program in a school is a necessary, but insufficient factor in promoting student participation. (p. 5)

Furthermore, research showed that teachers in lower-performing Advanced Placement classes reported significantly more often that there was little pressure from

administration to achieve high scores, while teachers in high performing courses indicated more often that they experienced pressure from administration (Handwerk, Tognatta, Coley, & Gitomer, 2008).

Measuring AP Contribution

Duffy (2010) looks at the phenomena of persistence and performance of students enrolled in a four-year university who have completed AP courses in high school. He defines and measures persistence by 1) whether the first-time, full-time freshman students reenrolled as sophomores, and 2) whether the students attained a degree within five years. Performance is gauged by freshman year GPA and graduation GPA.

Duffy used independent variables falling into four categories:

1. family income and parental educational attainment combined into a single socioeconomic composite variable representing family background (SESscale),
2. ACT composite score, high school GPA, and high school class rank were also combined into a single composite variable (ACHscale),
3. personal attribute variable represented by gender and race, and
4. student type as defined by participation or non-participation in dual credit programs (he includes AP courses as dual credit courses).

The four variables used as outcomes were first-year persistence, degree completion within five years, first year cumulative GPA and final degree cumulative GPA.

Duffy (2010) found that in terms of persistence, the ACHscale was the only significant predictor, and there were not significant differences in first year persistence or degree attainment between students who had regular course, AP or credit based college courses. He finds that the students in the AP and other college credit programs in high

school are academically motivated and academically proficient. They have higher pre-entry characteristics. In other words, they have distinctive characteristics as students that are independent of the AP experience.

The major finding of the research by Duffy (2010) is that no significant differences in persistence and performance outcomes were discovered among regular course, AP, and credit based college course participants. The composite high school achievement scale was the only independent variable to show a significant correlation with persistence and performance.

Advanced Placement and PD

The College Board established the importance of teacher training and made some recommendations for schools to achieve favorable AP student outcomes. Specifically, College Board recommended that all new "AP teachers attend a one-day training session followed by a College Board-endorsed AP Summer Institute, which provided five days of subject-specific PD" (Klopenstein & Thomas, 2010, p. 179). Furthermore, the College Board recommended teachers get, in addition to the summer institute, or five-day subject specific training, release time and supplemental pay for mentoring, networking, and collaboration as well as reading research and staying current with the latest technology (College Board, 2013). To be successful, a further recommendation by Klopfenstein and Thomas (2010) is that AP teachers audit a college course in order to learn what to do as well as what not to do, while relearning and gaining a deeper understanding of the content areas.

According to the Commission on the Future of the Advanced Placement Program, a sufficient number of dedicated, well-trained teachers are essential to a rigorous program

(2005). There were several studies that were conducted to research the outcomes of teacher training.

For example, a study conducted by Mason Goss (2004) looked at PD with regard to AP student outcomes. The focus of the study was AP social studies. The teachers were provided training in the use of different methods and strategies. Teachers were taught "the importance of a) mastery learning, b) the use of weekly written assessments, c) the use of primary documents, d) the use of actual AP tests for practice, e) the use of student-developed outlines, and f) vocabulary development" (p. 115). The results were that 88% of the students taking AP social studies earned passing grades of 3 or more. With some reproach, Mason Goss (2004) discussed that social studies teachers are faced with a conundrum: as the pressure increases around AP examination scores and AP participation, teachers must choose between teaching meaningful skills or teaching to a test. A limitation to this study though is that there was no comparison group. Thus, the study is limited because we can not necessarily directly attribute the success of the passing scores to the training as there are many other variables that could have attributed to the student success.

In another study, Paek et al. (2010) aimed at looking at AP Biology teacher characteristics and practices and the relationship to student AP exam performances. The primary goal was at identifying the differences between highly successful and less highly successful AP Biology teachers. The study surveyed 1,200 teachers. The study's key difference was found to be teachers' PD, and that PD is a consistent predictor of student performance on the AP exam. The analyses focused on two main questions, "1) What are the potentially salient differences in AP teachers' characteristics, situational contexts, and

teaching practices, and (2) Which of these characteristics and practices are related to higher student achievement on the AP exam?" (p. 71). The researchers chose to focus on the Biology exam because it is the most popular exam in science (the largest number of test-takers choose this exam) and because it has a "very broad and dynamic curriculum" (p. 64).

The most common PD activities that the teachers had participated in were the review of the exams, course descriptions and review of the *AP Biology Teacher's Guide* (2010). The teachers were concerned about the integration of technology into their courses and wished to have PD on that, and on managing students with less preparation in areas such as study skills. The teachers were also concerned about the breadth of the amount of material that was covered in the course. This was the "most critical training need," along with "knowing what can be dropped or modified." In this instance, the study methodology included getting opinions directly from teachers.

Some other findings of the study were that teachers encouraged the students to prepare for their exam by dedicating at least four hours a week to studying course material (Paek et al, 2010). They also helped the students prepare for the exams by using old AP exams as practice tests. The results suggest that there were three variables that link teacher context and practices with student outcome. First, the frequency of class meetings was important in that those that met daily did better than those that met less frequently. Second, the percentage of students who took the exam was significant. Classes in which fewer than 50 percent of the students took the exam tended to perform worse than classes with 75-100% of the students taking the exam. Thirdly, teachers who said that the use of AP exam topics and rubrics were "somewhat" to "extremely"

influential, had better student outcomes on the exam. Lastly, attendance at PD was a factor. Students of teachers that had never attended a "Summer Institute" or had only attended once, performed about the same on the exams. Interestingly, in the group of teachers who had attended more than once, their classes tended to perform worse than the classes between the first two groups.

In an another relevant study on the relationship of Advanced Placement and PD (PD), Laitusis (2012) examined the relationship between the level of AP PD activity undertaken in a school and the subsequent utility of that PD in predicting student outcomes while accounting for student, teacher, and school effects. That is, the study examined the level of AP PD activity and subsequent AP performance both in terms of average grade and percentage of students scoring a 3 or above. The analyses focused on AP outcomes in all subject areas as well as those only related to STEM courses. In addition to examining the relationship between the level of AP PD and overall AP performance, the study also examined student performance on a subset of the exams relating to the STEM disciplines (Biology, Chemistry, Computer Science, Environmental Science, Calculus AB, Physics B, Physics C: Electricity and Magnetism, Physics C: Mechanics, and Statistics).

The results were as follows:

- After controlling for average household income (SES), level of AP activity and teacher experience, schools with higher levels of teachers participating in AP PD were more likely to have higher levels of overall average AP performance (average exam score and average percentage of exams with scores of 3 or above) the following year.

- In addition to the number of PD events attended, teacher experience was also a statistically significant predictor of subsequent overall AP performance.
- For STEM-related AP Exams only, the level of AP PD attended by teachers in the school was also a statistically significant predictor of subsequent AP performance. (p.3)

The findings from the study done by Laitusis (2012) found evidence to support the relationship between the level of AP PD activity undertaken in a school and the subsequent utility of that PD in predicting student outcomes while accounting for student, teacher, and school effects. It is interesting to note that this study focused on STEM AP subjects and did not gather input from teachers after attending the training.

PD Learning Models

Drago-Severson proposes a learning-oriented model of adult learning and growth (2009). She discussed the need for a new model of leadership as well as a new learning-oriented model of school leadership. Her work is grounded in constructive developmental theory and recommends transformational learning over informational learning. Also, she adds how important it is to shape a school culture.

In her book, Drago-Severson (2009) claims that efforts to improve student achievement through building developmental capacity have traditionally been focused on the "*school or organizational capacity* as well as the *instructional capacity*" (p. 8). She defines the school capacity as "the school's collective ability as a functioning, working whole to increase achievement" (p. 8). Furthermore, she defines *instructional capacity* as a "teacher's ability to provide effective instruction" (p. 8).

However, Drago-Severson (2009) asserts there is a "third kind of capacity [that] is also needed…" (p. 8). The third component is *development capacity*, which "concerns the cognitive, affective, interpersonal, and intrapersonal capacities that enable us to manage better the demands of leadership, teaching, learning and life" (p. 8). Furthermore, she warns, "the demands on superintendents and principals have become increasingly complex" (p. 11). They are "no longer only primarily responsible for running the system, they are now responsible for transforming the school system in response to new demands" (p. 11).

Informational learning, the goal of traditional forms of PD, focuses on increasing the amount of knowledge and skills a person possesses. As Drago-Severson (2009) describes it, "Transformational learning…relates to the development of the cognitive, emotional, interpersonal, and intrapersonal capacities that enable a person to manage the complexities of work (e.g., leadership, teaching, learning, adaptive challenges) and life" (p. 11). Thus, transformational learning models or forms approach PD in a comprehensive and interactive approach that takes into account best practices for adult learning.

PD programs, as described by Guskey (2000), are, "those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p. 16). In the early 1970s, learning opportunities for teachers were referred to as "in-service education" (Joyce and Calhoun, 2010, p. 4). Recently, "PD" has become more common, yet there is also use of the term "training." Training "refers to conditions that are developed to help someone learn knowledge and skill in some domain of performance" (p. 5). Joyce and Calhoun (2010)

emphasize there are several models of PD, yet they point out that, "models where curricular and instructional initiatives are central, the growth of the educators need to lead directly to increased student learning" (p. 9). Linking PD to student learning is an area that has been challenging to educators as many school leaders, and educators are faced with a myriad of day to day tasks. That is, "Most common forms of PD do not have clear evidence of the student learning that will come from them" (p. 9). As such, when considering PD approaches, it is important to consider one which links educator learning to student learning.

Guskey (2002) suggests that there are five critical levels for the evaluation of PD in general: (1) participants' reactions; (2) participants' learning; (3) organizational support and change; (4) participants' use of new knowledge and skills; and (5) student learning. These critical levels inform the leadership to see if the goals of the PD were met. The first level, participant's reactions provide feedback from the learner to the leader. The participants' learning, the second level, ensures that the intended learning or objective has been transferred to the participants. The third level, organization support and change, is how the organization provides a safe environment and follow-up to the goals of the PD. The fourth level, participants' use of knowledge and skills, gathers information on the participant application of the knowledge and skills acquired. Lastly, the fifth level, the student level is about how the student is now being impacted as a result of the participant partaking in the PD. Guskey (2002) maintains that all of these levels are critical to any appropriate evaluation of a PD for teachers.

PD in all of its forms is a fixture of the modern American public school. Hyde and Pink (1992) note that there is no shared definition of the terms "staff development,"

"in-service teacher education," or "continuing education." Hyde and Pink point out that for most of the twentieth century, education in the United States has been informed by industry and bureaucratic conceptions. They write:

> Images and metaphors of schools as factories, teachers as workers (to be trained and retrained), principals as middle managers, superintendents as captains of industry, and the like have influenced both professionals and the public at large. (p. 5)

Hyde and Pink (1992) discourage this factory and industrial complex approach, noting that "like schooling and teaching, staff development is remarkably complex and deserves a richer elaboration than simple dichotomies allow" (p. 6). They further caution that educators must "move beyond facile adoption of catchy phrases, and delve deeply into promising theories" (p. 6).

Lieberman (1994) makes a distinction between the traditional "in-service education or staff development" and "teacher development." Teacher development: "…concerns itself with teachers' continuous inquiry into practice, viewing teachers as an adult learner" (p.15). The concept of teacher development assumes that the teacher is a *reflective practitioner*, someone with a tacit knowledge base, who continuously "builds on that base through ongoing inquiry into practice," by rethinking and reevaluating his or her own values and practices in concert with others through a collaborative culture in which teachers are encouraged to learn from one another (p. 16).

Hyde (1992) writes that the traditional methods of staff development in teaching leave the learning largely to the teachers themselves, to be conducted in isolation. Specifically, "Teachers learn their craft by emulating a few models and by trial and error

with pupils in their classrooms. They are rarely visited, coached, supported or assisted in developing their teaching practices" (p. 173). The most common form of PD is the "one-day, one-size-fits-all" style of presentation. In these PD formats, an expert on some topic comes in to the school, presents to the teachers (or some other group of faculty and staff, e.g. the administrators, teacher assistants, etc.), distributes information and is never to be seen again (Hyde, 1992).

Hyde and Pink (1992) refer to this form of professional learning as one that is traditional, based on "a widespread notion that teachers need in-service 'training' to remediate their inadequacies" (p. 3). This is a reactive form of remediation, in which central offices or school leadership respond to some perceived problem or deficit. They note that the trend in education is to advocate an approach that is developmental and process-oriented rather than the more traditional "fix-the-teachers" idea (p. 4).

Barr, Anderson and Slaybaugh (1992) also disagree with top-down approaches. They note, "School districts are conservative institutions," and "though they are frequently the foci of innovative efforts, often these efforts to realize change are short-lived." The authors lament, "Once advocates are no longer present to support a new practice, daily operations revert to what they were before the innovation" (p. 65).

Miller (1992) conceives staff development that is at odds with the dominant paradigm. She calls for staff development to be "culture building," and asserts, "the goal of staff development is building a professional culture that creates centers of inquiry, engage in the creation of new learning environments, and improve the learning for teachers and students alike" (p. 104).

According to Miller (1992), there are three essential elements of culture building staff development:

- Teachers work together as colleagues; they pool knowledge and resources; they work on collective enterprises.
- Professional knowledge develops from understandings about the craft of teaching, based on experience and practice.
- Teachers are decision makers about professional practice. Instructional leadership is the purview of teachers. (p. 106)

Hyde and Pink (1992) write that teachers can "mimic" the new teaching behaviors that they have learned in a staff development, but that does not necessarily mean that these new behaviors are occurring in the classrooms. They write:

> Clearly, there is a significant difference between "learning" a teaching approach and "incorporating" it into one's actual teaching routines. Since nearly all one's teaching occurs without scrutiny by peers or administrators, it is fair to ask such questions as: When no other adult is looking, what teaching approaches are actually used? What makes a teacher believe a particular strategy is worth using habitually? (p. 173)

According to Hyde and Pink (1992), in order to encourage teachers to "dislodge" well-developed teaching routines in favor of others will require that the staff developer address "ideas, beliefs, emotions, actions and behaviors simultaneously and with delicacy" (p. 175). The teachers will have to engage, through the staff development to do the following:

- Analyze one's own teaching practices and their efficacy with all pupils.

- Reconsider and rethink one's established routines, key assumptions, root metaphors, and core beliefs about teaching.
- Take risks by experimenting with new practices, approaches, and strategies that may threaten control or go awry. (p. 175)

Hyde and Pink (2002), further call for an orientation to staff development which is much more thoughtful and responsive to the environment and circumstances of the specific school. They note that there should be two professional practices in place for real learning among the faculty and staff to take place that include, "Ongoing reflection and analysis… and planning for implementing and evaluating change…" (p. 4).

Hyde (1992), in his chapter regarding a "school within a school" program to assist at-risk ninth graders notes that while it was laudable that a school district focused on this group of students, the model, as conceptualized and implemented in that school district was doomed to failure. He writes:

> Specifically, it ignores the fact that a secondary school a) is a complex organization that generates its own norms and operational ethos, b) frequently contains too many conflicting programs that fragment teachers and make goal consensus problematic, and c) is limited in what it can achieve by the district imposed policies and the support it receives to implement these policies. (p. 59)

According to Hyde, a better model for staff development can be implemented that will foment fundamental school culture change. In regards to the impact of school culture, McNeil et al. (2009), also assert the important of not overlooking the school culture as it has been shown to be statistically different, as measured by the 10 dimensions of Organization Health Inventory, between higher performing schools and lower performing

school in terms of state rakings based mostly on standardized test. Findings suggest that students achieve better results on standardized exams when there is a healthy climate (MacNeil, Prater, & Busch, 2009).

According to Robb (2000), the issue of choice in professional growth is paramount. For the PD she offers, she *invites* teachers to learn with her. She gives all teachers a brief introduction of her experience and education, and subsequently explains her year-long approach. The teachers then may indicate that they would like to be part of her study group. There is no negative consequence for opting out of this program for the teachers. The teachers are not mandated by the school administrators or the central office to attend. In grade-level teams, through meeting and discussions, the teachers then decide what they want to learn with her, what topics they will explore.

Robb (2000) believes that building awareness among administrators of how effective PD truly occurs is also part of the job. She emphasizes and re-emphasizes, "Professional study takes time—there are no instant remedies" (p. 9). Robb further believes that the administrators have to be involved in growth and change themselves. She writes, "If principals are to move beyond their past experiences and present assumptions about how teachers learn, they must read and study to construct new knowledge that can change their thinking about learning" (p. 9).

This sort of professional study recognizes teachers as professionals who study to remain abreast of research in their field. According to Robb (2000), PD is a spur for inquiry, and "inquiry identifies problems and issues within a school and allows teachers and administrators to develop professional study experiences that address these problems, taking teachers where they are and gently journeying them to other places" (p. 1).

According to Robb, the words "'staff development' imply a single experience such as an authority on a topic arriving at a school, delivering information and departing" (p. 14). The inquiring teacher is one who realizes that this inquiry is a critical component of efficacy.

Traditional PD

According to Atay (2007), traditionally, teachers' PD has consisted of "short-term or one-shot in-service programs" conducted by outside "experts" who disseminated a knowledge base constructed again almost exclusively by "experts" (p. 139). However, the knowledge transmitted is usually conceptual and far removed the environment of teachers and there are other "situational factors affecting their classroom that are not taken into account" (Atay, 2007, p. 139).

Research has shown that traditional models of PD have some ineffective components. According to Flint, Zisook, & Fisher (2011), large scale district workshops and in-service trainings regularly leave teachers feeling less, rather than more empowered. According to Flint, Zisook, & Fisher (2011), in these types of "PD models, a school representative redelivers the material presented at an auditorium style meeting to colleagues upon returning to school" (1164).

Frequently, all teachers in a school are required to attend occasional, full-day in-service sessions on topics selected by administrators and presented by outside experts who rely on direct instruction and draw upon their own experience (Sandholtz, 2001). In this deficit approach training model, "Little interaction occurs among teachers" (p. 816). Adults want learning opportunities that are "meaningful and practical to them, offer an immediate pay-off, involve reflection on their many experiences, and include social and

active learning" (p. 816). The Sandholtz (2001) study addressed the following question, "What type of opportunities do teachers find most valuable? The least valuable experience according to the teachers' interviews were, "school based" PD (p. 819). The author points out, "Most adult learning theories reflect a constructivist view of learning in which learners acquire new knowledge by constructing it for themselves" (p. 816). According to Avalos (2011), "PD is about teachers learning, learning how to learn and transforming their knowledge into practice for the benefit of their student's growth" (p. 10).

According to Miller (1992), in her chapter recounting her experience of curriculum work as a "culture building" form of staff development, notes that overall her several years of work did not change the paradigm—that of traditional staff development-- in her district regarding the training of faculty and staff. When her time at the district was over, the district still conceptualized staff development as "experts speaking to teachers, who by definition, needed remediation. She takes some responsibility for this, writing that she did not do sufficient work in publicly sharing her ideas on why culture building was so important in making the connection between staff development and curriculum work. She states, "My shortcoming was in not making the relationship explicit and public" (p. 108).

Pink and Hyde (1992) reaffirm and contend against prescriptive, one-shot, top-down approaches to staff development. The authors claim that this approach is inefficient and is likely to fail primarily because it is "insensitive to the individualistic or site-specific needs of each school" (p. 34). In his article regarding a program for at-risk youth, he writes:

> …I want to challenge the efficacy of top-down and prescriptive school improvement models that are designed for at-risk youth. Specifically, I want to challenge the notion that packaging information for teachers about 'best practices' will lead to the uniform adoption of these practices by teachers. (p. 33)

Pink (1992) is concerned that, in the case of at-risk youth (but this concern can easily be generalized to all groups of learners) that this sort of top-down approach to staff development ignores the diversity and the complexity of the reasons that youth are academically at risk and that it ignores the complexity and diversity of the local context factors of schools themselves.

Changes in PD

In the last few decades, both educators and researchers have attempted to alter methods of teacher PD so that teachers assume control of classroom decisions and actively participate in their own improvement on an ongoing basis (Drago-Serverson, 2009). Furthermore, the "research literature is replete with studies proving that the managerial and technical approach is not effective in contributing to a teacher's knowledge base or professional identity" (Flint, Zisook, and Fisher, 2001, p. 1164). Lastly, Avalos (2011) recommends that PD opportunities for educators must:

> (a) attend to the specificity and the multiple spaces of location in which teachers teach and learn,
>
> (b) be built upon the individual and genuine inquiries and concerns that are engendered in those contexts,
>
> (c) facilitate the development of mutual relationships, and
>
> (d) promote opportunities for advocacy. (p. 12)

In summary, it is important to note that, "PD works, if it works at all, by influencing what teachers do, not by influencing what they think they ought to do or what the professional developers think teachers ought to do" (City et al., 2009; p. 24). Furthermore,

> If you invest in teacher PD without a clear understanding of where you expect it to lead in terms of actual content that students are expected to master, then you get random innovation across classrooms and the innovation has no system wide or school wide impact on student learning (p. 25).

According to Lieberman (1994), PD also means "building a more collaborative culture in the school, one in which teachers are encouraged to lead and learn from one another" (p. 16).

Teacher Training and Effectiveness

Nasser and Shabti (2010) examined the relationship between background characteristics, motivation patterns and satisfaction from PD programs. They referenced Little (1987) in describing PD as "any activity that intended primarily or partly to prepare paid staff members for improved performance in present or future roles in the school districts" (p. 2739). Although they cite other references for much broader activities that can lead to a larger array of PD such as "continuing education courses, reflection on actual lessons, group discussion concerning selected authentic artifacts, individual activities such as engaging in educative online venues, and self-study and action research," their purpose was to examine the relationship between background variables and PD program characteristics and satisfaction from PD programs (p. 2739). They report three sets of factors or correlates of teachers' satisfaction from PD activities. Those include "1. Participant's background, 2. Their motivation and 3. Program

characteristics" (p. 2740). They concluded that the "expectation to find differences in satisfaction among participants with different personal and professional backgrounds was not confirmed" (p. 2743).

Chou (2011) states, "When teachers are enthusiastic in their teaching, energized about their learning, and not terrified of research, they can go on to find the answers to the questions they have about their education practices" (p. 423). With action research, "teachers have the opportunity to choose a theory or strategy to explore, research their topic in more depth, implement or practice new strategies, and collect data on their performance and their students' performance to monitor the results of their efforts" (p. 423). "Growing evidence has suggested that action research as a form of PD can not only make teachers feel better about their practice, but also can generate learning gains for students" (p. 423). "Most importantly, it offers teachers the opportunity to become more effective and influential educators" (p. 423). Nevertheless, even though action research has been regarded as an effective approach for PD, there are still some challenges (Chou, 2011). Teachers are often overburdened with all kinds of professional and personal obligations, and have little time for collaboration, researching and writing (Chou, 2011). Hence, it becomes important for administrative support as Darling-Hammond (2005) points out how important it is for teachers to be given appropriate support and time from administration.

One major obstacle of the teaching profession is the need to "bridge the gap between knowledge acquired during formal pre-service studies and further developments occurring while teachers are employed in schools" (Nir & Bogler, 2008, p. 377). PD programs are "intended to equip teachers with a 'toolbox' that will extend their

knowledge regarding the subject matter taught, instructional strategies and interpersonal communication skills" (p. 377).

Research has demonstrated that PD is most effective when it is long term, school based, focused on students' learning, and similar to the curricula (Nir & Bogler, 2008). Also, there are several advantages when carrying out PD in groups of teachers from the same school, department or grade level. Those include opportunities for teachers to "discuss their PD experiences, share common curriculum materials and assessment requirements, discuss students' needs across classes and grade levels, and build up a shared professional culture" (p. 378). Nevertheless, not all the research supports that site-based PD may be effective as local decisions may not always be good (Guskey, 1996).

School-based PD "implies that programs aimed at being 'close to home' may yield better results for the school and students than programs provided outside of the school" (Nir & Bogler, 2008, p. 378). Furthermore, Nir and Bogler argue, "School based programs also allow teachers the freedom to choose what best suits their strategies, unless the school principal is authoritative and does not promote teacher participation in decision-making regarding programs" (p. 378). Another advantage of having school-based PD is the enhancement it has on the organizational learning. Teachers are also more likely to prefer a kind of close interaction with the instructor of PD programs that is based on a "dyadic relationship" without involving the principal and/or other personnel in the school (p. 379). This would further support an environment where teachers can bring up issues and concerns and also be secure to take risks and have an instructional program that is tailored to teachers.

It is fairly understood that promoting teacher quality is a critical ingredient in improving education in the U.S. (Harris & Sass, 2010). Nevertheless, there is "no consensus on what factors enhance, or even signal, teacher quality" (p. 798). It is difficult to gauge the effectiveness of teacher training.

In "Linking teacher and student learning to improve PD in systemic reform," Fishman et al. (2003) discussed the need for learning more about what teachers actually learn from PD. They further proposed a framework on conducting research on PD that makes "explicit use of data on both students and teacher learning" (p. 644). Their approach begins with goals of the US national and state standards and links teachers' participation in PD to changes in their classroom practices and student outcomes. The authors contend that student learning must be taken into account when presenting evidence for the value of PD. They further contend that PD should be about the teacher learning that accounts for the teacher's, "changing of knowledge, beliefs, and attitudes and acquiring new skills, concepts and processes related to the work of teaching". Moreover, Fishman et al. (2003) cite the work of the National Staff Development Council (NSDC) that lists their, "principles for design in three categories: content, process and context." Lastly, they recommend that designers of PD focus on the areas or "Elements over which they have control over: 1. content of PD, 2. the strategies employed, and 3. the site of PD, and the media used" (p. 645).

Again, the researchers put these components into a study with two teachers by providing a voluntary workshop on curriculum on a particular subject area teachers were finding difficulty in getting positive student results (Fishman, Marx, Best, & Tal, 2003). The study included a pre-test and post-test. Furthermore, there was a workshop for

teachers as well as follow-up support which included brainstorming sessions with teachers to offer new suggestions. The researchers were careful not to use the evaluations as most PD do in isolation and not linking it to enactment and improved student learning. That is, "Most PD begins and ends with 'opinionnaires' given at the end of a session where teachers are invited to express their satisfaction with the experience or rate their learning experiences" (Fishman, Marx, Best, & Tal, 2003, p. 655). The researchers contend that such instruments are only one component of the overall range of information needed on assessing the value of PD. They further support that, "The most important measure of whether PD is 'working' is whether teacher enactment yields evidence of improved student learning and performance" (p. 655).

The researchers (Fishman, Marx, Best, & Tal, 2003) concluded it was important to focus on discrete elements of student learning that were proximal to the curriculum being taught in order to have a better focus on the evaluation of profession development. The design of PD and linking standards to student achievement as an important element of "future progress in systemic school reform" (p. 656). Lastly, the researchers suggest that future studies should include data over the long term and in many different contexts in order to generate a refined knowledge base that link teacher and student learning to PD.

Limitations of Teacher Training Hours

According to Chingos and Peterson (2010), there are some limitations with looking at training hours and drawing some conclusions. That is, "Those pursuing advanced training do so in order to make up for teaching deficits, prior research may have under-estimated the benefits of the training" (p. 449). They further point out that on the

job training or teaching experience may be "upwardly biased because the estimations do not account for the probable attrition from the teaching force of less effective teacher" (p. 451). That is, studies that compare groups of teacher with more years of experience to those will less may not be taking into account that the group of teachers with more experience no longer include teachers who may no longer be in the education workforce. Thus, this sample comparison could be based on teacher experience could have some validity concerns.

Corcoran et al. (2001) found several problems with the PD being offered to teachers. Some districts focused on the training process rather than on the content. Other districts offered a large variety of training options, but the options did not have a visible focus. Finally, most districts did not attempt to evaluate objectively what effect the training had on instructional practice or student achievement.

Aside from effective training practices and an environment that supports teacher collaboration, ultimately identifying the best-qualified teacher is essential. Peak et al. (2010) note, "Even with these ample resources, [curriculum materials and valid and reliable EOC assessments], the pivotal player in this complex enterprise is the teacher…" (p. 63). Therefore, identifying a teacher that is highly motivated for the challenge of teaching AP make a major difference.

Harris and Sass (2010) shared that studies that include middle schools consistently found positive effects of teacher experience on math achievement whereas the "findings for the effects of experience on middle school reading achievement are evenly split between positive and insignificant correlations" (p. 799). For example, "less effective teachers might be more likely to leave the profession and this can give the

appearance that experience raises teacher value-added when, in reality, less effective teachers are simply exiting the sample" (p. 799).

Interestingly, there is some research where PD by itself did not yield student improvements. For example, Garet et al. (2008) utilized an experimental design to study the impact of an intensive PD program for early reading teachers and subsequent follow-up with in-school coaches. While the PD intervention increased teacher knowledge and changed instruction, "neither the PD program alone nor the PD program with subsequent coaching yielded improvements in student reading scores" (p. 800 as cited in Harris and Sass, 2011).

Similarly, Harris and Sass (2011) found that teacher training effects on teacher quality come with three methodological challenges. First, they argue, it is difficult to isolate productivity, especially in teaching where a student's own ability, the influence of a student's peers, and other characteristics of schools also affect measured outcomes. The problem is compounded by the reality that students are rarely randomly assigned to classroom teachers who may lead to possible correlations between observed teacher attributes and unobserved student characteristics. Second, there is an inherent selection problem in evaluating the effects of education and training on teacher productivity. Unobserved teacher characteristics, such as motivation or intelligence, may affect the amount and types of education and training teachers choose to obtain as well as how well they deliver instruction and succeed in the classroom. Finally, "it is difficult to obtain data that provide much detail about the various types of training teachers receive and even more difficult to link the training of teachers to the achievement of the student they teach" (Harris and Sass, 2011, p. 798).

In the same way, the problems inherent in traditional models are plentiful. Firstly, there is no differentiation in terms of experience or skill of the learner. Robb (2000) notes that these sorts of sessions "are usually ineffective because sessions do not account for the differing levels of expertise and knowledge among staff members" (p. 7). The teachers may also be avalanched with new information, departing with mounds of hand-outs, but confused, "not knowing which strategy to try" (p. 7). The presenter may know little or nothing about the school's teachers, students or culture. The absence of the administrators may communicate to the faculty that the session is ultimately unimportant. Finally, there is no follow up to the learning when faculty are not sought again to determine if the content has context in their discipline and instructional practice. Unfortunately, no one returns to help teachers with the implementation of the new strategies, to help answer follow-up questions, or to direct the teachers in new paths of learning that were inspired by the original in- service.

Kantnor (1992) documented the relationship of cultural issues with staff development. He writes about this experience while in Georgia. As a transplant from a northern state, he was immediately struck by the choice of words in American Southern dialect and commented on it to one of the Georgian teachers who inadvertently became offended (p. 139).

Because of this experience, Kantnor (1992) began to recognize the relationship of cultural issues to staff development efforts. He writes:

> …I came to perceive that the cultural values within the school and community were in many cases different from, and even diametrically opposed to, those

> implicit in the content I was attempting to convey, and the process through which that content was being communicated. (p. 140)

Kantnor argues that the discrepancy between what is learned in a staff development and what is actually transferred to real practice in the classroom, may be based in teachers "responses to the cultural conflicts they acutely feel." He continues:

> Teachers may be attracted to new approaches by sense that those approaches will not work well with the existing situation. We can often perceive a set of clear dichotomies between competing values: creativity versus conformity, social interaction versus solitary effort, holistic learning versus acquisition of isolated skills or items of knowledge, critical thinking and risk taking versus docility and acceptance of the status quo (p. 142).

Teachers are faced with having to adapt the learning practice in an environment that may not be welcoming or nurturing for risk taking and in some cases may not be supported by administration or colleagues. Furthermore, Kantor (1992) asserts that training may not be as beneficial to simply imitate the training experience without adapting the specific needs of the different learners.

Limitations of Taking AP Courses

It is advantageous for schools to identify and develop students as early as possible. Dougherty and Mellor's (2010) research exploring the relationship between eighth-grade academic preparation, high school AP participation and exam success, and college graduation yield four results. The first finding showed that students must pass AP exams for there to be an impact on college graduation rates. Simply taking AP classes does not alter graduation rates. Second, minority students and students from low

income families have low AP exam passing rates. Third, they have found that students receive high school credit without much evidence that they mastered the course content. The fourth result is that academic preparation prior to high school, as indicated by eighth grade test scores, is strongly predictive of whether a student will take and pass an AP exam in a math, science, English or social studies subject. They go on to conclude what is important "is that academic preparation prior to high school, as indicated by eighth grade test scores, is strongly predictive of whether a student will take and pass an AP exam in a math, science, English or social studies subject" (p. 222).

Sadler (2010) gives this advice to school administrators regarding AP staffing and scheduling: Advanced Placement course are best reserved for students who have done well in a prerequisite course. Students who are underprepared or who do not commit to putting in extra time and effort will fare poorly in AP classes. Sadler (2010) reports,

> Your only accurate gauge of whether AP courses in your school are successful is if students take and pass (3 or higher) the AP exams. Failure indicates that the students are unprepared or not up to the challenge, or the course does not have a proficient teacher or is lacking in resources. PD for teachers can help immensely, as can teachers taking a refresher course in the subject at a local college or university to relearn the content and experience the coverage that AP courses seek to emulate. AP courses in which few students take or pass the exam are not effective, and the resources, both material and personnel, should be considered for reallocation to improve lower level courses. (p. 267)

According to Sadler (2010), the notion that simply offering students AP courses and having students take AP exams in hopes that they will pass will lead to more students to

succeed in attaining a 2-year or 4-year degree is not supported. As a result, Sadler asserts that it is important that for leaders to examine beyond schools offering more AP courses and rather review the data of students not experiencing success by scoring a qualifying score of 3 or higher.

The College Board recommends that teachers get appropriate training (2012). Yet, there are other factors that may contribute to variation of AP student success: teacher experience, student development, school resources, principal leadership, and a multitude of other variables that may not necessarily be attributed to or controlled by the school.

Dual Credit Gaining Political Support as Alternative to AP

Many high schools are offering dual-credit courses (DC) as well as AP courses (An, 2013; Swanson, 2007). The dual-credit movement has increased greatly since the late 1990s (Marshall & Andrews, 2002). Dual credit courses allow high school students to take college-level courses for credit upon mastery. While both program courses offer advanced level preparation for college and university studies, only dual credit courses allow college credit without having to take a high-stakes exam that requires a qualifying score. The literature and data suggest that DC programs have positive implications for the persistence and retention of high school students (Roman, 2013).

In a study by Jones (2013) that investigated the impact of dual enrollment participation on the academic preparation of first-year full-time college students at a large comprehensive community college and a large research university, the results suggest dual credit enrollment has benefited participating students. Jones investigation on dual credit indicated that dual enrollment participation has had a positive impact on the academic preparation of first-year full-time college students (Jones, 2013). It is not clear,

however, that the conclusion applies to their persistence since students with prior dual credit enrollment that attended the community college did *not* have statistically significant better persistence rates than those without prior dual credit enrollment. However, the study did find that students at the research university who had prior dual enrollment credits did have statistically significant higher persistent rates than those students who did not (Jones, 2013).

Several policies in Texas have assisted the growth of dual college credit. In 1995 the Texas legislature, via House Bills 1336 and 2447, significantly changed the dual credit program by "permitting a community college to waive tuition and fees for a public and private school student enrolled in a course in which students receive both high school and community college credit" (p. 202). Furthermore, in 2006, as part of its college readiness strategy,

> Texas passed a law (Texas Education Code, Section 28.009, College Credit Program) requiring that all high schools offer students the option to earn at least 12 college credits through any combination of Advanced Placement AP, international baccalaureate (IB), dual credit, or articulated postsecondary courses. (Roman, 2013, p. 202)

Students seeking this route still must meet entrance qualifications in order to be enrolled in dual credit courses and meet college entrance exams, which may include a writing component. In a study (Roman, 2013) which focused on a community college in San Antonio, Texas, found that the completion rate for students taking DC courses was 100% with almost 94% of students receiving passing grades for the affiliated high school course. Lastly, the study found that Hispanic-American students "tended to register for

academic courses at a higher rate (81.4%) [as compared to] career or technical courses (18.6%)" (p. 204). Interestingly, the results of a survey commissioned by the Texas Association of Community Colleges (TACC, 2010) suggested that "more Hispanics participate in these types of programs than in non-dual courses such as AP or IB distinctions" (cited in Roman, 2013, p. 203).

Socio-Economic Status and School Achievement Factors

Equally influencing the evolution of building successful AP programs is the "national concern" regarding the disparity of educational attainment between students of high and low economic status and among different racial and ethnic groups (Sadler, 2010, p. 8.) Students from low economic backgrounds have the opportunity to take college-level courses (AP) in high school. The basis of doing this is to help reduce the achievement gap by providing more students of diverse backgrounds with access to higher education (Klopfenstein, 2004; Olivos & Quintana de Valladolid, 2014; Roman, 2013). Nevertheless, AP programs have not necessarily served traditionally underserved students in low-performing and low-tax base school districts (Klopfenstein, 2004).

Klopfenstein (2004) investigated whether the increased amount of government funds and attention to AP programs made a difference for the traditionally underserved students. Her finding in 2004 showed students at high-poverty and rural schools continued to have limited access to AP courses. She found that non-White American students from low-economic backgrounds remained grossly underrepresented in the AP courses offerings. She determined that a reason for this could be that the majority of federal and state AP incentive program funding in the 1990s provided test fee subsidies, but these subsidies provided no incentive for schools to expand their course offerings.

Students that were identified from low income, Hispanic and African American often failed to enroll in the AP courses that they did have access to because of they lacked the academic preparation necessary to undertake the college level work, and most of the funding of the 1990s failed to address this issue.

One in five Americans under the age of 18 lives in poverty (Hoy and Hoy, 2013). That means that half of about 16.4 million children can be classified as living in deep poverty families with incomes which are 50% below the poverty threshold (Hoy and Hoy, 2013). According to the National Poverty Center, in Texas, about 49% (2,739,934) of children in urban areas are identified as low income. According to Hoy and Hoy (2013), "Rather than focusing on achievement gaps, many educators have called for more research on the successes of at-risk students" (p. 35). Their research is focused on resilience and hardship to the point of arguing, "Many children at risk for academic failure not only survive, they thrive" (p. 32).

Conger, Long and Iatarola (2009) studied longitudinal data on two cohorts of high school students. The first cohort was all students present in a Florida public school in eighth grade in 1998-1999. This cohort was called the "high school class of 2002-2003." The second cohort was all students present in a Florida public school in eighth grade in 2001-2002. Using these large samples, the researchers looked at race, poverty, and gender disparities in the advanced course taking.

One finding by Conger et al. (2009) to note was that when controlling for pre-observable student characteristics, African American and Latino students were more likely than observably similar white students to take advanced courses, possibly explained by their enrollment in magnet schools. The researchers determined that policy

decisions intended to increase participation of students of color in advanced placement classes seemed to have been successful, but the spillover effect (or secular trends) to students has spurred faster growth in that population, contributing to a widening demographic gap in those years.

Conger et al. (2009) explore three explanations for these disparities: The first possibility is that student characteristics (minority, poor, male) of those students who are less likely to take advanced courses begin high school much less prepared because of their educational needs (e.g. English Language Learners) and because of their family backgrounds, neighborhood characteristics, and the quality of education they received in the elementary grades. The second possibility is that these students attend high schools with limited or no AP offerings. A third possibility is that students with the low-enrollment course taking rates attend high schools with characteristics that lower their likelihood of enrolling in advanced courses even when they are offered.

Conger et al. (2009) conclude that removing differences between students before they enter high school would eliminate course-taking gaps. The authors find that this is a justification for a call for greater investment in disadvantaged children long before they arrive in high school. They find that reallocating high school students to different high schools would not affect course-taking gaps. They found little evidence that school size, or any other school resource, strongly correlated with course-taking rates. They do find that if a student of color is in a magnet program, they are more likely to take advanced courses.

Increase in Diverse Participation

In 2012, 58.9% of students from low-income families taking AP exams were from African American and Latino groups with 17.1 % and 41.1% respectfully (College Board, 2013). In terms of number of students who took at least one exam, 169,521 Latino graduates took an AP exam during high school, whereas 88,198 African American graduates took an AP exam during high school. When you look at the number of low-income AP exam takers in 2012, 58.9% identified themselves as receiving free or reduced lunch (College Board, 2013).

The increase in students from low-income and diverse backgrounds, particularly Latino and African American, taking AP exams is one of the reasons for the increasing numbers in AP classes over the years. For many households, particularly those driven by economic factors and motivated to access quality educational outcomes, taking AP classes assists students in gaining preparation to college readiness. According to the College Board (2013), Advanced Placement (AP) courses are college-level courses offered in high school, and they should reflect what is taught in the top introductory college courses. Students should be encouraged to take the AP exams and those that score a 3 or higher earn credit in college. For many families, this is particularly one of the driving motivators. For others, it is the first opportunity for a member of their family to be exposed to college level work and will facilitate an easier path to receiving a 2 year or 4-year college degree. That is, students that score a 3 or higher will be able to complete graduation requirements, receive college credits and thus be able to save money and time in completing their career goals. However, if students do not score a 3 or higher, then they will experience failure in the sense that they have completed the course,

but still need to re-take the course again in college. When you couple the student and family motivation along with the school prestige and benefits of school rankings, it is not surprising that there has been a large increase in AP participation and passing rates (Sadler, 2010).

Furthermore, the increase in more students taking AP exams has several benefits for students and is viewed by external publications such as the U.*S. News and World Report Best High Schools* annual rankings, as an indicator for rankings in schools (Morse, 2013). When schools have a low percentage of passing (less than 10%), it can affect the school rankings, the students college credits, and ultimately be seen as a negative towards the assessment of the overall quality of the school.

The impact on school rankings and student interest with the competition for admission to universities has increased the expectations of schools that aim to be competitive and provide their students a quality education. As Sadler (2010b) argued, "Students who take AP courses and earn a high grade also benefit from weighted grade point average and may earn top honors for high school graduation" (p. 265). Student ranking and other college admission selection factors are positively affected. Student participation rate and passing percentage are two objective criteria to evaluate the effectiveness of an AP program.

Is the Increase of Diversity and AP Significant Enough?

According to Aguirre, Martinez, and Barboza (2013), citing the U.S. Census Bureau, 2010, the U.S. Hispanic population increased its numbers from 35.3 million in 2000 to 50.5 million in 2010, an increase of 43% or more than four times the nation's overall population growth. The Hispanic population group accounted for 16.4% of the

entire population in the US, while Blacks accounted for 12.6 % according to the U. S. Census Bureau, 2011. Furthermore, "over one-third (34.6%) of the Hispanic population was younger than 18 years of age in 2009," and "by comparison, the percentage of person in the U.S. population 18 years and younger is 24.3" (Aguirre, Martinez, and Barboza, 2013, p. 120). Therefore, with the increasing school-age children population of Hispanic students, there is a corresponding increase of Hispanic students in elementary, middle and high school. According to the U.S. Census Bureau (2010; as cited in Aguirre, Martinez, and Barboza, 2013), "Of the U.S. population aged 25 and older, 86.7% had obtained a high school diploma, and 29.5% had obtained a bachelor's degree" (p. 121). Whereas, for persons of Hispanic populations the numbers were 61.9% who had obtained a high school diploma, and 13.2% had obtained a bachelor's degree. Furthermore, "If their [Hispanic] achievement gap is not systematically addressed, the nation will likely experience major social and economic problems in the future" (p. 122).

When you consider that Latinos are the youngest and fastest growing racial minority group in the country (Rodriguez, 2013), it can be quite "overwhelming" that the educational attainment statistically is still lagging behind (p. 32). Eugene Garcia's research (2012), centers on the importance of family engagement and educator training in practices that consider the cultural implications of Hispanic families and students. There have been others that have discussed how the current system does not utilize the cultural and linguistic attributes as an added value but rather counter them through "subtractive" practices to remove them and replace them with the dominant culture (Valenzuela, 1999). Valenzuela argues that in the 1980s, as demographic shifts in the US became increasingly visible, conservative groups challenged multicultural education, attempted to establish

English as the official language, and attempted to dismantle civil rights efforts such as affirmative action. Other researchers have collected responses through focus groups and discussed the importance of Mexican American identity and have collected responses on the importance of Mexican Americans' belief that they have less educational attainment than Anglo Americans, yet respondents believed gaining a quality education was important in order to keep the group [Mexican Americans] advancing (Niemann, Romero, Arredondo, & Rodriguez, 1999).

As Pedro Noguera (2005) asserts, one of the best ways to learn how to change the academic achievement of African Americans is to study those schools and programs that have proven successful in accomplishing this goal. He further asserts that interventions and programs designed to help African American males must be accompanied by strategies which actively engage Black males and their families in taking responsibility to improve their circumstances.

In a study that examined how school structure oppresses Mexican American students, Solorzano and Ornelas (2004) documented the responses and experiences of Mexican American and African American high school students regarding their limited access to AP classes as a form of oppression. They used critical race theory as a framework to examine access and availability of AP courses and how they impact educational outcomes for Latina/o and African American students. The study reviewed enrollment patterns of AP courses and asked the following research questions:

> How do school structures, practices, and discourses help maintain racial and ethnic discrimination in access to AP courses? How do Latina/o and African American students and parents respond to the educational structures, practices,

> and discourses that help maintain racial and ethnic discrimination in access to AP courses? Finally, how can school reforms help end racial and ethnic discrimination in access to AP courses? (p. 1)

In examining a school district in California that served a large population of Latina/o and African American students, three different patterns emerged around access and availability of AP courses:

> Latina/o students are disproportionately underrepresented in AP enrollment district-wide; schools that serve urban, low-income Latina/o and African American communities have low student enrollment in AP courses; and even when Latina/o and African American students attend high schools with high numbers of students enrolled in AP courses, they are not equally represented in AP enrollment. We call this structure and process 'Schools Within Schools.' (p.1)

This study used critical race theory, and the authors argued that the restricted access of Mexican American and African Americans to AP classes operates as a system of oppression.

Just a decade ago, Klopfenstein (2004) examined the expansion of AP and compared the growth of AP with low-income, Blacks, and Hispanics. Her findings reported that, "despite overall growth, small rural schools and high-poverty schools continue to offer relatively few AP courses, and black, Hispanic and low-income students remain grossly underrepresented in AP classes" (p. 1). The study used a data set of Texas public high schools and viewed course availability and enrollment. The work attempted to replicate the work of Darity, Castellino, Tyson, Cobb and McMillen (2001; as cited in Klopfenstein, 2004) that examined the AP access of minority students in North Carolina.

The study found, “Government incentive programs in Texas increased the AP access of traditionally underserved students in absolute but not in relative terms” (p. 2). Furthermore, “Among schools offering the AP Program, increased state and federal funding, which is primarily used to subsidize AP exam fees, generated limited increase in AP enrollment among traditionally underserved students (p. 2). The result of this, is “unsurprising” since the participation in advanced courses depends primarily on a “student’s prior academic experience” (p. 2).

Using National Education Longitudinal Study data from 1988, Flowers (2008) looked at whether there were racial differences in educational and labor market outcomes as a result of participating in AP programs. The group that experienced the most dramatic benefits seemed to be the Asian/Pacific Islander group. Their incomes were (reportedly) $10,000 higher than their Asian/Pacific Islander peers who did not take an AP class. Their college entry examination scores were higher than for non-AP participants. African Americans and Hispanics had smaller benefits from AP course taking, in terms of college entrance examinations, undergraduate grade point averages, post-secondary attainment and outcomes.

Flowers’ (2008) literature review suggests that parents, “need to be more actively involved in exploring how AP programs may assist their child in helping them to be successful in high school, college and in the workplace” (p. 129). She further recommends that attention be given to parents of underrepresented students in AP programs.

In a report presented to the Society for Research on educational effectiveness, Kemple, Proger and Roderick (2011) reported that of the 36,548 students who graduated

from a Chicago public high school between 2005 and 2007, over one-third of those students took an AP course at some point in high school and 10% taking one or more AP math and 12% taking AP science. Black and Latino graduates were underrepresented, and White students were overrepresented. Nevertheless, the study found that AP math and science courses have statistically significant effects on college outcomes, but are moderate. Taking an AP math or science course was related to an increased likelihood of enrolling in a four-year college. Students who took AP were more likely to enroll in a selective college. Taking AP math or science was related to improvement in a two year persistence at four-year colleges.

The study by Kemple, Proger and Roderick (2011) is limited in that their methodology shows relationships or correlations, and those studies are not intended to show causality. That is, even though students that experience AP courses and pass, and have showed a stronger relationship to positive student outcomes in earning or college success, it is dangerous to conclude that AP is the main contributing factor.

School Leadership, AP and Urban Schools

At the school campus level, the principal and instructional leaders understand the importance of helping students take AP courses and realize the importance of supporting the program through appropriate student and parent informational meetings, selecting teachers, and training teachers, as well as identifying and placing students early through Pre-Advanced Placement courses. Successful and effective schools need to not only have students taking AP exams, but they also have a need to promote the number of students who successfully earn a qualifying score of 3 or higher. Otherwise, schools could fall in rankings, and ultimately students would not benefit. Therefore, the instructional

leadership of the principal is an important factor that contributes to the overall school student achievement as well as to a strong AP program (Leithwood and Louis, 2013).

The literature is extensive on the impact school leadership can have on student learning and achievement (Leithwood & Louis, 2013; Fishman, Marx, Best, and Tal, 2003; Guskey 2000; Avalos, 2011; Drago-Severson, 2009; Marzano, Waters, McNulty, 2005). However, there has been little or no attempt to link the school leadership to strong AP programs and to offer any explanation about why leadership and the AP Programs have not resulted in positive student achievement in urban schools struggling with overall academic performance. For example, a quantitative study conducted in Florida by Christiansen (2009) sought to investigate the relationship between percentage of students within a high school who participated in the AP Program and the school-wide student achievement of a high school. The results were mixed. While AP participation and performance correlated with school-wide achievement for the schools with the most low-income students, there was no relationship between AP participation and school-wide student achievement.

In reviewing the research through a meta-analysis of 35 years on school leadership, Robert Marzano et al. (2005) found that a highly effective school leader can have a positive influence on student's overall academic achievement. Additionally, Roland Barth (2006) also discusses the importance of building trusting, generous, helpful, and generative relationships among the adults in a school and emphasizes that the quality of these relationships has "a greater influence on character and quality of that school and on student accomplishment than anything else" (p. 8). As a result, leadership in the

school remains an impactful variable that can affect the quality of the school and student achievement.

In the study *Resilient Schools: Connections Between Districts and School* (2012), the researchers used a mixed-method approach to examine the possible differences between district and school-level factors (Whitney, Maras, & Schisler). Three emerging themes included administrative support, professional collaboration, and academic support. To be eligible for participation in the study, the school data had to be above the mean on both the high-risk composite score and above the state mean on academic success. The researchers selected 27 of the 125 selected middle schools that met this criterion. However, urban schools were not included in the sample because none of them met the criteria for being high performing or above the state mean on academic success. The authors hypothesized that this may have to do with the "unique factors facing urban schools" (p. 46). Again, although the "hope" of the study was to identify themes to help inform schools of successful practices for supporting academic achievement, urban schools were not examined in the sample (p. 35). Yet, this study points to the need to review urban schools that are achieving success with high academic success and with high-risk student populations.

In Guilford County Schools in Greensboro, North Carolina, then Superintendent Terry Grier (2002), announced that the district had "failed to expose many qualified students to this rich, demanding curriculum" (p. 17). Grier met with principals to discuss increasing AP enrollment expectations for all students. He further communicated to principals new guidelines for class sizes and ethnic student enrollment percentages for AP courses. The goal was for ethnic student enrollment to mirror overall school

enrollment. The expectations were that all high schools would offer a minimum of 10 AP courses during the 2001-02 school year; a minimum of 15 AP courses during the 2003-04 school year, and a minimum of 20 AP courses during the 2005-06 school year.

Also, Grier implemented school district regulations that governed who taught AP courses. The district established a three-year goal that required one-half of each school's AP teachers to hold a master's degree. He argued, "All AP teachers must complete the College Board's AP training before teaching an AP course and must go through the training every three years" (p. 18). Grier discussed how they were "surprised by some teachers' reluctance to become involved" in meeting the district's goals (p. 18). Yet, through his leadership, the district continued to provide AP training to the high school teachers and to extend it to the middle school teachers. The results in the first two years were mixed. The district had 3,776 students taking AP courses, which was double the number of students taking AP courses the previous two years. However, less progress was made in increasing the percentage of minority students enrolled in AP courses, which went from 26% in 1999-2000 to 30% in 2001-2002 (Grier, 2002). Grier summarized that the key is to provide structured training and support for principals, teachers, students, and parents that mobilizes them to face the "lack of minority and lower income level students enrolled in AP courses" (p.19).

School level leadership's management of student scheduling also effects AP course participation. For example, VanSciver (2006) finds that the students often "underschedule" themselves. He writes,

> Either through the decisions they make (signing up for classes) or the behavior they demonstrate (underachieving when placed in more rigorous classes), in

> general these students provide information to school officials that they should be placed in classes which typically do not require much reading and writing or higher level mathematics, but make it possible for them to surrender to their parents report cards for which they receive praise. (p. 57)

According to VanSciver (2006), students make decisions about enrolling in courses based on how they feel they will be rewarded through the grading system. Although most AP teachers will promote the opportunity that students may get college credit, most may take the safer route and receive good grades and high school credit. VanSciver (2006) then relates how the school decided to schedule students with high academic potential aggressively into the AP courses. The students and parents were provided with meetings with school officials after each grading period to monitor their academic progress, their attendance, and their behavior. The results found that, when the students received this enhanced support and were enrolled in classes, they did quite a bit better in their advanced classes. VanSciver (2006) writes that the "students are proud, their parents are pleased and the school system is upholding its social contract with the diverse cultures, which produce students for the district's schools" (p. 58). Others have shown similar implementation by increasing the enrollment of students in academically challenging courses by including average students (Prince, 2004). Such policies are supported in an effort to schedule students more carefully into AP courses, and this is more likely to be done by administrators and counselors that are appropriately trained on identifying, selecting and supporting students.

Heck (1998) argued, "Belief that principals play an important role within the organizational structure of schools, has long stood in the folk wisdom of education."

Effective schools research "concluded that strong principal leadership was among those factors within the school that made a difference in student learning." Often referred as the instructional leader, the "Principal leadership was found to affect processes between the school and the outcomes it produces; however, this relation is more indirect than direct (Hallinger & Heck, 1996b).

What is the role of the administrators in teacher PD?

For Hyde and Pink (1992), a planner of staff development of any type would do well to consider six theoretical orientations that have great explanatory power for schools, teaching, learning, educational change and staff development. The six theoretical orientations are:

1. Psychological theories of human development and learning,
2. Theories found from social and cultural anthropology,
3. Political theories,
4. Organizational theories, and
5. General systems theory. (p. 10)

As these theoretical orientations have been used to study learning, education, and schooling, a professional may use these to provide a rich context for thinking about staff development.

For Robb (2000), administrators cannot expect authentic change or learning by the teachers without a real commitment of themselves and the school's resources to the task. First of all, she notes that the time to learn must be set aside in the school day for the teachers. She suggests,

> Principals set aside faculty meeting time, using other methods of disseminating faculty announcements and information (such as a weekly email newsletter) so that the precious meeting time is spent on learning rather than logistics, announcements, and other items that could be as easily read as spoken aloud in a faculty meeting. (p. 22)

Second, Robb (2000) notes that administrators must accept and honor that teachers are learners, and as such have differing needs, differing levels of experience and expertise. Many administrators may not recognize this attitude as one with which they are accustomed, as so many PDs, including those dictated by central office, are mandates for instantaneous change in practice, replete with consequences for a lack of the instantaneous change that can be quite severe for the teacher.

Third, there must be support of continual follow up and feedback by the administrators, according to Robb (2000). The plan for PD itself must be dynamic and flexible, since "without constant revision, a program's effectiveness can diminish and eventually cease to exist" (p. 22).

Fourth, there must be a sense of trust and community. If true learning is to occur, there must be shared decision making and shared learning. This gives teachers the power and freedom to develop goals and to develop their own theory of learning, according to Robb (2000). Administrators must have a great deal of patience and understanding about theories of andragogy for this to truly occur. Acceptance of teachers as learners at their level of expertise and in their practice "where they are" requires a great deal of trust that the teachers will grow. In the go-go atmosphere of many school districts, in which the pressure is incredible to reform schools within one school year or two, this may require

quite a bit of bravery. The teachers must be operating in an environment of safety, in order that they have the confidence to try new things and to sometimes fail. When failure does happen, the teachers then must feel the environment is sufficiently safe to go to colleagues and others to dialogue and revise the strategy (Robb, 2000, p. 23).

For Lieberman (1994), the school leadership has an obligation to set an example for collegiality as an essential building block for effective staff development. She writes:

> In schools where the principal was actively engaged with teachers and consistently announced expectations for and modeled behaviors of collegiality, there was increased support for self-examination, risk taking, and collective reflection on practice. When principals and teachers observed each other in classrooms…the lives of the teachers and the principal were transformed. (p. 16)

Secondly, Lieberman calls on school leadership to create the opportunities and to carve out the time for "disciplined inquiry." She cites examples of these opportunities including the "day-long retreat, and the creation of school groups that promote collegiality, such as a humanities team and a mathematics/science team" (p. 19). Thirdly, Lieberman asks that school leadership explore the concept of "content in context." She notes that teachers are learners as well as the students. She writes:

> The task of the school, then, is to match learning opportunities to these developing abilities. Such a viewpoint sees the student as creative, active, and continuously engaged in constructing his or her own understandings of subject matter…Teaching and learning are not seen as separate functions, but rather as interdependent parts of the whole…Learning is no longer consumption of memorization, but rather engagement in knowledge production. (p. 21)

Next, Leiberman (1994) calls on "rethinking the functions of leadership." She argues that the traditional hierarchical structure of schools "restricts the building of a culture of inquiry" (p. 23). She explains that in this model:

> Principals have the power in this view, but it is the "power to accomplish" rather than "power over people and events." In such a definition, principals practice the concept of leadership density; that is, leadership is shared and broadly exercised…leadership becomes something that both administrators and teachers can have and use, and leadership becomes an essential ingredient in transforming schools into centers of inquiry. (p. 23)

According to Lieberman (1994), the school leadership has a responsibility to "build networks, coalitions, and collaborations." Lieberman (1994) writes that the school leadership must work to build a culture in the school, but also has the responsibility to develop support networks outside of the school. Lieberman explains:

> Schools in the process of change need to build or be a part of larger networks whose norms and activities are concerned with similar types of change efforts…they can at the same time continue to gain support and knowledge from like-minded groups. (p. 25)

According to Grimmitt and Neufeld (1994), in order for teachers to derive real benefit from staff development, educational administrators need to:

> Consider how the growing field of teacher development fits into a broader social, economic and intellectual context and to understand that the expanding practice and theory in this field is, in large part, a consequence of these larger social changes. (p. 8)

Barr, Anderson and Slaybaugh (1992) tracked the initiatives and the implementation measures of a school district which aimed to reform its ability tracking practices (tracking students in classes or courses of study which may have been restrictive and seemed to have bases in racial or class prejudice). As this sort of reform implies quite a large undertaking, the district understood that it had to be backed with substantial staff development. They recount that the effort that was predicted to take one year took four. They created a Council, comprised of central office personnel, principals, and teachers, to oversee this effort. The council undertook activities that are thought of as staff development: for instance, they read and reflected on the research, and they shared ideas with consultants. However, things changed when the Council engaged in activities which were not traditionally thought of as staff development:

> The dynamics changed when the Council rejected the first draft of the grouping policy and participated in the values clarification discussions. Discussing their beliefs about the goals of schooling and the means to achieve quality education for all students empowered them to consider grouping from a new perspective. The discussion shifted from one which was rational and value-free to one in which the participants felt a personal investment. (p. 82)

Robb (2000) urges school leaders to understand their role in creating a climate and culture of the school, including how and to what extent that school is a learning community. Furthermore, Robb (2000) admonishes politicians and administrators who continually search for a remedy or quick fix that will improve student achievement. She writes that instead she will “urge them to put slogans aside, assess their needs, and

diligently work toward creating ten factors that indicate professional study is a vital part of their schools culture" (p. 48).

Culture and Environment of Support

There are several research articles that discuss the importance of setting a culture of support for PD to impact teacher learning and linking it to student learning outcomes. Some of these variables or factors have been widely accepted, yet have not made it to be common in schools. In *Small Schools, Big Ideas,* Benitez et al. (2009) make the case that "…creating a supportive, honest, and collaborative environment for educators plays an essential role in improving teacher practice and, ultimately, student outcomes" (p. 152).

MacNeil et al. (2009) noted the importance of a school's climate and culture as a critical relationship among successful schools with high student achievement. Furthermore, the authors present that the principal plays a critical role in establishing a positive culture and climate among teachers. This is also supported in other research. For example, Lieberman (1994) noted that in the past staff development education meant a workshop aimed at specific teachers and making the assumption that presentation of a topic was sufficient enough for it to be then carried out into the classroom. He adds, "The concept of teacher development represents a much broader idea" (p. 15). It is where teachers are, "encouraged and supported to lead and learn from one another" (p. 16).

The developing of a collaborative culture can be carried out in several ways, but it is chiefly not going to happen without proper supports that build collegiality and experimentation in place (Lieberman, 1994). The author reflects, "When principal and teachers had time to think about what they were doing and worked to find solutions to commonly defined problems, the lives of the teachers and the principal were

transformed" (p. 16). Norms and "traditions were changed from practicality, privacy, and isolation to shared ownership of issues and problems of practice, willingness to consider alternative explanations and a desire to work together as colleagues."

There have been studies that research the relationship between the school climate, academic self-concept and academic performance. According to Ghazvini (2011), the development of the "self-concept, principally the academic type, is not only the task of the classroom teacher, but that [of] the other professionals in the school also intervene" (p. 1038).

The concept of organization trust has been a staple of organizational research for some time (Leithwood & Louis, 2012). It does matter a great deal whether participants in an organization trust the decision-making capacity of the organization's leaders. In schools with higher levels of engaged teachers, teachers express higher levels of trust in their colleagues, more collective decision making, and a greater likelihood that reform initiatives are fully implemented and affect student achievement. Furthermore, "trust has been shown to predict how educators interpret their superiors' ability to carry out more technical and transformational leadership functions" (p. 31). As it is, there are practices that help establish that trust and indirectly support student achievement.

School-Level Factors

Burney (2010) found through her study variables that identify school- and district-level attributes that relate to advanced academic achievement. She used the ratio of the number of passing scores (3, 4 or 5) to school enrollment. Her study suggests that even after accounting for fixed factors, schools and districts can contribute significantly in achievement on these tests.

Burney (2010) defined fixed factors include school size, (her review of the literature suggests that smaller schools seem to offer benefits to students, but they are not without obstacles as well, such as a very small cohort of high ability students), poverty and ethnicity. She notes that it is difficult to tease out the effects of poverty from other coexisting variables. Her review seems to suggest that class differences are more powerful than differences within racial groups. As an example, class differences in how parents managed their children's leisure time.

Ability grouping acts as a means of offering social support to high achieving students. Burney (2010) writes, "Although educators worked hard to provide the right kinds of curriculum and instruction to develop academic ability, it was the social support, increased motivation, and positive self-regulatory behaviors that resulted from appropriate educational experiences that were often more important and longer lasting than the actual course content (Olszewski-Kubilius & Limburg-Weber, 1999 as quoted in Burney, 2010).

Burney (2010) finds that the research indicates that the curriculum is key, but that in high schools it varies widely. The results of Burney's study were interesting: The sizes of schools were positively correlated with Advanced Placement exam success. Her conjecture about this is that "smaller is generally better, a school needed to be large enough to offer a credible curriculum; it also needed to be large enough to have a cohort of high-ability students" (p. 123).

The number of Advanced Placement courses offered relates strongly to high achievement. A "rigorous high school experience, for individuals, is far more important than their demographics related to socioeconomic status, race, and level of parental

education in predicting the attainment of a degree in higher education" (Burney, p. 123). Another controllable variable at the high school level deemed, "Significant in explaining the variance in high achievement was the ratio of students who took the SAT test to the number of graduates" (p. 123). That is, schools with a high level of student participation on the SAT had more students with higher academic success.

According to Kyberg, Hertberg-Davis, & Callahan (2007), testing out data from a larger study that investigated the question of whether Advanced Placement and International Baccalaureate (IB) programs meet the needs of gifted learners, this qualitative study narrowed the focus to minority students. The researchers looked at such factors, such as teacher behavior, administrative behavior, and/or school environment factors that contributed to the successes or served as obstacles to minority students in Advanced Placement and IB courses.

Kyberg, Hertberg-Davis, & Callahan (2007) identified two key factors that seemed to be integral to creating environments that nurture the growth of academic talent among students: a) "a pervasive and consistent belief that these students could succeed, which resulted in instructional and group support, and b) scaffolding to support and challengeable students (e.g., extracurricular help, lunchtime discussion forums, subsidized college visits).

According to Harris and Sass (2010), there is evidence that "better trained and more experienced teachers tend to be assigned to students of greater ability and with fewer discipline problems" (cited in Harris and Sass 2010, e.g., Clotfelter et al. (2006), Feng (2009) p. 799).

AP courses in many schools across the country "continue to define rigor as more of the same: more textbooks to read and more content to memorize, after which students are asked to recall static events, facts, and pieces of compartmentalized information on standardized tests" (Benitez, Davidson, and Flaxman, 2009, p. 31).

Successful Leadership

According to Hallinger (2003) in the 1990s, there was some restructuring in North America; scholars and practitioners began to popularize terms such as shared leadership, teacher leadership, distributed leadership and transformational leadership. "The emergence of these leadership models indicated a broader dissatisfaction with the instructional leadership model, which many believed focused too much on the principal as the center of expertise, power and authority" (p. 330).

Bass and Riggio (2005) share:

> Transformational leadership is a process of influencing in which leaders change their associates' awareness of what is important, and move them to see themselves and the opportunities and challenges of their environment in a new way. Transformational leaders are proactive: they seek to optimize individual, group and organizational development and innovation, not just achieve performance 'at expectations.' They convince their associates to strive for higher levels of potential as well as higher levels of moral and ethical standards.

As it is, principals are constantly influencing others to move toward the mission of the school. Principals lead by example every day and as such influence expectations for student achievement. Thus, principals have a critical role in the changing the

expectations of PD and ensuring high expectations for all in order to implement effectively and support effective strategies in the classroom.

Chapter III

Methodology

In this chapter, the researcher will present the research questions, design and research methodology, setting and population and procedures used to accomplish the goals of the study. Furthermore, the chapter will conclude with a description of the instrument, hypothesis variables and statistical analyses of the data used for this study.

Research Questions

The study addressed the following questions:

1. *In an urban school district, how has the student participation increased and student performance improved on AP exams over a seven-year period between 2007 and 2013?*
2. *What is the difference between the quantity of completed teacher training PD and the rate of students achieving a qualifying score of 3 or higher on the following AP subject exams: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History?*
3. *Which factors of professional teacher training do teachers believe influence student performance on AP exams?*

Description of the Research Design

An explanatory sequential mixed method research design was selected for this study. Specifically, the explanatory sequential mixed method design consists of two phases (Creswell, 2014). According to Creswell (2014), the first phase the researcher collects quantitative data analyzes the results, and then uses the results to build the

second qualitative phase. The second phase is to have a qualitative data to help explain in more detail the quantitative results.

Therefore, the first phase included a descriptive quantitative method that examined the participation of the students scoring a qualifying score of 3 or higher (AP student achievement) for the last seven years. The study looked at different schools types as either magnet schools or comprehensive high schools. The purpose of the first research question was to find if the student AP participation and AP student achievement was consistent among schools with similar demographics. Also, the first research question was intended to examine if such differences or patterns in AP student participation and AP student achievement were similar to national trends that show gaps in student AP participation and AP student achievement between different schools that differ in levels of students from different levels of economic status and ethnic groups (College Board, 2013; Handwerk et al., 2008). The researcher began by selecting the school years of available data from all of the high schools from the Bayou urban district as reported in the annual report (School District, 2013). The AP student achievement or percentage of students scoring a qualifying score of 3 or higher were aggregated by school year, as well as the 2013 students PSAT mean by school. The student participation in AP courses and student performance on AP exams was compared between schools and school type.

For the second research question, the first phase collected more quantitative data, particularly about teacher PD training activity and student AP scores. The data base contained information about all tested subjects offered (Appendix D) and teacher PD information for all subjects taught. Then, study focused the four common core subject

areas of study of students while AP Spanish Language was added since the frequency was high for this exam. The collected PSAT scores for students were intended to represent a covariant factor to compensate for student ability prior to taking AP course. Previous research has been conducted that gives evidence that students with higher PSAT scores have a much higher probability of scoring a 3 or higher on subjects such as Biology, English Language and Composition, and Calculus AB (Millsap, Camara, & Ewing, 2006).

For the second phase, the third research question of the study was intended to help explain results gathered from second research question (Creswell, 2014). This explanatory sequential mixed method design was selected to gather qualitative data to "…help explain in more detail the initial quantitative results" (Creswell, 2014, p. 224). Specifically, the study collected responses from open-ended question responses from teachers who participated in focus group activity. The purpose was to collect qualitative data to inform the research on the impact of training and other factors teachers attribute to AP student achievement. From the focus group, responses were gathered to assist with the explanation of the results of the first phase.

Ultimately, at the end of the study, information produced more knowledge around the differences teacher training teacher's capacity on assisting students scoring a qualifying score on the AP exam from different groups and different AP tests (College Board, 2013; Millsap, Camara, & Ewing, 2006). The design is appropriate because teachers spend the most amount of time with students and may understand factors of student success on the AP exams.

Setting

For the purpose of this study, the high schools were from within the Bayou School District with students taking AP tests and the student performance were selected and documented with predetermined codes or numerical assignment in order to maintain confidentiality of the results. The schools associated were from an identified large urban school district in Texas. The district maintained a total of 43 high school campuses of which 24 were comprehensive high schools. According to the "2012-2013 Facts and Figures," the district total enrollment was 203,354 and 45,793 were enrolled in high schools.

Students by Ethnicity

The demographics of the district are as follows: Hispanic, 62.7%, White, 8.2%, African American, 24.6%, Asian, 3.4%, and Native American, .2%. The student population that is identified as Economically Disadvantaged is 79.7%, and Limited English Proficiency (LEP) is 29.8%.

Selection of Participants

The district AP Program provides course offering opportunities at all the 43 high schools. In these schools, the students have the opportunity to take college-level courses and earn college credit. A possible 37 AP exams were offered in 22 subject areas (see Appendix D), and exams are administered over a two-week period each year in May. The AP grade scale ranges from 1 to 5, and a score of 3 or higher qualifies a student to earn high school advanced placement credit, possibly college credit, or both. The range of comprehensive high schools offering AP subjects courses ranged from 4-26. This is

according to the district educational program report, “Advanced Placement Report” (School District, 2013).

To examine the first research question, data were included from all the high schools. Because of the possibility of different mediating variables in student population and higher concentration of students with particular backgrounds in student ability (based on PSAT school averages) among specialty schools or magnet schools, the researcher separated groups of schools by school type. The study then used descriptive statistics to describe student percent passing AP scores over a one-year period.

For the second research question, the decision was made by the researcher to only look at data from 25 high schools (23 comprehensive and 2 randomly selected magnet schools). Again, the other high schools were either charter, school-wide magnet or some other alternative type that may not have had a population that was well representative or a good sample of the district in terms of student background such as economic status (free or reduced lunch) and student potential as defined by PSAT average.

For the first and second research questions, participation and results of students on AP exams were collected from the district report that was compiled from data from the College Board. For this study, permission was solicited and granted by the district’s Research and Accountability for internal archival data on student participation in AP courses, courses taken and instructor’s background, and teacher activity of participation in PD.

For the third research question involving teacher participation in focus group, the researcher solicited permission from teacher participants. The focus group teachers participated at the end of a planned PD or AP Professional Learning Community (PLC)

by the school district. Teachers were expected to meet five times a year. The researcher met with the teachers after one of the sessions. Participants were informed of the study and given the option to participate through the consent form approved by the University of Houston's Institutional Review Board (IRB) Committee. Participants were informed that information collected would only be used for research purposes and the names of the participants would be de-identified whenever possible.

Instrumentation

Archival data was collected through permission and assistance of the district's Research and Accountability department. The Advanced Placement results were collected into an archival file through electronic communication from the database of the school district as well as the official report, Advanced Placement Report 2012-2013 (School District, 2013). The archival file also contained the district training information of teachers. The archival file was password protected to maintain confidential teacher information secure and uploaded on SPSS for statistical analysis. The focus group responses were collected by a digital audio recorder, and teachers had the option to provide written responses.

Procedures and Time-Frame

A proposal for this research study was submitted to the Institutional Review Board (IRB) for the University of Houston. All of the procedures of the University of Houston Human Subjects Committee were followed prior to conducting research. The researcher received final approval to begin the study on February 24, 2014 (see Appendix E). In accordance to district policy, written permission to conduct this study was proposed to the office of the Assistant Superintendent (see Appendix B). Afterward, the

research was granted permission on February 14, 2014 from the Assistant Superintendent of Research and Accountability (see Appendix C). The researcher's primary objective was to ensure that there was no potential harm to the participants of the study and all results were de-identified from individual student, teacher, and school names.

For the first research question, data were collected from district report (data from 2007-2013) on student participation and performance on AP exams (see Appendix D) for all high schools in the district (School District, 2013). For the second research question, the district provided several excel files that were password protected with archival data requested. The files contained AP results from a six-year school period years 2007-2008 to 2012-2013. The following data were also collected during this same period in one combined table database: Student AP score by subject, Student PSAT, Student SES status as identified by being a free or reduced lunch or not free or reduced lunch, Teacher name teaching AP course, and teacher name training hours. The databases were compiled into one database. Then, the data were readily converted into SPSS, and several sorting and analyses were conducted.

Teachers with different number of hours of attended training were identified. First, all those with no training, were given a column with 0, while those with 2-15 hours were given a 1, and those with greater than 15 were identified as 2. Thus, they were grouped into by three different groups, none, low and high training levels.

The study included student PSAT percentage scores by schools. The schools were grouped into two equal groups of students after ranking them by percent passing. Schools above the ranking were schools with higher potential level of students based on PSAT percentages (High PSAT) and schools in the lower potential group were schools

with lower level of students based on PSAT percentages (Low PSAT). The purpose of dividing two groups was to evenly distribute them to control for student potential (prior ability) to draw comparisons on how the independent variable (teacher training and school context) may show differences on students scoring a 3 or higher (dependent variable). Thus, parametric statistics, which rely upon the assumption of the normal distribution, was appropriately applied when analyzing data (Moore and Slate, 2008). The study also grouped the independent variable of teacher training into three groups: 1. no hours of activity (None), 2. 2-15 hours (low), and 3. 16 or more hours (high). The study further grouped students based on whether they were identified as participants of free or reduced lunch (Low SES) and non-participants of free or reduced lunch (High SES). An analysis of covariance (ANCOVA) was applied, and the co-variant of PSAT was applied when appropriate comparisons were made between groups. A Pairwise Comparison from SPSS was utilized to compare differences in averages between the different independent variables and dependent variables. The study also conducted one-way directional analysis of variance (ANOVA) when there were not enough PSAT student scores available to use in the ANCOVA. During the initial component of the focus group, consent forms were completed by teacher participants. After this, teachers then participated in an open-ended discussion of four questions that lasted no more than 30 minutes (see Appendices F and A).

Variables

The primary objective of this study was to examine the student achievement outcomes on Advanced Placement exams as measured by students scoring a qualifying score of three or higher and examine differences in the amount of PD training

participated by teachers, and collect understanding from teachers about their training experience. Specifically, this study explored possible differences of AP participation and AP student achievement results between the 25 high schools. Furthermore, the study measured by the College Board Advanced Placement exams as a function of teachers participation in trainings. In addition, teacher attributions were described.

After reviewing the literature on Advanced Placement, PD, and learning implications, dependent and independent variables were identified and selected for this study. The dependent variable in this study was AP student achievement (students scoring a qualifying score of 3 or higher on an AP exam).

The second research question had several independent variables used to compare against the dependent variable (AP student achievement). Those independent variables were teacher training and viewed from three different levels of activity, none, low and high. Where possible, student potential or the student Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT) was used as a covariant. Also, school PSAT mean was used to divide comprehensive high schools into two groups, (low PSAT and high PSAT or proxy for school characteristic). Lastly, student socioeconomic background was also a mediating variable that was utilized when making comparisons on AP student achievement. That is, the researcher divided up students from backgrounds of students participating in free and reduced lunch (low SES) and those not participating (high SES).

Data Analysis

After checking for data for normality, and as a method to examine the focus of the research questions, the inferential statistical tests were used in this non-experimental quantitative study were analysis of variance (ANOVA) and analyses of co-variance

(ANCOVA). PSAT average by student was used as the covariant. Both analyses were employed to measure differences in student achievement between the differences between teachers' hours of training (None, Low, High) and students scoring a 3 or higher. Several other analysis were done by other student characteristics as defined by students participating in free or reduced lunch (Low SES) or not participating (High SES) and student potential on AP exams as determined by high PSAT mean (HPSAT) or low PSAT mean (LPSAT). The study also conducted several Pairwise Comparisons.

Methods

A mixed method study was conducted that involved a two-phase study (Creswell, 2014). The first phase included two distinct collections of archival data. The first included collection of quantitative data about the participation and performance of students scoring a qualifying score of 3 or higher over a seven-year period. Specifically, the descriptive quantitative phase examined the participation of students taking AP courses and the number of students scoring 3 or higher in an urban district from the school years of 2007-2013. The second collection of data included data to assist with the analysis of the difference between the amounts of PD hours teachers attended and compared it to success of students who took the AP exam and scored a 3 or higher on the corresponding exam. Specifically the study examined the differences between the training of teachers in an urban district in five AP subject areas: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History.

Lastly, the second phase was qualitative in nature and collected teacher responses from open-ended questions to inform and explain the research on the impact of the training on student outcomes. The intent of this component was intended to provide

more depth and insight to the quantitative results. Responses were added to the discussion on modification of PD or future trainings.

The school district had 43 high schools, which included School-Wide Magnet Schools, Small Charter Schools, and Comprehensive Schools. PSAT score averages and qualifying free and reduced lunch percentages data were also collected for each comprehensive school.

Limitations

There were several limitations to this study. For instance, the study only focused on the student population enrolled in one large urban school district in the southwest part of the United States. The results may not be applicable to other states, districts, and alternative teacher certification programs because each program is created, managed and implemented differently. Additionally, only the AP results were used, and information was limited to what was recorded and available in the district database. There could have been other trainings that teachers attended without necessarily being inputted on the district database. For example, when dividing up teachers between groups of low and high, the number of teachers were divided up by hours from 2 to 15 hours (Low PD) and greater than 15 hours (High PD) to attempt to keep sizes of the groups similar; however, there were 25,470 records of teachers that showed no training (see Table 6). Therefore, interpretations or comparisons from this group to others were limited.

Aside from group sizes, it is also possible that although teachers attended such training, the quality, process and content of the trainings was not collected or researched. According to Guskey (2009), even the environment and context, could have a significant impact on the outcomes of the PD learning of teachers. Furthermore, the study did not

explore the teacher implementation of training in the classrooms. Lastly, the study did not collect classroom practices from the students' perspective.

As for the focus group, a possible threat to internal validity could have been the limitations of gathering data in group settings as well the small number of participants in such a large urban district. Therefore, a small sample of teachers may not have been representative of the general population of AP teachers.

This study may also have external validity concerns. Those could have been that the participating students and teachers are not necessarily characteristic of other students and teachers across different urban settings. Also, the study only reviewed the training of teachers for six years and thus information cannot be generalized to other years as the data collected was limited to those school years and other important variables may have been contributing to teacher training effectiveness and ultimately student results. Additionally, other external variables could have also impacted the results such as the principal's leadership, school resources, and student motivation. As it is, results of this study should not be generalized beyond the school district.

Finally, the findings of this study were based on the results of the College Board AP exam results at one given time. Such results may vary according to the students' test preparation, focus, and other influences of unknown factors that could have prevented them from taking the test and scoring well.

Summary

The study examined the participation and performance students taking AP exams over a seven-year period in one urban school district. The study also examined the differences between the PD activity and student outcomes on the number of students

scoring a qualifying score of 3 or higher from the following groups: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. Finally, the study conducted a teacher focus group to collect their perceptions through open-ended question responses. The teacher responses detailed the PD factors that contributed to positive student learning and achievement.

As noted by Nesser and Romanowski (2011), it is important that "teacher voices must be heard in the formulation of PD" (p. 1660). The focus was to collect information to inform the research on the impact of training and other factors that teachers believe are supportive to assist them in preparing more students to successfully scoring a qualifying score of 3 or higher on AP exams.

The purpose of this chapter was to provide the readers with a description of the research methodology which was used in this study, a description of the subjects in the study, description of the instruments used to measure the dependent variable, and a description of the statistical procedures that were followed. Chapter Four presents the results of the analyses and explanation of charts and tables.

Chapter IV

Results of the Study

The purpose of this study was to conduct a descriptive analysis of the AP program of an urban school district. Specifically, the study described the participation of students taking AP exams and number earning a qualifying score of 3 or higher during a seven year period (Spring 2007–Spring 2013) in a large, urban district located in the Southwestern United States. Another purpose of this study was to determine whether there was a difference in the amount of teacher PD hours or activities and students scoring a qualifying score in the following categories during 2008-2013: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. Lastly, the purpose of this study was to also gather opinions from teachers about their PD experience.

The research questions addressed in this study are as follows:

Research Questions

1. *In an urban school district, how has the student participation increased and student performance improved on AP exams over a seven-year period between 2007 and 2013?*
2. *What is the difference between the quantity of completed teacher training PD and the rate of students achieving a qualifying score of 3 or higher on the following AP subject exams: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History?*
3. *Which factors of professional teacher training do teachers believe influence student performance on AP exams?*

Data Analyses

The first research question was intended to assist in identifying and confirming the belief that the district participation and performance on AP exams were similar to national trends with gaps between ethnic groups and success and availability of AP exams as cited from previous researchers (Dutkowsky, Evensky, & Edmonds, 2009; VanSciver, 2006). The study used descriptive statistics to collect archival data from the previous seven years. Through a mixed method, the study utilized a variety of statistical methods for data analyses to examine the differences between the dependent variable (AP student achievement) and the independent variables as teacher PD activity (none, low, or high) and SES level as defined by student participation on free reduced lunch (Low SES) and those not participating (High SES), and covariate level of AP Potential or student PSAT score. High schools (mostly comprehensive high schools) were also grouped into two groups by high percentage of PSAT mean (H-PSAT) and low percentage of PSAT mean (L-PSAT).

Data Analyses for Research Questions:

Research Question One:

In an urban school district, how has the student participation increased and student performance improved on AP exams over a seven-year period between 2007 and 2013?

The data on *Figure 1* show the number of AP exams taken at the district level and the number and percent scored at 3 or higher. The district trend data show that the overall number of students taking exams increased steadily but had stronger increases from 2009 to 2010 from 11,594 exams taken to 16,556 exams taken. This increase continued to grow in 2011 and 2012 to 21,336 and 23,227 respectively. There was a slight decrease from 2012

to 2013 to 22,693. From 2007 to 2013, the number of exams taken by high school students increased by 150% (13,605) from 9,008 in 2007 to 22, 693 in 2013.

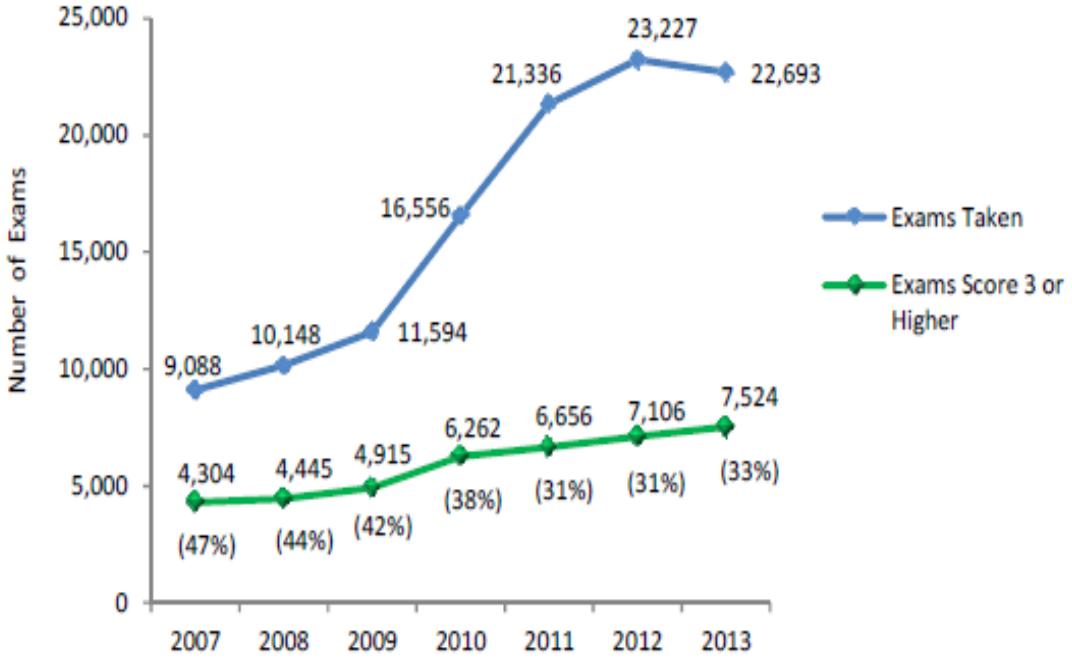

Figure 1. AP Participation and Performance from all High Schools 2007-2013. The figure shows the number of exams and the exams taken by students as well as the number of students scoring a qualifying score 3 or higher.

The district data show that the number of exams scored at a 3 or higher increased by 75% from 4,304 in 2007 to a high of 7,524 in 2013 at the high school level. However, the percent of AP exams taken with a score of 3 or higher decreased from 47% in 2007 to 33% in 2013.

AP Bayou Summary Data by Student Group

Table 1

2013 Bayou District Summary of AP Participation and Performance by Student Group in Gr. 9-12

Group	Exam Takers	%	Exams Taken	%	AP Score ≥ 3, N	AP Score ≥ 3, %
African American	2383	18%	3779	17%	511	14%
American Indian	43	0%	86	0%	22	26%
Asian	933	7%	2415	11%	1665	69%
Hispanic	7187	55%	11920	53%	2872	24%
White	1803	14%	3534	16%	2172	61%
No Response	260	2%	339	1%	48	14%
Other	357	3%	620	3%	234	38%
Female	7246	56%	12528	55%	3966	32%
Male	5720	44%	10165	45%	3558	35%
Free or Reduced Lunch	8465	65%	13744	61%	2882	21%
Non-Participation in Free or Reduced	4475	35%	8910	39%	4631	52%
Unknown Econ. Status	26	0%	39	0%	11	28%
Total	12966	100%	22693	100%	7524	33%

The district summary by student group is shown on Table 1. The table includes the number of students in 2012-2013 who took an AP exam, number of exams taken, and the number of exams scored 3 or higher for grades 9-12 by ethnicity, gender and economic status as defined by student participation on free or reduced lunch. The number of exam takers reflects an unduplicated count of students who took an exam, and the number of exams taken is a total count of exams in all subjects.

Hispanic students were the largest ethnic group represented who took an AP exam in grades 9-12, and represented 55% in 2012-2013 school year. African-American students represented the second largest group of AP exam testers in grades 9-12, representing 18% in 2012-2013 school year. White students accounted for 14% of all AP testers in 2012-2013 school year, and Asian students accounted for 7 % of all AP testers in 2012-2013 school year. Female students accounted for 60% of all AP testers in 2012-2013 school year. Students participating in free or reduced lunch (Low SES) accounted for 65% of all AP testers in 2012-2013 school year.

The following is the breakdown from All AP exams administered by race, ethnicity, and other demographics: Hispanics, 53%, African American, 18%, White, 15%, Asian 10%, Female 54%, Low SES, 61%.

In terms of performance, twenty-four percent of the exams taken by Hispanic students were scored at the qualifying score of 3 or higher in 2012-2013 school year. Fourteen percent of the exams taken by the African American students were 3 or higher in 2012-2013 school year. Sixty-one percent of the exams taken by White students were scored at 3 or higher in 2012-2013 school year. Sixty-nine percent of the exams taken by Asian students were scored at 3 or higher in 2012-2013 school year. Thirty-two percent of the exams taken by female students were scored at 3 or higher in 2012-2013 school year. Thirty-five percent of the exams taken by male students were scored at the 3 or higher level in 2012-2013 school year. Twenty-one percent of the exams taken by Low SES students were scored at the 3 or higher level in 2012-2013 school year. Fifty-two percent of the exams taken by students not participating in free or reduced lunch (High SES) scored at the 3 or higher level in 2012-2013 school year. In describing the data, there is a large

difference for students who participated in free and reduced lunch (Low SES) of which 21% of students scored at the qualifying score of 3 or higher versus 52% of the High SES students scoring at the qualifying score of 3 or higher. However, it is important to note that 28% of the students had an unknown economic status.

Table 2

2013 Comprehensive High Schools for AP Participation and Passing

	School Number	% of Met PSAT College Readiness	Number Taking AP Exams	Number AP Exams Taken	Number of Exams Scored 3+	% Scored 3+
1	W5	1.6	119	152	0	0%
2	F1	5.2	240	373	3	1%
3	K1	2.1	58	115	1	1%
4	J1	3.5	86	120	4	3%
5	Y1	1.9	113	170	5	3%
6	S4	3.9	117	169	6	4%
7	W2	12.9	135	281	11	4%
8	L2	4.3	328	586	35	6%
9	S1	7.5	170	289	21	7%
10	W6	4.7	119	149	12	8%
11	M1	4.2	337	525	45	9%
12	W3	1.3	543	957	102	11%
13	H2	4	584	1,022	127	12%
14	R1	12.1	584	1,035	139	13%
15	D1	8.3	370	620	97	16%
16	L1	38	1,645	1,731	276	16%
17	S2	4.2	348	616	112	18%
18	W1	11.5	345	636	129	20%
19	A1	3.2	274	404	99	25%
20	M2	5.6	351	549	164	30%
21	C3	11.5	727	1,141	348	31%
22	W4	35.1	817	1,707	760	45%
23	B1	65.5	926	2,567	2,091	82%
	District	20.6	12,966	22,693	7,524	33%
	Texas	35.6	209,543	398,130	190,042	48%
	Nation	46	2,168,995	3,864,035	2,284,890	59%

Table 2, *2013 Comprehensive High Schools for AP Participation and Passing*, ranks all of the comprehensive high schools based on the percentage of students scoring a qualifying score of 3 or higher (AP student achievement). The table identifies the district average to be 33% students meeting AP student achievement and shows that the majority of the schools fall below that average. That is, 21 of the 23 comprehensive high schools were below the district average. Interestingly, the school ranked at the highest level had 82% of the students scoring a 3 or higher. The table also shows the percentage of students above the College Readiness Index score as calculated based on PSAT means by the College Board (College Board, 2013).

Table 3

Magnet Schools PSAT College Readiness, AP Participation and Performance of Students Scoring 3 or higher.

	School Number	% PSAT College Readiness	Number Taking AP Exams	Number AP Exams Taken	Number of Exams Scored 3+	% Scored 3+
1	E3	**	46	49	1	2%
2	E4	0	43	192	3	2%
3	E5	8.8	119	226	8	4%
4	J2	7.4	246	355	16	5%
5	W2	13	109	109	5	5%
6	M3	14.9	73	113	10	9%
7	H3	17.1	345	737	70	10%
8	N1	30.3	125	185	33	18%
9	H1	27	214	311	63	20%
10	S3	10.1	178	281	74	26%
11	E1	44.3	246	279	81	29%
12	C2	69.4	381	557	174	31%
13	E2	25.2	248	465	204	44%
14	C1	100	566	1,273	824	65%
15	H4	79.8	294	640	450	70%
16	D2	95.4	393	1,003	919	92%

17	L3	**	*	*	*	*
	District	20.6	12,966	22,693	7,524	33%
	Texas	35.6	209,543	398,130	190,042	48%
	Nation	46	2,168,995	3,864,035	2,284,890	59%

*Note: * indicates no data available.*

Table 3, *Magnet Schools PSAT College Readiness, AP Participation and Performance of Students Scoring 3 or higher*, ranks all of the magnet high schools based on the percentage of students scoring a qualifying score of 3 or higher (AP student achievement). The table identifies the district average to be 33% students meeting AP student achievement and shows that the majority of the schools fall below that average. That is, 12 of the 17 magnet high schools were below the district average. Interestingly, the school ranked at the highest level had 92% of the students scoring a 3 or higher. The table also shows the percentage of students above the College Readiness Index score as calculated based on PSAT means by the College Board (College Board, 2013). The majority of the magnet schools had much higher percentages of students above the College Readiness Index score.

Table 4

Summary of AP Percentage for Both Magnet and Non-Magnet Schools

Type	# of Schools	Mean	Std Dev.	Min Percent	Max Percent
Comprehensive	23	16%	0.183335	0	82%
Magnet	16	27%	0.265965	2%	92%

Table 4, *Summary of AP Percentage for Both Magnet and Non-Magnet Schools,* shows the mean percentage of AP student achievement for the schools by type. It shows mean to be 16% among comprehensive schools, whereas it is 27% among the magnet schools.

Table 5

Summary of Combined Scale Score of PSAT Score

Type	# of Schools	Mean	Std Dev	Min Percent	Max Percent
Comprehensive	23	10.9608696	14.89925	1.3	65.5
Magnet	16	36.18	32.46837	0	100

Table 5, *Summary of Combined Scale Score of PSAT Score*, shows the mean percentage of PSAT scores for the schools by type. It shows the mean of students to be meeting College Readiness to be 10% among comprehensive schools, whereas it is 36% among the magnet schools. Therefore, the student potential based on PSAT means, is much higher among the magnet schools than the comprehensive schools.

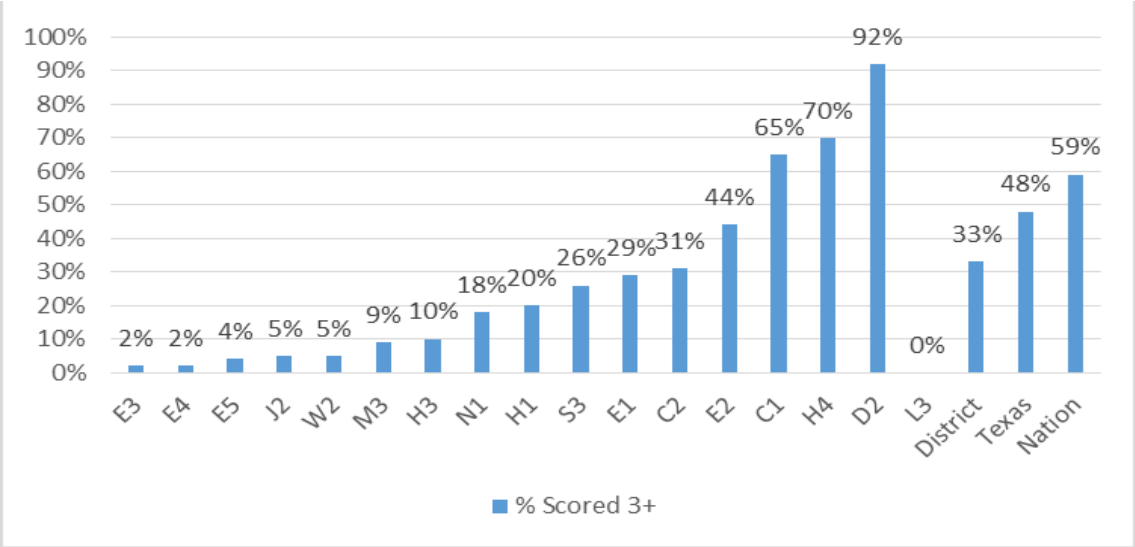

Figure 2. Percent AP Passing. AP by Magnet Campus Percent Scoring a 3 or Higher.

Figure 2 shows the percent of students scoring a qualifying score of 3 or higher at magnet schools and/or specialty schools (schools that require application and entrance requirements). There are sixteen schools in this category and thirteen of the schools were

below the district average and thirteen below the state average. Upon examination of the percent of students achieving a qualifying score of 3 or higher by campus, it reveals that there exist large differences among the campuses when it comes to the percentage of students scoring a 3 or higher. The range is from a minimum of 1.3% percent scoring a qualifying score of 3 or higher to the maximum of 92% scoring a 3 or higher (see Table 5). The figure also shows the differences when compared to the district, state, and national average.

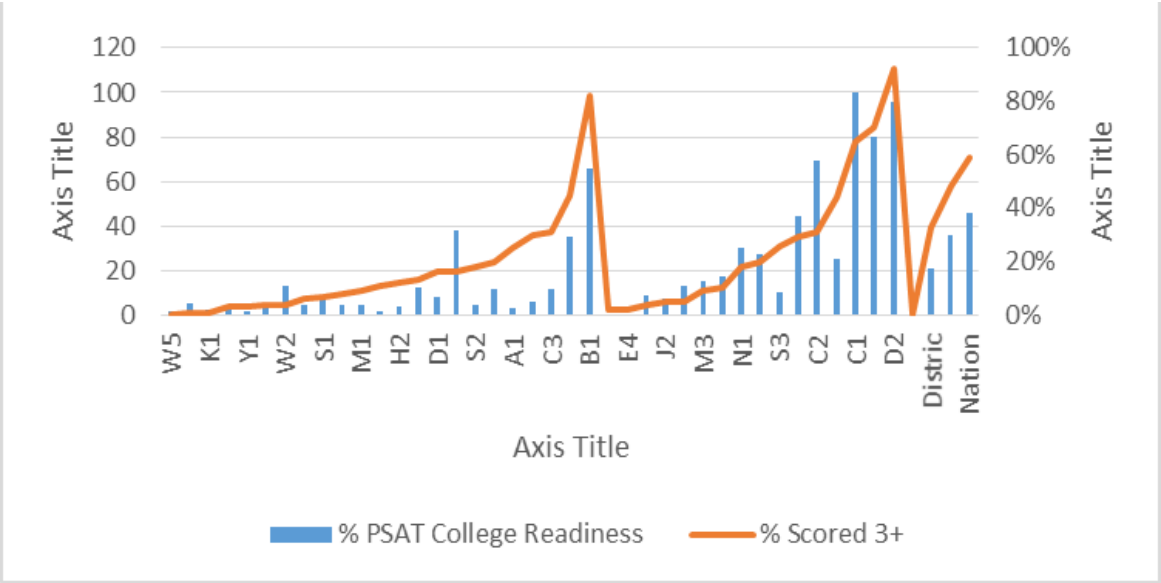

Figure 3. Percentage of PSAT Readiness Index and AP School Percentage 3 or Higher. The figure shows the comprehensive high school percent of AP Readiness Index and AP percentage 3 or higher.

Figure 3 represents the percent of students on the PSAT Readiness Index by comprehensive high school campus, and percentage of students scoring a 3 or higher. The graph data visually show the relationship between student PSAT Readiness is closely related to the percentage of students scoring a 3 or higher.

Research Question Two:

What is the difference between the quantity of completed teacher training PD and the rate of students achieving a qualifying score of 3 or higher on the following AP subject exams: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History?

Several different analyses were conducted. Aggregate data were collected on Excel spreadsheet tables and imported to Statistical Package for Social Science (SPSS). Homogeneity of variances was tested in SPSS using Levene's Test for homogeneity. The test examines the null hypothesis that the error variance of the dependent variable (teacher training activity) is equal across groups. The results were rejected at significant levels of less than .001. Results of the different sets of analyses used to determine the difference of AP PD activity (training hours) and student performance on AP exams. The assumption of several one-way analyses of variance (ANOVAs) and analysis of covariance (ANCOVA) were undertaken to examine whether student AP performance measured showed significant differences with teacher training from the following three categorized groups or levels of training: None (0 hours of training), Low (2-15 hours of training) and High (16 or more hours of training).

Overall Effect of Training Hours

The first analysis examined all the AP tests included in the database and all the total hours of activity for each AP teacher for the particular academic school year. That is, any training activity that was recorded from June (summer training) until May of the corresponding school year. The total mean of students scoring a 3 or higher was used to compare to the total mean of training. There were three categories: None, Low and High.

Table 6

Descriptive Statistics of PD (PD) Activity, Percent Passed (3 or higher) AP Exam, and Number of Students

PD Activity	% Passed AP	Std. Deviation	Number Tested
None (0 hrs)	26	0.441	25,470
Low (2-15 hrs)	18	0.388	1,076
High (>15 hrs)	38	0.485	992
Total	26	0.441	27,538

The first category resulted in 25,470 records, the second resulted in 1,076 records, and third category resulted in 992 records. The mean of students scoring a 3 or higher in the three categories was 26%, 18%, and 38%.

Table 7

Descriptive Statistics of PD (PD) Activity, Percent Passed (3 or higher) AP Exam, and Number of Students, included covariate.

			95% Confidence Interval	
PD Activity	% Passed AP	Std Error	Lower Bound	Upper Bound
None (0 hours)	26.7	0.002	26.30	27.1
Low (2-15 hours)	19.7	0.011	17.60	21.8
High (>15 hours)	27.6	0.011	25.40	29.8

Note: Covariate appearing in the model at the following value: PSAT = 142.92

The results of this analysis (see Table 7) shows the mean of students scoring a 3 or higher in the three categories was 26.7%, 19.7%, and 27.6% with adjustment of the covariate of PSAT. The analysis included the covariate of PSAT index score to adjust for student potential. The covariates appearing in the model are evaluated at the following values: PSAT = 142.92 and adjusted at the 95% Confidence Interval.

Pairwise Comparisons

A Pairwise Comparison was conducted and set at the 95% confidence interval. The comparison between the dependent variable of student AP outcomes were compared. The mean difference is significant at the .05 level. The results show that teachers with no training hours (none) is significantly different than teachers with low (2-15 hours) levels of activities at the .001 level. There is no statistical difference between no teacher training hours (none) and teachers with high levels of activity (hours > 15). The results also show that there is a statistical difference between the teachers with low activity (2-15 hours) and high activity (hours >15) at the .001 level.

The results of the analysis of covariance (ANCOVA) indicated a significant main effect for Teacher training (PD Activity) to be $F(2, 27534) = 21.061$, $p = .001$, Partial Eta Squared = .002 and indicated differences between the following groups: No training and low training, low training and high training. The results showed no significant differences between no training and high training when all teacher training hours and student scores for all AP scores are combined (See Figure 4).

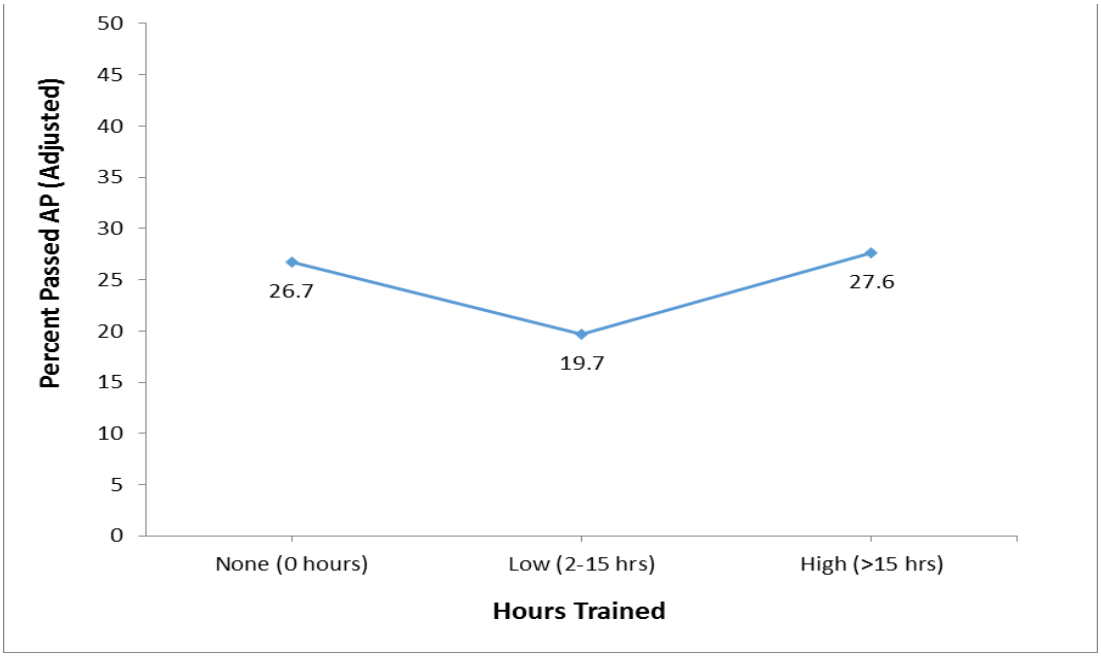

Figure 4. Percent AP Passed and Hours Trained. The graph shows the percent of students achieving a qualifying score of 3 or higher AP exams (scoring a 3 or higher) and the difference among teachers with different level of trainings, none, low and high.

Analysis of PD Activity and Social Economic Status (SES)

The second analysis was intended to examine differences between activity levels of teacher PD training and examine the differences between students who identified themselves as participants of free and reduced lunch (Low SES) and those non-participants of free and reduced lunch (High SES). Free and reduced lunch was used as a proxy for socioeconomic status (SES). The teacher PD activity included the three groups: None (0 hours), Low (2-15 hours) and High (>15 hours).

Descriptive Statistics as shown on Table 8 shows the dependent variable as the percentage of AP students scoring a qualifying score of 3 or higher (AP student achievement) and two independent variables of PD activity (None = 0, Low = 1 and High = 2) and students not participation on free and reduced lunch (High SES) and students that

are participating in free and reduced lunch (Low SES). The total records meeting this criterion are shown in Table 8.

Table 8

Descriptive Statistics PD Training and SES

		Socio-Economic (SES)			
		High (SES)		Low (SES)	
Training	*n*	%	*n*	%	*Difference*
(none)	10,990	29.7	14,480	24.4	5.3
Low (2-15 hrs)	408	23.8	668	17.1	6.7
High (>15 hrs)	512	36.2	480	19.6	16.6

Note. Covariate appearing in the model at the following value: PSAT = 142.92

The results of this analysis (see Table 8) shows the mean of students scoring a qualifying score of 3 or higher (AP student achievement) in the three categories and by student participants in free and reduced lunch (Low SES) and those non-participants in free and reduced lunch (High SES). For example, teachers with no training (none) and with students not participating in free and reduced lunch (High SES) had 29.7% of students scoring a qualifying score of 3 or higher on AP exams. Teachers with low training (2-15 hours) and with students participating in free and reduced lunch (Low SES) had 17.1% of students scoring a qualifying score of 3 or higher. Furthermore, students from Low SES and taught by teachers with no teacher training had 24.4% of students scoring a qualifying score of 3 or higher as compared to students from Low SES and High levels teacher training had 19.6% of students scoring a qualifying score of 3 or higher.

This analysis included a covariate of PSAT mean score to adjust for student potential. The covariates appearing in the model are evaluated at the following values: PSAT = 142.92 and adjusted at the 95% confidence interval. Table 8 adjust percentages for PSAT covariate coefficient. The results of an ANCOVA test demonstrated there was a

significant interaction effect between the training activity and SES, F (2, 27,532) = 12.760, p = .001, partial Eta squared = .001 (see Figure 5 for illustration).

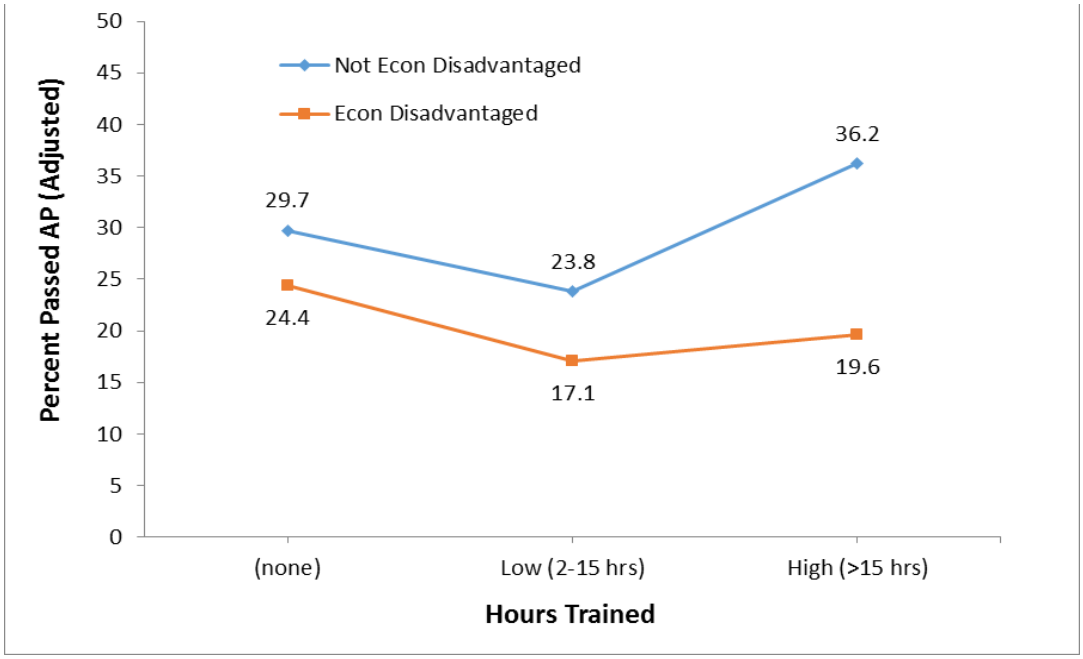

Figure 5. Hours PD and SES (with covariate). The figure shows the amount of students achieving a qualifying score of 3 or higher, all AP exams and the training level of the teacher for those students.

Campus Level PSAT

The third analysis added a campus level characteristic as defined by mean of the campus PSAT as an independent variable. Comprehensive high schools mean PSAT score, standard deviation and n counts were analyzed for 25 comprehensive high schools. The total mean for all schools was 142.82 for 27, 830 students (see Table 9). The purpose of ranking schools by PSAT score was to be able to divide the schools into two categories,

high schools with high percentage of PSAT mean (H-PSAT or > 135) and high schools with low percentages of PSAT mean (L-PSAT). The high schools were ranked by the PSAT average, and the approximate median was developed based on the amount of students at the schools. As a result, the H-PSAT group of schools had a total of 14,523 students, and the L-PSAT group of schools had a total of 13,307 students.

Table 9

Campus, PSAT Mean and Identification of High and Low PSAT

School #	Mean	Std. Dev.	# of Students	Total # students High	Total # students Low
002	185.57	25.141	3718		
025	169.58	26.074	1167		
036	154.31	26.001	4225		
015	141.40	20.513	977		
008	140.16	24.024	2973		
016	137.46	26.403	524		
011	136.32	17.699	939	14523	
012	133.82	21.324	1064		
034	131.66	17.684	890		
003	131.15	17.948	563		
027	129.37	19.202	2175		
009	127.14	21.268	929		
024	126.17	21.076	354		
023	125.06	20.525	958		
017	125.02	21.169	1343		
033	124.68	17.429	561		
010	124.45	18.207	947		
310	123.39	19.537	709		
001	123.11	17.654	823		
020	120.72	17.486	268		
004	120.44	18.774	661		
014	119.86	18.748	321		
007	118.50	19.136	203		
018	118.31	20.380	363		
006	117.49	16.296	175		13307
Total	142.82	30.553	27830	14523	13307

Comparison of All AP, Teacher Training by Campus Level

Table 10

AP PD Activity, Campus PSAT as Independent Variable

Training	*n*	Low (PSAT) %	*n*	High (PSAT) %	*Difference*
(none)	12,148	23.5	13,322	29.6	6.1
Low (2-15 hrs)	544	14.8	532	24.5	9.7
High (>15 hrs)	463	18.5	529	37.3	18.8

Note. Covariates appearing in the model evaluated at the value of PSAT = 142.92

Table 10 shows descriptive data with the dependent variable AP PD Activity or training. The independent variables were the campus level means on the PSAT. Specifically, schools were divided between low and high as previously noted. For example, schools with low PSAT (PSAT < 135) and no teacher training or PD (none) had a mean of 23.5%, whereas high PSAT and no teacher training or PD (none) had a mean of 29.6%. The table shows calculations with covariant coefficient of PSAT value of 142.92. The results further demonstrate high levels of PD and students from with higher PSAT schools have a higher percent of students scoring a qualifying score of 3 or higher on AP exams. Specifically, the high PD activity with high PSAT had an adjusted mean of 37.3% (see Figure 6). In contrast, high PD activity with schools with low PSAT had an adjusted mean of 18.5% of success on all AP exams. The ANCOVA results reveal a significant interaction effect between training and school PSAT, $F(2, 27{,}531) = 17.618$, $p = .001$, Partial Eta .001.

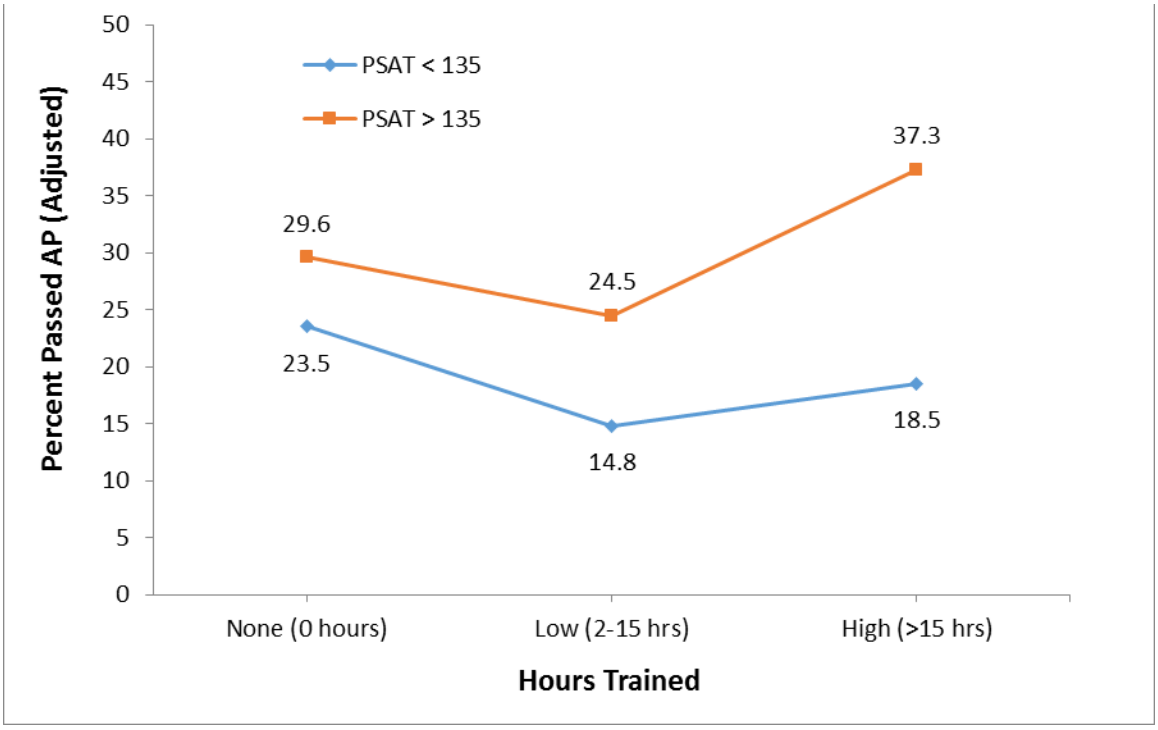

*Figure 6***.** All AP Exams Hours of PD by School PSAT (with covariate). The figure shows the percent of students achieving a qualifying score of 3 or higher AP exams that was adjusted with covariate and hours trained. It also compares the student passing between the students at different schools determined by level of PSAT.

"Selected" AP Exams, PD Training and School PSAT

The next analysis contained data from the four of the five subjects intended as a focus for the study. Those AP exams included: U.S. History, Biology, English Language and Composition, and Spanish Language. The database did not have enough data for Calculus when using the covariant of PSAT. In this scenario, the dependent variable remained the percentage of students scoring a qualifying score of 3 or higher and the independent variables were: (a) school characteristic as measured by high mean PSAT (H-PSAT or mean >135) or low mean PSAT (L-PSAT or mean<135), and (b) Teacher PD by three groups (None, Low, and High).

The analysis showed there is a difference between schools with a higher PSAT and lower PSAT (see Table 11). There was a larger difference between high levels of PD at campuses with high PSAT scores and high levels of PD and students from backgrounds of high socioeconomic status (H-SES) (see Figure 7). Furthermore, the results indicate that there was a large differences in outcomes on AP exams among teachers with high levels of PD and high PSAT schools, 45.8% versus high levels of PD and low PSAT schools, 19%.

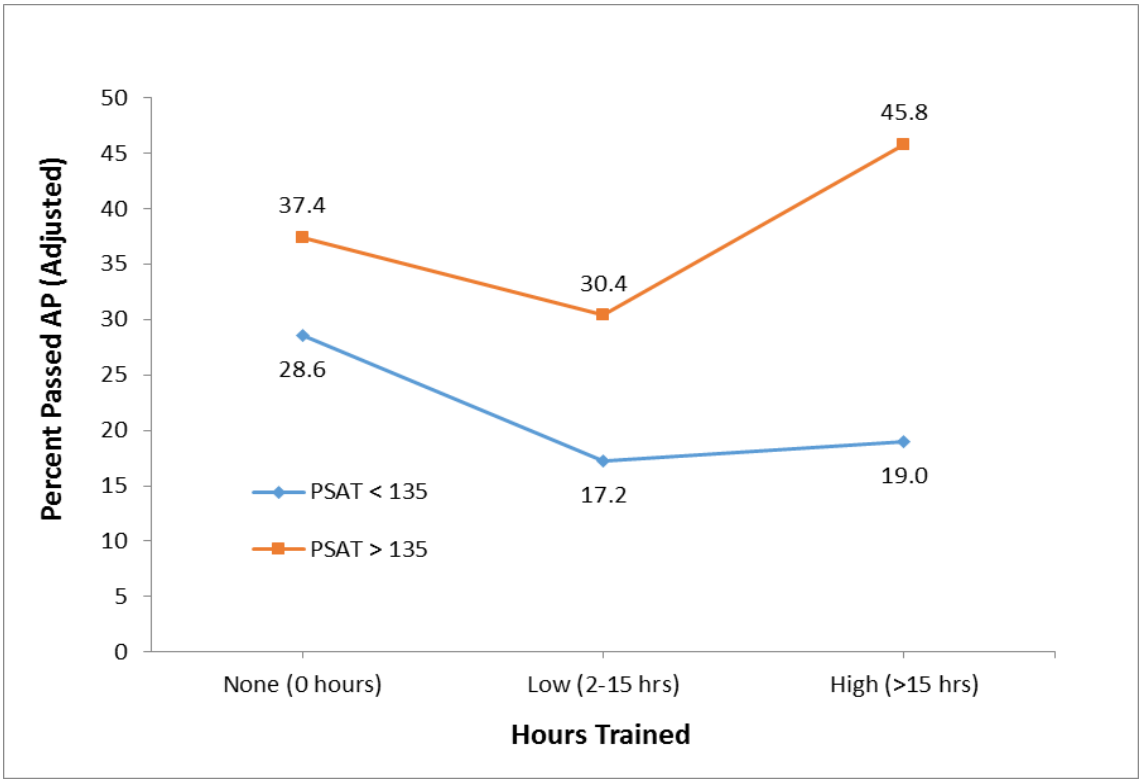

Figure 7. Selected Tests: AP US History, Biology, English, and Spanish
Hours PD by School PSAT (with covariant). The figure shows the percentage of students achieving a qualifying score of 3 or higher selected AP and compares it levels of teacher training by different schools based on PSAT level.

Table 11

Select AP Exams, PD Training, and School PSAT

Training	*n*	Low (PSAT) %	*n*	High (PSAT) %	*Difference*
(none)	5,462	28.6	4,874	37.4	8.8
Low (2-15 hrs)	217	17.2	225	30.4	13.2
High (>15 hrs)	379	19.0	458	45.8	26.8

Covariates appearing in the model evaluated at the value of PSAT = 142.92

Select AP Exams, PD Training, and SES

In this analysis, the data was limited to the four of the five subject areas of interest. Those AP exams included: U.S. History, Biology, English Language and Composition, and Spanish Language. As in the previous analysis, the database did not have enough data for Calculus when using the covariant of PSAT. In this scenario, the dependent variable was the percentage of students scoring a qualifying 3 or higher (AP student achievement) and the independent variables were: (a) SES level as defined by student participation on free or reduced lunch (L-SES) and those not participating in free and reduced lunch (H-SES), and (b) teacher PD by three groups (None, Low, and High).

The analysis results indicated there is a difference between students from teachers that were identified with high levels of training (High PD) and students from high SES (H-SES), 41.5% versus students that were identified with high levels of training (Low PD) and students from low SES (L-SES), 22.5% (see Table 12). Furthermore, the results of the analysis revealed that students that were from low SES and no professional development training (None PD) scored higher as compared to students that were from low SES and high PD activity (High PD). The results further show that low PD activity among both groups (H-SES and L-SES) students scored lower than students with teachers with no

training and high activity levels of training. Lastly, the results of the analysis show that students taught by teachers with high PD activity (High PD) had higher AP student achievement than students with teachers with no training among H-SES students. In comparison, the results of the analysis show that students taught by teachers with high PD activity (High PD) had lower AP student achievement when the students were from low SES.

Table 12

Analysis of AP in five subjects, PD Activity, and School Characteristic PSAT Level

	Socio-Economic Status (SES)				
PD Training	*n*	High (SES) %	*n*	Low (SES) %	*Difference*
(none)	4,304	35.6	6,032	30.7	4.9
Low (2-15 hrs)	163	28.0	279	22.0	6
High (>15 hrs)	466	41.5	371	22.5	19

Covariates appearing in the model evaluated at the value of PSAT = 142.92

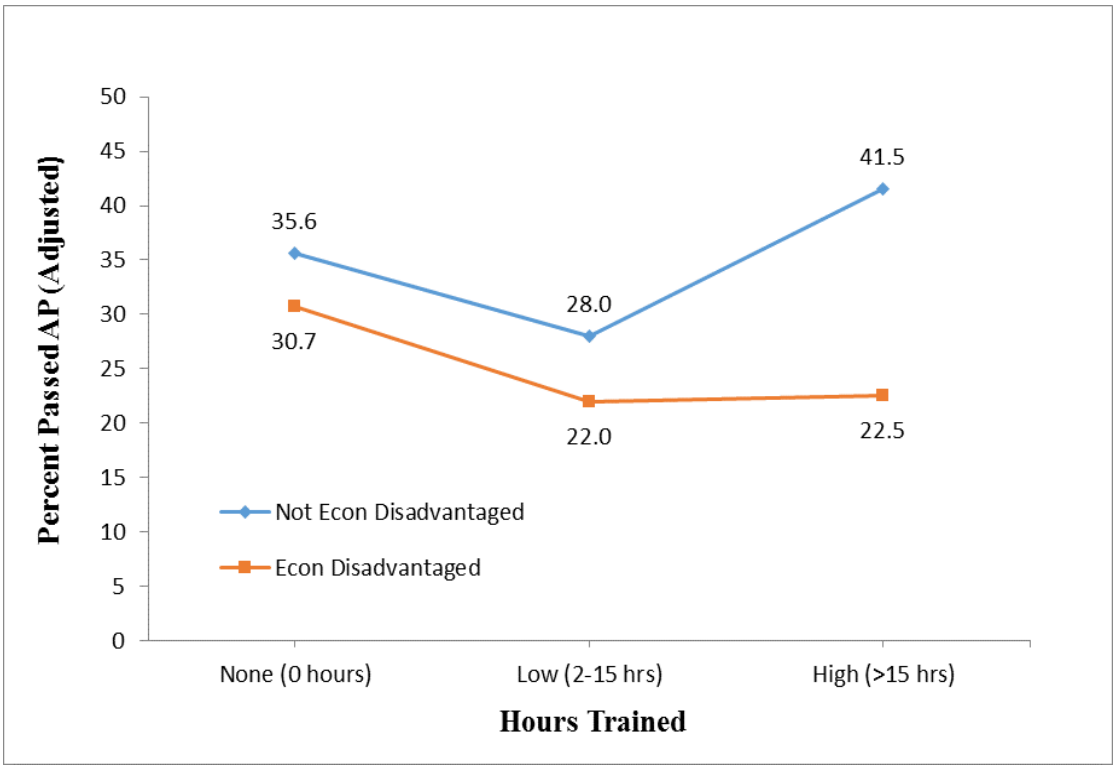

Figure 8. Selected AP Tests: AP US History, Biology, English, and Spanish Hours PD Training by SES (with covariant). This figure shows the percentage of students achieving a qualifying score of 3 or higher and hours trained and compares those outcomes by the SES of the students.

Selected AP Exams Outcomes, PD and SES Analysis (No Covariant)

The next analysis was limited to the results for five of the five subject areas of interest. Those AP exams included: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. The database did have enough data for Calculus when since this scenario removed the covariate of PSAT. In this scenario, the dependent variable (DV) remained the percentage of students scoring a qualifying score of 3 or higher and the independent variables were: (a) *School Characteristic* as defined by students from high PSAT (H-PSAT) schools and students from low PSAT (L-PSAT) schools, (b) teacher PD by three groups, None, Low, and High.

The analysis showed there is a difference in the percentage of students scoring a qualifying score of 3 or higher (AP student achievement) between schools with a higher PSAT and lower PSAT (see Table 12). The AP student achievement was the largest between high levels of PD at campuses with low PSAT campuses, 7.8% and high levels of PD and high PSAT campuses, 62.4% (see Figure 7).

The data analysis on Table 13 reveals there were differences between low PSAT schools and high PSAT. The percentage of exams scores were 13.6% passing and 7.8% passing when teachers had no training (none) and high PD levels (High PD), respectively. In contrast, the when reviewing the training at schools with high PSAT, the scores are higher for no training (Low PD) and high training (High PD) 51.2% and 62.4%, respectively.

Table 13

Select 5 AP Exams, PD and School PSAT (no covariant)

Training	*n*	Low (PSAT) %	*n*	High (PSAT) %	*Difference*
(none)	15,150	13.6	12,028	51.2	37.6
Low (2-15 hrs)	1,182	11.9	847	58.2	46.3
High (>15 hrs)	1,100	7.8	635	62.4	54.6

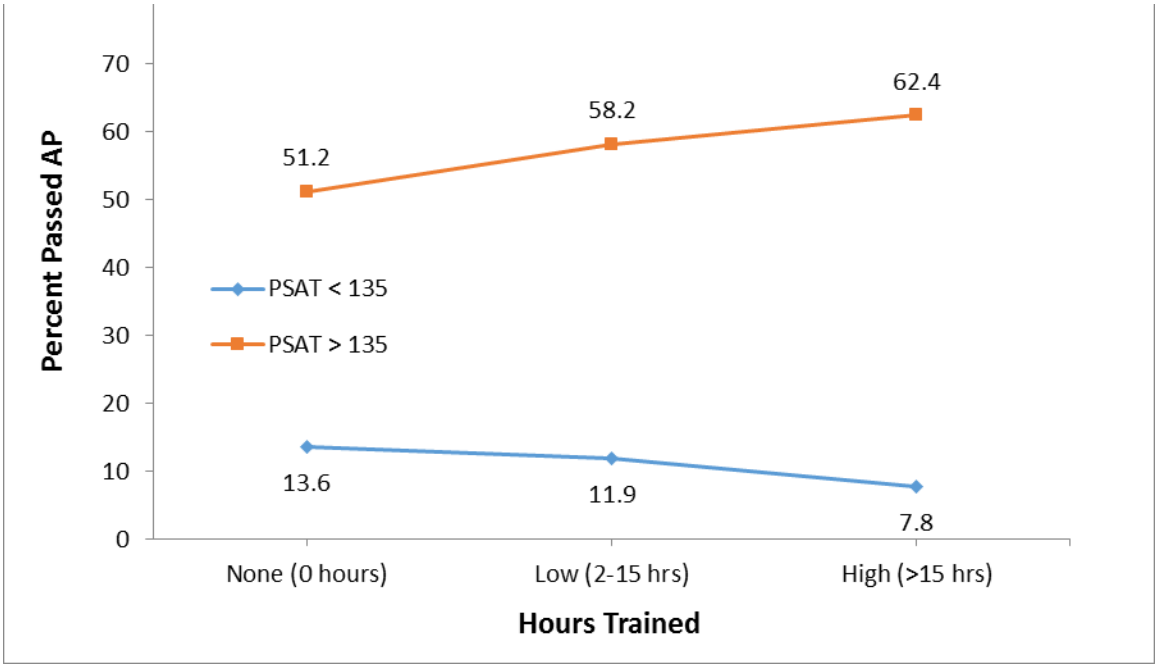

Figure 9. Hours PD Training, School PSAT: AP US History, Biology, English, Calculus, and Spanish

AP Training and SES (no covariant) Includes Tests: AP US History, Biology, English, Calculus AB and Spanish Language

The next analysis was similar to the previous analysis as and included five of the five subject areas of interest. Those AP exams included: Biology, Calculus AB, English Language and Composition, Spanish Language, and U.S. History. In this analysis, database did have enough data for the exam Calculus AB since this scenario removed the covariate of PSAT. In this scenario, the dependent variable remained the percentage of students scoring a 3 or higher (AP student achievement) and the independent variables were: (a) students who identified themselves as participants on free and reduced lunch (Low SES) and those that did not (High SES), and (b) Teacher PD by three groups, None, Low, and High.

The analysis showed there is a difference in student learning outcomes (DV) between students from low SES and high SES with the largest difference (between low SES and high SES) of 43.4% from teachers with high levels of PD (see Table 14). It is important to note that these are the actual percentage of students scoring a qualifying score of 3 or higher as this analysis did not factor a covariant score.

The outcomes on AP exams of students scoring a 3 or higher (AP student achievement) between high levels of PD at campuses with low SES students was 18.4% to high levels of PD at 10% (see Figure 8). The data on Table 14 reveals the percentage of exams scores were 18.4% passing with Low SES and no training to 16.2 % passing, whereas passing with high SES and no training was 48% and low training was 56%.

Table 14

Teacher Training versus SES

	High (SES)		Low (SES)		
Training	*n*	%	*n*	%	*Difference*
(none)	10,890	48.0	16,288	18.4	29.6
Low (2-15 hrs)	762	56.3	1,267	16.2	40.1
High (>15 hrs)	711	53.4	1,024	10.0	43.4

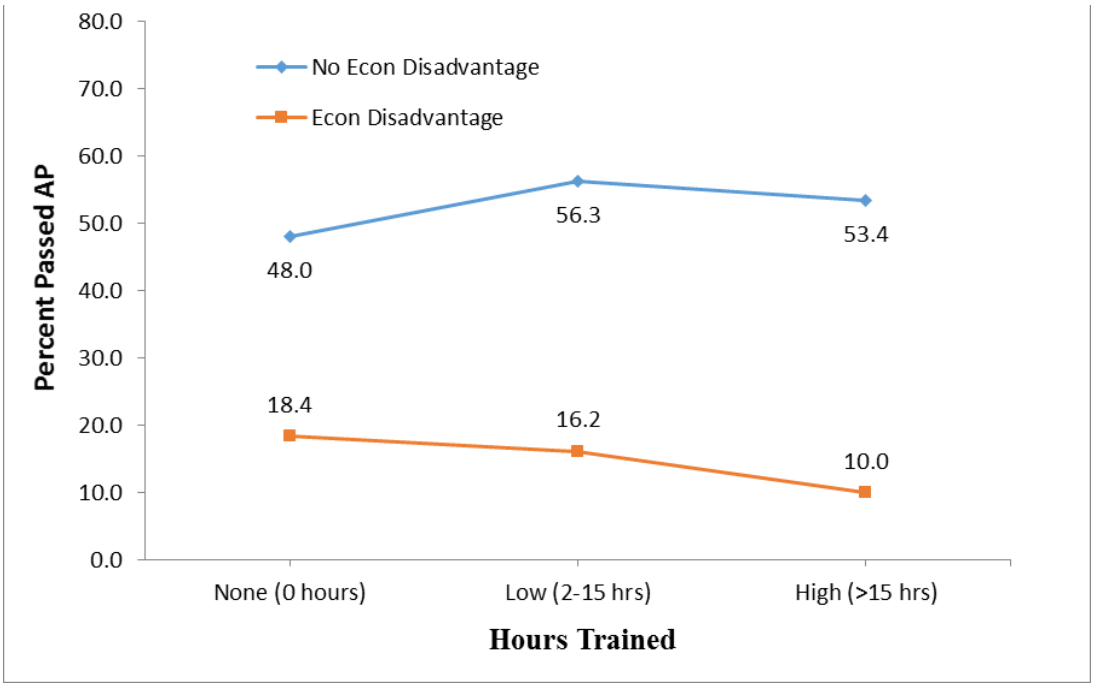

Figure 10. Teacher Training and AP Achievement. Includes Tests: AP US History, Biology, English, Spanish, and Calculus AB: Hours PD Trained by SES (no covariant)

AP Teacher Training, PSAT School, Five AP Exams

The final analysis compared between students scoring a qualifying score of 3 or higher (AP student achievement) and teacher PD activity (None, Low, and High) by levels of school PSAT (low PSAT versus high PSAT) for the following five AP exams: U.S. History, Biology, English Language and Composition, Calculus AB, and Spanish Language. The analysis did *not* use a covariate coefficient.

For the U.S. History AP exam, there was not enough data to compare the schools with the high PSAT scores since data for teachers with Low or High PD training did not compute because of missing data needed to calculate. Nevertheless, among the schools with low PSAT, the students with no training teachers was 3.4% of the students scoring a 3

or higher versus the high PSAT was 5.5% of students scoring a qualifying score of 3 or higher (AP student achievement).

For the Biology AP exam, teachers with AP none training (None PD), the AP student achievement was 9.7% AP at a low PSAT school versus 64% AP student achievement at a high PSAT school. The results from high PSAT score school with no training was 54.3% AP student achievement level versus high training was 62.4% AP student achievement.

For the English Language Composition AP exam, teachers with AP none training (none PD) was 7.2% at a low PSAT school versus 51.7% AP student achievement at a high PSAT school. The ELA data from high PSAT score with no training to low and high levels of PD was positive from 51.7% to 57% respectively. Yet, the results between training groups (from None to Low and Low to High) had lower results from no training (None PD) having 7.2% AP student achievement as compared to students with teachers with high activity PD (High PD) had 6% AP student achievement.

For the Calculus AB AP exam, teachers with no training (None PD) and at low PSAT schools, the student AP achievement was 16.1% versus 49.1% AP student achievement at a high PSAT schools with the same training activity (None PD). The results of the data show that students from high PSAT schools with some low training and high training was 70.5% and 64% passing, respectively. This was also similar in the low PSAT group from none to high levels of PD from 16.1% to 24.6% AP student achievement.

For the Spanish AP exam, the training data were limited as there were no records in the low and high category and PSAT %. The data analysis did reveal there was less of a

gap between the no training and low PSAT and no training and high PSAT as it was 8.1% difference among the two groups (see Table 15).

When looking at Figure 11, the graph denotes the positive differences between groups of teachers with no training (none PD) and low levels of PD as well as no training and high activity levels of PD (High PD) with the subjects of Biology and Calculus. The results showed a different pattern for English Language Composition as teacher training showed very little differences from no training (none PD) and high activity levels of training (High PD) when the population of students included the low PSAT group.

Table 15

Descriptive Statistics Teacher PD, School PSAT, and Exam

Test	Training	*N*	Low (PSAT) %	*n*	High (PSAT) %	*Difference*
US History						
	(none)	4,787	3.4	4,279	45.5	42.1
	Low (2-15 hrs)	156	3.2	0	-	-
	High (>15 hrs)	119	5.5	0	-	-
Biology						
	(none)	648	9.7	480	64.0	54.3
	Low (2-15 hrs)	20	35.0	52	53.8	18.8
	High (>15 hrs)	86	18.6	126	81.0	62.4
English Language						
	(none)	7020	7.2	5374	51.7	44.5
	Low (2-15 hrs)	741	2.6	690	56.7	54.1
	High (>15 hrs)	838	6.0	458	57.0	51.0
Calculus						
	(none)	877	16.1	948	49.1	33.0
	Low (2-15 hrs)	135	17.8	105	70.5	52.7
	High (>15 hrs)	57	24.6	51	64.7	40.1
Spanish						
	(none)	1818	65.3	513	73.7	8.4
	Low (2-15 hrs)	130	66.2	0	-	-
	High (>15 hrs)	0	-	0	-	-

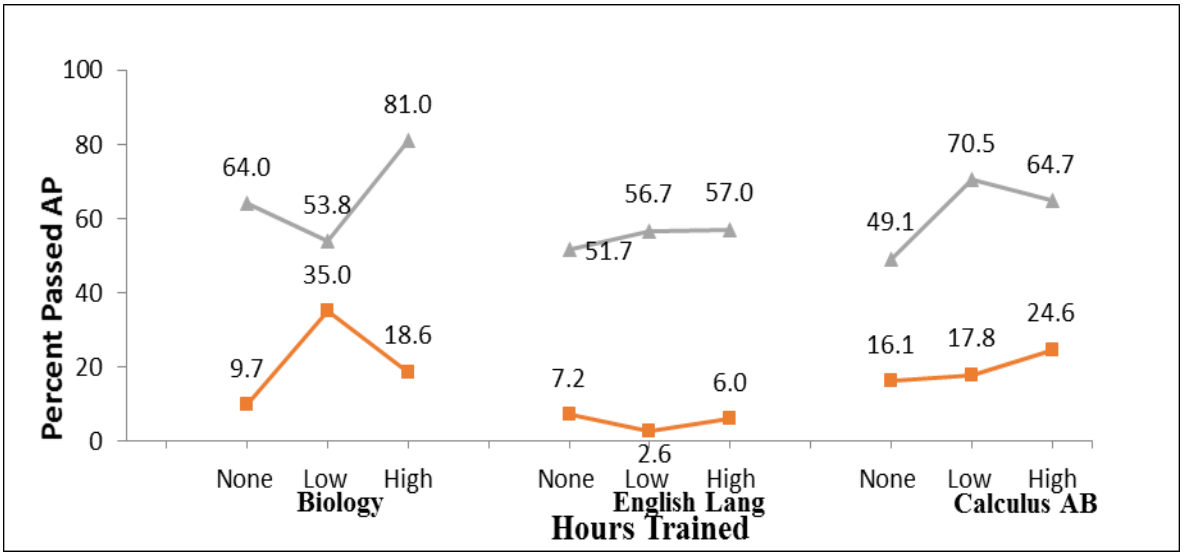

Figure 11. Select AP Exams. Hours PD Trained by School PSAT by AP Test (no covariant). This figure shows AP results by students scoring 3 or higher on selected AP exams. It also shows the levels of training by teacher for students in those classes.

Research Question Three:

Which factors of professional teacher training do teachers believe influence student performance on AP exams?

Fifteen teachers participated in the focus group. Although all fifteen were present, only eight teachers gave response. Below are the questions and the responses from the teachers.

Focus Group Responses:

Question #1: Please discuss training or PD opportunities that you have attended that you believe have assisted you in having a greater impact on students scoring a 3 or higher.

Teacher #1: "I attended a UH training. They give you a lot of material and presenter gave a lot of insight of grading and writing the tests." (Materials and presenter are helpful.)

Teacher #2: "I recently attended AP training at the Rice University and the presenter discussed ideas how to present it in class. The students will benefit and will be more focused."

Teacher #3: "I went to the AP conference in Las Vegas last summer. That was actually really good because I was able to not only [able] to hear various speakers but connect with people from across the country." (First-year teacher)

Question #2: Discuss opportunities that you have attended that you feel like did not assist you in helping students do better in AP?

Teacher #4: "We had a training at [Adams HS] at the start of the school year where it focused on Rigor training. This training was too general; it should be focused on the content."

Question #3: What type of knowledge or techniques that you have acquired during AP training has helped you be better AP teacher?

Teacher #5: "Knowing where the resources are located." (Teacher mentions a pacing calendar)

Teacher #4: "Opportunities where I get to collaborate with other teachers."

Teacher #5: "Being a first-year as AP teacher having a team to collaborate and like having the syllabus, and I was able to adapt easier."

Questions #6: "What other changes or modifications of PD do you think would have a greater impact on going forward?"

Teacher # 5: "Having an AP reader."

Teacher #6: "Big thing for improvement is a vertical team so that we know what the students need at each level and address the curriculum better."

Teacher # 7:

> In the past 5 years, my scores have been diving. I am having a motivational problem with the kids. What can I do to change it around? I hear all these stories from previous students how they are going to college, and they are tutoring and they scored a one in their AP class. I need ways to motivate the kids to learn.

Teacher #8:

> [The Superintendent's] initiative to put everybody in AP classes. Even though they put them in a growth plan and they don't meet the growth plan and the counselor still keeps them in the class. It basically draws away the opportunity from the good kids that have 4 or 5 because if you have kids that put their heads down it takes away the drive from the good kids that want to do the right thing. So if we have a policy in [district] in place for the growth plan let's adhere to it and not keep all the kids in the program because they need to meet the numbers.

Teacher #8: "I would like to see more teachers in AP courses not the same one teaching that particular course. Rotate the AP teachers."

Focus Group Summary

Teachers were passionate about having time to "collaborate" with other experienced teachers. They also were very interested in ways to "motivate" students, especially from different abilities. One teacher discussed the importance of building school capacity by "rotating teachers" in teaching AP although another cautioned that this process could have a negative impact on AP students. Yet, another teacher also commented on spending time developing students and not just "placing" students in AP courses as this may hurt the

stronger and more motivated students. Lastly, there were several that agreed with vertical planning meetings to ensure students were coming to AP courses better prepared.

Summary

The major findings of this study revealed that AP student participation and performance was more positive in schools that had similar positive results on the PSAT average. The other findings of the results reveal that there are a few schools less than six for the district that are above the district average on AP student achievement while the majority of the schools are well below these schools. This finding signals disparities among the schools. The other findings suggests that PSAT potential revealed that students at campuses with high PSAT means performed better than those at low PSAT means campuses. The findings also showed that students that were not identified as free or reduced lunch did significantly better with teachers with high levels of teacher training as compared to those students that were identified as free or reduced lunch and high levels of teacher training. Yet, there were positive differences in student achievement on AP exams for low SES students in the subjects of Biology and Calculus, although the benefit of teacher training being high as opposed to none was significantly higher for students that did not participate in free or reduced lunch (High SES). The analyses consistently showed that students from Low SES backgrounds had lower AP student achievement as compared to High SES students even when they were in classrooms with teachers that had high activity levels of training. The findings from the focus group revealed the importance of teachers collaborating and sharing practices from experienced teachers and teachers learning ways to motivate students to do well in AP classes.

Chapter V

Conclusion

Introduction

The purpose of the study was to examine the student AP participation and performance patterns of students scoring a qualifying score of 3 or higher on the Advanced Placement exam. Another purpose was to examine any differences on the amount of training that the teachers participated in for that school year and the outcomes of students scoring a qualifying score of 3 or higher. Lastly, the study intended to learn more about teacher training to inform leaders on what teachers perceived as most beneficial for instructional planning and delivery.

Discussion of Results

For first research question (RQ-1), it was important to first identify if there were similar patterns of participation in an urban district among the different high schools that were represented by various percentages of students who qualify for free and reduced lunch or lower socio-economic status (SES). That is, were there achievement gaps evident among the schools across the district despite overall increases in AP participation and performance? The results revealed that a few schools, less than five among the magnet schools (16 total reviewed) and the comprehensive schools (23 total reviewed), were performing at high levels in AP participation and performance in comparison to district average. Specifically, the results of the differences of AP results gave evidence of the differences among schools with little success continued to show little or no improvement of students scoring a 3 or higher, despite increases in offering of AP courses. The overall district number of exams scored at a 3 or higher increased by 75%

from 4,304 in 2007 to a high of 7,524 in 2013 at the high-school level. However, the percent of AP exams taken with a score of 3 or higher decreased from 47% in 2007 to 33% in 2013. There was a large difference from students identified as low SES as this group had 21% of students scoring at the 3 or higher versus the 52% of high SES group scoring at the 3 or higher.

The second research question (RQ-2) was intended to explain this further by reviewing the Advanced Placement teacher training effort. School leaders may impact student achievement when they are supporting the professional growth of teachers (Drago-Severson, 2009). The study intended to control different variables such as student potential, with the effort of being able to examine if differences in teacher training may be a contributing factor on AP student achievement. The results of the quantitative analyses revealed evidence that despite teacher training efforts, in schools where there existed teachers with high levels of teacher training, students from lower SES had lower amounts of students scoring a qualifying score of 3 or higher academic on AP exams. For example, the analyses indicated there is a difference between students from teachers that were identified with high levels of training (high PD) and students from high SES (H-SES), 41.5% versus students that were identified with high levels of training (low PD) and students from low SES (L-SES), 22.5% (see Table 12). Furthermore, the data reveal that students that were from low SES scored lower as the levels of training increased.

When looking at training differences overall, there was a minimum change from none to low PD (low PD), and the results were higher with high levels of PD when the sample of groups included the higher level schools based on PSAT (high-PSAT) and the

high levels of SES. In helping explain these findings, the study relied on qualitative methodology. This revealed and affirmed the research that the need for PD to include more ways to motivate students was regarded as highly important when referring to students not traditionally having success. The district data support that many of the students that are struggling with scoring a 3 or higher at schools with low PSAT and high levels of free and reduced lunch students (see *Figure* 5 and 6).

The findings from this study are similar to research from a report from Handwerk et al, (2008), in which findings show positive trends in participation and students scoring a 3 or higher overall in the nation's public high schools, yet overall counts of students disaggregated by student groups such as different socioeconomic and geographic characteristics reveal differences among different groups of students, even within districts and within high schools. Through similar methodology of "clustering" schools and categorizing public high schools on important characteristics, they examined and found differences students eligible and not eligible for free and reduced lunch (proxy for SES) (Handwerk, Tognatta, Coley, & Gitomer, 2008, p. 10). In addition, even though there was evidence of AP course availability, this did not imply that the courses were in practice available to all students.

Implications for School Leaders

It is important that the teacher trainings be an integral component of the campus implementation plan or school improvement plan. By doing so, campus leadership can appropriately support teachers and provide proper evaluation to inform future trainings. If this is not done on the campus level, then the training done in isolation may have little impact on the student learning or success of students scoring a 3 or higher on an AP

exam. Moreover, the trainings need to take into account the background levels of students and provide teachers with resources that students have available to them.

Freeman (1998) specified, "…that teaching is about asking questions, and that in asking questions, you will learn" (p. 40). He maintained that teachers should, "Ask questions more frequently, which would result in an inquiry-based attitude and more academically inclined interpretation of teacher-hood" (p. 40). In much the same way, the study attempted to ask relevant questions in hopes of adding to body of research regarding effective PD that will improve the achievement of *all* students, particularly at high levels on AP achievement by students from diverse backgrounds.

Implications for Further Research

Future studies should attempt to research which type of trainings will help teachers provide the most success for students on the AP exam when they are serving a large population of low SES students. The type of school environment practices by school leaders help assist the success of students in AP courses as well.

Furthermore, the future studies could also examine if the training lessons gaps in achievement of diverse students, when controlling for student potential such as PSAT scores and other school factors. Many districts and schools recognize the importance of promoting college access to students by supporting teachers with effective leadership and PD, yet as the research has demonstrated, many schools continue to struggle with student achievement outcomes. Added resources need to be directed to schools that continue to struggle with not only AP student achievement, but low PSAT scores. Although the findings of this study were limited and not meant to show causation, the analyses of the data reveal that training may be influencing some students and not others. While this

study demonstrated evidence of little positive difference for students from low SES, it does not necessarily mean that teachers would not benefit from effective teacher PD. On the contrary, the research should show that there were differences among some students, and thus those differences should be explored. Research is needed for effective training and bringing attention to ensuring that training is impacting *all* learners to achieve better academic outcomes for *all* students.

Along the same lines, further exploration is needed on the impact of other programs intended to develop students with study skills and discipline which may give students necessary skills to be prepared for college. As an illustration, Klopfenstein (2008) contends that AP course taking alone does not impact how much time it takes a student to finish a degree after accounting for differences. That is, those students who pass enough AP exams to graduate within three years do experience a benefit (as they save the money and the time), and there is some positive effect of graduation within four or five years. However, the researcher points out that this data was from cohorts of high school students prior to 1997. Prior to the 1990s, only the elite, high-performing students were in the AP programs. Later cohorts began to include students who are less-prepared and identify as first-generation, college-bound students. For these reasons, Klopfenstein argues that subsidies meant to increase AP participation on the grounds that students will stay in college for fewer years until graduation is unjustified.

Klopfenstein argues that the subsidies are not necessarily justified in that the effects of AP student participation and, as a result, will trickle down into the lower grades and improve education overall. The researcher argues that this top-down trickle-down theory has yet to be proven, and therefore AP student participation and the subsidies

provided to fund them are not justified. Finally, Klopfenstein worries that those subsidies that are not income-driven, but rather based on how many AP classes a school offers and will reward well-funded schools serving middle-class students. Although this study did not attain different socioeconomic levels of individual schools, the findings from this study further add to the body of evidence that AP student achievement was much higher among High SES students. Yet, these students already thrive in a college-bound culture with their parents as higher education degree-recipients.

Klopfenstein and Thomas (2010) criticize what they call "helicopter drops" of mandatory AP participation in schools and warn policy makers to watch for costs and to measure benefits carefully. They argue, "…the assumption that the correlation between the AP Program and college success is causal leads well-intentioned administrators and policy makers to mandate 'helicopter drops' of AP Programs into school that have neither a rigorous academic pipeline nor the resources to support the program" (p. 182). Moreover, Klopfenstein and Thomas (2010) point out that while there is a correlation, it does not mean that the experience is causal.

For all intents and purposes, Klopfenstein and Thomas (2010) recommend that schools invest in programs such as Advancement via Individual Determination (AVID), a program designed to coach high school students who would be first-generation college students. The authors believe AVID may help provide a "higher return on investment" when in consideration of the amount of costs to properly implement an AP program (p. 184). AVID provides extensive individualized tutoring in study skills, note taking, essay writing, and test taking during an elective class period and students are enrolled in at least

one AP, IB or other advanced level course in one of their core classes (Guthrie & Guthrie, 2000; Watt, Powell, & Mendiola, 2004; Laughlin, 2011).

In terms of developing and implementing successful PD trainings, there is evidence to suggest that trainings done in isolation from training to training and exclusive of the current school environment make little or no difference in student achievement. It is important that PD programs include long-range planning and include the leadership of the campus as well. Training should not be limited to the "elite" teachers and should be conducted with all teachers in a methodical manner to assist with other important variables that effect student achievement such school culture of high expectations.

PD should also include opportunities to be specific and personalized to the educator. Research by City et al. support the efforts of instructional rounds as being a vehicle that can assist with teachers in their transforming of learners more likely to implement with fidelity (City, Elmore, Fiarman, & Teitel, 2009). PD should include opportunities for collaborative opportunities with structured protocols for effective teachers to share best practices from their experience. In the focus group, teachers showed great enthusiasm and energy, despite this meeting occurring after school around 5:30 in the evening. Teachers mentioned how appreciative they were to be afforded opportunities to learn from others on how to motivate students, particularly those with the least potential. This was not surprising as the evidence in the data revealed that many schools had high levels of AP participation, yet AP achievement levels were in the single digits among comprehensive high schools. As a result, teachers shared about the importance of building rapport with students that were genuine and heartfelt by students.

Lastly, leaders of PD should take time to listen to students through student focus groups to gather ideas on what motivates them as learners. There have been research to support the importance of providing incentives to students in schools that have traditionally struggled with student achievement and have implemented successful AP teacher training for teachers and incentive programs to students (Ramsey, 2012).

Conclusion

This study took a closer look at an urban school district and examined the number of students taking AP courses, the amount of students experiencing success by scoring 3 or higher, and examined if there are other factors attributed with student success. The major findings of this study suggested that AP student participation and performance was more positive in schools that had similar positive results on the PSAT means. The other findings of the results revealed that there were less than six schools for the district that were above the district average on AP student achievement, and the majority of the schools were well below the mean on AP student achievement. This finding signaled disparities among the schools. The second phase of the study helped explain this disparity.

Hence, the study collected quantitative data on teacher PD activity. The findings gave evidence that PSAT potential revealed that students at campuses with high PSAT means performed better than those at low PSAT means campuses on AP student achievement. The findings also showed that students that were not identified as free or reduced lunch (high-SES) did significantly better with teachers with high levels of teacher training as compared to those students that were identified as low SES and with a teacher with more PD time. Yet, there were positive differences in student achievement

on AP exams for low SES students in the subjects of Biology and Calculus, although the student academic achievement was significantly higher for students that did not participate in free or reduced lunch (high SES). The analyses consistently showed that students from low SES backgrounds had lower AP student achievement as compared to high SES students even when they were in classrooms with teachers that had high activity levels of training.

The qualitative data were limited in the amount of variables it could gather to assist in group differences. For example, one area that could have also been reviewed was teacher experience. It is just as important to examine why some schools do experience success with students scoring a qualifying score of 3 or higher, and see what factors compare with the student success. Districts are encouraged to challenge themselves to assess the student outcomes of AP, and then provide appropriate resources to develop the students and teachers to meet the achievement levels that other schools are achieving. Otherwise, simply spending funds on training, textbooks and other resources, student exams, and leaving students with the taste of failure is not enough to narrow the achievement gap of students from diverse backgrounds (Olivos & Quintana de Valladolid, 2014).

Although student recruitment through various “Magnet” or “School Choice” transfer options may be available, most public schools do not have much leverage in selecting and denying their student population. Thus, the energy not expended in selection and recruitment should be diverted to the development of “zoned” students or neighborhood students. Educators need an appropriate improvement plan that focuses on selection and training of teachers that is appropriate in meeting the needs of students from

diverse backgrounds. As Avalos (2001) argued, "PD is about teachers learning, learning how to learn, and transforming knowledge into practice for the benefit of their student's growth" (p. 15). As such, it is in the training that leadership have the most influence to decide on how best it will be for it to be effective and relevant to the population they are serving.

In summary, the quantitative and qualitative data collected and analyses conducted would suggest that teacher training does show positive differences, but it depends on the student background. Furthermore, students attending campuses with characteristic of high PSAT indexes did better on AP student achievement than students from campuses with below average PSAT indexes. Although these findings may not be surprising, what was unexpected was the little or no difference teacher training hours had on AP student achievement when students were from low SES and similar PSAT score.

For urban districts that have a higher percentage of students from low socioeconomic backgrounds and diverse learners, the teacher training may not be addressing the specific needs of students with diverse backgrounds. Specifically, the training efforts may not be addressing the development of teachers to assist students from lower SES and at schools with low PSAT indexes as teachers voiced recommendations on learning ways to motivate and developing students. Consequently, the evidence from the analyses suggest that future AP trainings incorporate more ways for teachers to learn and apply student motivational strategies and ways on developing students that may not be on campuses with characteristic of high PSAT indexes. Furthermore, it is recommended that school leaders invest in PD that has a longer range of developing teachers over a longer period of time and giving teachers coaching opportunities to

implement in the classroom. Equally important, frequent PD sessions during the school year should be allocated for teachers to collaborate and share instructional material and practices that address the need for diverse learners. As other studies have shown, a comprehensive PD plan incorporating teachers in the decision-making is more likely to be valued, implemented and ultimately lead to positive student learning outcomes.

References

An, B. P. (2013). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis*, *35*(1), 57–75. doi:10.3102/0162373712461933

Aguirre, A, Martinez, R, and Barboza, S. (2013). Mexican American School Children in US Public Schools: A Review of Social Science Research on the Mexican American Family's Cultural Capital. In B. Gastic, & R. R. Verdugo (Eds.). (2013). *The education of the Hispanic education, selected essays*. (pp. 119-135). Charlotte, NC, Information Age Publishing.

Atay, D. (2007). Teacher research for PD. *ELT Journal*, *62*(2), 139–147.

Avalos, B. (2011). Teacher PD in teaching and teacher education over ten years. *Teaching and Teacher Education*, *27*(1), 10–20.

Barr, R., Anderson, C.S., & Slaybaugh, J. E. (1992). Deliberations about grouping in Crete-Monee. In A. A. Hyde & W. T. Pink (Eds.), *Effective staff development for school change* (65-93). Norwood, NJ: Ablex Publishing Corporation.

Barth, R. S. (2006). Improving relationships within the schoolhouse. *Educational Leadership*, *63*(6), 8-13.

Bass, B. M., & Riggio, R. E. (2005). *Transformation leadership*. Mahwah, N.J: Erlbaum.

Burney, V. H. (2010). High achievement on advanced placement exams: The relationship of school-level contextual factors to performance. *Gifted Child Quarterly*, *54*(2), 116–126.

Chingos, M. M., & Peterson, P. E. (2011). It's easier to pick a good teacher than to train one: Familiar and new results on the correlates of teacher effectiveness. *Economics of Education Review*, *30*(3), 449–465.

Chou, C. (2011). Teachers' PD: Investigating teachers' learning to do action research in a professional learning community. *The Asia-Pacific Education Researcher*, *20*(3), 421–437.

Christiansen, D. W. (2009). *The impact of Advanced Placement (AP) participation and success on school-wide student achievement* (Ed.D.). University of Central Florida, United States -- Florida. Retrieved from http://search.proquest.com.ezproxy.lib.uh.edu/dissertations/docview/305096065/abstract/B5F6FABB30234D46PQ/1?accountid=7107

City, E. A., Elmore, R.F., Fiarman, S. E., & Teitel, L. (2009). *Instructional rounds in education: A network approach to improving teaching and learning.* Cambridge, MA. Harvard Education Press.

College Board (2001). *Access to excellence: A report on the future of the advanced placement program*. College Board. Retrieved from http://research.collegeboard.org/publications/content/2012/05/access-excellence-report-future-advanced-placement-program

College Board. (2008). Advanced placement report to the nation. http://professionals.collegeboard.com/profdownload/ap-report-to-the -nation-2008.pdf

College Board. (2013). Spotlight on success: *Strategies For Equity & Access*. 4th Ed.

Conger, D., Long, M. C., & Iatarola, P. (2009). Explaining race, poverty, and gender disparities in advanced course-taking. *Journal of Policy Analysis and Management*, *28*(4), 555–576.

Corcoran, T., & Christmas, J. B. (2002, November). *The limits and contradictions of systemic reform: The Philadelphia story*. Philadelphia, PA: Consortium for Policy Research in Education.

Dallas ISD marks Advanced Placement Incentive Program milestone of 10,000 students, expands program to all Dallas secondary schools. (2010, October 4). *Health & Medicine Week*, p. 949.

Deal, T. E., & Peterson, K. D. (2009). *Shaping school culture: pitfalls, paradoxes, and promises*. San Francisco: Jossey-Bass.

Darling-Hammond, L. (2005). Teaching as a profession: Lesson in teacher preparation and PD. *Phi Delta Kappan*, *87*(3), 237-240.

Dougherty, C. & Mellor, L. T. (2010). Preparing students for Advanced Placement. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 51 - 61). Cambridge, MA: Harvard Education Press.

Dougherty, C., Mellor, L., & Jian, S. (2006a). *The relationship between advanced placement and college graduation.* Austin, TX: National Center for Educational Achievement.

Dougherty, C., Mellor, L., & Jian, S. (2006b). *Orange juice or Orange drink? Ensuring that "advanced courses" live up to their labels. NCEA Policy Brief No. 1*. National Center for Educational Accountability.

Dougherty, C., & Mellor, L. (2009). *Preparation matters*. National Center for Educational Achievement.

Drago-Severson, E. (2007). Helping teachers learn: Principals as PD leaders. *The Teachers College Record*, *109*(1), 70–125.

Drago-Severson, E. (2009). *Leading adult learning: supporting adult development in our schools*. Thousand Oaks, CA: Corwin.

Education Partnerships, Inc. (2005). *Research brief: Success in advanced placement courses.* Austin, TX: Angela L. Hansen.

Fishman, B. J., Marx, R. W., Best, S., & Tal, R. T. (2003). Linking teacher and student learning to improve PD in systemic reform. *Teaching and Teacher Education*, *19*(6), 643–658. doi:10.1016/S0742-051X(03)00059-3

Flint, A. S., Zisook, K., & Fisher, T. R. (2011). Not a one-shot deal: Generative PD among experienced teachers. *Teaching and Teacher Education*, *27*(8), 1163–1169.

Flowers, L.A. (2008). Racial differences in the impact of participating in Advanced Placement programs on educational and labor market outcomes. *Educational Foundations*, Winter-Spring.

García, E. E. (2012). *Understanding the language development and early education of Hispanic children*. New York, NY: Teachers College Press.

Ghazvini, S. D. (2011). Relationships between academic self-concept and academic performance in high school students. *Procedia - Social and Behavioral Sciences*, *15*, 1034–1039.

Goss, R. M. (2004). Strategies for improving the advanced placement examination scores of AP social studies students. *The History Teacher*, *38*(1), 115–117.

Grimmitt, P. P. & Neufeld, J. (1994). Introduction: The struggle for authenticity in a changing educational context. In P. P. Grimmit & J. Neufeld (Eds.), *Teacher development and the struggle for authenticity: Professional growth and restructuring in the context of change* (1 – 12). New York, NY: Teachers College Press.

Guskey, T. R., & Huberman, A. M. (1995). *PD in education: New paradigms and practices*. New York, NY: Teachers College Press.

Hallett, R. E., & Venegas, K. M. (2011). Is Increased Access Enough? Advanced Placement Courses, Quality, and Success in Low-Income Urban Schools. *Journal for the Education of the Gifted*, *34*(3), 468–487.

Hallinger, P., & Huber, S. (2012). School leadership that makes a difference: international perspectives. *School Effectiveness and School Improvement*, *23*(4), 359–367. doi:10.1080/09243453.2012.681508

Hallinger, P. (2003). Leading Educational Change: reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education*, *33*(3), 329–352.

Handwerk, P., Tognatta, N., Coley, R. J., & Gitomer, D. H. (2008). *Access to success: Patterns of advanced placement participation in U.S. high schools. Policy information report*. Princeton, NY: Educational Testing Service.

Hansen, A. L. (2005). *Research Brief Success in AP Courses.pdf* (Brief). Education Partnerships, Inc.

Harris, D. N., & Sass, T. R. (2011a). Teacher training, teacher quality and student achievement. *Journal of Public Economics*, *95*(7-8), 798–812.

Harris, D. N., & Sass, T. R. (2011b). Teacher training, teacher quality and student achievement. *Journal of Public Economics*, *95*(7-8), 798–812

Heck, R. H. (1998). Conceptual and methodological issues in investigating principal leadership across cultures. *Peabody Journal of Education*, *73*(2), 51–80.

Holstead, M. S., Spradlin, T. E., McGillivray, M. E., & Burroughs, N. (2010). The impact of advanced placement incentive programs. Education policy brief. *Center for Evaluation and Education Policy, Indiana University*. Retrieved from http://eric.ed.gov/?id=ED510967

Hoy, A. W., & Hoy, W. K. (2013). *Instructional leadership: A research-based guide to learning in schools*. Boston, MA: Pearson.

Hyde, A. A. (1992). Developing a willingness to change. In A. A. Hyde & W. T. Pink (Eds.), *Effective staff development for school change* (171 – 190). Norwood, NJ: Ablex Publishing Corporation.

Hyde, A. A., & Pink, W. T. (1992). Thinking about effective staff development. In Hyde, A. A. & Pink, W. T. (Eds.), *Effective staff development for school change* (3 – 29). Norwood, NJ: Ablex Publishing Corporation.

International Baccalaureate Organization. (2014). Retrieved June 12, 2014, from http://www.ibo.org/history/

Joyce, B., & Calhoun, E. (2010). *Models of PD: a celebration of educators*. Thousand Oaks, CA: Corwin.

Kantnor, K. J. (1992). Cultural conflicts in staff development on the teaching of writing. In A. A. Hyde & W. T. Pink (Eds.), *Effective staff development for school change* (139 – 152). Norwood, NJ: Ablex Publishing Corporation.

Keller-Margulis, M. A. (2012). Fidelity of implementation framework: A critical need for response to intervention models. *Psychology in the Schools, 49*(4): 342–352. doi: 10.1002/pits.21602

Kelly-Kemple, T., Proger, A., & Roderick, M. (2011). *Engaging high school students in advanced math and science courses for success in college: Is advanced placement the answer?* Report presented to the Society for Research on Educational Effectiveness (SREE) Fall 2011 Conference. Evanston, IL.

Klopfenstein, K. (2003). Recommendations for maintaining the quality of advanced placement programs. *American Secondary Education, 32*(1), 39-48.

Klopfenstein, K., & Thomas, M. K. (2009). The link between advanced placement experience and early college success. *Southern Economic Journal, 75*(3), 873-891.

Kyberg, R. M., Hertberg-Davis, H., & Callahan, C. M. (2007). Advanced placement and international baccalaureate programs: optimal learning environments for talented minorities? *Journal of Advanced Academics, 18*(2), 172–215.

Lacy, T. (2010). Examining AP: Access, rigor, and revenue in the history of the advanced placement program. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 17-48). Cambridge, MA: Harvard Education Press.

Laitusis, V. (2012). *An analysis of the relationship between school-level AP PD activity and subsequent student AP performance*. Retrieved from http://research.collegeboard.org/publications/analysis-relationship-between-school-level-ap-professional-development-activity-and

Leithwood, K. A., Louis, K. S., & Anderson, S. E. (2012). *Linking leadership to student learning*. San Francisco, CA: Jossey-Bass.

Leithwood, K. A., Louis, K. S., Anderson, S., & Wahlstrom, K. (2004). *Review of research: How leadership influences student learning*. University of Minnesota Toronto.

Leithwood, Kenneth; Louis, Karen Seashore; Anderson, Stephen; (n.d.).

Lieberman, A. (1994). Teacher development: Commitment and challenge. In P. P. Grimmit & J. Neufeld (Eds.), *Teacher development and the struggle for authenticity: Professional growth and restructuring in the context of change* (pp. 15–30). New York, NY: Teachers College Press.

Marshall, R. P., & Andrews, H. A. (2002). Dual-credit outcomes: A second visit. *Community College Journal of Research and Practice*, *26*(3), 237–242. doi:10.1080/106689202317245437

Marzano, R. J., Waters, T., & McNulty, B. (2005). *School leadership that works: From research to results*. Alexandria, VA: Association for Supervision and Curriculum Development.

Mezirow, J. (2000). *Learning as transformation : Critical perspectives on a theory in progress*. San Francisco, CA: Jossey-Bass.

Miller, L. (1992). Curriculum work as staff development. In A. A. Hyde & W. T. Pink (Eds.), *Effective staff development for school change* (pp. 95–110). Norwood, New Jersey: Ablex Publishing Corporation.

Millsap, R. E., Camara, W. J., & Ewing, M. (2006). *The relationship between PSAT/NMSQT scores and AP examination grades: A follow-up study*. Retrieved from http://research.collegeboard.org/publications/content/2012/05/relationship-between-psatnmsqt-scores-and-ap-examination-grades-follow

Nasser, F., & Shabti, A. (2010). Satisfaction with PD: Relationship to teacher and PD program characteristics. *Procedia - Social and Behavioral Sciences*, *2*(2), 2739–2743.

Nasser, R., & Romanowski, M. (2011). Teacher perceptions of PD in the context of national educational reform: the case of Qatar. *International Journal of Training & Development*, 15(2), 158-168.

National Center for Educational Achievement. (2010). *The Advanced Placement Program Benefits Mainly Well-Prepared Students Who Pass AP Exams. Issues in College Readiness*.

Niemann, Y. F., Romero, A., Arredondo, J., & Rodriguez, V. (1999). What does it mean to be “Mexican”?: Social construction of an ethnic identity. *Hispanic Journal of Behavioral Sciences*, *21*(1), 47–60.

Nir, A. E., & Bogler, R. (2008). The antecedents of teacher satisfaction with PD programs. *Teaching and Teacher Education*, *24*(2), 377–386.

Noguera, P. A., (2005). The trouble with Black boys: The role and influence of environmental and cultural factors on the academic performance of African

American males. In O. S. Fashola (Ed.), *Educating African American males: Coices from the field* (pp. 51-78). Thousand Oaks, CA: Corwin.

Paek, P. L., Braun, H., Trapani, C., Ponte, E., & Powers, D. (2007). *The relationship of AP teacher practices and student AP exam performance*. Citeseer.

Paek, P.L., Braun, H., Trapani, C., Ponte, E., & Powers, D. (2010). AP biology teacher characteristics and practices and their relationship to student AP exam performance. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 51 - 61). Cambridge, MA: Harvard Education Press.

Pink, William T, & Hyde, Arthur A. (Eds.). (1992). *Effective staff development for school change*. Norwood, NJ: Ablex Publishing Corporation.

Powerful PD: Building Expertise Within the Four Walls of Your School [Paperback] [2010] (Author) Diane Yendol-Hoppey, Nancy Fichtman Dana. (n.d.). Corwin Press.

Pink, W. T. (1992). A school-within-a-school for at-risk youth: Staff development and program success. In A. A. Hyde & W. T. Pink (Eds.), *Effective staff development for school change* (pp. 33–63). Norwood, NJ: Ablex Publishing Corporation.

Ramsey, S. B. (2012). *The effect of the advanced placement training and incentive program on increasing enrollment and performance on advanced placement science exams*. Richmond, VA: Virginia Commonwealth University. Retrieved from http://search.proquest.com.ezproxy.lib.uh.edu/docview/1017535444/abstract/6BF576897D11472DPQ/2?accountid=7107

Rhodes, T. (2007). Accelerated learning for what? *Peer Review, 9*(1), 9–12.

Robb, L. (2000). *Redefining staff development: A collaborative model for teachers and administrators.* Portsmouth, NH: Heinemann.

Rodriguez, L. (2013). Beyond school structures and individual blame. In B. Gastic & R. R. Verdugo (Eds.), *The education of the Hispanic population, selected essays*. Charlotte, NC: Information Age Pub.

Roman, L. (2013). The Role of dual credit/dual enrollment courses in the recruitment and retention of Hispanic students in higher education. In B. Gastic & R. R. Verdugo (Eds.), *The education of the Hispanic population, selected essays*. Charlotte, NC: Information Age Publishing.

Sadler, P. M. (2010). Advanced placement in a changing educational landscape. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 3-16). Cambridge, MA: Harvard Education Press.

Sadler, P. M. (2010). Key findings. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 263-270). Cambridge, MA: Harvard Education Press.

Sadler, P. M. (2010). How are AP courses different? In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program.* (pp. 51-61). Cambridge, MA: Harvard Education Press.

Sadler, P. M. (2010c). Key findings. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program* (pp. 51-61). Cambridge, MA: Harvard Education Press.

Sadler, P. M., & Sonnert, G. (2010d). High school advanced placement and success in college coursework in the sciences. In P. M. Sadler, G. Sonnert, R. H. Tai, & K. Klopfenstein (Eds.), *AP: A Critical Examination of the Advanced Placement Program.* (pp. 51-61). Cambridge, MA: Harvard Education Press

Sandholtz, J. H. (2001). Inservice training or PD: Contrasting opportunities in a school/university partnership. *Teaching and Teacher Education*, *18*(7), 815–830.

Sandholtz, J. H., & Scribner, S. P. (2006). The paradox of administrative control in fostering teacher PD. *Teaching and Teacher Education*, *22*(8), 1104–1117.

School District. (2012-2013). *District and School Profiles*, Author.

School District. (2012, November 12). *Research brief. District advanced placement program*. Houston, TX: Author.

Solorzano, D. G., & Ornelas, A. (2004). A critical race analysis of Latina/o and African American advanced placement enrollment in public high schools. *The High School Journal*, *87*(3), 15–26.

States News Service. (2012, August 8). NC receives grant to cover AP/IB test fees. *States News Service*. Retrieved from http://www.lexisnexis.com.ezproxy.lib.uh.edu/lnacui2api/api/version1/getDocCui?lni=5695-2771-DYTH-G09S&csi=8058&hl=t&hv=t&hnsd=f&hns=t&hgn=t&oc=00240&perma=true

Swanson, J. (2007). Dual enrollment and advanced placement: Partners for student success. *Principal Leadership*, *7*(7), 26–30.

U. S. Department of Education. (2010). *Status and trends in the education of racial and ethnic groups* (NCES Publication No. 2010-015). Washington, DC: U.S. Government Printing Office.

Valenzuela, A. (1999). *Subtractive schooling: Issues of caring in education of U.S.-Mexican youth*. Albany, NY: State University of New York Press.

VanSciver, J. H. (2006). Closing the diversity gap in advanced placement course enrollment. *Multicultural Perspectives*, *8*(3), 56–58.

Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, *24*(1), 80–91. doi:10.1016/j.tate.2007.01.00

Appendix A

Teacher Focus Group

Focus-Group Questionnaire

Focus Group Questions:

Hello, the purpose of this focus group is to gather teacher opinion on how to improve Professional Development (PD) and/or training opportunities for teachers that teach AP courses and increase the success of students scoring a 3 higher.

For the purpose of this discussion, PD includes any trainings either on campus, off-campus or online; it can also include professional collaboration opportunities, study groups, or workshops as well as conferences.

1. Please discuss trainings or PD opportunities have you attended that you believe assisted you in having a greater impact on students scoring a 3 or higher on an AP exam?

2. Please discuss trainings or PD opportunities have you attended that you believe did not assist or were least helpful in the success of students to score a 3 or higher?

3. What type of knowledge and techniques have you acquired during the "**Advanced Placement"** (AP) PD process?

4. What other changes or modifications can the trainings, or PD opportunities make to have a greater impact on students scoring a 3 or higher on an AP exam?

Appendix B

Letter to Assistant Superintendent

Letter to Assistant Superintendent

January 18, 2014

Chairperson, Research Committee
[redacted]

Dr. [redacted],

I am enclosing a copy of my dissertation proposal approved by my advisor, Dr. Angus MacNeil, Assistant Professor at the University of Houston, College of Education. Also enclosed are the materials requested for permission to conduct research with SCHOOL DISTRICT.
As stated in the proposal, I would like to study the area of Advanced Placement, Trainings and Student Achievement results at an urban district. I would like to have access to archival data for the last five years from student participation on AP, student percent passing, and the name of the teacher of the students. I would also like to know the following about the teachers that taught AP to the students:

1. Teacher Year(s) Experience (from last six years),
2. Training Hours (E-Train file and/or another database with AP training documentation for training up to 2012-2013)
3. School location

Participants to interview would include teachers that have taught AP courses for 2013-14 school year in the following subjects: AP English Language and Composition, Calculus AB, US History, Biology, and Spanish Language. My intent is to ask teachers that are participating in this year's AP PLC to participate in the 30-minute focus-group at the end of their planned training. Rest assured that confidentiality and anonymity will be ensured for all participants. Participants will also have the option to decline to participate or re-schedule at a later time back on their campus. Principals will be given the option to allow teachers to participate and not interfere with the teacher's normal class schedule.
The findings of my research will be made available to you upon completion of the project which I anticipate on or about December 1, 2014.

Please consider this letter as a formal request for permission to conduct doctoral research. Thank you and your team in advance for your assistance.

Sincerely,

Jorge L. Arredondo
Jarredondo6@uh.edu

Appendix C

Approval Letter from Assistant Superintendent

Approval Letter from Assistant Superintendent

February 14, 2014

Jorge Arredondo
7210 Ashburn
Houston, TX 77061

Dear Mr. Arredondo:

The Independent School District is pleased to approve the research study titled "Is there a Significant Difference between Advanced Placement Teacher Training Hours and Student Learning Outcomes on AP Exams: Implications for School Leaders." The purpose of the research is to review and describe the effort of implementation of the AP program of an urban school district. More specifically, the study will describe the participation of students taking AP exams and number earning a qualifying score of 3 or higher for the last five years (2008–2013). A secondary goal is to compare if there is a significant difference in the amount of teacher professional development hours or activities and students scoring a qualifying score in five subject areas: AP Calculus, Chemistry, U.S. History, Spanish Language, and English Language and Composition. A final goal is to gather opinions from teachers about their professional development experience.

Approval to conduct the study in is contingent on your meeting the following conditions:

- The study will include all high schools with Advanced Placement programs.
- Participants attending the AP PLC will be invited to participate in a 30-minute focus group.
- Participants that are currently teaching the following AP courses will be invited to participate in an interview: AP English Language and Composition, Calculus AB, US History, Biology, and Spanish Language.
- Written, informed consent must be secured of staff participants prior to participation in the study. Teachers must provide consent to audio tape interviews or focus groups.
- Data being requested includes the following: teacher years of experience (2008–2013), Advanced Placement training hours (e-Train only), school location, participation of students taking AP exams and those scoring three or higher (2008–2013), student ethnicity, free/reduced lunch status, school, student-teacher linkage information for all AP teachers (if available).
- The researcher must follow the guidelines of D and University of Houston regarding the protection of human subjects and confidentiality of data. IRB approval/exemption letter must be provided to the Department of Research and Accountability prior to conducting the study.
- The researcher must follow the guidelines of HISD regarding the confidentiality of data.
- The D Department of Research and Accountability will also monitor the study to ensure compliance to ethical conduct guidelines established by the Department of Health and Human Services, Office for Human Research Protection (OHRP) as well as the disclosure of student records outlined in Family Educational Rights and Privacy Act (FERPA).
- Data will only be reported in statistical summaries that preclude the identification of the district or any principal/school participating in the study.
- In order to eliminate potential risks to study participants, the reporting of proposed changes in research activities must be promptly submitted to the Department of Research and Accountability for approval prior to implementing changes. Non compliance to this guideline could impact the approval of future research studies in SD.
- The study does not interfere with the districtwide instructional/testing program.
- The District and district personnel are not identified in process or final reports.

- The study involves no expense to the district.
- The district receives copies of the completed final report within 30 days of its completion.

Any other changes or modifications to the current proposal must be submitted to the Department of Research and Accountability for approval. Should you need additional information or have any questions concerning the process, please call

Sincerely,

CS:
cc:

Appendix D

Course Data Table

Course Data Table

Exam Code	Exam Name
07	United States History
13	Art History
14	Studio Art: Drawing Portfolio
15	Studio Art: 2-D Design Portfolio
16	Studio Art: 3-D Design Portfolio
20	Biology
25	Chemistry
28	Chinese Language and Culture
31	Computer Science A
33	Computer Science AB
34	Microeconomics
35	Macroeconomics
36	English Language and Composition
37	English Literature and Composition
40	Environmental Science
43	European History
48	French Language and Culture
51	French Literature
53	Human Geography
55	German Language and Culture
57	United States Government and Politics
58	Comparative Government and Politics
60	Latin
61	Latin Literature
62	Italian Language and Culture
64	Japanese Language and Culture
66	Calculus AB
68	Calculus BC
69	Calculus BC: AB Subscore
75	Music Theory
76	Music Aural Subscore
77	Music Non-Aural Subscore
78	Physics B
80	Physics C: Mechanics
82	Physics C: Electricity and Magnetism
85	Psychology
87	Spanish Language
89	Spanish Literature and Culture
90	Statistics
93	World History

Appendix E

Approval from the University of Houston Human Subjects Research Committee

University of Houston Institutional Review Board (IRB) Approval Letter

UNIVERSITY of HOUSTON

DIVISION OF RESEARCH

February 24, 2014

Jorge Arredondo
c/o Dr. Angus MacNeil
Curriculum and Instruction

Dear Jorge Arredondo,

The University of Houston Committee for the Protection of Human Subjects (1) reviewed your research proposal entitled "Is There A Significant Difference Between Teacher Training and Advanced Placement Student Learning Outcomes? Implications for School Leaders" on February 7, 2014, according to federal regulations and institutional policies and procedures.

At that time, your project was granted approval contingent upon your agreement to modify your protocol as stipulated by the Committee. The changes you have made adequately fulfill the requested contingencies, and your project is now **APPROVED**.

- **Approval Date: February 24, 2014**
- **Expiration Date: February 1, 2015**

As required by federal regulations governing research in human subjects, research procedures (including recruitment, informed consent, intervention, data collection or data analysis) may not be conducted after the expiration date.

To ensure that no lapse in approval or ongoing research occurs, please ensure that your protocol is resubmitted in RAMP for renewal by the **deadline for the January 2015** CPHS meeting. Deadlines for submission are located on the CPHS website.

During the course of the research, the following must also be submitted to the CPHS:

- Any proposed changes to the approved protocol, prior to initiation; AND
- Any unanticipated events (including adverse events, injuries, or outcomes) involving possible risk to subjects or others, within 10 working days.

If you have any questions, please contact Alicia Vargas at (713) 743-9215.

Sincerely yours,

Daniel O'Connor

Dr. Daniel O'Connor, Chair
Committee for the Protection of Human Subjects (1)

PLEASE NOTE: All subjects must receive a copy of the informed consent document, if one is approved for use. All research data, including signed consent documents, must be retained according to the University of Houston Data Retention Policy (found on the CPHS website) as well as requirements of the FDA and external sponsor(s), if applicable. Faculty sponsors are responsible for retaining data for student projects on the UH campus for the required period of record retention.

Protocol Number: 14219-01 Full Review: ____ Expedited Review: _X_

316 E. Cullen Building Houston, TX 77204-2015 (713) 743-9204 Fax: (713) 743-9577
COMMITTEES FOR THE PROTECTION OF HUMAN SUBJECTS

Appendix F

Solicitation Script

Solicitation Script

Dear AP Teacher,

Hello, my name is Jorge L. Arredondo. I am a graduate student at the University of Houston in the College of Education, and I am conducting research on teacher PD and results on Advanced Placement (AP) student exams, and I am inviting you to participate because you are (or have been in the last two years) an AP Teacher and have participated in PD in the previous two years. **This study has been approved by the department of Research and Accountability of Houston ISD. Furthermore, this project has been reviewed by the University of Committee for the Protection of Human Subjects (713) 743-9204.**

Participation in this research includes participating in a focus group discussion about your thoughts and opinion about your PD experiences. The discussion will take approximately 20-30 minutes. Responses will audio recorded; however, every effort will be made to maintain the confidentiality of the subject's identity. Also, school names and any names of participants will be de-identified in the reporting of the study.

If you agree to participate, please remain in training room after the district session has completed. If you would like to schedule another appointment on your campus to participate in the research, or have questions, I can be reached at 713-256-7924 or jarredondo6@uh.edu

Lastly, participants will have a choice to participate in a drawing for an Amazon gift card of $10.

Thank you very much!

Jorge L. Arredondo
Graduate Student
University of Houston