2011

# An Examination Of The Relationship Between The Exposure To The Use Of Cash Incentives As A Part Of The A Plus Grant Program And Performance On The Advanced Placement Exam

Juanita Inman-Vann
*University of Alabama at Birmingham*

# AN EXAMINATION OF THE RELATIONSHIP BETWEEN THE EXPOSURE TO THE USE OF CASH INCENTIVES AS A PART OF THE A PLUS GRANT PROGRAM AND PERFORMANCE ON THE ADVANCED PLACEMENT EXAM

by

JUANITA INMAN-VANN

LOUCRECIA COLLINS, COMMITTEE CHAIR
JOHN A. DANTZLER
TONYA PERRY
WILLIAM BOYD ROGAN
LINDA SEARBY

A DISSERTATION

Submitted to the graduate faculty of The University of Alabama at Birmingham,
in partial fulfillment of the requirements for the degree of
Doctor of Education

BIRMINGHAM, ALABAMA

2011

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EDUCATIONAL LEADERSHIP

## ABSTRACT

This research examined the relationship between the use of cash incentives and performance of high school students on the Advanced Placement (AP) exam by gender, race/ethnicity, and socioeconomic status. Logistic regression was used with binary variables to determine predictor variables for success on the AP exam. This quantitative analysis found that while gender does not have a relationship to success, race/ethnicity, socioeconomic status, and the use of cash incentives are related for certain groups. The use of cash incentives was the strongest predictor of success on the exam, which supports the theory of operant conditioning discussed in the literature. The results showed that minorities and low socioeconomic students still had a low success rate on the AP exam, although they had doubled the success rate of the non-incentive year. White students almost doubled the success rate of minorities when incentives were involved. All students showed an increase in performance when a cash incentive was available.

Keywords: Advanced Placement Exam, A Plus Grant Program, Low Socioeconomic Status, Cash Incentives, Logistic Regression

# DEDICATION

This dissertation research is dedicated to my loving husband, Herman L. Vann, and my beloved son, Solomon Asa Vann, who have patiently and untiringly supported me during this process. There were many late evenings at school or in study where I was absent either physically or mentally. They stepped in and carried the house with meals and cleaning. It would not have been possible without them.

In memory of my loving parents, Ervin and Velma Inman, who having no more than an elementary education, emphasized the importance of getting as much knowledge as possible to open doors to new possibilities. They always pushed me to do my best. They wanted me to become a medical doctor because they thought that I had the intelligence to do it. I tried to fulfill their dream for me by doing pre-med in my undergraduate studies. My passion for education rose to the surface and I became a teacher instead. They informed me that teachers didn't make that much money but that I needed to follow my dream and not theirs. I really appreciated that support and continued my studies. Now, I have become a "doctor" just not a medical doctor. I do wish they were here to see it.

ACKNOWLEDGEMENTS

I thank Loucrecia Collins for being my chair and mentor during this process—especially stepping in to fill the role of chair when my original chair retired. It was Dr. Collins who encouraged me to apply for the doctoral program while I was pursuing the Ed.S. I had mixed feelings about taking that route but she assured me that it was indeed possible and a viable option. Once I finished my Ed.S., she cracked the whip and kept me inline by setting deadlines and checking on my progress on a regular basis. When members of my committee were no longer available due to retirement or other jobs, she readily found replacements that were willing and interested in my progress. I will be forever grateful for her support.

Thanks to Dr. John Dantzler, my methods person, for taking the time to teach me how to do logistic regression and recommending literature that would show examples of how it was done. He made himself available by phone and email as well as scheduled time to meet in person. Thanks to each of the committee members, Drs. Tonya Perry, Linda Searby, and Boyd Rogan for their guidance and input.

Thanks to Dr. Phil Hammonds and the Jefferson County Board of Education for allowing me to conduct research in this school district. Special thanks to June Hogue for providing data and guiding me to additional sources of data. Thanks to Steve Hogg for effortlessly and untiringly providing data from archived sources. Thanks to Dr. Anna M. Vacca for her guidance and support. Thanks to the A Plus Foundation for providing data and statistics for my research.

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# CHAPTER 1

## INTRODUCTION

The advanced placement (AP) program was designed to give high school students the opportunity to take college level courses before entering college. In the 1950s, the Ford Foundation for the Advancement of Education funded a study that included three private schools in America. These three college preparatory schools were Andover, Exeter, and Lawrenceville located in Massachusetts, New Hampshire, and New Jersey, respectively. They were to work together in conjunction with three universities; Harvard, Princeton, and Yale, to design college level courses that could be taken at the high school level (The College Board, 2010a).

The teachers from the three high schools and the professors from the three colleges collaborated to plan the coursework for the students in high school. The intent was to offer the advanced courses to high school students during their last two years of high school to better prepare them for success in college. The coursework would be equivalent to a first year college course. Alan R. Blackmer, an English teacher from Andover, led the committee. The committee published a report through the Harvard University Press, which urged the colleges to work with the high schools to recruit and train teachers to teach the coursework at the high school level (The College Board, 2010a).

Simultaneously, another group was developing a college level curriculum to be offered at the high school level. The Kenyon Plan was developed by a committee consisting of 12 colleges and 12 secondary schools. The Kenyon College President, Gordon

Keith Chalmers, organized the project and developed the Committee on Admission with Advanced Standing. This committee focused on developing a curriculum in multiple subject areas and used the findings of the study funded by the Ford Foundation for the purposes of advancement of education (The College Board, 2010a).

As a result of the AP program, an already privileged group of students in college preparatory schools was given an added advantage (The College Board, 2010a). In an effort to open the gates to include more than this small group of students from elite schools, AP courses have been offered in public and private schools in urban and suburban areas for the past 30 years (The College Board, 2002). This recent change has allowed additional students the opportunity to be exposed to a more rigorous curriculum option.

Under the leadership of President George W. Bush, the No Child Left Behind Act of 2001 (NCLB) was enacted to ensure that students finishing high school were prepared to enter college. One component of this initiative was the expansion of the advanced placement program to include students from low-income households as identified by the free or reduced lunch program. The 2005 fiscal year budget added $28 million dollars of new funding to address the expansion of the AP program (The White House, 2004).

The federal government has sought to level the playing field by implementing an Advanced Placement Incentive Program (APIP) which pays for the exam and offers a cash incentive for qualifying scores of at least a 3 of 5 on the exam. This federal program provides grant funding for states through an application process and can be accessed by local school systems within each state (U.S. Department of Education, 2008).

## Statement of Problem

From its origin in 1954, the AP program was designed to challenge students from elite private schools who had college plans to attend Harvard, Princeton, and Yale (Nugent & Karnes, 2002). At that time, approximately 1,000 college-bound juniors and seniors from more than 100 American high schools took the first AP exams, selecting among 11 available subject areas (Mollison, 2006).

Over the past 50 years of the AP program, America's educational population has changed to include a more diverse clientele. In the 2008-2009 academic year, the enrollment of minorities in advanced placement courses had increased to include 15.5% Hispanic students, 8.2% African American students, 10.2% Asian students, and 0.6% American Indian students (The College Board, 2010f). Refer to Table 1 and Table 2for a comparison of the enrollment to performance on the AP exam for underserved groups.

One of the missions of the AP Program is to ensure that the schools have AP classes with demographics that are representative of the school wide population. AP classes should be as diverse as the school to ensure equity and excellence for all students. There are 18 states that have closed the gap on the number of Alaskan Native or American Indian students enrolled in the AP courses relative to their representation in the school population. Sixteen states have closed the gap for Hispanic or Latino students. However, there are only two states that have closed the equity and excellence gap for Black or African American students (The College Board, 2010f).

Table 1

*AP Access by Race/Ethnicity in the U.S. in 2009*

| Race/Ethnicity | Percent of overall population | Percent of AP examinee population | Percent of successful AP exam population |
|---|---|---|---|
| Black/African American | 14.5 | 8.2 | 3.7 |
| Asian, Asian American, Or Pacific Islander | 5.4 | 10.2 | No data provided |
| Hispanic/Latino | 15.9 | 15.5 | 14.3 |
| American Indian or Alaska Native | 1.2 | 0.6 | 0.4 |
| White | 61.6 | 59.4 | No data provided |
| Other | 1.4 | 6.1 | No data provided |

*Note:* Source(The College Board, 2010f)

Table 2

*Examinee Gaps in AP Courses in the U.S. in 2009*

| Race/ethnicity | Percent of Overall Student Population | AP Examinee Population | Difference |
|---|---|---|---|
| Black or African American | 14.5 | 8.2 | -6.3 |
| Asian, Asian American, or Pacific Islander | 5.4 | 10.2 | +4.8 |
| Hispanic or Latino | 15.9 | 15.5 | -0.4 |
| American Indian or Alaska Native | 1.2 | 0.6 | -0.6 |
| White | 61.6 | 59.4 | -2.2 |
| Other | 1.4 | 6.1 | +4.7 |

*Note:* Source(The College Board, 2010f)

In many states, the gap in terms of enrollment has been closed. With regards to performance indicators, however, the nation has not made much progress in terms of success by students in underserved groups. Many scores for students in underserved groups are still below the qualifying score of a 3 of 5 on the AP exam, which is the minimum requirement for receiving college credit. To rectify this situation, there has been a con-

certed effort to increase the preparation of students for the AP exam by designing courses that are pre-AP. These courses are offered in the middle school (sixth grade, seventh grade, and eighth grade) as well as ninth grade and tenth grade of high school (The College Board, 2010f).

Since its inception, the AP program has grown to include 33 college level courses, over 750,000 students, and over 30,000 high schools annually (Nugent & Karnes, 2002). Despite the large number of available programs, there are still groups of students that are underserved in the AP program that are not performing as well on the AP exam (Brown & Bartee, 2007). For example, there tend to be fewer female students in math and science courses, and when they are present, their scores tend to be lower than their male counterparts (The College Board, 2001).

Although efforts have been made to increase the accessibility of AP courses for all students, the cost of the AP exam still represents a major obstacle for many students whose socioeconomic status does not support this type of expense. At present, each AP exam costs $86. Based on federal guidelines, the cost per AP exam is $56 for students who are eligible for free or reduced lunch (The College Board, 2010e). Even with this reduction, some students from low-income homes are unable to afford to take the exam (Willis, 2004). Because of this financial constraint, some students have chosen to take only one AP course as compared to their peers who may take multiple AP courses without regard for the expense (Willis, 2004).

The AP Program has grown to include a greater number of students from low socioeconomic or underserved populations. However, the program has not seen the same level of success among this group of students as it has with their peers. Attracting stu-

dents is not enough (The College Board, 2010f). There has to be some measure of success for students in these underserved groups. The use of cash incentives as a part of the A Plus Grant is intended to be part of the solution (A Plus College Ready, 2009a). Alabama participates in the A Plus Grant and uses cash incentives to motivate the underserved groups to perform better on the AP exam. This performance study examines the relationship that exists between the use of the cash incentives and performance on the AP exam.

## Statement of Purpose

The purpose of this study was to examine the relationship between the use of cash incentives provided by the A Plus Grant in Alabama and changes in student performance on the AP exam before and after the implementation of the grant.

## Research Hypothesis

The research hypothesis proposed for this study was as follows:

There is no relationship between the linear combination of the use of cash incentives, gender, ethnicity, socioeconomic status (SES), PSAT scores, and the performance of students on the advanced placement exam.

## Assumptions and Limitations of the Study

The study of cash incentives used in the A Plus Grant assumes that schools that implement the grant are actively pursuing students to enroll in the AP program. It also assumes that educators are given training in the selection of students and use tools to help

them make the selection. It further assumes that students and parents are educated about the value and benefits of the AP program.

This study was limited to one school district in Central Alabama. Despite the limited geographic focus, several of the participating schools represent diverse populations. The other school district in Alabama that received the A Plus Grant during the 2008-2009 academic year had only four schools. Three of the four schools in this district were magnet schools with limited diversity in student population. Due to potential concerns regarding sample size for each variable, data from the participating schools in this study were combined to represent the district as a whole.

Another potential limitation of this study was the use of PSAT scores. While PSAT scores are intended to be a predictor of AP success, they were used to identify students as potential candidates for successful performance on the advanced placement exam. The actual AP exam scores were used for analysis.

## Definitions of Technical Terminology

There are certain terms associated with the AP program. The first term is A Plus College Ready, which refers to a nonprofit organization that works with corporate sponsors to be able to sponsor cash incentive programs to increase the equity in Alabama schools (Vocino, 2008).

The Advanced Placement program is a part of the College Board and is referred to as the AP Program (The College Board, 2010a). The Advanced Placement Incentive Program (APIP) is provided by the federal government as a 3 year competitive grant to state educational agencies, local educational agencies, or national nonprofit educational enti-

ties to increase the performance on the exam of underserved groups in the AP program (U.S. Department of Education, 2008).

National Math and Science Initiative (NMSI) refers to a nonprofit organization that started in 2007 to address America's decline in math and science education. It includes the A Plus College Ready as well as the APTIP (National Math and Science Initiative, 2009). Refer to Table 3for these terms and others that relate to the study of cash incentives used in the A Plus Grant.

## Significance of the Study

The study of cash incentives used in the A Plus Grant may yield significant information regarding the potential relationship between the use of cash incentives, gender, socioeconomic status, and race/ethnicity and performance on the exam in Advanced Placement courses. Previous studies regarding outcomes of student performance on AP exams have focused on incentives for teachers (Haessler, 2007; Jackson, 2007) as well as the exam construct (Morgan & Ramist, 1998).There was a study conducted using incentives for students to motivate them to get As (Raymond, 2008). At present, there are no studies that examine student performance on advanced placement exams as it relates to the use of cash incentives for students based upon their gender, SES, and race/ethnicity.

This study will focus on the relationship between the use of cash incentives and student performance on the AP exam. When the barrier of funding is removed, more students will be open to the challenge of taking a rigorous advanced placement course. School systems may or may not choose to use cash incentives for specific groups of underserved students based on the results of this study. The advanced placement program

Table 3

*Technical Terminology*

| Term | Definition |
|---|---|
| A Plus College Ready | Nonprofit organization which works with corporate sponsors to be able to sponsor cash incentive programs to increase the equity in Alabama schools(Vocino, 2008). |
| ACT (American College Testing) | A college entrance exam(ACT, Inc., 2010). |
| Advanced Placement Incentive Program (APIP) | Provided by the federal government as a grant to increase the performance on the exam of underserved groups in the AP program(U.S. Department of Education, 2008). |
| Advanced Placement Training and Incentive Program (APTIP) | A nonprofit organization that started in 2007 to address America's decline in math and science education and is a part of NMSI(National Math and Science Initiative, 2009). |
| AP (Advanced Placement) | Part of the College Board that administers college level exams to high school students(The College Board, 2010a) |
| Charter Schools | Charter schools fit in a niche between private and public schools. They are funded with public money (except for their facilities) and they are an alternative to regular public schools systems. A private group of people can submit and get approved a charter to run their own school. Charter schools receive waivers from public school districts in exchange for promising better academic results. Charters are usually given for 3-5 years, where an eye is kept on academic performance. If academic performance lags behind comparable public schools, then the "charter" is pulled and the school is closed(Chen, 2007). |
| Incentive | Something that incites or has a tendency to incite to determination or action(Merriam-Webster Incorporated, 2010). |
| Magnet Program | A school with superior facilities and staff and often a specialized curriculum designed to attract pupils from throughout a city or school district(Merriam-Webster Incorporated, 2010). |
| National Math and Science Initiative (NMSI) | A nonprofit organization that started in 2007 to address America's decline in math and science education(National Math and Science Initiative, 2007). |
| No Child Left Behind (NCLB) | A Federal Law that addresses equity of access in the U. S. public schools(The White House, 2004). |
| PSAT (Preliminary Scholastic Aptitude Test) | Used to predict success on AP exams(The College Board, 2007). |
| SAT (Scholastic Aptitude Test) | A college entrance exam(The College Board, 2007). |
| Vertical Teaming | High school and middle school teachers working together in the same subject to prepare students to take the AP exam (AP Strategies, 2008). |

may be able to compare the performance of cash incentivized underserved students to those who did not receive a cash incentive.

This study may also contribute to the body of literature on operant conditioning which is the basis for the use of cash incentives (Staddon & Cerutti, 2003). This study may find that operant conditioning is still useful in motivating students to perform better on academic tests. It also has the possibility of confirming that students are punished by rewards according to Kohn (1993).

## Organization of Study

This study was organized in five chapters. Chapter 1 includes an overview of the investigation including a statement of the problem, the purpose of the study, research questions, theoretical framework, significance of the study, definition of terms, delimitations, limitations, and a summary. Chapter 2 includes a review of relevant literature regarding the topic. Chapter 3 provides the methodological framework for the study including philosophical assumptions, design elements, data collection and analysis, assurances of validity and reliability, and ethical considerations. Chapter 4 presents the findings of the research and chapter 5 discusses conclusions and directions for future research.

# CHAPTER 2

# LITERATURE REVIEW

## Introduction

Education is America's ticket to future success according to Hoyle and Kutka (2008). This success is contingent upon providing equitable quality education to all Americans. AP courses are a part of quality education. These courses come with a cost for taking the AP exam which may serve as a barrier to some students. The interconnected issues of race/ethnicity and class may limit America's ability to provide this equitable quality education (Hoyle & Kutka, 2008).

There is a major gap in the achievement level of whites when compared to minorities, women, and low-income students (Levitt & Fryer, 2002). Closing that gap is no small feat, but may prove to be worthwhile to the American economy. Estimates suggest that the gross domestic product for America can increase by $230 billion if this achievement gap is closed (Fitzgerald & Delaney, 2002). There has been a concerted effort on the part of the American Public School leaders to increase both the enrollment and the passing rates for minorities, women, and students of low-income in advanced placement courses (Hoyle & Kutka, 2008).

The College Board has invested significant time and effort to increase access to the advanced placement program (Mississippi Department of Education, 2007). Meanwhile, other organizations have funded grants that target underserved groups. Collectively, there has been a total re-conceptualization of the AP process including the use of

incentives to encourage participation by students in underserved groups (Delaware Department of Education, 2008).

## Theoretical Framework

### Operant Conditioning

The use of incentives is an example of a reward system, which has its roots in operant conditioning. Introduced by B. F. Skinner, John B. Watson, and Edward Thorndike, this form of conditioning involves the use of stimulus and response to achieve a desired behavior (Staddon & Cerutti, 2003). Operant conditioning has been in use since 1937 and is a term that was coined by Skinner (1988).

Staddon and Cerutti (2003) recognized the similarities between operant conditioning and another term known as "instrumental learning," commonly referred to as "habit."Habits are formed by this stimulus response method. A well trained operant becomes a habit (Staddon & Cerutti, 2003).

The two major forms of scheduled reinforcement are time-based and ratio-based schedules. Time-based schedules are most popular due to their predictability and can involve either a fixed or variable interval for the reinforcement to be delivered. Time is monitored and the reinforcement is then given after the time has occurred (Staddon & Cerutti, 2003).

The ratio schedule is not as popular due to the fact that there is no way to predict how much time will elapse between behaviors. It involves reinforcing the behavior either at a fixed or variable ratio. The behavior can be reinforced at equal intervals so that it can be predictable or it can be reinforced at variable intervals so that it is not predictable. The

operant does not know when to expect reinforcement when variable ratio is used. According to Staddon and Cerutti (2003), the operant prefers to have a fixed ratio of reinforcement because of its predictability.

B. F. Skinner asserted that repeatable responses should be used during the conditioning process. If the behavior has been reinforced regularly, it should be available on demand and easily replicated. The goal of the operant conditioning is to be able to predict the response when the reinforcement is used (Staddon & Cerutti, 2003).

Behaviorists have been influenced by this form of input-output relationship since its inception. Different forms of stimuli have been used to reach the desired behavior. The ultimate goal of operant conditioning is to achieve the desired behavior even when there is no reinforcement. Once the operant has been conditioned, the response should occur out of habit rather than through the use of reinforcement (Zentall, 2002).

Classical and operant conditioning are the foundations upon which incentive plans are built. For example, experiments on the behaviors of dogs and rats have been studied for decades by psychologists and others (Cautilli, Rosenwasser, & Hantula, 2003; Skinner, 1988; Staddon & Cerutti, 2003; Zentall, 2002). The concept has been used on humans as well (Staddon & Cerutti, 2003).

Classical conditioning was associated with Pavlov's dogs in which dogs were allowed to smell a steak and subsequently began to salivate at the same time that a bell was rung. The dog began to associate the steak with the ringing of the bell. When the steak was no longer introduced, the dog still salivated at the sound of the bell. The pairing of a smell and the ringing of a bell allowed for a predictable response (Kohn, 1993).

Operant conditioning is different than classical conditioning in that it uses a stimulus after an appropriate behavior is performed to ensure that the behavior is repeated. Skinner (1988)referred to the stimulus as a “reinforcer" that followed the desired behavior. Basically, it is a “Do this and you’ll get that” approach (Kohn, 1993). According to Staddon and Cerutti (2003), operant conditioning is the basis for the use of incentives to improve performance.

Frederick Taylor was instrumental in using operant conditioning in the workforce by applying it to scientific management. Taylor began this scientific management movement by timing a set of workers in a plant in Midvale Steel Company. He argued that economic losses of time were associated with waste and suggested that workers could have higher production rates and thereby increase profits (Bruce & Nyland, 2001).

Historically, workers were rewarded with pay bonuses or raises (Bruce & Nyland, 2001) and this same system of reward has been applied to the advanced placement program. Students and teachers are given cash rewards for student performance on the advanced placement exam. The student’s performance is linked to the teacher and the teacher’s performance is linked to the students. This concept of rewarding behavior has been around for decades and continues to have respect and validity (Cautilli et al., 2003).

## Studies of Current Trends and Effectiveness of Incentives

The concept of rewarding students for performance has roots that go back further than the advanced placement program (Lake, 2008). Schools in New York City, Chicago, and Washington, D.C. have cash-based incentive programs that were recognized by the mayors and chancellors of these cities as being a viable option for motivating students

(GreatSchoolsStaff, 2008). In New York City, students in fourth grade to seventh grade were rewarded with items such as MP3 players and prepaid cell phones for their performance on each of 10 sets of tests (Warren, 2008). In Chicago, freshmen and sophomore students were rewarded for As, Bs, and Cs with $50, $35, and $20, respectively, at the end of a 5-week marking period. Finally, in Washington, D.C., middle schools students were rewarded every 2 weeks with up to $100 for grades, behavior, and attendance (Henderson, 2009).

Angrist and Lavy (2004) conducted a study that showed the use of cash incentives increased performance on high stakes tests but did not improve learning. The researchers conducted a similar study of twelfth graders who were rewarded for doing well on a high school matriculation exam and found that students who received the cash incentive improved on learning the necessary content for the exam (Angrist & Lavy, 2004).

Despite equivocal results in the research, there are numerous school districts and philanthropists choosing to use cash incentives to reward performance (Elmasry, 2008). Some argue that cash incentives increase learning, while others contend that cash incentives do not address the root causes of poor performance, such as overcrowded classrooms, sub-par facilities, and lack of academic rigor (Singer-Vine, 2008).

## Empirical Studies Related to the Use of Cash Incentives

Three empirical research studies have significantly influenced the study of cash incentives in the AP program. Each of the studies examined the use of cash incentives as related to various aspects of student performance. The first study was conducted by Jackson (2007) and described as the Texas APIP. The second study investigated the use of in-

centives and performance of girls in Kenya on a national exam (Kremer, Miguel, Thornton, & Ozier, 2005). The third study focused on the effect of performance pay for teachers on student achievement (Winters, Greene, Ritter, & Marsh, 2008).

Jackson's (2007) study reviewed the APIP in 10 schools in Dallas, TX. The program was designed for minority students who were also considered to be low-income. The study addressed four areas including (a) whether cash incentives are effective in motivating students to succeed on the AP exam; (b) how students respond to the use of cash incentives based on race/ethnicity and gender; (c) any possible negative effects of the use of cash incentives; and (d) how cash incentives influence student outcomes.

The goal to have more minority and low-income students take both the advanced placement courses and the advanced placement exams is a national priority (The White House, 2004). Previous studies have shown that students who take AP courses in high school have higher college GPAs and increased rates of persistence to graduation (The College Board, 2010b, 2010f; Fitzgerald & Delaney, 2002; Lim, 2008).

APIP provides incentives for both students and the teachers based on student performance on the AP exam (Delaware Department of Education, 2008). The decision to use incentives for both students and teachers was based on the results from an earlier study in which providing incentives to students without an incentive for teachers weakened the effectiveness of the program (Angrist & Lavy, 2002). APIP not only provides cash incentives for teachers but also trains teachers to become more effective in preparing students to take the AP exam (Delaware Department of Education, 2008).

School level data were used in this research study to measure performance outcomes and to compare multiple schools to one another (Jackson, 2007). The study

showed that students scored higher on the ACT and SAT if they were enrolled in one of the participating schools. While there was no significant difference by gender, there was a significant improvement in SAT and ACT scores for minority students. According to Jackson (2007), this finding demonstrated that minority students who participated in the advanced placement program did not take away from the enrollment in other advanced courses within the school. Other groups of students continued to participate and perform as well as they did before the minority population increased. There was no evidence that schools with higher rewards performed better than other schools. A residual benefit was that the enrollment in advanced placement courses increased even for courses that did not have cash incentives (Jackson, 2007).

In the APIP Program in Texas, vertical teams of teachers worked together to prepare students for the advanced placement exam. The lead teacher was assigned to work with teachers from grade 6 through grade 12 in a particular subject area to increase the readiness of students for the AP exam. A cash incentive was provided for a lead teacher which included an annual bonus ranging from $3,000 to $10,000 depending on the availability of funds from corporate sponsors and the number of sessions attended outside of the school day. Based on the actual results of the AP exam, teachers were rewarded with an additional $2,000 to $5,000 bonus. Teachers who taught courses preparing students to take an AP course received a supplement of $500 to $1,000 per year as well in addition to their salary. AP Strategies, a Dallas-based nonprofit organization, was responsible for managing the APIP in Texas (AP Strategies, 2008).

AP Strategies provided preparation sessions that extended beyond the regular class time and paid for half of the exam fee for those students who took the AP exam.

Once the exam was taken, students who attended the course had the opportunity to receive an incentive for their scores. Students were awarded $100 to $500 for each qualifying score on the advanced placement exam. As previously stated, a score of 3 or higher is considered a qualifying score (AP Strategies, 2008).

Teachers were able to earn cash incentives for student test results as well. Once exam scores were reported by The College Board, AP teachers earned $100 to $500 for each qualifying score in their courses depending upon the reward system set up in that state. An additional $1,000 bonus was available based on the cumulative results based on a threshold that is set annually. The actual amount paid varied by school (A Plus College Ready, 2008b).

The funding for APIP was provided by private businesses that invested in a school or district of their choice. These businesses provided a large portion of the funding and the school district provided the rest without any predetermined ratio of business to school district funding. The donor determined which subjects they wished to fund. Businesses chose to fund math, science, and English because these were the target areas identified by NCLB. The donor funds were used for the awards to students and teachers based on student performance on the advanced placement exam. Typically, the district was responsible for the cost of teacher training, equipment and release time (AP Strategies, 2008).

While the study used data related to the AP exam, the outcomes measured SAT/ACT scores and college enrollment. The results indicated that there was no statistical significance in the use of cash incentives for performance on the SAT/ACT exam as compared to the control group that did not receive an incentive for performance. Howev-

er, the number of students who scored above 1100/24 on the SAT/ACT did increase progressively over the 3-year period of the study (Jackson, 2007).

Data revealed no statistical significance between the variables of gender and the uses of cash incentives (Jackson, 2007). The use of cash incentives did, however, reveal significance for the African American and Hispanic populations with respect to SAT/ACT scores. The results showed that more African American and Hispanic students enrolled in the AP courses and improved their average scores on their SAT/ACT exams. There was no statistical difference in the enrollment of White students in the AP courses or with regards to their scores on the SAT/ACT exams (Jackson, 2007).

There were no negative effects reported in this study regarding the use of cash incentives (Jackson, 2007). Instead, the investigator found that cash incentives had a positive effect on participation and performance by minority and low-income students. Teachers and students had positive attitudes toward the AP program with the use of cash incentives. The findings were inconclusive with regards to whether or not student performance was better in schools with higher cash incentives (Jackson, 2007).

The second empirical study cited was entitled *Incentives to Learn* (Kremer et al., 2005). The study explored the use of cash incentives for Kenyan girls to improve their end of the course performance on a standardized test. The results showed positive gains in multiple areas. On average, girls who received cash incentives scored higher than girls who did not receive cash incentives. For girls who participated in the program, test scores stayed high for a full year after the cash incentive was awarded. An additional finding of the study was that the boys in participating schools performed better even though they were ineligible to receive the cash incentive due to their competitiveness with the girls.

Cash incentives for teachers were also a focus of the Kenyan study. Incentives were not valued as much by teachers as they were by the students. There were more preparatory sessions offered to students but the teachers still did not teach to the test, which is a good thing. It was difficult to assess the long term impact of the use of cash incentives on student performance since the program was discontinued after 1 year (Kremer et al., 2005).

The Kenyan study addressed the variables of gender and the use of cash incentives. Findings from the Kenyan study presented a strong case for the use of cash incentives as a reward for student performance. Further, the researchers posited that competitiveness between the boys and girls was motivation for the boys to perform better on their exams, although the girls were the only ones rewarded (Kremer et al., 2005).

The final study, performance pay in Little Rock, Arkansas, assessed the impact of cash incentives on student achievement in which teachers were rewarded for student performance on standardized tests. Five elementary schools participated in the study between 2004 and 2007. The study used a differences-in-differences approach to determine if there was a difference in performance for students when teachers were rewarded. This approach was based on the improvement in scores by percentages as shown in Table 4 (Winters et al., 2008).

Based upon the achievement growth results (Table 4), teachers who were eligible for performance pay had higher score gains in math, reading, and language than teachers who were not eligible. The researchers concluded that test scores for students improved when the teachers were rewarded. This phenomenon even occurred among teachers who

had been deemed ineffective by the state of Arkansas in achieving high test scores in the past (Winters et al., 2008).

Table 4

*Performance Pay Criteria in Little Rock Arkansas*

| Achievement growth | Bonus pay times the No. of students |
|---|---|
| 0-4% | $50 |
| 5-9% | $100 |
| 10-14% | $200 |
| ≥ 15% | $400 |

*Note:* Source (Winters, Greene, Ritter, & Marsh, 2008)

The performance pay study is valuable to this investigation because it focused on the use of teacher incentives to improve student performance. Teachers were included in the reward program for the A Plus Grant. Additional findings indicated that student performance increased even when the students were not rewarded (Winters et al., 2008).

## Non-empirical Research Related to the Use of Cash Incentives

In addition to the previously described research studies, four non-empirical documents regarding the advanced placement program are referenced in this current study. Kohn (1993) has written a book that addresses being punished by rewards about how the use of incentives reduces intrinsic motivation. Loftus (2009) looked at how cash incentives improve performance for minorities in a Texas-based initiative. Finally, Raymond (2008) investigated the use of cash incentives in charter schools to see if student performance increased as a result of rewards.

The first document addressed the debate regarding the use of incentives Kohn (1993) acknowledged that incentive plans have been in use as long as humans have owned pets. According to Kohn (1993), there is a prevailing mindset that people get what they deserve. Rewards are given to deserving people. Those who fail have not worked hard enough and therefore do not deserve a reward. This assumption asserts that individuals live in a just world. In addition to the "just world paradigm," there is also an equity model which assumes that fairness always wins in which being fair means that people get what they have earned (Kohn, 1993).

As stated by Kohn (1993), when individuals acknowledge acceptable behavior through classical conditioning responses like "good boy", then people are treating others like pets. Similarly, individuals in the workplace are often bribed and threatened through the use of rewards and punishments, commonly referred to as "carrots and sticks" (Kohn, 1993). Some have even said that adults are treated like children when they are manipulated through the use of incentives. According to Kohn (1993), the idea of using incentives has become a less popular method for behavior modification.

The threat of "Do this or else here's what will happen to you" (Kohn, 1993)has been equally as controlling as the use of cash incentives. The use of punishments and rewards to control behavior does not allow for intrinsic motivation (Dickinson, 1989). As suggested by Kohn (1993), instead of bribing and punishing students they should become hooked on learning as form of motivation in the classroom (Kohn, 1993). Kohn's (1993) critique of rewards in the classroom questions the long and short term benefits of cash incentives.

The second document investigated the viability of funding AP exams for low-income students. Loftus (2009) discussed the ways in which cash incentives and coaching promoted student success and described how the National Math Science Initiative (NMSI) allowed students to access programs that would normally be out of reach to them due to financial constraints.

NMSI assists underserved minority students to excel in the science, technology, engineering, and math (STEM) fields. The NMSI grant requires that participating schools maintain an open enrollment to allow all students an opportunity to enroll in AP courses. The NMSI grant pays for underserved students to take the ACT and the AP exams (Loftus, 2009).

The NMSI grant partially covers program expenses with states supplementing the grant in order to continue the program. Corporate funding from nonprofit organizations also benefits the schools and businesses that support the NMSI grant. Previous funding sources have included the Bill & Melinda Gates Foundation, Michael & Susan Dell Foundation, and others (Loftus, 2009).

Raymond (2008) studied how the use of cash incentives in 186 schools across 17 states influenced student performance in charter schools. There are certain schools and districts that use cash incentives to reward student behaviors regarding academic performance, continued enrollment in school, and attendance. Although some public schools have participated in the use of cash incentives, charter schools (Table 3) have provided the greater opportunity to participate due to the latitude given to their programs (Lake, 2008).

The growing demand for accountability by the federal government has increased interest in the use of cash incentives to increase performance of underserved groups (The White House, 2004). According to Raymond (2008), incentives are currently being used across all grade levels to motivate students in the 17 states in the survey. Variations existed in both the grading criteria and the length of time before the students were rewarded. On the state exam, student improvements in reading were consistent across all grade levels; however, there was no evidence of improvement in math on the state exam (Raymond, 2008).

This study identified positive results when cash rewards were given to the students for academic performance. According to the author, the most effective incentives were those that had the shortest time interval between the positive behavior and the use of the cash incentive (Raymond, 2008).

## The Original Purpose and Target Groups of the Advanced Placement Program

After World War II, Americans recognized that there was a significant gap between the level of performance in high school and expectations for entering college students. A study funded by the Ford Foundation was conducted in 1952 to examine the relationship between the high school courses taken and the preparation for college. The resulting report recommended that high schools and colleges work together to close the existing gap in student performance. This recommendation was based on the realization that college-bound students would need to be better prepared in order for the United States to compete more effectively on the world stage (The College Board, 2010a).

The initial study lead to the development of an advanced placement program and began with three preparatory schools working with three of the country's most prestigious colleges. The preparatory schools included academies of Andover, Exeter, and Lawrenceville. The colleges were Harvard, Princeton, and Yale. These institutions were encouraged by the Ford Foundation to work together to prepare students for college level coursework. This initial program was limited to the participating schools (The College Board, 2010a).

A second study was conducted in the early 1950sand focused on implementation of college level course work at the high school level. The Committee on Admission with Advanced Standing developed a curriculum designed for high school students that had the rigor of college level classes. A team of five faculty members from three colleges and two high school teachers set out to write a curriculum that would be suitable to be taught at the high school level (The College Board, 2010a).

A pilot program was launched as a result of the second study with 11 initial subjects that included English composition, English literature, biology, physics, chemistry, French, Latin, German, Spanish, and history. By the mid-1950s, the program spread across the nation to include more minority and low-income students and the College Board was invited to consolidate efforts into one joint venture. The pilot program was officially named the College Board Advanced Placement program during the 1955-1956 academic year (The College Board, 2010a).

By the early 1960s, after the full implementation of the College Board Advanced Placement program, teachers began to be trained in curriculum instruction. Teachers saw AP courses as a boost to their careers because they finally had the opportunity to teach

motivated students a challenging curriculum. More schools began to add AP classes to their course offerings during the 1970s and 1980s. Both the College Board and the local high schools began to reach out to minority and low-income students to become a part of the AP classes. This recruitment effort continued into the 1990s (The College Board, 2010a).

### The Current Purpose and Target Groups of Advanced Placement Courses

In the 21st century, the AP program continues to be a part of many high schools. In an effort to expand access, the College Board has designed pre-AP courses, which can be offered at both the middle school and high school levels. This pre-AP Initiative began in the 1990s and included AP Vertical Teams, a joint effort between the high school and the middle school programs. High schools are now making a concerted effort to bridge the gap from the middle school to the high school as well as from the high school to the college levels as commissioned by NCLB (The White House, 2004).

Since the late 1980s, the AP program has gone worldwide and includes over 17,000 schools. As of 2009, there were 33 AP courses and exams available. The graduation classes of 2009 across the United States included approximately 450,000 students who had taken at least one AP exam during their high school experience. In 2009, there were more than 3 million exams taken by 1.7 million students worldwide (The College Board, 2010b).

AP courses can have a positive effect on students who are enrolled in regular courses at schools that participate in the advanced placement program (Mississippi Department of Education, 2007). The advantages of participating in the rigorous courses

stretch beyond the local school to the community and the college (Santoli, 2002)and help prepare students to compete in a global economy (Lim, 2008). Many students are encouraged to take AP courses in order to gain exposure to a rigorous curriculum (Bracey, 2007). Research has shown that taking AP courses improves students' ability to attract scholarships for college and to persist to graduation (The College Board, 2009a; Winn, 2008).

The AP program is designed to provide students with three outcomes: (a) the opportunity to earn college credit for courses taught in high school; (b) the chance to improve study habits, writing skills, and problem solving abilities; and (c) the opportunity to gain confidence in ability and preparation for the college environment (The College Board, 2009e). The standard for success on the AP exam has remained the same over the past 60 years. Exam scores range from 1 to 5 with 5 being the highest possible score. Colleges are looking for students to earn a 3, 4, or 5 on the exam in order to earn college credit for the course, based on a study of 21 colleges conducted by the Educational Testing Services (Morgan & Ramist, 1998). The score that earns college credit varies by college, but there are currently no institutions that accept scores lower than a 3 on the AP exam. Some colleges and universities may only accept a score of 4 or 5 and may even have different standards within the institution, depending upon the subject matter (The College Board, 2009e).

**No Child Left Behind (NCLB) and the Advanced Placement Program**

NCLB was enacted by President George W. Bush to support American high schools. In addition to help struggling readers, the act focused on math and science part-

nerships as well as expanding AP for low-income schools. In the FY 2005 budget, $28 million of new funds were added to the budget to help address the needs of the low-income schools. Mathematics and science partnership programs were added to the budget with $120 million dollars of funding (The White House, 2004).

President George W. Bush endorsed different types of reform in order to better prepare high school students for entering both higher education and the workforce. At the time that NCLB was enacted, approximately 60% of high schools had at least one AP course in their curriculum. The funding was intended to increase the number of schools offering AP courses and to prepare teachers to teach these courses. The increase in funding brought the FY 2005 budget to $52 million per year to ensure that teachers were well trained to teach both AP and pre-AP courses in low-income schools (The White House, 2004).

NCLB was designed to provide equitable education for children at various levels. Minority students, however, are underserved in AP classes in America (Klopfenstein, 2004). Research has shown a significant gap in opportunities for minority students to participate in AP course (Mississippi Department of Education, 2007). The factors that contribute to this gap include lack of nomination by their teachers, lack of recommendations by their counselors, feelings of isolation or alienation while in the classes, and lack of preparation for the rigor of the course (Brown & Bartee, 2007; Mississippi Department of Education, 2007; Taliaferro & DeCuir-Gunby, 2008).

**The Underserved Groups**

One of the goals of the AP program is to attract a wider, more diverse population of students. As stated in the most recent literature on the AP program, there are still significant inequities in the program which are addressed in Table 5. Although participation by minorities has increased over time, there are still groups that are underserved in the AP program. (The College Board, 2010f). Research has shown that GPAs and graduation rates are usually higher for minority and low-income students when they take AP courses (The College Board, 2009b; Mississippi Department of Education, 2007).

The College Board has outlined a 7-point plan (Table 5) for achieving equity among minority and low-income students participating in AP courses. This plan includes (a) supporting teachers with professional development; (b) using the AP Potential from the PSAT to predict success on the AP exam; (c) offsetting the cost of the exam for low-income students; and (d) announcing a commitment by the local school faculty and administration to the AP program (The College Board, 2009b).

Findings from research have shown that the AP program is particularly important to students who come from homes where students represent the first generation to have a college experience (Fitzgerald & Delaney, 2002). This program offers students from underserved populations the opportunity to overcome some of these barriers to success. Minority students may encounter stereotypical barriers of low expectations and treatment from their teachers. Additionally, these students frequently attend schools that do not offer AP courses. Efforts have been made to address these challenges that are faced by students who are considered most at-risk (Burton, Whitman, Yepes-Baraya, Cline, & Kim, 2002).

Table 5

*7 Point Equity Plan*

| 7 Point | Plan for achieving equity |
|---|---|
| 1 | Announce a major commitment to equity in AP. |
| 2 | Conduct an inventory of current AP offerings and capacity. |
| 3 | Support teacher professional development for AP and Pre-AP teachers |
| 4 | Align middle and high school curricula. |
| 5 | Use AP Potential™ to identify prospective AP students. |
| 6 | Mandate AP course offerings. |
| 7 | Offset the AP Exam fee for low-income students. |

While African Americans comprise nearly 15% of the overall student population, only about 8% are currently taking the AP exam. In comparison, Asian Americans are proportionately taking about 10% of the overall exams while they represent only about 5½% of the population. National performance data on the AP exam are available in Table 2. Overall, the participation gap has either been reduced or eliminated for Hispanic and American Indian students. Hispanic and American Indian students have been taking exams at the same ratio as the relative population of students enrolled in participating schools. Major gaps in participation rates, however, remain for African American students in every state (The College Board, 2010f).

In Alabama, there are major discrepancies between the numbers of students taking the AP exam as compared to the overall student population (The College Board, 2009b). White students are taking AP exams at least 20% more than their comparable population. Both American Indian and African American students are represented at least 50% less than their comparable population on AP exams. Both Asian and Hispanic students are over represented for their population with Asians being at least 300% their comparable

population and Hispanics nearly 200% of their comparable population (The College Board, 2009d).

Overall, Alabama has had lower participation by all students or specific segments of the population on AP exams than the rest of the nation. The percentage of students taking the exam has gradually increased from 2003-2008. Participation by African American students has increased from 10% to 16% in that same time frame but is still only a fraction of the overall population of currently enrolled students (The College Board, 2009d).

The Hispanic population in Alabama has nearly doubled from 2003 to 2008 and participation on AP exams for Hispanic students has kept pace with this unprecedented growth. The percentage of American Indian students in Alabama high schools has been consistent from 2003-2008, but the number of students participating in AP has decreased over time. The Asian American population in Alabama has remained relatively unchanged from 2003-2008, but participation in the AP program has been four to five times their proportional population (The College Board, 2009d).

White students have consistently been represented at a higher rate in AP courses than the corresponding proportion to the population both nationally and in Alabama. Alabama, however, has increased the representation of low-income students in AP courses. From 2003-2008, the representation of low-income students in AP courses has nearly tripled in size. This number, however, is still significantly lower in comparison to AP students who are not considered low-income (The College Board, 2009d).

Hawaii and Montana are the only two states that have eliminated the equity and excellence gap in AP participation for African American students. Sixteen states listed in Table 6 have eliminated the equity and excellence gap for Hispanic students in the AP

program, and Alabama is among them. On the national level, the equity and excellence gap has been eliminated more frequently for Hispanics than it has been for African American students (The College Board, 2010f).

Table 6

*Equity and Excellence Gap Elimination for Hispanic/Latino Students*

| State | Percent of Graduating Class | Percent of Successful AP Examinee Population |
|---|---|---|
| Alabama | 1.9 | 2.5 |
| Alaska | 2.8 | 4.1 |
| Arkansas | 6.0 | 6.2 |
| District of Columbia | 6.5 | 19.7 |
| Florida | 22.2 | 27.6 |
| Georgia | 5.5 | 6.1 |
| Kentucky | 2.3 | 2.3 |
| Louisiana | 1.9 | 4.4 |
| Maryland | 6.8 | 7.5 |
| Mississippi | 1.1 | 2.1 |
| Ohio | 1.8 | 1.8 |
| Oklahoma | 6.9 | 6.9 |
| South Carolina | 3.2 | 3.2 |
| Tennessee | 2.9 | 3.8 |
| Virginia | 6.3 | 6.5 |
| West Virginia | 1.0 | 1.1 |

Within the AP program, there are currently 19 subject areas in which the equity and excellence gap has been narrowed or eliminated for Hispanic students, as shown in Table 7. In comparison, only eight subject areas have seen similar results in closing the gap in achievement for African American students (Table 8).They include biology, calculus AB, chemistry, English language, English literature, European History, psychology, studio art, and U.S. history (The College Board, 2010f). Although there has been

Table 7

*Exemplary AP Subjects for U.S. Hispanic Students in 2009*

| Subject | Public high school with largest number of Hispanic Students with a 3 or higher from the class of 2009 |
|---|---|
| Art | Barbara Goleman (Miami, FL) |
| Calculus AB | School of Science and Engineering at Yvonne A. Ewell-Townview Magnet Center (Dallas, TX) |
| Calculus BC | Cypress Bay (Weston, FL) |
| Chemistry | Miami Coral Park (Miami, FL) |
| English Language | Coral Reef (Miami, FL) |
| English Literature | Coral Reef (Miami, FL) |
| Environmental Science | Miami Killian (Miami, FL) |
| European History | Coral Reef (Miami, FL) |
| Government and Politics | Cypress Bay (Weston, FL) |
| Human Geography | Miami Killian (Miami, FL) |
| Macroeconomics | Cypress Bay (Weston, FL) |
| Microeconomics | Cypress Bay (Weston, FL) |
| Psychology | Cypress Bay (Weston, FL) |
| Spanish Language | Calexico (Calexico, CA) |
| Spanish Literature | Valley (Pharr, TX) |
| Statistics | Cypress Bay (Weston, FL) |
| Studio Art | Design and Architecture (Miami, FL) |
| United States History | Cypress Bay (Weston, FL) |
| World History | Coral Reef (Miami, FL) |

Table 8

*Exemplary AP Subjects for U.S. African American Students in 2009*

| Subject | Public high school with largest number of African American Students with a 3 or higher from the class of 2009 |
|---|---|
| Biology | Eleanor Roosevelt (Greenbelt, MD) |
| Calculus AB | Michael E. DeBakey for Health Professions (Houston, TX) |
| Chemistry | Eleanor Roosevelt (Greenbelt, MD) |
| English Language | Eleanor Roosevelt (Greenbelt, MD) |
| English Literature | Renaissance (Detroit, MI) |
| European History | Stanton College Preparatory (Jacksonville, FL) |
| Psychology | Homewood-Flossmoor Community (Flossmoor, IL) |
| United States History | Cypress Bay (Weston, FL) |

some positive growth for both Hispanic and African American students, there is still room for improvement.

**PSAT as a Predictor of AP Success**

The PSAT is taken by students in their sophomore or junior year of high school. As reported by The College Board, the PSAT can be used as a predictor of AP success (Von Secker, 2005). The formula for predicting success on AP exams has taken into account the educational preparation of students and thereby reduced the effect of teacher assigned grades. Separate formulas are used for minority students in which scores are broken down to indicate probable success by subject (Ewing, Camara, & Millsap, 2006).

PSAT scores are useful because these tests are typically taken at least 1 year before enrollment in an AP course. PSAT scores have been correlated to predict success in English literature, English composition and calculus. Despite their usefulness as a predictive tool, research has shown that some students possess a level of ambition or interest that overrides their performance on the PSAT (Burton et al., 2002).

The relationship between PSAT and AP exams has proven to be reliable based on product-moment correlations for scores on the PSAT/NMSQT and each possible AP exam (Camara & Millsap, 1998). The AP potential from the PSAT was used to select students who are more likely to be successful in AP courses in Montgomery County, Alabama Schools (Von Secker, 2005). Now that writing has been added to the PSAT, it can now be used nationally to help predict success on each of the 29 AP exams (Ewing et al., 2006).

PSAT scores can be used to help select students for AP courses but should not be used as the sole indicator of probable success. Students' grades in previous courses and teacher recommendations are key factors to be considered (Von Secker, 2005). The College Board conducted a study in 1998 that reviewed student success in AP courses based on their PSAT scores and concluded that predicted success and actual success in AP courses were comparable. The study did not, however, include students who had predicted success but chose not to take either the AP course or the AP exam. (Camara & Millsap, 1998).

**Guidelines for AP Participation**

For schools to be eligible to offer AP courses there are specific guidelines that have to be followed; these steps are listed in Table 9. The College Board provides free workshops for training AP coordinators at schools that are participating in the AP program, and manuals are provided at these workshops with specific instructions regarding test security, test administration, test packaging, and test shipping. Deadlines have to be met to order testing materials, and teachers have to be trained for subject specific courses. Training costs for teachers range from $150 to $350 per training session and are frequently covered by school districts through professional development funds specifically allocated for training purposes (The College Board, 2010c).

**Teacher Preparation**

While the AP program is designed to measure student success based on exam scores, the program is also a reflection of the teachers' ability to convey the material.

Table 9

*AP Participation Guidelines*

| Steps for Advanced Placement Program Participation |
|---|
| Organize Your AP Program |
| Obtain a College Board School Code |
| Offer Authorized AP Courses |
| Enroll AP Students |
| AP Potential™ |
| Designate an AP Coordinator |
| Complete the AP Participation Materials |

There are subject area teachers from all over the world who are trained by The College Board to instruct students in both subject matter and exam preparation. The training includes workshops as well as other teacher resources such as supplies for labs and books for English (The College Board, 2010b).

The teacher has to complete the AP course audit conducted by the College Board, showing specifically what content will be covered, the sequence and timeline, as well as any additional resources that will be used in preparation for the exam (The College Board, 2010d). The AP course audit has to meet the approval of The College Board and be signed by the teacher, the principal, and the AP coordinator at the local school (The College Board, 2009d).

The success of any program depends on the strength of the teachers involved as well as the student selection process (The College Board, 2007). Because the demographics of schools are changing rapidly to include more minorities, researchers agree that educators have to be prepared to address the needs of students who are underachieving and/or lower socioeconomic status (Watt, Powell, Mendiola, & Cossio, 2006).

Once teachers have been trained, they return to the classroom to prepare students who have chosen to take AP courses. Classrooms tend to include students of varied abilities and cultural backgrounds, therefore cultural and ethnic gaps may exist between the students and the teachers. The average teacher is stereotypically a White female (Margolis, 2006), and multicultural education may not have been a significant part of her schooling. According to Margolis (2006), the field experiences of new AP teachers should include a wider sampling of the student population to help teachers be aware of the challenges they could face in the classroom.

AP teachers have made a significant contribution to the recruitment of minority students in AP courses (Meraw, 2007; Taliaferro & DeCuir-Gunby, 2008). However, less than half of the schools in America have teachers who make a conscious effort to recruit minority students to enroll in AP courses (Brown & Bartee, 2007). Part of the challenge in recruiting minority students is the lack of minority teachers with whom they can identify. The number of minority teachers who teach AP courses is not representative of the population of minority students. In 2000, there was a 3 to 1 ratio of minority students to minority teachers (Burton et al., 2002).

One of the challenges to minority recruitment is the way that teachers measure the success of their class. Throughout the program's history, teacher success has been measured by student performance on the exam (U.S. Department of Education, 2009). While this is true for teachers who have less than 5 years of experience teaching AP, veteran teachers measure their success by the number of minority students that enroll in the course (Hale, 2007). There are 2 different measures: (a) how teacher success has been measured by others, and (b) how teachers have measured their own success based on a

different set of criterion (specifically diversity in the classroom). These teachers recognize that they have to meet the needs of all students and include more cultural diversity in their classroom (Burton et al., 2002).

Research has shown that many AP classrooms lack cultural diversity and minority participation (Brown & Bartee, 2007). In the 2004-2005 academic year, David Hale (2007)accepted the challenge to teach AP Language and Literature to the lowest quartile of African American students at Suncoast High School in Riviera Beach, FL. At the beginning of the academic year, none of his students had a qualifying score on the AP exam. Consistent with the aims of the AP program, his goal as a teacher was to offer these students more rigorous course work. As a result, the majority of these 19 students were accepted and graduated from college (Hale, 2007).

The opportunity for students to take rigorous courses has been important to both teachers and administrators in schools where they have successfully involved more minorities in AP. It is this heightened interest by the teacher and administration that has contributed to the success of the students (Ewing et al., 2006).

The qualities of teachers who are successful in teaching minority students are the same qualities found in any good teacher that is equipped to deal with the diversity of the classroom (Lim, 2008). This finding suggests that there is no special preparation needed for individuals to teach minority students other than the principles of good teaching, knowledge of subject matter and high expectations for all students independent of their diverse background (Burton et al., 2002).

## Challenges to Enrollment in Advanced Placement Courses

### Gender

Despite advancements in equal rights, there are still gender inequities in the AP program (Handwerk, Tognatta, Coley, & Gitomer, 2008). According to Vanderbrook (2006), girls tend to experience gender bias in the classroom as it relates to curriculum and instruction. These biases lessened when girls are able to make a personal connection to the teacher. Research has shown that classroom performance is equal among girls and boys when they are both treated with respect and concern. If students are perceived as less than equal, there is the potential for roadblocks to be created that may prevent girls from reaching their full potential (Vanderbrook, 2006).

According to the National Math and Science Initiative (2007), females are under-served in math and science courses as well as careers related to these disciplines. Despite earned doctorates in the fields of math and science, women are not proportionately represented in the job market according to NMSI (2007). Women represent 26% of the jobs in science, technology, and engineering even though they constitute 47% of the workforce as of 2007. After 30 years, the intention of Title IX that promises equal opportunity for women has yet to be realized. Administrative leadership in medical schools is still predominantly male, although half of the enrollment is female, and women only represent 10% of the engineers working in the U.S. (National Math and Science Initiative, 2007).

**Socioeconomic Status**

The principle of educational equity implies that every child should have equal access to a good education. The prospects should be the same regardless of social background, race/ethnicity, or gender, and resources should be equitably distributed. As reported in the literature, this is not the case for individuals of lower SES (Brighouse, 2007).

Children of poverty are more likely to be in schools where financial resources are limited and the curriculum is below par (Handwerk et al., 2008). Educational facilities are frequently unclean and lack many of the following: textbooks, computers with internet access, extracurricular activities, fine arts, and technology electives (Brighouse, 2007). Schools in poverty stricken areas often lack qualified teachers and struggle with student attrition (Smyth, 2008).

According to Klopfenstein (2004), low-income and rural students have been systematically left out of the expansion of the AP program. This population of students is disproportionately represented by minority students who may be disadvantaged by low SES as well (Newman & Ralston, 2006). According to experts, these students are virtually invisible in the AP program (Handwerk et al., 2008).

**Race/Ethnicity**

Middle class White students from the suburbs have traditionally dominated AP courses (Mississippi Department of Education, 2007). African American and Hispanic students from rural and low-income areas have been the most underserved in the AP programs (Brown & Bartee, 2007). African American students are more likely to attend

schools that have a low number of courses offered in the AP program. With the exception of Asian students, minority students are poorly represented in AP courses (Handwerk et al., 2008).

As seen in Table 10, a disparity index compares the representation of students by group in the population to their representation in the AP program. This index allowed the comparison of the different groups by demographics. Scores of one or higher indicate equal or overrepresentation in the AP program and scores of less than one indicate under-representation in the AP program (Klopfenstein, 2004).As one can see from the data, there are significant disparities amongst low-income Hispanics and African American students.

Table 10

*Representation in AP Classes by Demographic Groups in Texas*

| | Avg. Percent of All students | | Avg. Percent of AP students | | Avg. Disparity Index (No. of Schools) | |
|---|---|---|---|---|---|---|
| Group | 1994 | 2000 | 1994 | 2000 | 1994 | 2000 |
| Low-income | 25.6 | 50.6 | 13.4 | 30.9 | 0.45(245) | 0.54(539) |
| Asian | 3.4 | 2.4 | 8.2 | 5.1 | 2.89(205) | 2.10(392) |
| Hispanic | 25.0 | 32.4 | 15.7 | 23.6 | 0.59(245) | 0.61(536) |
| African American | 16.6 | 13.7 | 10.4 | 9.0 | 0.56(228) | 0.59(467) |
| White | 56.7 | 54.1 | 67.9 | 65.0 | 1.46(244) | 1.31(537) |

When the demographic representation in 1994 was compared to 2000, there had been a minimal increase in the average disparity index for Black (African Americans) and Hispanic students. Low-income students showed a more significant increase in participation. Based on these figures, expansion efforts by the AP program have left the underserved groups behind while White and Asian students continue to be overrepresented

in the program based on the relative populations for these two groups (Klopfenstein, 2004).

## The Use of Cash Incentives in the Advanced Placement Program

### Advanced Placement Incentive Program (APIP)

As a result of NCLB, the federal government has developed a plan to fund the participation of low-income students in the AP program (U.S. Department of Education, 2008). This plan targets three subject areas: math, science, and English. The concept involves a partnership among schools, businesses, and community organizations. To be eligible for this program, states must provide matching funds, local funds and other sources of funding in support of this grant. States that have applied but are not funded may reapply and are given priority for future consideration (U.S. Department of Education, 2008).

The funding for the APIP includes training programs for teachers and compensation for professional development in specific subject areas (Riverside Virtual School, 2009b). Teachers may also receive financial remuneration which varies by state for the success of their students on the advanced placement exam. In addition to teacher incentives, students receive cash rewards as well. According to the U.S. Department of Education (2008), financial incentives are targeted for the participation of low-income students in AP courses but are not restricted to them.

During the 2008 fiscal year, the discretionary grant for APIP was allocated nearly $12.5 million of federal money with the possibility of more depending upon the availability of the funds and the quality of the applications. Grant requests ranged from approximately $93,000 to $975,000. These grants were awarded to State Educational Agencies

(SEA), Local Educational Agencies (LEA) including charter schools, or to National non-profit educational entities with expertise in advanced placement services. Applications were rejected if the budget exceeded$1 million for a single 12-month period. Approximately 20 grants were awarded to different U. S. agencies in 2008 (U.S. Department of Education, 2008).

The grant criteria defined a high concentration of low-income students as a population with 40% or more low-income individuals. The status of being low-income was based upon the SEA or LEA data for a child between the ages of 5 years and 19 years. Free and reduced lunch data were used to determine low-income status (U.S. Department of Education, 2008)

Grant monies support activities designed to enhance, expand, and develop AP and pre-AP courses. Funding assists with areas such as professional development for teachers, acquisition of books and supplies, and curriculum development. Other activities such as after school or weekend study sessions that are directly related to expanding access and participation for low-income students can be funded through this grant (U.S. Department of Education, 2009).

Grants are typically awarded for a 3-year period. Goals are set for each recipient in order to be able to continue with the grant. With the main focus of the grant on equity, programs have to demonstrate a conscious effort to reach students who are underserved. States have approached this requirement in different ways (Delaware Department of Education, 2008).

Maine has chosen to take advantage of the College Board's APIP, which helps to select students who have a high likelihood of succeeding in AP but who have not chosen

to take an AP course (Department of Education State of Maine, 2009). The AP Potential program is a web-based application that is free to schools. The program uses PSAT/NMSQT (National Merit Scholarship Qualifying Test) scores to identify students who have a high probability of succeeding. Studies have shown that the APIP is a good indicator for success (The College Board, 2007, 2009b; Von Secker, 2005).

Kansas set goals that include increasing the number of AP courses offered by 10%t each year as well as increasing the participation of feeder school students from the middle school in the AP program by 5% each year. Professional development activities include College Board summer training institutes for 100 AP teachers as well as Vertical Teams composed of the combination of middle and high school teachers in the same AP subject area. Kansas has also developed plans to increase the number of students scoring 3 or better on AP exams but target figures have not yet been released (Reed, 2008).

Arizona submitted 34 grant applications throughout the state. Grants are specifically designed to meet the unique needs of underserved students. The state awards mini-grants of up to $10,000 within a school district to assist middle and high schools in activities such as vertical teaming and implementing pre-AP and AP courses. Arizona has shown an 88% increase in enrollment in the first year for pre-AP courses and a 77% increase for AP courses (Arizona Department of Education, 2009a).

Riverside Virtual School, which is a part of Riverside Unified School District, has goals that include increases in the following areas: higher enrollment of low-income students in AP courses; number of low-income students who enroll in and pass AP exams; and access and success with online AP and pre-AP course work (Riverside Virtual School, 2009b).

The Riverside Virtual School study recognized some barriers that might interfere with reaching the goals including (a)lack of instruction or inadequate instruction in math; (b) the lack of skills may influence progress in both math and science courses; (c) scheduling conflicts for high-poverty; and (d) student attrition in AP courses or AP exams (Riverside Virtual School, 2009b).

Schools in Delaware involve counselors and teachers in the selection process for students who may benefit from the AP program. Despite Delaware's diverse population, programs have had limited participation in the AP program by students who are minorities or from low-income families. The state has been proactive in recruiting and teachers and counselors have been asked to be professional in judging who is more likely to succeed. Educators review student data as far back as fifth grade. GPAs are considered as well as scores on both the PSAT and the SAT when available (Delaware Department of Education, 2008).

Mississippi has a written compliance policy in their state code designed to ensure adequate education to students for success beyond high school. The goal of this policy is to give all students equal access to a rigorous academic curriculum. In the 2007-2008 academic year, all high schools were required to offer at least one AP course in each of the four core areas. Additional measures were enacted to fund pre-AP courses and professional development for the teachers (Mississippi Department of Education, 2007).

**The Success in Texas Used as a Model**

APIP was started in Texas in 1996 with 10 Dallas schools. This program targeted low-income students in schools that had a minority majority (mostly minority students in

the school) and the goal was to increase college readiness. This program coupled cash incentives for students with cash incentives for teachers. It also paid at least half of the exam fee for students. In order for the exam to be partially paid for, students had to both attend the course and take the exam. The cash incentive for both students and teachers was paid based upon qualifying scores of 3, 4, or 5 on a 5-point scale. Business donors funded the project and were able to choose which AP subject they would sponsor (Jackson, 2007).

There has been a growing trend of "rewarding" students to do well in high school (Elmasry, 2008). This trend has swept the nation (Henderson, 2009)and has impacted the AP program. Texas is one of several states that have implemented a program of financial reward for students (Jackson, 2008). According to Jackson (2008), Texas has benefitted from APIP and pays their students for doing well on the exam. The College Board found that the percentage of students in Texas taking at least one AP exam was higher than the national average of students who had taken at least one AP exam during their high school experience (Laying the Foundation, 2009).

Students in Texas have shown a significant increase in performance on the exam after the first year of implementation of the program in the majority of districts that participated in the grant. The pass rate for exams, however, did not increase significantly. In fact, while African American and Hispanic students showed improvements in Dallas, with higher scores than those reported by Texas Public schools and the United States average, there was still a significant gap compared to the overall increase for the Tax Increment Financing (TIF) Dallas Independent School District (ISD) in Texas (AP Strategies, 2008).Minority students continue to lag behind their White and Asian class-

mates in many areas such as advanced course enrollment, graduation rate, and AP test results (Watt, Powell, Mendiola, & Cossio, 2006).

Several factors contributed to the success of the AP program in Texas. Teachers were trained, mentored, and given cash incentives. Students were given more time on task by having sessions on weekends and after school to help prepare. Students were also given cash incentives. According to Pederson (2009), the strategies for success (Table 11) that were implemented in Texas could be easily replicated in other programs (Pederson, 2009).

**National Math and Science Initiative (NMSI)**

NMSI was launched in 2007 with the goal of advancing math and science education in America's public schools by expanding successful programs and funding grants such as A Plus to several states in an effort to reproduce the success of the Texas program (National Math and Science Initiative, 2007). In 2000, NMSI provided training and incentives in Dallas, Texas for 67 public schools across six states. Alabama was one of the six participating states along with Arkansas, Connecticut, Kentucky, Massachusetts, and Virginia (The College Board, 2010f).

A secondary goal of NMSI is to provide more opportunities for students to experience the rigors of AP math, science and English. The focus of the initiative has been on math and science courses since 80%t of the jobs in the future may require these skills and knowledge base (National Math and Science Initiative, 2007). English is included to enhance literacy and writing skills. NMSI specifically targets underserved students (Pederson, 2009).

Table 11

*Strategies Included in the NMSI Program*

| Strategy |
|---|
| More **student time on task,** reinforced by special prep sessions. |
| **Student recruitment/counseling** so more students will have the confidence and support to take advanced courses. |
| **Minischolarship incentives** for successful students. |
| **Supplies and equipment** provided for the state-of-the-art lab projects essential for exploratory learning. |
| **Stipends and bonuses for teachers and administrators** who put in extra time and effort for AP instruction. |
| Rigorous, content-focused **teacher training** for the AP and pre-AP years. |
| **Lead teachers** who serve as mentors. |
| Vertical teaming **so students can acquire the skills they need to participate in challenging AP courses.** |

**A Plus College Ready**

A Plus College Ready is a 3 year mini grant provided by NMSI to Alabama through the A Plus Foundation program offered in several southern states. One of the goals of the A Plus Foundation program is to address the inequities that exist in public schools. The program is designed to increase the number of students exposed to the rigor of an AP course (A Plus College Ready, 2009a). The inequities in education can be traced back to the unequal educational opportunities in Alabama because of separate but equal legislations. The 1990-1991 class of Leadership Alabama consists of policymakers such as the governor, State Board of Education, State Superintendent of Education, and legislators, as well as directly with educators and business and other community leaders who set out to address the inequity dilemma that exists in the Alabama schools' AP program. There is a national demand for better schools which is driven by excellence demands of NCLB (The White House, 2004). Alabama State Superintendent Joseph Morton

is among those who make key decisions to foster educational progress in Alabama (Vocino, 2008).

A Plus College Ready is one of the newest divisions of the A Plus Foundation. The program began in 2007 as one of six $13.2 million grants from the NMSI. The grant stipulates that states receiving funds must replicate the cash incentive and training programs that were implemented in Texas. Key organizational leaders who lobbied for the A Plus College Ready program for the state of Alabama included the governor, the state Superintendent of Education, Alabama Power Foundation, and the Alabama Math, Science and Technology Coalition (Vocino, 2008).

Governor Bob Riley recognized that children in Alabama needed exposure to the AP program to prepare them to succeed in the global economy. The State of Alabama has implemented the A Plus College Ready program to prepare students for these rigorous learning opportunities. The program started with 12 program schools in Jefferson county and Montgomery county (A Plus College Ready, 2009a).

ExxonMobil Foundation is the primary source of funding for the A Plus College Ready plan, and additional funding is provided by Alabama Power Foundation and Regions Financial Corporation (Owen, 2009). Participating schools had to commit to increasing their enrollment in AP courses by 70% and increase in their AP course offerings by 60% in order to be eligible for the funding. Additionally, schools are required to more than double the number of qualifying scores within the first year of implementation. Qualifying scores have to be at least 3 of 5 on the AP exam. There are financial incentives that go along with this grant listed in Table 12. The A Plus Foundation in Alabama compares the A Plus Grant to Texas because the Laying the Foundation program is based in

Texas and program coordinators from Texas have helped implement the grant program in Alabama through NMSI (AP Strategies, 2008).

Table 12

*Texas vs. Alabama Incentives*

| State | School Incentive | Teacher Incentive | Student Incentive |
|---|---|---|---|
| Texas | $3,000 equipment grant (one time) | Up to $450 for training; $250 for teaching course for the first time; Up to $100 for each student who receives a score of 3 or better. | Up to $65 reimbursement for scores of 3 or better on the exam. |
| Alabama | | $100 for each student that earns a 3 or better. | $100 for scores of 3 or better. Exam is paid for regardless of scores. |

Source: (Vocino, 2008; Texas Education Agency, 2001)

Students in Alabama who earn a qualifying score on an AP exam may be eligible to receive college credit from any of the colleges and universities in the state of Alabama as well as other states. If a student earns an acceptable score and receives credit from one Alabama College, those credits are transferrable to another Alabama college (A Plus College Ready, 2009b).

For the 2009-2010 academic year, 10 Huntsville area high schools and 3 Birmingham City schools joined the ranks of the A Plus College Ready program. These schools are located in the Huntsville and Madison County school districts. With the addition of these new schools, the total number of schools participating in the program in Alabama is 25 (State of Alabama, Office of the Governor, 2009). A listing of all of the

schools in Alabama involved in the A Plus College Ready grant program as of the 2009-2010 academic year can be found in Table 13.

Although some of the schools are entering their third and final year of the grant others are in their first year of implementation. The A Plus College Ready program has three content directors who monitor the progress of the students and teachers that are involved in this grant (A Plus College Ready, 2009a).

## Summary

The United States has to be able to compete in a global society. Increasing the competitive edge requires preparation in the areas of science and math (National Academy of Sciences, 2007). NCLB addressed and funded efforts to increase the readiness of minority students graduating from high school. Inequities were found in both preparation and access to rigorous curricula (The White House, 2004). Government grants were made available by state application for APIP. Schools in Dallas, Texas had such a high success rate on the AP exam with the APIP incentives that they were used as a model for other school systems (Laying the Foundation, 2009).

In addition to funding by NCLB, private foundations such as NMSI invested funds to help bridge the gap for minorities (National Math and Science Initiative, 2009). The A Plus Foundation is a subsidiary of NMSI and funded the A Plus Grant in Alabama as well as five other states (A Plus College Ready, 2008b).

A more diverse population of students creates new challenges for AP exam performance which can be met by the combination of capable well trained teachers and the use of incentives provided by the A Plus grant. Ill-prepared, underserved populations of

Table 13

*A Plus Grant Recipients in Alabama*

| Year of Grant | School District | School |
|---|---|---|
| 2008-2009 | Jefferson County | Clay Chalkville |
| 2008-2009 | Jefferson County | Gardendale |
| 2008-2009 | Jefferson County | Hueytown |
| 2008-2009 | Jefferson County | Jefferson County International Baccalaureate |
| 2008-2009 | Jefferson County | Minor |
| 2008-2009 | Jefferson County | Pinson Valley |
| 2008-2009 | Jefferson County | Pleasant Grove |
| 2008-2009 | Jefferson County | Shades Valley |
| 2008-2009 | Montgomery County | Booker T. Washington Magnet |
| 2008-2009 | Montgomery County | Brewbaker Technology Magnet |
| 2008-2009 | Montgomery County | Robert E. Lee |
| 2008-2009 | Montgomery County | Loveless Academic Magnet Program |
| 2009-2010 | Madison County | Buckhorn |
| 2009-2010 | Huntsville City | Butler |
| 2009-2010 | Huntsville City | Columbia |
| 2009-2010 | Madison County | Hazel Green |
| 2009-2010 | Huntsville City | Huntsville |
| 2009-2010 | Huntsville City | J. O. Johnson |
| 2009-2010 | Huntsville City | Lee |
| 2009-2010 | Madison County | Madison County |
| 2009-2010 | Madison County | New Hope |
| 2009-2010 | Madison County | Sparkman |
| 2009-2010 | Birmingham City | Huffman |
| 2009-2010 | Birmingham City | Ramsey |
| 2009-2010 | Birmingham City | Wenonah |

Source: (A Plus College Ready, 2008a; State of Alabama, Office of the Governor, 2009)

minorities and low-income students are usually unable to afford the cost of the exam without the grant funding (Brown & Bartee, 2007).

Teacher training provided by the grant empowered teachers to prepare under-served students for the AP exam through AP as well as pre-AP courses (Laying the Foundation, 2009). Teams of teachers worked together from the middle school and high school level courses in math, science and English to plan appropriate coursework and readiness techniques. The PSAT was used as a tool to help in the selection of students who were more likely to succeed on the AP exam with scores of 3 or higher on a 5-point scale (Camara & Millsap, 1998).

There are mixed views of the usefulness of incentives for long term gain (Elmasry, 2008). Some argue that the use of incentives depletes intrinsic motivation to achieve while others maintain that the incentives reward those who have achieved (Dickinson, 1989). Either way, the goal is to increase the number of successful students on the AP exam (A Plus College Ready, 2008b).

# CHAPTER 3

# METHODOLOGY

This study involved the use of existing data on AP exam performance for students who were in schools that were participating in the A Plus Grant in Alabama. There were two school districts that received the A Plus Grant in the 2008-2009 academic years. They were Montgomery County and Jefferson County. There were only four schools participating in the Montgomery County Schools. Three of the four schools were magnet schools. Magnet schools have a population of students who were already interested in doing well. This population was not typical of the average high school so this school district was not included in the study.

The population of students for the study of cash incentives used in the A Plus Grant came from one central Alabama school district, Jefferson County Schools. There were eight schools in the district that were participating in the A Plus grant beginning in the 2008-2009 academic year. These schools had diverse populations of students in race/ethnicity, SES, gender, and PSAT scores. One of the schools was an International Baccalaureate school, which only accepted students by application process. The other seven schools were neighborhood schools that had open enrollment.

A quantitative analysis of scores was used to compare the performance of students who were participating in the grant to similar students based on race/ethnicity, SES, gender, and PSAT scores. The goal was to determine if there was a relationship between the use of cash incentives provided by the grant and the performance on the AP exam.

The method of choice for the study of cash incentives used in the A Plus Grant was the logistic regression method.

## Logistic Regression

Logistic regression as a form of data analysis has grown in the past decades. It was mostly used for epidemiological research but has now spread into areas such as bio-medical research, business and finance, as well criminology, health policy, and other fields (Hosmer & Lemeshow, 2000, p. ix).

Logistic regression fell into the category of statistical models that was known as generalized linear models. This was a broad category that included ordinary regression, ANOVA, ANCOVA, and log linear regression. Logistic regression was the model that allowed prediction of a discrete outcome such as whether or not one would have group membership from a set of variables that may be continuous, discrete, dichotomous, or any mix of these. While discriminant analysis could also be used for predicting group membership, it was limited to continuous independent variables (San Francisco State University, 2002).

Logistic regression was different from other linear models in that the outcome variable (dependent variable) in logistic regression was dichotomous or binary. That meant that there were only two possible outcomes (Garson, n.d.). An example of a dichotomous outcome would be that 1 represents membership in the group while 0 represents the lack of membership in the group.

The prediction for the dependent variable had multiple independent variables that determined the outcome and these independent variables were not restricted to being di-

chotomous. These independent variables were called covariates and were used in the predictive process. The key to logistic regression was to determine which variables determined the outcome and whether they increased or decreased the likelihood of the desired outcome (Hosmer & Lemeshow, 2000, p. 1).

For variables that were dichotomous, the choices were 0 or 1 for example. When the independent variables were not dichotomous, they were coded so that they represented a dichotomous variable. An example was the original six colors for M & M's. Although the available colors included red, yellow, green, brown, orange, and violet, they could have been coded so that each color represented two possible choices. Red could have been coded as 1, while yellow, green, brown, orange, and violet were coded 0 because they were not red. The same thing could have occurred for each color so that each color could have been treated as a dichotomous independent variable (Hosmer & Lemeshow, 2000, pp. 56-62).

Once the variables were coded, then logistic regression was be used in two ways. The first use was the prediction of group membership while the second use was the determination of the relationships and strengths among the variables (Garson, n.d.). Data analysis determined that some variables did not influence the outcome of the dependent variable while others had a positive or negative influence. Even further determination decided whether the variables had a strong or weak influence on the outcome (Logistic regression, 2002).

This data analysis was used to develop a logistic equation. The equation used the odds and ratios of the independent variables to determine the log odds of the dependent variable. Tests of significance were run to determine whether or not coefficients were in-

cluded or eliminated from the equation. There were several different techniques that include the Wald test, the likelihood-ratio test, and Hosmer-Lemshow goodness of fit test. Each test served a purpose in determining the significance of the variables (Menard, 2002, pp. 41-48).

The Wald test measured the statistical significance of each coefficient (β) in the model. The likelihood-ratio test used the ratio of the likelihood function of the full model over the maximized value in the simpler model and was best used with backward stepwise elimination. The Hosmer-Lemshow goodness of fit test used a chi-square statistic to compare the actual (observed) to the number predicted by the logistic regression model (San Francisco State University, 2002).

Menard (2002) provided an equation for the logistic regression:

Equation 1- Logistic Equation Formula

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \epsilon,$$

where Y represented the predicted outcome, α was the intercept when Y = 0, β was the slope, X was the variable whose values were being used to predict Y, k was the number of predictor variables, and $\in$ *was* the error in predicting Y from X.

When there were multiple independent variables, it was possible for interaction and confounding to take place. When there was an independent variable that was associated with both the dependent variable and one or more independent variables, it was confounded. The equation controlled for that interaction effect. Tests were done to determine if there was an interaction effect for each of the covariates and whether or not it was confounding (Hosmer & Lemeshow, 2000, pp. 70-74). It was possible that two covariates were independently not significant but did have an interaction effect that was measurable (Menard, 2002, p. 61).

In the study of cash incentives used in the A Plus Grant, success on the AP exam was the desired outcome. Two groups of students were chosen. One group did not receive an incentive but took the AP exam while the other group did receive a cash incentive and took the AP exam. The dependent variable was success on the AP exam which was measured by a score of 3, 4, or 5 on the exam. This was a dichotomous variable where "1" represented success with a 3, 4, or 5 on the exam and "0" represented lack of success with a score of 1 or 2 on the exam.

Existing data on the performance of students on the AP exam the year before implementation and the performance of students on the AP exam during the implementation of the grant were used in the study. Students were compared based upon their exposure to the incentive during the year of implementation of the A Plus Grant. The A Plus Grant used incentives for math, science, and English. Students were considered incentive free in the year before implementation of the grant as well as subjects that were not incentivized during the year of the grant.

## Random Sample

The College Board standard was at least a 3 on the AP exam to be measured as success. Students were grouped based on whether they made a 3, 4, or 5 on the exam or if they made a 1 or 2 on the exam. The dependent variable was performance where if a student made a 1 or 2 on the exam the code was a 0. Students who made a 3, 4, or 5 were a 1 for that variable.

Data were coded so as to remove identifiable data. Females were coded as 1 while males were coded as 0. Minorities were coded as 1 and whites were coded as 0. Free/reduced were coded as a 0 while those students who paid were coded as a 1.

There were two groups of students—those who had been exposed to the use of cash incentives and those who had not been exposed to the use of cash incentives. The group of students that had not been exposed to the use of incentives was the control group. There was a comparison made as to which students actually succeeded on the advanced placement exam with or without the use of incentives to see if incentives changed the performance on the AP exam.

## Data Analysis

Data were broken down by gender, race/ethnicity, and SES. Patterns were observed to see if there was a correlation between each variable and the use of incentives as well as the combination of the variables with the use of incentives. A predictive formula was developed using logistic regression to determine if each variable either positively or negatively contributed to the performance on the exam when incentives were used.

Each school was looked at individually to determine if they had subgroups that met the criteria of study. If subgroups were present, the data were analyzed in each of the areas. The schools were then looked at as part of the district to compare the performance on the exam patterns of the individual schools to the performance on the exam of the district. If individual schools did not have a large enough sample size to be studied in one of the subquestions, then that part was omitted for the individual school. However, their data were used as part of the larger group for the district.

## Hypotheses

The central research question was "how well does the combination of cash incentives, gender, socioeconomic status, and race/ethnicity predict the change in performance on the advanced placement exam?" To determine the predictability, each variable was looked at individually before the combination was studied to determine whether the change in performance was based upon a single variable or the combination of variables.

### Null Hypothesis 1

There was no relationship between the use of cash incentives and the performance of students at the eight program schools in Jefferson County on the advanced placement exam.

### Null Hypothesis 2

There was no relationship between gender and the performance of students at the eight program schools in Jefferson County on the advanced placement exam.

### Null Hypothesis 3

There was no relationship between ethnicity and the performance of students at the eight program schools in Jefferson County on the advanced placement exam.

**Null Hypothesis 4**

There was no relationship between socioeconomic status and the performance of students at the eight program schools in Jefferson County on the advanced placement exam.

**Null Hypothesis 5**

There was no relationship between the linear combination of the use of cash incentives, gender, ethnicity, socioeconomic status, PSAT scores and the performance of students at the eight program schools in Jefferson County on the advanced placement exam.

## Institutional Review Board Approval Protocols

Permission may be obtained from the local school board to be able to access the data for the years of implementation of the grant and the year prior to implementation. The data may include information about the courses enrolled, PSAT scores, gender, SES, race/ethnicity, and whether or not student had succeeded on the AP exam. These data were represented without any identifying information. These raw data were used to select the sample from the population.

Existing data were used so there was no need to interview, survey, or work with human subjects. It was conducted in an established educational setting and used an educational test which was the AP exam. Data that were gathered were used in such a way that the human participants could not be identified directly or indirectly.

There was no risk of harm to the human participants or the school district. Because the data already exists, there was no need to get informed consent. There was no promised benefit to the participants or the district. Institutional review board approval was obtained from the University of Alabama at Birmingham before data collection and analyses began (Appendix).

## Summary

The study methodology did not affect the participants. There was no danger, inconvenience, or discomfort associated with data collection or analysis. In fact, they were not aware that they participated as individuals. The aggregate data included their data depending on whether or not they were selected in the matched pairs.

Permission was requested from the school district of Jefferson County Schools to be able to conduct the study. The data requested included PSAT scores, AP exam scores, free/reduced lunch status, gender, SES, and race/ethnicity. The permission was requested in the form of a letter to the Jefferson County School Board. The data were provided by the Jefferson County School Board in the form of either written reports or electronic data.

The data were immediately coded to remove any personally identifiable information. Once coded, the data were entered into the SPSS data analysis software. The original identifiable information was locked in a file cabinet where only the principal investigator had a key. The computer that was being used for the data storage and analysis was protected by a firewall, virus protection software, encryption software, and a computer login password. The computer was not used by anyone other than the principal investiga-

tor. The flash drive that was used as a backup for the coded data was encrypted and locked up in the file cabinet when not in use.

The study began by identifying the students that took AP exams in the eight program schools (Clay-Chalkville, Gardendale, Hueytown, Jefferson County International Baccalaureate, Minor, Pinson, Pleasant Grove, and Shades Valley high schools) during the 2007-2008 academic year. The AP exam scores for those students were collected for data analysis. Since the A Plus grant that provided cash incentives was implemented during the 2008-2009 and the 2009-2010 academic years, those students who participated in exams at those aforementioned eight high schools that year were included in the study. The AP exam scores were collected from those students who participated during the 2008-2009 and the 2009-2010 academic years.

The students were paired based upon similar gender, ethnicity, and SES. The scores on the AP exam were compared to see if they varied with the use of incentives provided by the A Plus grant. Each of the eight schools data was represented as aggregate data. If there were enough students to represent a subgroup by gender, ethnicity, and/or SES, that data were aggregated. If an individual school did not have a subgroup in each category that was large enough, the data were still used to aggregate the district data by those subgroups.

Logistic regression was used to determine if each independent variable of gender, ethnicity, PSAT scores, cash incentives, and SES had a main effect on the dependent variable of AP exam scores. Scores were considered qualifying if they were 3 or higher on a 5-point scale. The combination of variables was reviewed to see if there was an interaction effect.

# CHAPTER 4

# RESULTS

The purpose of this study was to examine the relationship between the use of cash incentives provided by the A Plus Grant in Jefferson County, Alabama and changes in student performance on the AP exam before and after the implementation of the grant. Logistic regression was used to determine if any of the independent variables gender, race/ethnicity, SES, and cash incentives could be used as predictors of success on the AP exam as measured by a score of 3 or higher.

The data were collected from the eight participating schools during the 2007-2008, 2008-2009, and the 2009-2010 school years. The 2007-2008 year represented the non-incentive year. The incentive years were represented by 2008-2009 and 2009-2010 school years. A Plus Foundation provided the cumulative scores for 2008-2010 in electronic format. The College Board provided the PSAT scores for 2007-2009 either electronically or by printed reports. The gender, SES, and race/ethnicity were provided electronically by Jefferson County Schools.

## Review of Research

The data were coded and analyzed using four distinct steps to remove any personally identifiable information and represented only aggregate data. The steps in the data analysis were: (a) generation of descriptive statistics to determine frequencies of data for the full sample and separated for the incentive and non-incentive years; (b) use of logistic

regression to analyze the data and determine if any of the independent variables could be a good predictor of success on the AP exam; (c) use of correlation tables to determine if there was multicollinearity and (d) predictors were used to develop an equation.

**Descriptive Analysis**

The research was conducted by collecting scores for over 2,000 separate exams in the areas of English, math, and science in high school age students. The data were reviewed for consistency and it was discovered that some students were represented multiple times because he or she took exams in more than one subject. To reduce or eliminate multicollinearity, only one exam was used per student leading to a sample size of 1,276 exams.

The sample of 1,276 exams was checked for missing data and found that students from the 2007-2008 school year did not have the availability of PSAT scores that were present after the A Plus Grant. Removing the 2007-2008 school year from the sample would have eliminated the independent variable of cash incentives because that year represented the absence of cash incentives. Because the purpose of this research was to study the relationship between the use of cash incentives and other independent variables, this was not a viable option. Instead, the PSAT scores were eliminated as an independent variable for all exam scores and the study looked at gender, race/ethnicity, SES, and cash incentives.

Starting with a population of 2,177 exams and using 1,276 unique exams provides an adequate sample size. The confidence interval (margin of error) was 3.05 using 50/50 and a 95% confidence level (Creswell, 2008). An effect size of .5 and a power analysis of

.80 showed that a minimum of 65 exams would be needed in each sub group. This study had 144 exams in the smallest group, which met and exceeded the power requirements for an effect size of .5 (Creswell, 2008). Evaluation of the data set showed no significant outliers using leverage during the regression analysis (Tabachnick & Fidell, 1989).

The 1,276 exam sample represented in Table 14 was predominantly female (60%), White (65%), paid lunch (79%), incentivized (89%), and not successful on the AP exam (84%). The descriptive statistics showed an increase in minority participation from the pre-incentive year to the incentive years and went from 16% to 37%. Lower socioeconomic groups represented by their free/reduced lunch status increased from 11% to 22% with the use of cash incentives. The overall success rate on the AP exam increased from 8% to 17% after the A Plus Grant.

Further analysis measured the success of minorities and low socioeconomic groups on the AP exam. Table 15 showed that the minority and low SES students had a 20% success rate on the exam while white students nearly doubled minorities with a 35% success rate. White students accounted for less than one third of the low SES students (28%) that took the exam. Almost half of the minority population (42%) was on free/reduced lunch while only 9% of all White students were low income that took the AP exam.

Table 14

*AP Comparison of Incentive and Non-Incentive Years*

| Category | 2007-2010* Percentages | 2007-2008* % Before Incentives | 2008-2010* % After Incentives |
|---|---|---|---|
| Gender | | | |
| Male | 40 | 40 | 40 |
| Female | 60 | 60 | 60 |
| Race/Ethnicity | | | |
| White | 65 | 84 | 63 |
| Minority | 35 | 16 | 37 |
| Socioeconomic Status | | | |
| Free/Reduced Lunch | 21 | 11 | 22 |
| Paid Lunch | 79 | 89 | 78 |
| Incentive | | | |
| Not Offered | 11 | 100 | 0 |
| Offered | 89 | 0 | 100 |
| Exam Scores | | | |
| 1 or 2 | 84 | 92 | 83 |
| 3 or higher | 16 | 8 | 17 |

*Note*: *$N$ = 1,276 for 2007-2010, $N$ = 144 for 2007-2008, and $N$ = 1,132 for 2008-2010

Table 15

*AP Comparison of Underserved and White Students for 2007-2010*

| Category | **Minority Percentages | **Low SES Percentages | **White Percentages |
|---|---|---|---|
| Gender | | | |
| Male | 40 | 40 | 40 |
| Female | 60 | 60 | 60 |
| Race/Ethnicity | | | |
| White | 0 | 28 | 100 |
| Minority | 100 | 72 | 0 |
| Socioeconomic Status | | | |
| Free/Reduced Lunch | 42 | 100 | 9 |
| Paid Lunch | 58 | 0 | 91 |
| Incentive | | | |
| Not Offered | 5 | 6 | 15 |
| Offered | 95 | 94 | 85 |
| Exam Scores | | | |
| 1 or 2 | 80 | 80 | 65 |
| 3 or higher | 20 | 20 | 35 |

*Note*: **$N$ = 445 minority students, $N$ = 262 low SES students, $N$ = 831 White students

**Logistic Regression**

Logistic regression was the method of choice to determine which variables were the strongest predictors of who was successful on the AP exam when cash incentives were used. Gender, race/ethnicity, SES, PSAT scores, and cash incentive were the independent variables used to predict the dependent variable of success on the AP exam.

The independent variables listed in Table 16 were coded so that each variable was dichotomous having only two possible outcomes with the first variable in each category represented as 0 and the second variable represented as 1. Each variable was analyzed to determine whether or not it was a strong predictor of success on the AP exam and should be included in the logistic model. At the time of the analysis, a correlation matrix was used to examine the potential for multicollinearity among variables. Although logistic regression was a non-linear technique, logarithmic manipulations of the logistic equation were used resulting in a linear expression of the predictor variables. The correlation matrix shown in Table 17 indicates no concern for multicollinearity because none of the correlations fell into the interval $0.7 \leq r \leq 0.9$ (Tabachnick & Fidell, 1989).

Table 16

*Correlation Matrix*

| | Gender | Race/ Ethnicity | SES | Incentive |
|---|---|---|---|---|
| Gender | 1.000 | -.027 | -.008 | -.005 |
| Ethnicity | -.027 | 1.000 | .339 | -.094 |
| SES | -.008 | .339 | 1.000 | .031 |
| Incentive | -.005 | -.094 | .031 | 1.000 |

The Hosmer-Lemeshow tests show that the logistic regression equation was a good fit for the data with $\rho > .05$ and failed to reject the null hypothesis that there was no relationship between the data and the logistic equation. Therefore, the predictor equation was right at least 70% of the time according to the classification table (George & Mallery, 2001).The standard error in this data ranges from 0.128 < S.E. <.317, which was minimal.

Table 17

*Variables in the Equation*

| | | β | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I. for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Step 1[a] | Gender | -.052 | .128 | .168 | 1 | .682 | .949 | .739 | 1.219 |
| | Ethnicity | -.737 | .150 | 24.166 | 1 | .000 | .479 | .357 | .642 |
| | SES | .454 | .184 | 6.106 | 1 | .013 | 1.574 | 1.098 | 2.256 |
| | Incentive | 1.409 | .263 | 28.724 | 1 | .000 | 4.093 | 2.445 | 6.852 |
| | Constant | -2.242 | .317 | 50.127 | 1 | .000 | .106 | | |

*Note:* a.Variable(s) entered on step 1: Gender, Ethnicity, SES, and Incentive.

Hypothesis 1 proposed that there was no relationship between the use of cash incentives and the performance of students on the AP exam. The test of the bivariate model in Table  indicated that the use of cash incentives does change the performance of students on the AP exam ($\beta = 1.409$, df = 1, $\rho < .05$, and Wald = 28.724) and was included in the logistic equation as a strong predictor of success (Field, 2005). A student was about four times as likely to succeed (Table 14) on the AP exam when cash incentives were used as suggested by the Exp(B) of 4.093.

Hypothesis 2 proposed that there was no relationship between gender and performance on the AP exam. The bivariate model indicates that there was no relationship ($\beta$ = -.052, df = 1, $\rho$> .05, and Wald = .168).The Exp(B) of .949 suggests that it does not matter whether the student was male or female (Table 17) when it comes to success on the AP exam.

Descriptive statistics show that the majority of students enrolled in AP science, math, and English courses were females. This statistic has remained the same even with the introduction of incentives by the A Plus Grant. Despite the fact that the literature suggests that girls experience gender bias in the classroom, they still tend to perform as well as the males (Vanderbrook, 2006). Gender was not a strong predictor of success on the AP exam.

Hypothesis 3 proposed that there was no relationship between race/ethnicity and performance on the AP exam. The bivariate model showed that race/ethnicity was protective against success on the AP exam for minority students ($\beta$ = -.737, df = 1, $\rho$<.01 and Wald = 24.166) and was included in the logistic equation as a predictor. Minority students were half as like to succeed (Exp(B) = .479) on the exam. In other words, White students were more than twice as likely to succeed on the exam as minority students as shown in Figure 1.

The use of incentives did increase the enrollment of minority students (Table 14) from 16% the year before incentives to 37% once incentives were available; however, the rate of success on the exam remained low. Minority enrollment was highest in English Language, English Literature, and Biology and was lowest in other sciences and math as represented in Figure 2.

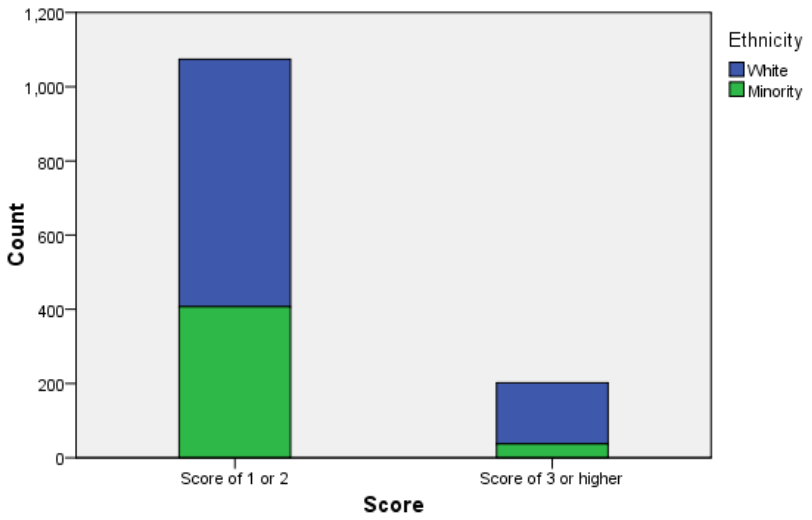


*Figure 1*. AP scores by ethnicity.

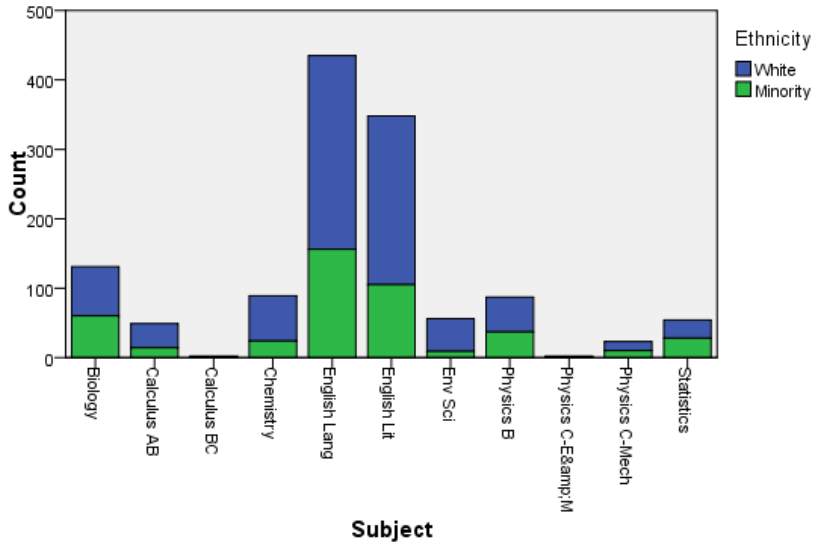


*Figure 2.* AP subjects enrolled by ethnicity.

Hypothesis 4 proposed that there was no relationship between socioeconomic status and performance on the AP exam. The Exp(B) of 1.574 indicates that students who pay for their lunch were one and a half times as likely to succeed than students who were on free/reduced lunch. Statistical tests confirm that SES must be considered a predictor ($\beta = .454$, df = 1, $\rho < .05$, and Wald = 6.106).

Descriptive statistics (Table 14) indicate that the enrollment of low SES students doubled from the non-incentive year (11%) to the incentive years (22%). The cost of the exam being covered by the A Plus Grant allowed more students to enroll, however, the success on the AP exam was still minimal as shown in Figure 3. English Language, English Literature, and biology were still the most commonly enrolled courses for low SES students (Figure 4).

Hypothesis 5 proposed that there was no relationship between PSAT scores and performance on the AP exam. Because of missing data for the 2007-2008 school year, this independent variable was eliminated from the study. There were already sufficient studies that have shown the correlation between PSAT scores and success on the AP exam.

Hypothesis 6 proposed that there was no relationship between the linear combination of the use of cash incentives, gender, race/ethnicity, socioeconomic status, PSAT scores and performance on the AP exam. While gender has no relationship to the success on the AP exam, ethnicity, SES, and the use of cash incentives do have a relationship ($\chi^2 = 5.149$, df = 6, $\rho = .525$) (George & Mallery, 2001). Successful scores on the AP exam increased overall from 8% to 17% with the use of cash incentives. The relationship can be expressed as a predictor equation using logistic regression.

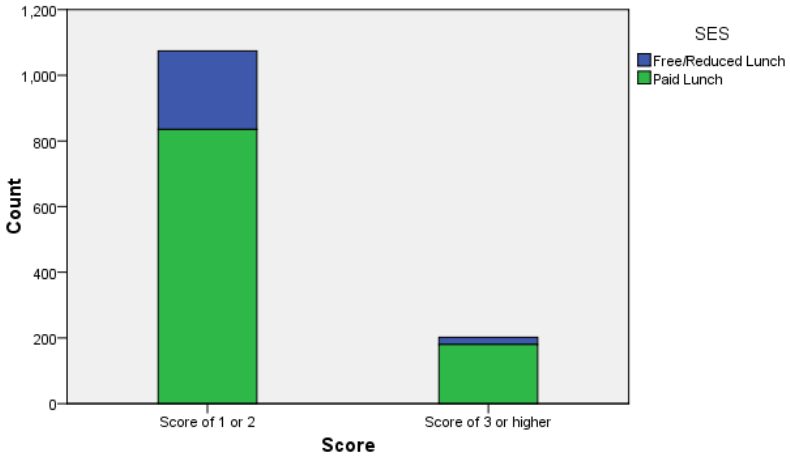


*Figure 3*. AP scores by socioeconomic status.

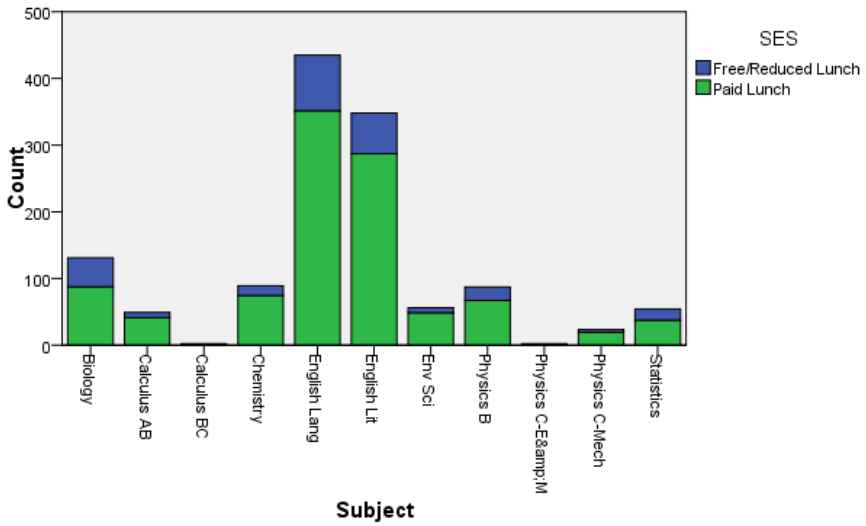


*Figure 4*. AP subjects enrolled by socioeconomic status.

Menard (2002) provides an equation for the logistic regression:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \epsilon,$$

where Y represents the logit predicted outcome, α was the intercept when Y = 0, β was the slope, X was the variable whose values were being used to predict Y, k was the number of predictor variables, and ∈ wasthe error in predicting Y from X. Success on the AP exam was the predicted outcome (Y) and the independent variables gender, SES, and race/ethnicity were the predictor variables included in the equation. The value calculated in Equation 3 was a logit value that was converted to an odds ratio in Equation 4 by using Equation 2.

Equation 2 - Odds Ratio Formula.

$$Odds\ Ratio = {}^{(AP\ Success)}$$

Equation 3–Logit of Success on the AP Exam.

AP Success = -2.242+(-.052) Gender+ (.454) SES + (-.737) Race/Ethnicity

+ (1.409) Incentives

Equation 4 - AP Success Odds Ratio.

Odds Ratio = .106 + (.949) Gender + (1.574) SES + (.479) Race/Ethnicity

+ (4.093) Incentives

Table 18

*Codes Used in Research*

| Descriptor | Variable | Code |
|---|---|---|
| Gender | Male | 0 |
| | Female | 1 |
| SES | Free/Reduced Lunch | 0 |
| | Paid Lunch | 1 |
| Race/Ethnicity | White | 0 |
| | Minority | 1 |
| Incentives | No Incentive | 0 |
| | Cash Incentive | 1 |

Using the codes to substitute into Equation 4, a White female who pays for her lunch was 6.7 times more likely to have success on the AP exam when given a cash incentive. Black females who pay for their lunch benefit the most with the odds of success increasing to 7.2. Black males of low SES with no cash incentives were least likely to succeed with a 0.59 to 1 ratio of success. The incentive increased the odds of success by 4.67 times for the black male.

## Summary of Results

The findings of the research were that gender does not have a significant relationship to the student success on the AP exam when cash incentives were used. The groups that were most likely to increase their success rate when incentives were used were those students who were minorities and come from a low SES. Enrollment did increase for all groups of students and the success rate doubled overall.

The data allowed the development of a predictive equation, which showed how much success was favored for each type of student based upon their race/ethnicity, SES, and gender when incentives were used. There was a significant increase in each of the independent variables except for gender.

# CHAPTER 5

# CONCLUSIONS

The purpose of this study was to examine the relationship between the use of cash incentives provided by the A Plus Grant in Alabama and changes in student performance on the AP exam before and after the implementation of the grant. The research hypothesis postulated if there was no relationship between the linear combination of the use of cash incentives, gender, ethnicity, SES, and the performance of students on the AP exam. In this section, I will discuss the findings, assess the significance of the findings, and list any recommendations for practice or future research.

## Discussion of Findings

Education in America focused on providing equitable quality education to all Americans recognizing that this was the ticket to our future success (Hoyle & Kutka, 2008). Making advanced placement courses available to more students—especially the underserved students—has been a focus of the American government in more recent years (The White House, 2004). There has been a major gap in the achievement levels of whites when compared to minorities, women, and low-income students in AP courses (Levitt & Fryer, 2002). Efforts have been made to close those gaps to help improve the American economy (Fitzgerald & Delaney, 2002).

The College Board (2009b) has invested significant time and effort to increase access to the AP curriculum (Mississippi Department of Education, 2007). Funding

sources to support this effort came from such programs as the APIP, NMSI, and A Plus College Ready (A Plus College Ready, 2008b; Delaware Department of Education, 2008; Loftus, 2009). These funds have been used to supplement or fully cover the cost of the exam and to reward students and teachers for student success on the AP exam (AP Strategies, 2008).

The incentives used for students have helped to increase the enrollment in AP courses because the cost of the exam is fully covered for students who are enrolled in English, math, and science courses as a part of the A Plus Grant (AP Strategies, 2008). Once the student has taken the exam, a cash incentive was given for success on the exam (qualifying scores), which was considered to be a 3 or higher on a 5-point scale (Riverside Virtual School, 2009b). Research in this performance study has shown that there is an increase in the performance of all groups overall when cash incentives were used but the amount of increase will be discussed later.

The idea of using incentives to increase performance was not a new concept but has been around for decades as a form of operant conditioning (Staddon & Cerutti, 2003). The use of a stimulus to get desired results was the foundation upon which incentive plans were built (Cautilli et al., 2003; Skinner, 1988; Staddon & Cerutti, 2003; Zentall, 2002). Frederick Taylor was instrumental in using operant conditioning in the workforce by applying scientific management to workers to get higher production rates and thereby increase profits (Bruce & Nyland, 2001).

The A Plus Grant applied operant conditioning by using cash incentives as the stimulus to get the desired result of success on the AP exam (Arizona Department of Education, 2009a). Jefferson County Schools was not the first system to use the cash in-

centives to increase performance on the AP exam. In fact, Alabama used the success in Texas as a model for designing its program (A Plus College Ready, 2009a).

Texas targeted low income schools that had a minority majority in 10 Dallas schools in 1996 with a goal of increasing college readiness (Jackson, 2007). This APIP coupled cash incentives for students with cash incentives for teachers. Texas paid at least half of the exam fee for students if they had both attended the course and taken the exam (Texas Education Agency, 2001).

Additional cash incentives (Table) were provided to both teachers and students for qualifying scores (Jackson, 2008).Texas provided a onetime $3,000 equipment grant as well as up to $250 for teachers who were teaching the course for the first time. Teacher training costs were covered up to $450. Qualifying scores could earn a teacher up to $100 per student. Students could be reimbursed up to $65 for qualifying scores (Texas Education Agency, 2001).

Alabama followed the model by paying for the exam but chose to cover the full cost independent of the scores. Equipment for schools was purchased and provided by A Plus College Ready (Vocino, 2008). Both teachers and students were eligible to receive a $100 cash incentive for qualifying scores. The teacher received this incentive for each qualifying score in their subject (A Plus College Ready, 2008b).

Teachers received training at no cost to them and could be reimbursed for travel expenses and substitutes. Teachers were trained on how to prepare the students for the exam and given readymade resources to use both in the pre-AP as well as the AP courses (Laying the Foundation, 2009). The training included recruitment techniques, content

knowledge, and teaching strategies. Teacher collaboration was part of the training so that vertical teaming was used to ensure student success (Vocino, 2008).

Teacher training was crucial to the success of the AP program and was provided by the College Board for any AP teacher worldwide (The College Board, 2010b). The teacher completed an AP course audit conducted by the College Board which showed specifically what content was covered, the sequence, timeline, and any additional resources used in preparation for the exam (The College Board, 2010d).

The teachers played a role in the student selection process as well so it was important that the teachers were trained to look for the right indicators for determining a student's potential for success in the AP program (The College Board, 2007). Because the demographics of schools have changed rapidly to include more minorities, researchers have agreed that educators had to be prepared to address the needs of students who were underachieving and/or lower SES (Watt et al., 2006). Multicultural education may not have been a significant part of the teacher preparation program for many teachers as they earned their teaching certificates (Brown & Bartee, 2007; Burton et al., 2002; Margolis, 2006).

The qualities of teachers who were successful in teaching minority students were the same qualities found in any good teacher that was equipped to deal with the diversity of the classroom (Lim, 2008). This finding suggested that there was no special preparation needed for individuals to teach minority students other than the principles of good teaching, knowledge of subject matter and high expectations for all students independent of their diverse background (Burton et al., 2002).

The typical AP student was a White female and that statistic has not changed with the implementation of the grant (The College Board, 2010b). This research showed that the use of cash incentives maintained the ratio of males to females enrolling in AP courses. However, it did increase the diversity by including more minorities and low income students in AP courses just like it did in Texas (Jackson, 2007).

The minority population more than doubled with the presence of the cash incentives in this performance study. Of that population of minorities taking the exam, only 20% earned qualifying scores (Table ) compared to 35% of the White students taking the exam. The representation of low income students doubled when the exam was paid for and they were rewarded for their performance on the exam. The number of qualifying scores was 20% of the low SES population taking the exam.

The AP examinee population was not proportionate to the overall population of the schools included in this performance study. While minorities represented 37% of the AP examinee population (Table ) during the incentive years, the schools in this performance study had an overall ratio of 50/50 minority/White population. This is an improvement from the non-incentive years where the minority population was only 16% of the AP examinee population.

The results from the performance study were similar to the Texas study where data revealed no statistical significance between the variables of gender and the uses of cash incentives (Jackson, 2007). The use of cash incentives did, however, reveal significance for the African American and Hispanic populations with respect to exam scores. The results showed that more African American and Hispanic students enrolled in AP courses improved their average scores on the exams. There was no statistical difference in the

enrollment of White students in AP courses or with regards to their scores on the exams (Jackson, 2007).

The performance of all groups increased with the use of cash incentives but White students' success rate almost doubled that of the underserved groups. Qualifying scores increased for both minority and low SES students with each almost doubling the success rate achieved before cash incentives were added, which is similar to the Texas study.

The Texas study found that there were no negative effects reported regarding the use of cash incentives (Jackson, 2007). Instead, the investigator found that cash incentives had a positive effect on participation and performance by minority and low-income students just like this performance study. Teachers and students had positive attitudes toward the AP program with the use of cash incentives (Jackson, 2007).

Despite equivocal results in research, there were numerous school districts and philanthropists who still chose to use cash incentives to reward performance (Elmasry, 2008). Some argued that cash incentives increased learning, while others contended that cash incentives did not address the root causes of poor performance, such as overcrowded classrooms, sub-par facilities, and lack of academic rigor (Singer-Vine, 2008).

There were certain assumptions and limitations when studying the relationship between the use of cash incentives and performance on the exam. Teachers and staff did actively pursue students to encourage them to enroll in AP courses. Schools were given target enrollment figures for each year of the grant (AP Strategies, 2008). Teachers were given cash incentives to ensure that a certain number of students were successful on the AP exam. Students were told that they would receive cash for success on the exam in ad-

dition to the exam cost being covered by the grant. Everyone knew in advance that cash was involved in the student's success (A Plus College Ready, 2008b).

There was a relationship between the use of cash incentives and increased performance on the AP exam but with only 17% qualifying scores during the incentive years (Table ) as opposed to 8% before incentives, the questions remains "was the incentive really worth the investment?" Did the results represent the targeted goals set by the district and A Plus College Ready?

## Assessment of the Significance of Findings and Implications

The increase in performance of certain groups on the AP exam as a result of cash incentives was a significant finding that supported the use of grants to increase success (Haessler, 2007; Henderson, 2009; Kremer, Miguel, Thornton, & Ozier, 2005). It was particularly useful in helping to recruit more minorities and low SES students. Removing the financial barrier for underserved groups allowed them to focus on their academic performance rather than their financial need (Handwerk et al., 2008; Loftus, 2009).

Teachers can use the relationship between incentives and performance to encourage students to have success overall (Elmasry, 2008; Henderson, 2009). The cash incentives may not be an option for the individual teachers but can be used as a part of the grant. The idea of rewards for desired behavior was not a new concept but has been around for decades and was still working today (Singer-Vine, 2008; Zentall, 2002). Operant conditioning can be useful in getting the desired results. Some still argue that paying for performance does not increase learning (Staddon & Cerutti, 2003). Intrinsic motivation was said to be more effective in long term performance; however, this grant's focus

was more on the short term results rather than the long term performance (Henderson, 2009).

The results of the performance study have implications that impact decisions made by school districts as well as the A Plus Foundation and NMSI. Large amounts of money have been invested in this grant over the course of 3 years in Alabama (A Plus College Ready, 2008b). School districts have changed curriculum and scheduling to accommodate the needs and expectations of the A Plus Grant (Vocino, 2008). Were the changes that were made for the few students involved in the AP program worth the investment?

Teachers have changed their methods of teaching and invested significant amounts of time into preparation for AP courses. Administrators and faculty have to decide whether or not changing the school routine has increased the learning of all students or just a few. If the training for the AP courses has improved teacher performance, should the training be made available to all teachers? If so, who will pay for the training or will it be done in-house by teacher collaboration?

Where do we go from here? Do we continue to use funds for an AP program that has an overall 17% success rate? Do we give more time to see if it improves? Do we change our recruiting tactics and use PSAT scores to narrow the selections? Are we looking for numbers or success? These questions must be answered to make decisions for the future of the A Plus incentive program.

In my opinion, the value of the AP program is not measured by the performance on the AP exam. The exposure and rigor of college level courses has a value that is im-

measurable. Even if a student makes a 1 or 2 in the course, they are still head and shoulders above other students entering college by having had that experience.

## Recommendations for Practice or Future Research

The use of cash incentives for changing the performance of students on academic exams must be considered a viable option. Cash incentives alone were not enough; academic readiness and support were still needed (Cooper L. , 2007; Lake, 2008). Minority and low SES students were already behind before they reached middle school (Brown & Bartee, 2007; Darling-Hammond, 2007; Paul, 2004; Smyth, 2008).

Teachers need to be trained to meet the needs of low SES and minority students in their early years of schooling (Bensimon, 2004; Cooper & Schleser, 2006; Johnson & Uline, 2005; Levitt & Fryer, 2002). Curriculum changes may be necessary to address the needs of underserved students (Beecher & Sweeny, 2008; Cooper L. , 2007; Guskey, 2007). Different forms of technology may be suitable to assist in closing the achievement gaps but should not be the sole source of impacting change (Beglau, 2005). Teachers will need to use a combination of strategies and work together as a team to resolve this issue (Burney & Cross, 2006; Lee, 2004; Levine & Marcus, 2007).

Research can be done in the area of teacher incentives to determine whether teaching strategies changed or if teacher success rate changed as a result of cash incentives. The A Plus Grant rewarded teachers for the success of the students in their subject area.

Further studies can be done on the long term benefits of the use of cash incentives for performance. Follow up studies can look into whether or not these students continue

to take challenging courses when there was no incentive and whether or not they continue to see success when the cash was gone (Lake, 2008; Lei, 2010; Raymond, 2008).

Studies have already been conducted to measure the relationship between PSAT scores and success on the AP exam (Ewing et al., 2006; Von Secker, 2005). A comparison of predictions to success can be studied to see if the use of cash incentives changed the predicted success. How many students were not predicted to succeed but actually did when the cash incentive was involved?

English, math, and science courses were the only subjects involved in this performance study due to the restrictions of funding by the grant (A Plus College Ready, 2008b). A study can be conducted to see if other AP subjects improved student performance during the incentive years even though they did not receive the incentive. Was there was a residual effect? The A Plus Foundation may even consider supporting subjects other than English, math, and science.

## Summary

The use of cash incentives did change the performance of students on the AP exam based on race/ethnicity and SES. A cash incentive definitely increases the performance of minority and low income students on AP exam but maybe not enough. There was still room for improvement in the performance of minority and low income students on the actual exam. The literature supports the increased performance due to cash incentives and this performance study confirms the body of literature. There was still room for further study in the area of minority and low income students. Strategies for helping these students succeed need to be developed to support them as they were enrolling in these AP

courses. Cash incentive was enough to get them in the classes but was not enough to significantly change their rate of success.

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# APPENDIX

## INSTITUTIONAL REVIEW BOARD APPROVAL FORM

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

*Institutional Review Board for Human Use*

8/10/10

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00005960 and it expires on October 26, 2010. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56 and ICH GCP Guidelines.

| | |
|---|---|
| Principal Investigator: | INMAN-VANN, JUANITA |
| Co-Investigator(s): | |
| Protocol Number: | **X100730011** |
| Protocol Title: | *An Examination of the Relationship Between the Exposure to the Use of Cash Incentives as a Part of the A+ Grant Program and Performance on the Advanced Placement Exam: A Case-Control Study* |

The IRB reviewed and approved the above named project on 8-10-10. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

IRB Approval Date: 8-10-10

Date IRB Approval Issued: 8-10-10

Marilyn Doss

Marilyn Doss, M.A.
Vice Chair of the Institutional Review
Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1530 3RD AVE S
BIRMINGHAM AL 35294-0104