2015

Advanced Placement Teachers' Professional Development

Janet Faye Page
Indiana State University

VITA

Janet F. Page

EDUCATION

2015	Indiana State University, Terre Haute, Indiana Ph.D. in Educational Leadership
2008	Indiana State University, Terre Haute, Indiana Ed.S. in Educational Administration
1988	University of Louisville, Louisville, Kentucky M.S. in Education
1984	University of Louisville, Louisville, Kentucky B.S. in Business Administration

PROFESSIONAL EXPERIENCE

2010-present	New Albany Floyd County School Corporation, New Albany, Indiana New Albany High School, New Albany, Indiana Principal
2005-2010	Lanesville Community School Corporation, Lanesville, Indiana Lanesville Junior-Senior High School, Lanesville, Indiana Principal
1995-2005	New Albany Floyd County School Corporation, New Albany, Indiana New Albany High School, New Albany, Indiana Assistant Principal
1985-1995	Greater Clark County School Corporation, Jeffersonville, Indiana Jeffersonville High School, Jeffersonville, Indiana Business & Economics Teacher

ADVANCED PLACEMENT TEACHERS' PROFESSIONAL DEVELOPMENT

A Dissertation

Presented to

The College of Graduate and Professional Studies

Department of Educational Leadership

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

Janet F. Page

May 2015

Keywords: College Board, Advanced Placement (AP) course, AP exam, AP scores, Teacher Professional Development

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

COMMITTEE MEMBERS

Committee Chair: Todd Whitaker, Ph.D.

Professor of Educational Leadership

Indiana State University

Committee Member: Steve Gruenert, Ph.D.

Associate Professor of Educational Leadership

Indiana State University

Committee Member: Terry McDaniel, Ph.D.

Associate Professor of Educational Leadership

Indiana State University

Committee Member: Kim Tucker, Ph.D.

Superintendent

Clay Community Schools

ABSTRACT

The purpose of this study was to add to existing educational literature on the role of the Advanced Placement (AP) teacher in AP course success for students, including the role teacher professional development plays in those courses. Since 2009, the state of Indiana has required high schools to offer at least two AP courses, and at the district level, school corporations are expected to provide AP science and math courses. Nationally the number of students taking AP courses continues to grow; the number of students scoring at least a 3 on an AP exam is not keeping pace with the growth in enrollment. Descriptive statistics and tests of multiple regression were used to analyze the data collected for this study. The study was conducted by administering an electronic survey to all public school AP teachers in the state of Indiana who taught an AP course in the 2013-2014 school year.

An 11-question AP Teacher Survey was created to quantitatively measure the opinions and perceptions of AP teachers about College Board professional development. A total of 216 teachers submitted responses to the AP Teacher Survey via the Qualtrics website. Statistical analysis of the data included descriptive analysis as well as inferential analysis. A composite score was tabulated from the survey that helped to determine if years teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the areas of English/language arts, mathematics, science, and social studies. Multiple regression tests found no significance in the areas of mathematics and science. Multiple regression tests found in the

area of English/language arts as years teaching AP English/language arts increases, passing rates on student exams are predicted to decrease. For English/language arts teachers for every additional hour of College Board professional development a teacher earns, the predicted passing rates on student exams is expected to increase. In the area of social studies, as years teaching AP social studies increases, passing rates on student exams are expected to increase.

ACKNOWLEDGMENTS

Dr. Todd Whitaker, chair of my dissertation committee, along with committee members Dr. Terry McDaniel, Dr. Steve Gruenert, and Dr. Kim Tucker demonstrated patience and consistent support throughout the months of writing, even when they did not hear from me for long periods. Dr. Michael Langevin was never more than a phone call away when the statistical work became confusing. Rhonda Beecroft and Judy Barnes worked beyond expectations as the dissertation moved through its many phases.

The support from Dr. Bruce Hibbard, Superintendent of the New Albany Floyd County School Corporation, members of the New Albany Floyd County Schools Board of Trustees, and the Ph.D. candidates in the New Albany cohort, particularly those from New Albany High School (Michelle, Nancy, Chandra, and Jason), is sincerely appreciated. My colleagues and friends at New Albany High School have always inspired me.

Friends at Lanesville Junior-Senior High School put me on the path to earning a Ph.D. The Eagles let me lead, were eager to follow, and corrected the flight plan when necessary. Jordan, my niece, is earning her Ed.S. at The Citadel. I choose to believe I've influenced her pursuit of higher education.

Kelsey and Andrew, and Bart, you stopped by often enough to provide much needed interruptions in the various stages of completing this dissertation. CLARA, the only person, ever, in my whole life, who gets my undivided attention. Kevin, for believing in the dream of living in "the city."

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The students from the class of 2012 were the first graduates in a decade to post an increase in the average score on Advanced Placement (AP) exams (Banchero & Porter, 2013). Compared to the class of 2011, which had an average score of 2.80 out of a 5, the class of 2012 earned an average score of 2.83 (Banchero & Porter, 2013). A decade earlier, in 2002, the average score was a 2.94 (Banchero & Porter, 2013). Some argue the scores reflected "the growing number of students taking the tests, many of them less prepared" (Banchero & Porter, 2013, para. 2). In 2011, "18 percent of U.S. high school graduates passed at least one AP exam (by scoring 3 or higher on a scale of 1 to 5), up from 11 percent in 2001" (Pope, 2012, p. 1). Although the percent of students earning passing scores is up over the last decade, the "proportion of all tests taken in 2011 earning the minimal score of 1 increased over that time, from 13 percent to 21 percent. At many schools virtually no students pass" (Pope, 2012, p. 1). Pope's (2012) research led him to the Academy for College & Career Exploration in Baltimore and to the state of Indiana. In Baltimore, "81 percent of students at the Academy were eligible for free or reduced lunch in 2010. Over the past two years, just two of 62 exams taken by its students earned a 3" (Pope, 2012, p. 1). In Indiana, Pope found "21 school districts in 2011 where graduates took AP exams but none passed" (p. 1).

According to the College Board website, AP Central, there are 132,500 teachers involved in AP courses in high schools around the world. In any year as many as 60,000 of these teachers will attend AP workshops and institutes (Milewski & Gillie, 2002).

> The AP Program is strengthened by their participation in professional development workshops and Summer Institutes and in the annual AP Reading where thousands of AP teachers and college faculty gather at college sites across the United States to score the AP exams using rigorous guidelines. (College Board, 2013a, para. 4)

Recent changes made to AP exams, and changes coming soon to other exams, is forcing the College Board to "invest substantial resources in creating professional development programs and online tools to help teachers make that transition" (Drew, 2011, para. 45).

The Indiana Department of Education (IDOE; 2010) "shall prepare an annual report concerning the implementation of the Advanced Placement program and shall submit the report to the board before December 1 of each year" (p. 4). The most current report available is dated 2012. The report includes the IDOE's Advanced Placement Action Plan, which states

> Action Plan/Benchmarks:
>
> (A) 75% of 10th graders sign up for PSAT
>
> Result = 80% of all 10th graders took the PSAT in 2011-2012
>
> (B) 100% of schools learn how to utilize AP Potential through local workshops
>
> Currently = 218/370 (59%)
>
> (C) Recognition of top performing and top improving schools
>
> 34 schools earned recognition in 2013 for their "Access and Success" performance in 2012

(D) Professional Development – 1,110 Indiana educators have participated in various AP development opportunities:

Secured an additional 99 paid spots for a College Board workshop, 822 teachers attended

Strategies: AP Vertical Teams in English

Strategies: AP Vertical Teams for History and Social Sciences

Strategies: AP Vertical Teams in Mathematics

AP Potential and Summary of Answers and Skills workshops, 43 institutions in 2012 with 4 team members each

AP Readers: Currently 90 high school educators and 146 college educators in Indiana serve as AP readers

National Math and Science Initiative; administered through AP-TIP IN at the University of Notre Dame

(E) Grants/Funding

(1) Title II Learning Technology Grants

(2) Math Science Partnership Grant, I.C. 20-36-3-8

(3) Advanced Placement Incentive Program, I.C. 20-36-3-8

(4) AP Fellows Grant

(F) High School Accountability

AP success is part of the college readiness metric

(G) Instructional Reports – AP Instructional Reports provide individual AP teachers with skills-based results from the most recent AP exam administration; informing teachers of instructional practices that may be enhanced to further student success. These are

provided to teachers in July following exam administration in May, a webinar on the use of these reports is available.

(H) Learning Connection – for best practices, "AP Teachers and Coordinators" community

(I) HEA 1135, passed March, 2010 – A significant number of college credits will be awarded through the implementation of this law. This translates to major savings for Indiana students, and potentially higher 4-year graduation rates. There is real value given to AP exam scores of 3 or higher. All public colleges' AP articulation are posted on http://www.tranferIN.net (Fatum, 2012, pp. 28-29)

The *10th Annual AP Report to the Nation, Indiana State Supplement* was published February 11, 2014 (College Board, 2014e). In the report the College Board (2014e) stated, "Indiana has made progress in recent years in improving student access and supporting student performance in AP" (p. 3). The College Board (2014e) credited the state of Indiana with implementing six specific strategies "to build a robust AP program" (p. 3). These strategies, listed below, are aligned with the Indiana Action Plan.

- Include AP in the state accountability system.
  - Establish AP participation and performance indicators.
  - Set clear, measurable statewide goals toward improvement in AP participation and performance.
- Provide support for AP students by paying for exam fees.
- Celebrate the schools that have more than 25 percent of their graduating students scoring a 3 or higher on an AP exam.

- Encourage educators to participate in the development of the AP program, such as by becoming AP Readers or participating in course and exam development committees.
- Clearly communicate how AP fits into state graduation requirements, and share information about funding opportunities that enable students to participate and succeed in AP.
- Ensure that public colleges and universities develop AP exam credit and placement policies based on institutional goals, alignment with corresponding courses, and objective outcomes research. (College Board, 2014e, p. 3)

The College Board (2014e) also offered suggestions for additional strategies Indiana could explore "to build an even stronger AP program" (p. 4). Those suggested strategies included

- Provide funding for teachers in underserved areas of the state to participate in professional development.
- Provide targeted assistance and resources to some schools serving traditionally underserved populations (funding for materials, supplies, outreach efforts, and tutoring programs).
- Provide resources to schools and districts to support research-based programs that build content knowledge and skills—particularly in literacy and math—to prepare students for success in AP course work, and in college and careers. (College Board, 2014e, p. 4)

Data included in the *10th Annual AP Report to the Nation* (College Board, 2014d) were aligned with the strategies already being used in Indiana, and with those suggested to further enhance the AP program in Indiana. In 2013, 90 high school teachers and 146 college and

university faculty in Indiana participated as AP readers (College Board, 2014e). An additional 22 Indiana educators in 2013 served as AP professional development leaders, and six educators served on AP development committees (College Board, 2014e). Data also showed 34 Indiana high schools in 2013 where at least 25% of graduates passed an AP exam (College Board, 2014e). Nationally, 20.1% of "U.S. public high school graduates in 2013 scored a 3 or higher on an AP exam during high school" (College Board, 2014d, p.11) and 16.2% of Indiana public high school graduates in 2013 scored a 3 or higher on an AP exam during high school. For the decade between 2003 and 2013, Indiana high school graduates improved from 7.5% of the class of 2003 scoring a 3 or higher on an AP exam during high school, to 16.2% of the class of 2013 scoring a 3 or higher on an AP exam during high school (College Board, 2014e). The total number of graduates in Indiana in the class of 2013 was 63,524 (College Board, 2014e). Indiana students in the class of 2013 took 56,684 AP exams with 28.9% of those exams receiving a score of one; 25.4% of the exams received a score of two; 21.2% of the exams received a score of three; 14.9% of the exams received a score of four; and 9.7% of the exams received a score of five (College Board, 2014e).

Statement of the Problem

A formula for creating successful Advanced Placement courses does not exist. Therefore, it is incumbent upon stakeholders in high schools to seek out resources, including opportunities for teacher professional development, and implement the instructional strategies that are found to increase access and success for students in AP courses.

AP courses are taught at an accelerated pace and are intended to mirror a college-level introductory course. AP courses generally require more of teachers in their knowledge base and their preparation for their classes (Oberjuerge, 1999). Historically, successful teachers are those

who can use a broad range of instructional strategies in response to the specific needs of their students (Darling-Hammond, 2000). Because the AP curriculum covers many topics with high expectations of mastery, developing successful strategies for all students can be a challenge for AP teachers (Mason, 2010). Research has shown that some teachers are hesitant to teach an AP course as many AP teachers feel scrutinized by the annual public reporting of student test scores (Bodenhausen, 1989; Oberjuerge, 1999). A study of the characteristics of teachers revealed that AP teachers traditionally have more experience teaching and have on average a higher graduate school background than non-AP teachers (Milewski & Gillie, 2002).

Teacher training and expertise have been found to have a significant effect on the quality of teachers' practices (Darling-Hammond, 2000; Ferguson & Womack, 1993). Researchers Darling-Hammond (2001) and Murnane and Phillips (1991) found a positive relationship between teachers' effectiveness and their years of teaching.

> Overall, teachers who had taught for less than three years tended to be less effective than teachers with more experience. Teaching experience also has an effect on the personal goals and priorities of AP teachers for their class and for their students. (Mason, 2010, p. 29)

AP teachers with an average of four years of teaching AP reported their least important goal (on a rating scale of one to five) was that their students earn a passing score of 3 or higher on the AP exam (Burton, Whitman, Yepes-Baraya, Cline, & Kim, 2002). In contrast, a study of new AP teachers revealed that a passing grade on the AP exam was the highest priority for new AP biology and AP U.S. history teachers (Burton et al., 2000). "To the more experienced teachers the most important goals were that the students experience college-level work, build their

confidence in the subject, and build their confidence regarding success in college" (Mason, 2010, p. 30).

Purpose of the Study

The purpose of this quantitative study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses. The study examined the quantity and quality of College Board professional development experiences as well as other teacher characteristics. The study examined AP teaching experience, the total hours spent in professional development related to AP, the effectiveness rating for professional development, and the educational background of AP teachers.

Research Questions

The research questions for the study were

1. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of English/language arts?
2. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of mathematics?
3. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of science?

4. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of social studies?

Null Hypotheses

The following null hypotheses were generated through the research questions:

1. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of English/language arts.
2. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of mathematics.
3. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of science.
4. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of social studies.

Definition of Terms

Advanced Placement annual conference is high school teachers, high school administrators, college faculty, and others who attend workshops, panel discussions, and lectures where they share ideas with peers (College Board, 2013e).

Advanced Placement course is a college-level course taught in the high school setting using a standardized course syllabus aligned with the AP examination (College Board, 2008).

Advanced Placement course, English/language arts, for the purpose of this study, includes teachers of English language and composition and English literature and composition who were included in the research.

Advanced Placement course, mathematics, for the purpose of this study, includes teachers of calculus AB, calculus BC, and statistics who were included in the research.

Advanced Placement course, science, for the purpose of this study, includes teachers of biology, chemistry, environmental science, physics B, physics C (electricity and magnetism), and physics C (mechanics) who were included in the research.

Advanced Placement course, social studies, for the purpose of this study, includes teachers of European history, government and politics (comparative), government and politics (United States), human geography, macroeconomics, microeconomics, psychology, United States history, and world history who were included in the research.

Advanced Placement exam is administered once a year by the College Board. An exam is given for each of the courses offered in the AP program for a fee. Students receiving a passing score on the exam may be eligible for college credit in the subject of the exam (College Board, 2007b).

Advanced Placement passing score, for the purpose of this study, is a 3, 4, or 5 on a 5-point scale. The College Board (2013a) considers a score of 3 to mean a student is *qualified* for entry-level college work, a score of 4 the student is *well qualified,* and a score of 5 that the student is *extremely well qualified* for entry-level college work.

Advanced Placement Potential is a free, web-based tool that allows schools to generate rosters of students who are likely to score a 3 or better on a given AP exam. Based on research that shows strong correlations between PSAT scores and AP exam results, AP Potential is

designed to help increase access to AP and to ensure that no student who has the chance of succeeding in AP is overlooked (Fatum, 2012).

At the *AP reading meetings* experienced AP teachers are encouraged to apply to serve as readers at the annual AP reading, where the free-response sections of the AP exams are scored (College Board, 2013e). After the 2013 exams were given, 11,497 AP teachers and college professors spent 643,832 total hours reading and scoring 17.8 million student responses from over 3.9 million AP exams over a three-week period (Fatum, 2012).

Advanced Placement summer institutes are hosted by colleges and universities; these intensive, weeklong courses provide in-depth preparation for teaching AP courses (College Board, 2013e).

Advanced Placement teaching experience, for the purpose of this study, is the number of years teaching AP courses.

Advanced Placement workshops are offered throughout the academic year and range from one to three days in length. Each workshop concentrates on the teaching of a specific AP subject with the focus on instructional strategies and the management of an AP course (College Board, 2013e).

College Board is a non-profit organization that since 1955 has continued to develop and maintain the AP program, support high schools, colleges and universities, and coordinate the administration of annual AP examinations (College Board, 2008).

College and career readiness means an individual has the knowledge, skills, and abilities to succeed in post-secondary education and economically-viable career opportunities (Indiana College and Career Ready Standards, 2014).

Educational background, for the purpose of this study, is graduate hours in the teacher's content area.

Effectiveness ratings for professional development, for the purpose of this study, are scores generated from the responses of several 6-point, Likert-type scale questions in an effort to identify the perception of respondent's overall view of effectiveness towards the AP professional development they have participated in over the last few years. The 6-point, Likert-type scale used is *strongly disagree* = 1, *disagree* = 2, *somewhat disagree* = 3, *somewhat agree* = 4, *agree* = 5, and *strongly agree* = 6.

Preliminary SAT/National Merit Scholar Qualifying Test (PSAT/NMSQT) scores are useful in identifying students who may be successful on AP exams. Studies show that PSAT/NMSQT scores are stronger predictors of students' AP exam grades than the more traditional signposts such as high school grades, grades in previous same-discipline course work, and the number of same-discipline courses a student has taken (Fatum, 2012).

Teacher professional development, for the purpose of this study, is the attendance at a College Board sponsored training.

Significance of the Study

This study is significant in that it adds to existing educational literature on AP and the role teacher professional development plays in student success on AP exams. The study provides information about AP teacher experiences related to professional development. The information from this study can assist in better evaluation of current AP teachers' professional development experiences and the support needed to retain and train AP teachers. As the state of Indiana continues to place emphasis on student access to and success on AP exams by including both the number of students taking exams and the percent of students scoring a 3 or higher on the

exams in accountability measures for college and career readiness, this study could provide guidance to high school principals as options are considered for the professional development needs of AP teachers. Further, as resource allocation decisions are made at local and state levels, this study could be useful to educational leaders at the district level as well as lawmakers at the state level.

Limitations

The study only included data from schools in the state of Indiana from the 2013-2014 academic year and included approximately 2,500 teachers of Advanced Placement courses. This study relied on teachers honestly self-assessing their number of hours spent in professional development related to AP courses and their perceptions of the effectiveness of the professional development. The study could not account for students who took an AP course, but not the associated AP exam, nor could the study account for the students who took the AP course through a College Board approved online provider. The number of teachers responding to the survey could be impacted through technology filters that did not allow the survey to reach e-mail accounts. Furthermore, to achieve the minimum number of respondents necessary (50 in each of four content areas: English/language arts, mathematics, science, and social studies) to run statistical analysis, a high percentage of AP teachers needed to reply to the survey. Further studies are required to affirm or disprove what this study found.

Delimitations

Data were collected for AP exam results in the state of Indiana for the 2013-2014 school year. Approximately 2,500 teachers of AP courses in the state of Indiana were included in the study. The length of the survey window for data collection was a delimitation of this study. Only AP teachers in high schools in Indiana were surveyed for this study.

Summary of the Study

This study is divided into five chapters. Chapter 1 provided an introduction for the study, a statement of the problem, the purposes of the study, research questions, null hypotheses, definition of terms, and limitations. Chapter 2 presents a review of the related literature. Chapter 3 presents information about the population sample, instruments used and methods of analysis. Chapter 4 presents findings to questions posed in Chapter 1. Chapter 5 presents a summary of the findings, conclusions, and a discussion of the implications of those findings.

CHAPTER 2

REVIEW OF RELATED LITERATURE

As World War II ended, many Americans recognized the number of citizens pursuing higher education was losing ground and people were ending formal education during high school. At Kenyon College in Gambier, Ohio, the college president, Gordon Chalmers, believed that certain students in high school could earn college credit and developed the "Kenyon Plan." The Ford Foundation responded to this idea and "created the Fund for the Advancement of Education" (College Board, 2003, para. 2). The Fund for the Advancement of Education engaged in two studies. One study involved educators from Andover, Exeter, and Lawrenceville prep schools and educators from Harvard, Princeton, and Yale. The study found

> the problem of high school curriculum for the academically advanced student was two-fold: either they were taking all of their challenging courses in the earlier grades and were left with the choice of easier electives their senior year or early graduation; or, their high schools were offering advanced courses and they found themselves duplicating the course work during their freshman year in college. (Wilbur & Chapman, 1978)

Along with the Ford Foundation study, Koos in 1925, Mills in 1935, and Parker in 1961 reported problems with duplication of curriculum. Koos (1925) stated,

> We may well remember that our colleges pursue two lines in their practice with regard to the school work which they duplicate. In the one case they do the seemingly obvious

> thing and after a student has covered certain ground in school he is permitted to proceed in college to the next more advanced stage of the same subject. But in the second instance, where the colleges offer work which is nominally identical with that done in the schools and entrance credit is given for the same, the student, when once he is safely inside the college walls, finds himself set to doing right over again much which he has already done in school. This procedure is frequently justified on the ground that the work is carried on in college from a more mature and advanced point of view. (p. 322)

Koos (1925) maintained

> that although there are some differences between high school and first year college courses in chemistry, the courses are in reality much alike . . . if a student takes the course in general inorganic chemistry in college after having had the high school course—as students often do—he is repeating almost all of it. (p. 330)

Mills (1935) reported, "Duplication of course content between high school and college constitutes a problem which administrative officers in institutions of secondary and higher education in this country have accepted somewhat apathetically" (p. 363). Mills went on to cite a study between the University of Buffalo and the high schools in Buffalo "which has as its aim improved articulation between high school and college, particularly in the case of the superior student" (p. 363).

As a result of the Ford Foundation study, faculty members from Andover, Exeter, Lawrenceville, Harvard, Princeton, and Yale found that "of 344 students whose records were examined, undesirable duplication was found in American history, English literature, and beginning courses in physics, chemistry, and biology" (Parker, 1961, p. 349).

The Ford Foundation study "urged schools and colleges to see themselves as 'two halves of a common enterprise'" (College Board, 2003, para. 3). "The report recommended that secondary schools recruit imaginative teachers, that they encourage high school seniors to engage in independent study and college-level work, and that achievement exams be used to allow students to enter college with advanced standing" (College Board, 2003, para. 3). Over 400 students were allowed to enter college at 11 different universities and colleges and the younger students were able to compete with older students, which highlighted the idea that younger students could handle college-level work (Fund for the Advancement of Education, 1957).

The second study, conducted by the Committee on Admission with Advanced Standing, "formulated a plan for developing college-level curricula and standards that could be instituted at the high school level" (College Board, 2003, para. 4). Content experts from higher education developed "high school course descriptions and assessments that colleges would find rigorous enough to use as a basis for granting credit" (College Board, 2003, para. 4). A pilot program involving 11 subjects began in 1952. As the 1955-56 school year began, the College Board formally took over the program and was named the College Board Advanced Placement program.

The College Board

The College Board, also referred to as the College Entrance Examination Board, is a non-profit organization established in 1900 whose goal was to expand college and university access by simplifying the application process for students wishing to attend post-secondary institutions (as cited in College Board, 2010). This led to the Scholastic Aptitude Test (SAT), which replaced the College Boards in 1926. Through a collaborative effort between the Carnegie

Foundation for the Advancement of Teaching and the American Council on Education, the Educational Testing Service (ETS) was created (Funding Universe, 2014). The relationship between the College Board, colleges, universities, and high schools made it the appropriate administrator for the AP program. The first courses offered by the College Board were AP English and AP calculus, both beginning in 1956.

The AP program began its relationship with the government in 1957, due to the appearance of inadequate instruction in secondary schools. This coincided with the Russians' explorations of space and a general concern that the Russian education system was outperforming that of the United States (Bracey, 2002). The Elementary and Secondary Education Act (ESEA) of 1965 followed, and program funding for minority and low-income students made it possible for them to have the opportunity to go to college, and the AP program was a way for these students to get college-level experience while in high school (State of Washington, 2014). The federal government became part of the funding process by providing financial support to states for reforming their education plan and following the ideas established by the government. ESEA was created through President Lyndon Johnson's "War on Poverty" (State of Washington, 2014).

Advantages of the Advanced Placement Program

As early as 1980, the College Board invested heavily in research on the AP program. Casserly (1986) concluded that

> AP students who had passed the AP exam and were given credit for an introductory college course were more successful in advanced college courses than students who had not participated in the AP program and had been required to take introductory college courses. (p. 6)

A longitudinal study published by Willingham and Morris (1986) compared nearly 5,000 AP and non-AP students from 700 high schools. The research found that "AP students outperformed their non-AP counterparts academically" (Willingham & Morris, 1986, p. 1). In 2002, Breland, Maxey, Gernand, Cumming, and Trapani found that "college admissions personnel ranked AP course enrollment above SAT II scores in importance for college admissions" (p. 14).

Analysis of AP student performance in college began in 1967 at Yale University. A study by Burham and Hewitt (1967) reported that "in English and mathematics courses, AP students outperformed their non-AP peers." Additional studies (Simms, 1982; Willingham & Morris, 1986) found that AP students were better prepared prior to entering college to enroll in upper-level courses and AP students specialized in majors with tougher grading standards more often and tended to double major. In 1993 across the University of California system, a study of 3,000 AP students found that "AP students continued to pursue knowledge in the subject area of their exam at greater rates than other students as well as earned grades that were higher than non-AP students" (Morgan & Crone, 1993). Santoli (2002) revealed that "AP courses made a difference in how students prepared and how they felt for college" and found that "AP students had a better four-year college performance than non-AP students" (p. 28). First-year students at Syracuse University, "who entered the university with AP credit, maintained a first-year retention rate of 96% compared to the existing national average of 79%" (Miller, 1994, p. 12). Another longitudinal study conducted in 2007 discovered "a trend of students who had successfully participated in one or more AP courses significantly outperforming similar non-AP students" (Hargrove, 2007, para. 3). The study by Hargrove (2007) included 182 sophomores in college and an analysis of the performance of those who had taken AP English in high school and those who were limited to a first-year writing composition class. "Those students who had

taken both the AP English course and the first-year writing composition class significantly outperformed students who had just taken one or the other" (K. Hansen et al., 2006, p. 461). Mason (2010) cited the 2006 work of Richards, who compared the performance of 5,000 science students who had "received introductory level credit for high school AP courses" (p. 19) and found they "performed better in advanced science classes in college than students who had taken the introductory science course before taking the advanced course" (p. 19). Additional studies by Callahan (2003), Mathews (2005), and Santoli (2002) indicated that students who perform poorly on AP tests by not scoring at least a 3 were still more likely to go to college and graduate from college than students who did not take AP classes.

Grove (2013) outlined six reasons commonly cited for taking AP classes. His reasons included impressing college admissions counselors, developing college-level academic skills, saving money, choosing a major sooner, taking more electives in college, and adding a minor or second major more easily. Hood (2010) noted another advantage of high school students taking AP courses: "kids can be turned on to a field by taking an AP course." Taking an AP course is a predictor of actually majoring in the particular field that you are taking the course in, so getting deeper into a subject can be very appealing to students and gets them hooked on a particular field (Hood, 2010).

> The College Board reports that the TIMSS Study Center shows that AP students rank with the best math and science students in the world. AP calculus students with grades of 3 or better on the AP exam outperformed advanced and honors students for each of the 18 countries that participated in the study. Physics students who received an AP exam grade of 3 or better on the AP Physics B or C exams performed as well as physics students from

> the top-performing nations of Norway, Sweden, and the Russian Federation. (College Board, 2007a, p. 4)

The College Board (2007a) provided current research regarding the correlation between college success and AP courses. Two studies conducted in Texas, which had the second largest AP population in the country, found positive correlations between students with AP credits and college grade point average (GPA). One of the studies found that over four years, students scored higher in the subject areas in which they had successful AP exam scores than those who did not take AP (College Board, 2007b). The second study found that students in Texas who take AP courses have higher college GPAs and four-year graduation rates than those students who scored in a similar range on the SAT but did not take AP courses. The same study found that although those students who took AP courses earned higher college GPAs than those who did not take AP, those students who took both the AP courses and the subsequent exam earned higher GPAs than those who took the course without taking the exam (College Board, 2007b).

Increased Enrollment in the Advanced Placement Program

At its inception, the AP program was designed for those students considered to be at the top of their class. Many of those students were looking for a challenge or for a head start to college. In 2012, more than two million students sat for over 3.6 million AP exams, double the number from a decade earlier (Table 1). According to Pope (2012), writing for the Associated Press, the AP exam has "become the 'de facto gold standard' for high school rigor" (para. 2).

Table 1

Annual AP Program Participation (1956-2012)

Year	Schools	Students	Examinations	Colleges
1955-56	104	1,229	2,199	130
1965-66	2,518	38,178	50,104	1,076
1975-76	3,937	75,651	98,898	1,580
1985-86	7,201	231,378	319,224	2,125
1995-96	11,712	537,428	843,423	2,895
2005-06	16,000	1,339,282	2,312,611	3,638
2006-07	16,464	1,464,254	2,533,431	3,743
2007-08	17,032	1,580,821	2,736,445	3,817
2008-09	17,374	1,691,905	2,929,929	3,809
2009-10	17,861	1,845,006	3,213,225	3,855
2010-11	18,340	1,973,545	3,456,020	4,001
2011-12	18,647	2,099,948	3,698,407	4,005

Note. College Board (2012)

Although the AP program has enjoyed increased enrollment over the last decade, *USA Today* columnist Toppo (2013) pointed out "discrepancies among states and race" (para. 1). "Opportunities to do advanced work are uneven across the U.S. Nearly 30 percent of high school students in Maryland pass an AP test in high school, but fewer than 5 percent in Mississippi do" (Toppo, 2013, para. 3). Toppo (2013) went on to cite the following statistics: "White students comprise about 59 percent of the student population and 62 percent of those

who pass an AP test. But African-American students, who are nearly 15 percent of the student population, comprise fewer than 5 percent of those who pass an AP test" (para. 5).

A variety of entities contribute to the increased enrollment trends in AP courses. In 2007 the Advanced Placement Training and Incentive Program (AP-TIP) was launched as an initiative "to increase the number of students taking and passing AP exams" (Institute for Educational Initiatives [IEI], 2013, para. 4). AP-TIP is "based on research indicating that U.S. students who participate in AP coursework and exams increase their chances of success in school and in life" (IEI, 2013, para 8). AP-TIP, through grants from the National Math and Science Initiative, is present in several states—Alabama, Arkansas, Connecticut, Indiana, Kentucky, Massachusetts, and Virginia. Since implementation in the 2008-2009 school year, when 67 schools participated in AP-TIP, 230 high schools were involved with the initiative in 2013 (IEI, 2013). The IEI reported nine Indiana high schools that participated in the first year of the AP-TIP excelled compared to the rest of the state and nation (Schmitt, 2013). Within

> the nine AP-TIP schools, the number of students who earned a passing score of 3 or more on an AP exam grew by 66% compared to 8.9% growth in Indiana and 7.2% growth nationally. Five of the nine schools more than doubled their number of passing scores. (Schmitt, 2013, para. 2)

The results were even more impressive in AP math and science courses, where passing exam scores improved by 114% compared to 16.2% in Indiana and 8.2% nationally.

The program perhaps shines most brightly in its contribution to narrowing the Hoosier achievement gap. The number of African-American and Hispanic students who

> passed AP exams in the nine high schools jumped by 119% versus 14.3% growth for Indiana and 14.1% for the nation. (Schmitt, 2013, paras. 2-3)

"The Advanced Placement Training and Incentive Program initiative sponsors extensive training for teachers during the summer, cultivates lead teachers, and pays for more time-on-task for students through tutoring and Saturday exam preparation" (Schmitt, 2013, para. 4).

"The program also promises students and teachers financial incentives for passing scores. For the 2012-13 school year, 755 students earned $112,300 in bonuses for their AP success, while the nine schools earned $262,100 in bonus money" (Schmitt, 2013, para. 5). "For the 2013-14 school year, the number of schools participating in the program increased from nine to 20, and an additional one-dozen are expected to join in the summer of 2014" (Schmitt, 2013, para. 6). "Indiana's AP-TIP is coordinated by the University of Notre Dame's Institute for Educational Initiatives through a five-year $7 million grant that the National Math and Science Initiative received from the federal i3 fund (Investing in Innovation) program" (Schmitt, 2013, para. 7).

Students in Advanced Placement Courses

Students who take AP courses are well documented in a variety of reports. Some of the reports indicate that more students of poverty and minority populations in the United States need to take the AP courses. Most students taking AP courses are from affluent areas in the suburbs with minorities underrepresented (Furry & Hesch, 2001). In addition to underrepresentation of minority students in AP courses, students in small, rural settings also face barriers to taking the courses. When staffing decisions are made in these settings, with few students in the population to begin with, a small class size is difficult to justify with limited resources. Limited resources

force all schools to make difficult decisions about resource allocation, and paying for the basic curriculum can limit student access to advanced programs.

Research has demonstrated that students' preparation prior to taking AP courses has been significantly related to how well students performed on AP exams (Camara, Camara, & Millsap as cited in Mason, 2010). As more schools have pushed for open access to AP courses, teachers report concerns of struggling students and difficulties maintaining the rigor of the program (Winebrenner, 2006). Even though most teachers reported that AP course quality and student achievement on AP exams had remained the same over the last five years, many teachers also reported that the overall ability of their students had lowered, with many students struggling in their AP courses (Duffett & Farkas, 2009). In 2003, Klopfenstein found that

> evaluating schools based on exam results gives schools the incentive to limit AP enrollment to only the most capable students. Hispanic, Black and low-income students earn passing scores on AP exams at dramatically lower rates than White students. Schools evaluated based on student AP exam performance may strategically limit enrollment to exclude these groups. (p. 45)

A 2001 study by Furry and Hecsh reported, "African-Americans and Hispanics are grossly under-represented in AP classes. If they were to enroll in AP classes in proportion to their enrollment in the schools, African-American and Hispanic participation would have to increase, on average, by 100 percent" (p. 7). In contrast, "Asian students are greatly over-represented in AP classes" (Furry & Hecsh, 2001, p. 8).

Eworo-Enfumo "examined the role of the perceptions of teachers and guidance counselors and their impact on minority underachievement in AP courses" (as cited in Mason, 2010, p. 31). The study reported that institutional barriers of policy implementation were

contributing to enrollment disparities for African American and Latino students. The Eworo-Enfumo study (as cited in Mason, 2010) noted that "White, middle class parents were successful in advocating for their students to have high school grades changed and raised, and for their children to receive specific teachers and gain admittance into specific courses" (p. 31).

"Students who are homeschooled or students who attend a school that does not offer AP courses can still take AP exams by arranging to test at a participating school" (Mason, 2010, p. 14). Likewise, "students with documented disabilities may receive accommodations on the AP exams including extended time, large-type exams, and Braille exams" (Mason, 2010, p. 14).

The criteria for student enrollment in AP courses varies as much as the high schools that offer the courses. Some schools use an *open enrollment* philosophy allowing every student the opportunity to take a class. Some schools require an application to gain admission to courses. Other schools consider previous academic performance before a student is permitted access to AP courses. There are schools that require recommendations from counselors or teachers before a student can enroll in an AP course. Although there is no system in place for admission to AP courses, permission of any nature has impacted the number of minority students who participate in the AP program (Escalante & Dirmann, 1990). A majority of AP teachers are in favor of some type of process before allowing students to enroll in courses. These teachers believe that students must have the appropriate prior knowledge before they can be successful in the program (Sawchuk, 2009).

Mason (2010) found "in 2002, the College Board reported in a study of 31,811 AP teachers, 49% of AP teachers used previous course grades, 58.8% used teacher recommendations, and 53.3% used prerequisite course requirements before admitting students into their AP course" (p. 31). The 2009 Duffett and Farkas survey reported 52% of teachers

> favored screening students based upon a pre-set criterion such as grade point average or teacher approval before allowing a student to enroll in an AP course. Only 38% of the teachers surveyed reported that AP courses should be open to all interested students. Overall, 63% of all teachers surveyed reported that they supported some form of screening to ensure that students who enroll in an AP course are prepared appropriately. (p. 31)

In a meta-analysis of 515 studies, Pettigrew and Tropp (2005) suggested that diversity in classrooms contribute to achievement gains and that interaction among students of different groups can minimize issues of prejudice and stereotyping. A study by Burton et al. (2002) reported that

> about half of the principals reported making an effort to let minority students know about AP courses or to recruit minority students to take AP courses. Even fewer teachers—about 20 percent of AP Calculus AB teachers and 30 percent of Literature teachers—reported making an effort to recruit students in minority groups. (p. 10)

Scoring of Advanced Placement Exams

AP exams taken by students earn a score of 1 to 5. A score of 5 reflects a student is *extremely well qualified* for entry level college work. A score of 4 indicates the student is *well qualified*; a score of 3—the student is *qualified*; a score of 2—the student is *possibly qualified* for entry level college work; and a score of 1 signifies *no recommendation* (College Board, 2013a).

> The College Board conducts college comparability studies, in which a portion of the AP exam is administered to college students when they complete the corresponding college course. These students' performance on the AP exam is compared to their performance on their college tests and to their course grades. These studies allow the AP program to

> set AP exam grade boundaries. Consequently, the cut-off point for an AP exam grade of 5 is roughly equal to the average AP grade of college students who receive an A in the corresponding college course; the cut-off point for an AP grade of 4 is roughly equivalent to the average AP grade of college students who receive a B, and so on. (Milewski & Gillie, 2002, p. 2)

AP exams are made up of multiple choice questions, and free response/essay questions. Multiple choice items are scored by computer, free response/essay items are scored by "trained Readers at the AP Reading" that takes place each year in June (College Board, 2013a, p. 5). Once scores are weighted, they are combined into a raw composite score. The chief reader for each exam then decides on the grade cutoffs for that year's exam, which determine how the composite scores are converted into the final grade. Students receive a score from 1-5, but do not receive an explanation about how the score was determined. The College Board does not explain the weighting process for the exam. It is not known how much a free response question impacted a score. To ensure that the grading is reliable, a number of reviews and statistical analyses are performed (College Board, 2013a). "Continuity of AP standards is important, so that colleges can be confident that an AP grade on this year's exam will represent, as nearly as possible, the same level of achievement as a grade on last year's exam" (AP Enviro-Science, n.d., para. 22).

The scores on the test vary from year to year, but the same level of work is present from one year to the next. For example, in 2012 and 2013, students taking the Spanish language test had a breakdown of scores as reflected in Table 2.

Table 2

AP Test Scores for Spanish Language Test (2012 & 2013)

Year	Score of 5	Score of 4	Score of 3	Score of 2	Score of 1
2012	24.2%	26.8%	20.5%	14.8%	13.7%
2013	24.5%	26.5%	20.8%	15.2%	13.0%

Note. College Board (2014f)

Even with the great variation of scores, the level of student ability did not vary. A student should score the same whatever year they take the exam.

According to a report by the IEI (2013), "during the 2009-2010 school year, first year AP-TIP schools registered a remarkable 84.6 percent increase in the number of students who passed AP exams. Nationally, that number increased by 7.5 percent" (para. 10).

Advanced Placement Awards

Students in the United States may be recognized by the College Board for their accomplishments on AP exams. There are five levels of recognition: AP Scholar—grades of 3 or better on three or more exams; AP Scholar with Honor—grades of 3 or better on four or more exams and an average of 3.25 on all exams taken; AP Scholar with Distinction—grades of 3 or better on five or more exams and an average of 3.5 on all AP exams taken; National AP Scholar—grades of 4 or better on eight or more AP exams and an average of 4 on all exams; AP State Scholar—top male and female student in each U.S. state and the District of Columbia with scores of 3 or higher on the greatest number of AP exams, and then the highest average score (at least 3.5) on all AP exams taken (College Board, 2013c). In 2011 in Indiana, 4,344 students were recognized for their scores on the AP exams by the College Board (College Board, 2011).

A total of 2,257 students were recognized as scholars; 808 as scholars with honor; 1,097 as scholars with distinction; six as state scholars; and 176 as national scholars (College Board, 2011).

With the results of the 2010 AP exams, additional recognitions for school districts were announced. The College Board unveiled its first AP district of the year awards (College Board, 2011-2014). That year 388 public school districts in the United States were recognized for "simultaneously achieving increases in access to AP courses for a broader number of students and also maintaining or improving the rate at which their AP students earned scores of 3 or higher on an AP exam" (College Board, 2011, para. 1). Within the 388 school districts on the list, awards were further disaggregated by the size of the district. The AP District of the Year Award for *large* districts (3,500+ AP students in 2010 excluding Spanish language) was presented to Chicago Public Schools, IL; for *medium* districts (200+ AP students in 2010 excluding Spanish language) was presented to Colton Joint Unified School District, CA; and for *small* districts (50+ AP students in 2010 excluding Spanish language) was given to West New York, NJ. Additionally, three school districts, Hillsborough County Public Schools, FL, Township High School District 214, IL, and Wentzville School District, MO, were noted as *Districts with the Greatest Increase in the Number of Students Earning AP Exam Scores of 3 or Higher* (College Board, 2011). Also in 2011, three school districts were recognized as *Districts with the Greatest Increase in the Number of African American, Hispanic/Latino and/or American Indian Students Earning AP Exam Scores of 3 or Higher* (Chicago Public Schools, IL, El Paso Independent School District, TX, and Brawley Union High School District, CA). The state of Indiana had nine school districts on the inaugural list.

The second year the AP District of the Year Awards were presented found 367 United States public school districts on the list. The criteria for inclusion remained the same for 2012 as it was in 2011. However, the large, medium, and small distinctions were not included in 2012, nor were districts recognized for greatest increases in the number of students earning AP exam scores of 3 or higher or for demonstrating the greatest increase in the number of African American, Hispanic/Latino and/or American Indian students earning AP exam scores of 3 or higher (College Board, 2012). In 2012 the state of Indiana had 13 school districts on the list; three of the districts (Carmel Clay Schools, Metropolitan School District of Pike Township, and New Albany-Floyd County Consolidated Schools) appeared for two consecutive years (College Board, 2012).

The College Board continued in 2013, based upon AP exam results from 2012, with its *Third Annual AP District of the Year Awards Honor Roll*. The criteria for selection remained constant from the two previous years, and 539 public school districts in the United States found themselves on the list. As in 2012, only the names of the 539 school districts were included in the recognition, with no further awards noted. Twenty-one Indiana school districts were on the list in 2013. Three Indiana districts have appeared multiple years (Carmel Clay Schools, Metropolitan School District of Perry Township, and Oak Hill United School Corporation), and 11 districts are noted as having 30% or greater enrollment of students who qualify for free/reduced lunch (College Board, 2013d).

The 2014 College Board's Fourth Annual AP District of the Year Awards Honor Roll changed from including only school districts in the United States, to also including districts in Canada. The criteria for selection remained the same, and 477 districts were recognized. Twelve districts in Indiana were on the 2014 list, four appearing for multiple years, none were

recognized for the percent of students qualifying for free/reduced lunch (College Board, 2011-2014).

Cost of Advanced Placement Program

During the May, 2013, AP exam administration, the cost of each AP exam was $89, up from $87 in 2012 (College Board, 2013e). "Students who are either enrolled or eligible to participate in the Federal Free or Reduced Price Lunch Program qualify for the College Board fee reduction on all AP exams that they take in a given year" (College Board, n.d., para. 1). Beyond the fee waivers authorized by the College Board, individual states and school districts provide for individual student needs. According to the College Board (2014c) bulletin, information for every state in the United States outlines the final exam cost to qualifying students. Most states can offer the exams for $18, some states can offer the exam to qualifying students at no cost, and a few states still charge as much as $55 to students who qualify for subsidies. Pope (2012) reported 2009 revenue for the College Board was $353 million. The College Board president makes $638,000 annually, and senior staff average $239,000 (Green, 2010).

Subjects Offered in the Advanced Placement Program

The courses offered through the AP Program have tripled from the original 11 subjects piloted in 1952. Today, 34 courses and exams are offered (College Board, 2014d). The 34 courses are found in Table 3. Two courses were to be added in 2014: AP Physics 1, and AP Physics 2. In the 2013 AP exam administration, "the most taken exam was AP English language with 476,277 exams, and the least taken was AP Italian language and culture with 1,980 exams" (College Board, 2013d, para. 19).

Table 3

Courses Offered Through Advanced Placement Program

Subject	Number of Participating Schools	Male Students	Female Students	2012 Program Total	2013 Program Total	% of Change 2012-2013
Art History	1,912	7,960	14,763	22,650	22,723	0
Biology	10,161	84,656	118,533	191,773	203,189	6
Calculus AB	13,559	147,404	135,410	266,994	282,814	6
Calculus BC	6,386	62,164	42,319	94,403	104,483	11
Chemistry	8,444	5,066	64,940	132,425	140,006	6
Chinese Language & Culture	1,460	4,603	5,518	9,357	10,121	8
Computer Science A	3,249	25,310	5,807	26,103	31,117	19
Macroeconomics	4,359	60,885	47,334	99,903	108,219	8
Microeconomics	3,569	39,491	28,014	62,351	67,505	8
English Language and Comp	11,407	182,283	293,994	443,835	476,277	7
English Literature & Comp	13,497	144,911	240,665	380,608	385,576	1
Environmental Science	4,896	53,683	64,605	108,839	118,288	9
European History	4,700	51,810	58,068	108,854	109,878	1
French Language & Culture	3,280	6,660	14,065	19,769	20,725	5
German Language and Culture	1,200	2,564	2,402	4,754	4,966	4
Govt. & Pol. – Comp.	1,229	10,540	9,777	18,402	20,317	10
Govt. & Pol. – U.S.	8,193	123,033	132,725	239,513	255,758	7
Human Geography	3,049	51,706	62,655	98,679	114,361	16
Italian Language & Culture	339	741	1,239	1,806	1,980	10
Japanese Language & Culture	610	954	1,280	2,177	2,234	3
Latin – Vergil	1,104	3,356	3,311	6,424	6,667	4
Music Theory	2,945	10,274	7,918	18,161	18,192	0
Psychology	6,924	88,603	150,359	220,361	238,962	8
Spanish Language	7,310	51,345	83,914	129,674	135,259	4
Spanish Literature	1,602	6,571	12,214	17,919	18,785	5
Statistics	7,357	83,308	86,128	153,859	169,508	10

Table 3 (continued)

Subject	Number of Participating Schools	Male Students	Female Students	2012 Program Total	2013 Program Total	% of Change 2012-2013
Studio Art – Drawing	3,446	3,974	12,623	16,188	16,597	3
Studio Art – 2-D Design	3,923	6,599	18,329	23,591	24,928	6
Studio Art – 3-D Design	1,344	1,244	2,923	3,840	4,167	9
U.S. History	12,176	207,441	235,449	427,796	442,890	4
World History	5,783	105,279	124,828	210,805	230,107	9
Total # of Exams Taken		1,809,495	2,128,605	3,698,407	3,938,100	6
Total # of Students		986,137	1,232,441	2,099,948	2,218,578	6

Note. College Board (2013c)

The College Board dictates the exact dates and precise times when every AP exam is administered. The testing schedule in 2013 is shown as examples in Tables 4 and 5.

Table 4

Sample of Timetable for Administration of Advanced Placement Exams – Week 1

Week 1	Morning 8:00 AM	Afternoon 12:00 Noon	Afternoon 2:00 PM
Monday May 6	Chemistry Environmental Science	Psychology	
Tuesday May 7	Computer Science A Spanish Language	Art History	
Wednesday May 8	Calculus AB Calculus BC	Chinese Language & Culture	
Thursday May 9	English Literature & Comp.	Japanese Language & Culture Latin	

Table 4 (continued)

Week 1	Morning 8:00 AM	Afternoon 12:00 Noon	Afternoon 2:00 PM
Friday May 10	English Language & Comp.	Statistics	

Note. College Board (2012)

Table 5

Sample of Timetable for Administration of Advanced Placement Exams – Week 2

Week 2	Morning 8:00 AM	Afternoon 12:00 Noon	Afternoon 2:00 PM
Monday May 13	Biology Music Theory	Physics B Physics C: Mechanics	Physics C
Tuesday May 14	Govt. & Pol. – U.S.	Govt. & Pol. – Comp. French Language & Culture	
Wednesday May 15	German Language & Culture U.S. History	European History	
Thursday May 16	Macroeconomics World History	Italian Language & Culture Microeconomics	
Friday May 17		Human Geography Spanish Literature & Culture	

Note. College Board (2012)

States Requiring Advanced Placement Programs

Newsweek, in its May, 2005, issue published a ranking of the top 100 public high schools (Kantrowitz, 2005). Campus Beast (2014) reported the rankings were determined by "the number of AP and/or International Baccalaureate (IB) tests taken by all students at a school

divided by the number of graduating seniors" (para. 2). As *Newsweek* has continued annually publishing its top 100 public high school rankings, "a prevailing idea based on research in education is that the more AP and/or IB classes students can take, the better the school they attend" (Imig, 2009, p. 1).

In 2012, six states required high schools to offer AP courses. Among the six are four states, Arkansas, Louisiana, Mississippi, and South Carolina, "that have struggled the most with educational achievement" (Pope, 2012, para. 17). The other two states requiring high schools to offer AP courses are Indiana and Connecticut. Furthermore, "Indiana gives schools bonuses for AP performance, and factors AP into the state's accountability formula and performance goals" (Pope, 2012, para. 18). Holstead, Spradlin, McGillivray, and Burroughs (2010) provided the following regarding the AP incentive program in Indiana:

> In 2009, House Enrolled Act 1001-SS (the state budget bill) appropriated $953,284 per year of the biennium for Advanced Placement programs. The state mandates that every high school must offer a minimum of two AP courses and every school district must provide AP science and math courses (IC 20-36-3). Increasing math and science proficiency is a priority for Indiana.
>
> Indiana school districts must include both the percentage of students taking AP exams and the percentage of students scoring 3 or better on the exams (IC 20-20-8-80). Beginning with the class of 2010, AP courses became requirements for high school students in order to achieve a Core 40 Diploma with Academic Honors (IAC Title 511, rule 6-71.-6). (p. 5)

Additionally, "seven states require public colleges to award credit or placement based on AP exam scores" (Pope, 2012, para 18). Most colleges and universities consider a score of 3

sufficient for introductory level course credit, with many states such as Kentucky mandating all public state universities to give introductory level credit for a score of 3 or higher on AP exams (Johnson, 2005). Some exclusive colleges and universities such as Stanford will only accept a perfect score of 5 to grant test credit for introductory courses (Stanford University, 2009).

Changes to Advanced Placement Exam Format

Mason (2010) stated about the AP program that "too much course content may limit long-term student achievement by forcing instructors to limit any in-depth study of the content" (p. 15). Additionally, teachers and students reported "frustration at the rigidity of AP courses," and students in a focus group "have suggested that there was only a limited amount of room for a diversity of teaching styles in AP courses" (Kyburg, Hertberg-Davis, & Callahan, 2007).

Changes to the AP biology exam took effect with the 2012-2013 school year. "The changes mark a new direction for the board, which has focused on the tests more than the courses" (Drew, 2011, para. 9). In 2002, a committee of the National Research Council "criticized AP science courses for cramming in too much material and failing to let students design their own lab experiments" (Drew, 2011, para. 20). "For biology, the change means paring down the entire field to four big ideas. Under each of these thoughts, a 61-page course framework lays out the most crucial knowledge students need to absorb" (Drew, 2011, para. 23). Other changes highlighted by Drew (2011) included teachers having

> more leeway to focus on different events in teaching students how to craft historical arguments in AP U.S. history, knowing what will not be on exams, and allowing for a good deal more flexibility in terms of what is covered in the classroom. (para. 25)

VanderArk and Cargill (2012) saw the changes in the AP program as a shift to "emphasizing depth over breadth, improving formative assessments, and adding an integrative experience" (para. 1). Viewed as improvements in the AP program, the changes were

> based on years of teacher feedback and an interest in making AP reflective of the knowledge and skills . . . most essential to 21st century college majors and subsequent careers, and also reflect recent advances in cloud-based technology and updated standards for college and career readiness. (VanderArk & Cargill, 2012, para. 2)

The AP exams included more essays and open-ended problems and fewer multiple choice questions. "Remaining multiple choice questions are shifting to measure not just content knowledge, but content knowledge and the skill to use that knowledge in meaningful ways essential to college and career success in that discipline" (VanderArk & Cargill, 2012, para. 4).

Along with changes to the AP program exams, the College Board "has been working to deliver more insightful assessments of student knowledge throughout the academic year in smaller chunks" (VanderArk & Cargill, 2012, para. 8). Beginning with the revised AP biology exam, the College Board launched a pilot called AP Insight. "AP Insight, funded by a federal Investing in Innovation (i3) grant, was designed to 'empower teachers with research-based, classroom-tested tools and resources to plan, teach, assess, and adapt rigorous AP course work'" (VanderArk & Cargill, 2012, para. 9). A pilot portfolio assessment is underway for AP English classes. The College Board "intends to roll out changes from its pilots and findings through 2015" (VanderArk & Cargill, 2012, para. 15).

Teacher Professional Development in the Advanced Placement Program

"As America increasingly relies on AP and IB classes to prepare youth for college, a significant factor is being overlooked: the teaching" (Imig, 2009, p. 2). In the decade between

1981 and 1991, "only one study examined effective teaching practices inside AP classrooms" (Imig, 2009, p. 8). "Most of the research that has been done has been done on the program itself, not the instruction in the classrooms. Yet, the standardization of the program allows for quality training of teachers" (Imig, 2009, p. 7). Only in the 2006-2007 school year did the College Board begin any effort to expect teachers to provide information about actual classroom content and practices. With the implementation of an auditing process, attempts are being made by the College Board "to ensure that AP students are receiving a consistent level of instruction" (Imig, 2009, p. 8) from year to year, school to school, and teacher to teacher. "By June 1, 2007, all schools claiming to offer an AP class had to have completed a course audit form and submitted a syllabus to the College Board" (Imig, 2009, p. 8). "Trevor Packer, vice president of the Advanced Placement program estimated that 105,000 syllabi would be submitted, but we received more than 140,000" (Duke Talent Identification Program, 2007, para. 3).

Just as graders of AP exams have experience and a knowledge base, it is assumed that teachers of the course have the same. There is not a specific academic standard or level of teaching experience required to be an AP teacher, but there are training sessions available for teachers from the College Board. A 2002 College Board research report, authored by Milewski and Gillie, was the largest survey of AP teachers to date. At the time, 1,732 Indiana teachers were registered as AP teachers, comprising 1.7% of all registered AP teachers. Of the number of registered AP teachers in Indiana, 529 responded to the Milewski and Gillie (2002) survey, or 1.6% of all the teachers responding.

The Milewski and Gillie (2002) report investigated, among other things, the educational background of AP teachers. "Analyses revealed that 82.3% of the survey respondents held a

bachelor's degree, 69.7% held a master's degree, and 6.2% held a Ph.D." (Milewski & Gillie, 2002, p. 12).

> A distinct pattern is found in math and computer science, physical/natural science, and social science teachers. It appears these teachers are "more likely to earn a bachelor's degree in a matching academic discipline while English, fine arts and music, and foreign/classical language teachers seem more likely to earn a master's degree in a matching academic discipline. For those teachers with a Ph.D., concordance between the academic subject of their degree and the AP course they teach is less clear, mainly because only a small percentage of AP teachers (6.2 percent) hold a Ph.D. (Milewski & Gillie, 2002)

In a study of AP courses offered in the state of California, researchers concluded that there were several factors strongly associated with success, and three factors related specifically to teacher training (Furry & Hecsh, 2001).

- Teachers in higher-performing classes met with teachers from their feeder schools more times during the year than teachers in lower-performing classes.
- Higher-performing classes have teachers with more years of experience teaching the AP subject than teachers in lower-performing classes.
- In the higher socio-economic status schools, there was a link between high-performing classes and the teacher's possession of a doctorate. (Furry & Hecsh, 2001, pp. 8-9)

Regarding teacher preparation, the Furry and Hecsh (2001) study also reported years of experience teaching the AP subject was most important. Experience is more important than attending AP

> Summer Institutes or Workshops, and more important than having a Master's degree. The power of this variable is true for all SES groups and generally true for all five subjects in the study (Calculus, Chemistry, English Literature, Spanish Language, and U.S. History). If, in fact, many AP teachers will soon be retiring (as is frequently mentioned at AP conferences) it would not be surprising to see exam scores decline. Since experience is so important, it might be wise to encourage young teachers to become AP teachers so that once they have acquired the experience they will not be on the brink of retirement. This may require commitment from school administrators to actively recruit and select teachers for AP courses. (Furry & Hecsh, 2001, p. 10)

The state of Florida has begun subsidizing professional development to train AP teachers and rewards teachers for helping students achieve passing scores on the AP exams (College Board, 2007a). Texas offers training and incentives to teachers as well as payment to students who passed the AP exam (Teicher, 2000). Hanover Research (2012) provided significant information from Texas regarding AP courses and teacher professional development. Across Texas, teacher professional development was identified as "one of the key components of a successful AP program" (Hanover Research, 2012, p. 4), yet multiple districts reported their "inability to provide appropriate professional development to teachers due to recent budget cuts in the state" (Hanover Research, 2012, p. 4). Furthermore, "few of the Texas districts noted how AP teachers are identified, although many districts require these teachers to participate in multiple forms of professional development" (Hanover Research, 2012, p. 12).

In the Dallas (Texas) Independent School District "specially trained 'master teachers' train other AP teachers and help prepare course materials" (Hanover Research, 2012, p. 13). Through an AP Incentive Program, privately funded by Advanced Placement Strategies

> AP teachers are awarded between $100 and $500 for every passing score earned by their students. Teachers also receive an annual stipend of $500 - $1,000 for attending special professional training sessions; 'master teachers' receive an annual stipend of $10,000. (Hanover Research, 2012, p. 13)

Students identified as Gifted and Talented (GT) in the Pearland (Texas) Independent School District enroll in AP courses in high school. The Texas Education Agency requires all teachers of gifted students to complete a 30-hour GT Awareness certificate; Pearland ISD encourages teachers of gifted students to also complete a three-level training plan to develop expertise in their specific field. The Director of Advanced Academics, the district department that manages GT and AP courses, noted that "research has consistently proven that one of the best ways to increase achievement and improve student success is to provide meaningful professional development for teachers" (Hanover Research, 2012, p. 15).

The Pasadena (Texas) Independent School District, in a partnership with the National Math and Science Initiative, sponsors the AP-TIP. The partnership advocates four core components, three of which target teacher preparation: extra training for AP teachers; on-going support from master teachers; and incentives for teachers and students who excel. The first cohort of schools that participated in the partnership demonstrated significant gains in the number of students earning a 3 or higher on AP tests in math, science, and English (Hanover Research, 2012).

Specifically regarding teachers of low-income and minority students, "the College Board has developed a set of seven recommendations for AP program administration" (Hanover Research, p. 6), two of the recommendations target teacher professional development:

- Conduct an inventory of current AP offerings and capacity: Determine extent and rigor of AP offerings in high schools as well as effectiveness of teacher training for pre-AP and AP courses.
- Support teacher professional development for AP and pre-AP teachers: Offer year-round training for AP and pre-AP teachers and hands-on professional development for school and district leaders. (p. 6)

The Hanover Research study (2012) went on to state,

> Past research has found that specific types of teacher qualifications are important factors in the ability to improve student test scores across the school year. Research shows that students learn more from teachers with good basic skills test scores, teachers with high verbal skills, and teachers who have a major or minor in the field they teach. Within the context of AP courses, a College Board study of teachers in AP U.S. History and Biology courses found certain similarities in background and training among teachers in both fields. AP teachers were likely to be veteran teachers and had both higher levels of teaching experience and academic preparation than the average U.S. teacher. The majority of teachers were over 36 years old and Caucasian. The most popular professional development activities in which these teachers participated were reviews of previous AP exams, course descriptions, and the Teacher's Guide. (p. 7)

In a research brief for Education Partnerships, Hansen (2005) stated, "Teachers participating in AP professional development have been credited with greater content and pedagogical knowledge" (para. 1). Hansen referenced the 2001 Commission on the Future of the Advanced Placement Program which identified a limited number of qualified teachers for AP courses, and the corresponding recommendations from the commission calling for *greater*

instructional resources for teachers, and that *teacher professional development is essential*. The Milewski and Gillie (2002) survey respondents "indicated they participated in professional development activities prior to teaching AP courses" (p. 13). Survey respondents rated professional development activities as "effective or very effective to their professional endeavors related to teaching AP courses" (Milewski & Gillie, 2002, p. 13).

> When asked to rate the professional development and professional resource needs they felt required further attention within their subject area, the results indicated that "preparing students for the AP exam," "accurately assessing student performance and proficiency levels during an AP course," and "alternative methods for presenting specific content or skills" were the most frequently endorsed training needs across all years of AP teaching experience. The most frequently endorsed critical training need was "covering the course content in the time available." (Milewski & Gillie, 2002, p. 15)

The Elementary and Secondary Education Act (ESEA), originally passed in 1965, and reauthorized in 2002 as the No Child Left Behind Act (NCLB, 2002), is the federal law that dictates K-12 education in the United States. NCLB created the Access to High Standards Act, which includes section 1704, the Advanced Placement Test Fee Program, and section 1705, the Advanced Placement Incentive Grants Program.

> The Advanced Placement Incentive Grants Program awards 3-year grants on a competitive basis to educational entities for teacher training, pre-advanced placement course development, books and supplies, and other activities and resources (NCLB, 2002). In the 2008 fiscal year, the U.S. Department of Education appropriated $31,539,834 to 64 educational entities. (Mason, 2010, p. 26)

"The College Board recommends that AP teachers have undertaken some form of professional development prior to teaching AP for the first time" (Kline, 2012, para. 1). The College Board provides workshops, summer institutes, readings, and an annual conference as means of professional development opportunities. Other organizations also provide training for teachers. For example, the University of California at Riverside offers a certificate in AP teaching. It is a 17-credit hour program that has courses in foundations, layout, and content. Six of the 17-credit hours are spent in the content area (Gruendyke, 2012).

In 2007 the College Board created the AP Fellows program.

> The AP Fellows program is an annual competitive grant program that provides scholarships for high school teachers from schools serving minority or low-income students who have been traditionally underrepresented in AP courses. The $1,000 scholarships assist teachers with the cost of attending an AP Summer Institute. The scholarship is for teachers who have not attended in the past 3 years. In 2014 there are approximately 100 scholarships available for urban AP teachers nationally. (College Board, 2014b, para. 2)

Also in 2014, approximately 500 scholarships were available nationally for the AP Redesign Scholarship program.

> The College Board has raised funds to pay for a limited number of AP Physics 1, AP Physics 2, and U.S. History teachers to attend an AP Summer Institute. These redesigned courses take effect in the 2014-2015 academic year. This scholarship is for teachers who have no other source of funding and covers the cost of tuition only. (College Board, 2014b, para. 1)

The AP Rural Fellows Scholarship began in 2014 (College Board, 2014b).

> It is an annual competitive grant program that provides scholarships for high school teachers from schools serving in rural areas of the country. The $1,500 scholarships assist teachers with the cost of attending an AP Summer Institute, including travel. This scholarship is for teachers who have not attended in the past 3 years. (College Board, 2014b, para. 3)

The College Board (2005) offers a maximum award of $30,000 as a startup grant to schools that do not have an AP program or to "strengthen their current programs" (para. 15). The award included professional development for teachers, classroom materials and resources, and a consultant for the first year of the program (College Board, 2005).

So what is teacher professional development? More precisely, what is AP teacher professional development, and does it impact student outcomes in AP courses? Garet, Porter, Desimone, Birman, and Yoon (2001) conducted a national study of over 1,000 teachers of mathematics and science providing one of the first "large-scale empirical comparisons of effects of different characteristics of professional development on teachers' learning" (p. 915). The study indicated

> three core features of professional development activities that have significant, positive effects on teachers' self-reported increases in knowledge and skills and changes in classroom practice: (a) focus on content knowledge; (b) opportunities for active learning; and (c) coherence with other learning activities. It is primarily through these core features that the following structural features significantly affect teacher learning: (a) the form of the activity (e.g., workshop vs. study group); (b) collective participation of teachers from the same school, grade, or subject; and (c) the duration of the activity. (Garet et al., 2001, p. 916)

The decade between 1991 and 2001 experienced an emergence of a "considerable body of literature on professional development, teacher learning, and teacher change" (Garet et al., 2001, p. 917). "Despite the size of the body of literature, however, relatively little systematic research has been conducted on the effects of professional development on improvements in teaching or on student outcomes" (Garet et al., 2001, p. 917).

In a 2001 study by Furry and Hecsh, which involved 220 high schools in California, "58% of the teachers had never attended a summer institute, and 28.7% had never been to an AP workshop" (p. 21). As was the case then, there still "are no rigidly defined criteria for who can serve as an AP teacher. The College Board recommends teachers have undertaken some form of professional development prior to teaching AP for the first time" (College Board, 2013e, para. 1). In a College Board research report, Burton et al. (2002) stated, "What teachers know and can do is important." (p. 1). The report went on to say "professional development activities are the principal way of improving existing teachers' subject area and professional knowledge, and recent research has established a connection between teacher professional development and student achievement" (Burton et al., 2002, p. 1).

A College Board research study was conducted to benefit the AP program in two ways (Paek, Ponte, Sigel, Braun, & Powers, 2005). The first benefit of the research was to

> provide an assessment of teacher needs which would allow the AP program to target its professional development services. In addition the AP program will be able to identify effective teacher practices that are underutilized by AP teachers, and thus offer professional development that supports those practices. (Paek et al., 2005, p. 1)

The second benefit to the AP program was "the description of teacher practices serving as a baseline for the evaluation of professional development services and other AP program

interventions to improve such practices" (Paek et al., 2005, p. 1). Paek et al. (2005) stated, "Veteran teachers who continue to participate in good-quality professional development activities continue to improve their performance. Professional development is currently seen in the educational arena as a key tool to improving teaching and learning in our schools" (p. 2)

Similar to the study by Garet et al. (2001), the 2005 study by Paek et al. described "characteristics of good professional development programs" (p. 3).

> Effective professional development programs should be school-wide; be long-term with follow-up; encourage collegiality; foster agreement among participants on goals and vision; have a supportive administration; have access to adequate funds; develop buy-in among participants; acknowledge participants' existing beliefs and practices; and make use of outside facilitators. (Paek et al., 2005, p. 3)

The Paek et al. (2005) research involved AP teachers in biology and U.S. history. The biology teachers reported their most common professional development activities were "reviewing the released AP Biology exams, course description, and Teacher's Guide" (Paek et al., 2005, p. 14). In contrast, "relatively few teachers reported they had consulted for AP workshops or taught in AP Institutes, and 30% have never attended an AP workshop" (Paek et al., 2005, p. 11). AP U.S. history teachers in the Paek et al. study revealed their most common professional development activities as

> reviewing released AP U.S. History exams, the AP U.S. History course description, and the AP U.S. History Teacher's Guide, while the least common professional development activities were teaching AP Institutes, consulting for AP workshops, and participating in AP Readings (p. 14)

Patterson and Laitusis (2006), on behalf of the College Board, prepared a report about AP professional development in the state of Florida and the effects on AP exam participation. Like other researchers cited in this literature review, Patterson and Laitusis (2006) found "the relationship between teacher professional development and student outcomes has not been firmly established in the literature" (para. 2). As noted in the Patterson and Laitusis (2006) study, the primary goals of the AP professional development program include

> expanding professional development opportunities such as workshops and Summer Institutes, providing teaching resources for AP courses, addressing equity by building partnerships with universities and other organizations, and advancing the field by continually learning more effective ways to support the AP community. (p. 1)

An assumption made in the Patterson and Laitusis study (2006) was that "the stronger a school's participation in AP professional development, the greater the effect on overall exam taking at that school" (p. 3). Further, models used in the study "assume that the number of days spent at an AP Summer Institute and the number spent at half-day AP professional development workshops have significantly different effects on AP exam taking" (Patterson & Laitusis, 2006, p. 3). The study found

> half-day workshops seem to be associated with a more direct and positive effect on exam-taking patterns within a school. The content of the workshop tends to focus on changes to the AP exam and exam strategies and readiness. These are more targeted workshops from which new and experienced AP teachers alike can directly and immediately benefit, whereas it may take a longer time for AP teachers to incorporate what they learned in AP Summer Institutes into their teaching practices and exam-preparation strategies. (Patterson & Laitusis, 2006, p. 4)

The College Board (2014c) publication, *Professional Development Workshops for Educators, The Official AP and Pre-AP 2014-2015 Catalog*, provides detailed information about opportunities for teachers to attend training. One-day and two-day workshops are available where "participants review course outlines, content-related handouts, student samples, and scoring guidelines. Workshops focus on learning specific pedagogical techniques and content-specific strategies that can be incorporated in the classroom" (College Board, 2014c, p. 3). The College Board offers workshops for new AP teachers, defined as those with "zero to three years' experience," and for experienced AP teachers, defined as those with "more than three years' experience" (College Board, 2014c, p. 3). Typical one-day workshops include six hours of professional development, and the cost associated with the workshop ranges from $185 for members of the College Board, to $265 for individuals who are not members. Typical two-day workshops include twelve and one-half hours of professional development, and the cost range is $365 for members of the College Board to $470 for nonmembers (College Board, 2014c, p. 5). Beyond the one-day and two-day workshops, the College Board hosts two annual professional development events, the AP Annual Conference held in July each year, and the College Board Forum held in October each year (College Board, 2014c). Additionally, there are six regions that comprise the College Board, and each region holds an annual opportunity for professional development. For individuals unable to attend College Board professional development away from school, the College Board provides online professional development courses (College Board, 2014c, p. 30).

Guskey (2009) compared student achievement gaps with the gap "between our beliefs about the characteristics of effective professional development and the evidence we have to validate those beliefs" (p. 224). Guskey claimed this gap in professional development beliefs

and evidence is "equally threatening in education with consequences just as serious" (p. 224). As outlined in this literature review, "a quick review of the professional development literature yields more than a dozen lists of those characteristics, each one claiming to identify factors crucial to successful professional development" (Guskey, 2009, p. 224). "But several recent reports challenge that assertion when 'effectiveness' is defined by professional development's demonstrable impact on improved student learning" (Guskey, 2009, p. 224). Guskey went on to state, "Scouring the education literature for examples of school improvements without professional development fails to yield a single case" (p. 226) The recommendation Guskey made was to move away from what educators refer to as best practices in professional development. Guskey asserted, "a far more productive approach would identify specific core elements of professional development that contribute to effectiveness and then describe how best to adapt these elements to specific contexts" (p. 229).

A College Board research report (Laitusis, 2012), found the following:

> After controlling for average household income (SES), level of AP activity, and teacher experience, schools with higher levels of teachers participating in AP professional development were more likely to have higher levels of overall average AP performance (average exam score and average percentage of exams with scores of 3 or above the following year).
>
> In addition to the number of professional development events attended, teacher experience was also a statistically significant predictor of subsequent overall AP performance. (p. 3)

Laitusis (2012) was careful to caution against viewing any single study as "providing conclusive evidence for any relationship under investigation. Rather, these results should be viewed as an

additional source of incremental evidence toward a more complete understanding of an otherwise complex dynamic, that of teacher professional development and student achievement" (p. 12)

The recent changes made to AP exams and changes coming soon to other exams are forcing the College Board to "invest substantial resources in creating professional-development programs and online tools to help teachers make that transition" (Drew, 2011, para. 46). More than a decade ago, Milewski and Gillie (2002) identified "access to good professional development" (p. 16) as the "most important" (p. 16) issue facing high schools as reported by teachers of AP courses. Teachers went on to cite "training in new trends in one's discipline, training in new teaching methods, increasing test preparation skills, and increasing access to professional development for teachers" as important issues related to professional development (Milewski & Gillie, 2002, p. 16). A formula for creating successful AP programs does not exist. Therefore, it is incumbent upon stakeholders in high schools to seek out resources and implement the instructional strategies that are found to increase access and success for students in AP courses. The purpose of this quantitative study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses.

Summary

A current literature review addressed the topic of the history of the AP program. The literature findings indicated themes regarding advantages of the AP program, increased enrollment in the AP program, scoring of AP exams, the percent of students passing AP exams, AP student awards, the cost of the AP program, subjects offered in the AP program, states requiring the AP program to be offered in high schools, the changes to the AP test format, and teacher training in the AP program.

CHAPTER 3

METHODOLOGY

The purpose of this quantitative study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses. The study examined the quantity and quality of College Board professional development experiences as well as other teacher characteristics. The study examined AP teaching experience, the total hours spent in professional development related to AP, the effectiveness rating for professional development, and the educational background of AP teachers relative to student success.

Research Questions

The research questions that guided the study were as follows:

1. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of English/language arts?
2. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of mathematics?

3. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of science?
4. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of social studies?

Null Hypotheses

The following null hypotheses were generated through the research questions:

$H_0$1. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of English/Language Arts.

$H_0$2. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of mathematics.

$H_0$3. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of science.

$H_0$4. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of social studies.

Description of the Sample

In the state of Indiana in 2013-2014, there are 2,539 AP teachers registered with the Indiana Department of Education (K. Bauder, personal communication, July 31, 2014). The survey was offered to all AP teachers for this study.

Survey Design

This was a quantitative study using a voluntary sampling of AP teachers through the use of an online survey. The survey I developed measured the perceptions of AP teachers about the effectiveness of College Board professional development related to AP courses. The items on the survey were designed to gather data in order to gain a deeper perspective of the current AP environment in the state of Indiana. The survey contained an introductory section to obtain demographic information that was considered in evaluating the results of the study. This information included the participants' years of teaching AP courses, frequency of professional development related to AP courses, and level of education. The questions on the teacher self-assessment survey about perceptions of effectiveness of professional development related to AP are in the form of a 6-point Likert-type scale of *strongly disagree* = 1, *disagree* = 2, *somewhat disagree* = 3, *somewhat agree* = 4, *agree* = 5, and *strongly agree* = 6. The survey items are listed in Appendix A. "The advantages of using a survey design include the low cost of data collection, potential high speed of returns, and providing time for thoughtful answers, checking records, or consulting with others" (Fowler, 2014, p. 73).

To ensure the validity of the survey, it was reviewed by members of my Ph.D. cohort, who were not included in the study. They answered the following questions in regard to the survey:

1. How long did it take to complete the survey?
2. Are the instructions easy to follow?
3. Are the questions clear?
4. Do you have suggestions for how this survey could be improved?

Responses from the pilot study indicated the survey would take approximately 10 minutes to complete and that the instructions were easy to follow. Although responses from the pilot study indicated the questions were clear, several of the responses suggested to include drop down boxes rather than text or data boxes whenever possible.

Descriptive statistics were conducted, including a Cronbach's alpha test for reliability. Cronbach's alpha is a coefficient of internal consistency, indicating how closely related a set of items are as a group (King, Rosopa, & Minium, 2011). Cronbach's alpha is commonly used as an estimate of the reliability of psychometric tests for a sample of examinees (King et al., 2011). This study was looking to see whether the five survey questions, when combined together and used as a dependent variable within the inferential testing, was reliable. For this study, a Cronbach's alpha of .921 was present, indicating the five items in the survey had reliability, and indicated the composite score was reliable.

Data Sources

For the purpose of this study, surveys were sent to all high school teachers in Indiana who taught AP courses. The population of teachers who received surveys was determined from a directory of public high school AP teachers provided by the Public Records Department of the Indiana Department of Education. The surveys were created in Qualtrics and invitations to complete the survey were sent via e-mail to all AP teachers.

Data Collection Procedures

I obtained the approval of the Instructional Review Board (IRB) at Indiana State University, Terre Haute, to conduct the study. The AP teachers in Indiana high schools were contacted using email addresses, were informed of the study, and were encouraged to participate in the online survey, which was open for two weeks. The AP teachers initially contacted were contacted again after the first week the survey was available and were thanked if they had already completed the survey, and reminded and encouraged to participate in the online survey if they had not. Each of the survey participants was asked to denote his or her agreement on the online survey consent form (Appendix B).

Survey data with the lowest number indicated the lowest level of positive perception about the effectiveness of professional development related to AP courses, and the highest score represented the highest level of positive perception about the effectiveness of professional development related to AP courses. The composite score was obtained by adding together individual participant's responses to Questions 7 through 11. Survey responses were downloaded from Qualtrics to SPSS and Microsoft Excel. The data were analyzed by scoring the returned surveys using the Statistical Package for the Social Sciences (SPSS), a statistical software program designed to tabulate data for analysis.

Method of Analysis

Data were collected on four research questions and all four questions were evaluated using step-wise multiple regression analysis. Step-wise multiple regression analysis was the appropriate test because each research question had more than one predictor variable and attempted to predict one criterion variable. In step-wise multiple regressions, the predictor variable that explained the most variance was entered first; if found to be significant, the next

predictor variable that explained the most variance left was entered. This process was continued until adding another predictor variable did not explain a significant amount of variance in the criterion variance. All assumptions related to multiple regression tests were examined to ensure validity prior to running these tests. If a significant predictor was identified, the study examined the unstandardized partial regression coefficient to determine the impact on the criterion variable for a one unit increase in the significant predictor variable while holding all other predictor variables constant. If more than one predictor variable was significant, the study examined the standardized partial regression coefficient to determine rank orders of the overall impact on the criterion variable. These beta-weights put all predictor variables in the same metric using *z*-scores.

Summary

In this chapter, the following design components were presented and described: the research questions; the hypotheses; the data sources, including the population and sample; the data collection procedures; the instrumentation; and the statistical analysis used. The purpose of this study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses.

CHAPTER 4

ANALYSIS OF DATA

The purpose of this quantitative study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses. The study examined the quantity and quality of College Board professional development experiences as well as other teacher characteristics. The study examined AP teaching experience, the total hours spent in professional development related to AP, the effectiveness rating for professional development, and the educational background of AP teachers. This study used survey methodology to gather data from teachers of AP courses in the state of Indiana from the 2013-2014 school year. Data were entered into SPSS software.

Presentation of the Data

Descriptive Analysis

The total number of completed survey responses was 216, including 33 (15.3%) teachers of English/language arts; 46 (21.3%) teachers of science; 49 (22.7%) teachers of mathematics; 50 (23.1%) teachers of social studies; and 38 (17.6%) teachers of subjects other than English, science, mathematics, or social studies. The average number of years teaching AP for teachers in this whole sample was 7.69 (SD = 8.53). The average number of graduate hours earned by AP teachers in this whole sample was 19.71 (SD = 21.62). Teachers reported the percent of students scoring a 3 or higher on AP exams as 54.81 (SD = 31.11). The whole sample reported an

average of hours spent in College Board professional development as 64.21 (*SD* = 94.10). Finally, the average composite effectiveness rating for College Board professional development was 22.88 (*SD* = 5.49).

AP teachers were asked five questions on the survey which were designed to measure perceptions of professional development provided by the College Board. A total of 189 (87.5%) respondents reported a level with at least some agreement (somewhat agree, agree, strongly agree) that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. When responding to the statement that College Board professional development related to AP provided teachers with new ideas to assess students in AP courses, 176 (81.5%) of the respondents indicated at least some agreement. Survey respondents were further asked to reply to the statement that College Board professional development related to AP provided them with a deeper understanding of the content being taught; 168 (77.8%) of the respondents indicated at least some agreement with the statement. Further, 195 (90.3%) of the respondents indicated at least some agreement that College Board professional development related to AP provided them with a deeper understanding of AP examinations. Finally, 178 (82.5%) of those replying to the survey indicated at least some agreement that the College Board professional development related to AP provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work (Table 6).

Table 6

Whole Sample Number and (Percentage) of Responses to Perceptions of Effectiveness of College

Board Professional Development

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	8 (3.7%)	11 (5.1%)	8 (3.7%)	40 (18.5%)	89 (41.2%)	60 (27.8%)
New ideas to assess	7 (3.2%)	11 (5.1%)	22 (10.2%)	62 (28.7%)	79 (36.6%)	35 (16.2%)
Deeper understanding of the content	9 (4.2%)	21 (9.7%)	18 (8.3%)	47 (21.8%)	84 (38.9%)	37 (17.1%)
Deeper understanding of AP exams	6 (2.8%)	12 (5.6%)	3 (1.4%)	31 (14.4%)	75 (34.7%)	89 (41.2%)
Awareness of appropriate rigor	5 (2.3%)	16 (7.4%)	17 (7.9%)	49 (22.7%)	90 (41.7%)	39 (18.1%)

English/Language Arts Teachers

Table 6 displayed data on perceptions of the effectiveness of College Board professional development for the whole sample population. Table 7 displays data on perceptions of the effectiveness of College Board professional development for English/language arts teachers. When compared to the whole sample population ($M = 7.69$, $SD = 8.53$), English/language arts teachers had taught for slightly fewer years ($M = 7.40$, $SD = 6.14$). English/language arts teacher had earned more graduate hours in their content area ($M = 23.10$, $SD = 22.29$), than the whole sample population ($M = 19.71$, $SD = 21.62$). There was little difference in the percent of students scoring a 3 or higher on AP exams between the whole sample population ($M = 54.81$, $SD = 31.11$), and English/language arts teachers students ($M = 54.62$, $SD = 27.87$). Teachers of English/language arts had more hours spent in College Board professional development related

to AP (M = 72.24, SD = 141.64), than the whole sample population (M = 64.21, SD = 94.10). Finally, there was little difference between the whole sample population (M = 22.88, SD = 5.49), and English/language arts teachers (M = 22.52, SD = 6.09), in the composite effectiveness rating of College Board professional development (Table 7).

Table 7

Number and (Percentage) of Responses to Perceptions of Effectiveness of College Board Professional Development by English/Language Arts Teachers

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	2 (6.1%)	1 (3.0%)	1 (3.0%)	8 (24.2%)	8 (24.2%)	13 (39.4%)
New ideas to assess	3 (9.1%)	1 (3.0%)	4 (12.1%)	11 (33.3%)	8 (24.2%)	6 (18.2%)
Deeper understanding of the content	2 (6.1%)	2 (6.1%)	1 (3.0%)	10 (30.3%)	14 (42.4%)	4 (12.1%)
Deeper understanding of AP exams	3 (9.1%)	0 (0.0%)	1 (3.0%)	5 (15.2%)	9 (27.3%)	15 (45.5%)
Awareness of appropriate rigor	2 (6.1%)	2 (6.1%)	2 (6.1%)	6 (18.2%)	17 (51.5%)	4 (12.1%)

Almost no difference was reported between English/language arts teachers (87.8%) and the whole sample population (87.5%) who responded they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. The whole sample population reported more frequently

(81.5%) they somewhat agreed, agreed, or strongly agreed than English/language arts teachers (75.7%) that College Board professional development related to AP provided them with new ideas to assess students in AP courses. Contrary to that finding, English/language arts teachers reported more frequently (84.8%) than the whole sample population (77.8%) they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with a deeper understanding of the content they were teaching. The whole sample population responded more often (90.3%) than the English/language arts teachers (88%) that College Board professional development related to AP had provided them with a deeper understanding of AP examinations. Finally, little difference was reported between English/language arts teachers (81.8%) and the whole sample population (82.5%) that College Board professional development related to AP had provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work.

Mathematics Teachers

When compared to the whole sample population (M = 7.69, SD = 8.53), math teachers had taught for more years (M = 10.27, SD = 14.75). Math teachers had earned fewer graduate hours in their content area (M = 17.08, SD = 17.24) than the whole sample population (M = 19.71, SD = 21.62). There was no difference in the percent of students scoring a 3 or higher on AP exams between the whole sample population (M = 54.81, SD = 31.11), and math teachers whose students scored a 3 (M = 54.76, SD = 31.68). Teachers of math had more hours spent in College Board professional development related to AP (M = 69.37, SD = 82.17), than the whole sample population (M = 64.21, SD = 94.10). Finally, there was a difference between the whole sample population (M = 22.88, SD = 5.49), and math teachers being higher (M = 24.49, SD =

5.58), in the composite effectiveness rating of College Board professional development (Table 8).

Table 8

Number and (Percentage) of Responses to Perceptions of Effectiveness of College Board Professional Development by Mathematics Teachers

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	2 (4.1%)	2 (4.1%)	1 (2.0%)	6 (12.2%)	18 (36.7%)	20 (40.8%)
New ideas to assess	1 (2.0%)	2 (4.1%)	4 (8.2%)	11 (22.4%)	16 (32.7%)	15 (30.6%)
Deeper understanding of the content	1 (2.0%)	4 (8.2%)	3 (6.1%)	6 (12.2%)	21 (42.9%)	14 (28.6%)
Deeper understanding of AP exams	0 (0.0%)	3 (6.1%)	1 (2.0%)	4 (8.2%)	13 (26.5%)	28 (57.1%)
Awareness of appropriate rigor	0 (0.0%)	4 (8.2%)	2 (4.1%)	8 (16.3%)	19 (38.8%)	16 (32.7%)

A difference was reported between math teachers (89.7%) and the whole sample population (87.5%) who responded they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. The whole sample population reported less frequently (81.5%) they somewhat agreed, agreed, or strongly agreed than math teachers (85.7%) that College Board professional development related to AP provided them with new ideas to assess students in AP courses. Similar to that finding, math teachers reported more frequently (83.7%) than the whole

sample population (77.8%) they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with a deeper understanding of the content they were teaching. The whole sample population responded slightly less often (90.3%) than the math teachers (91.8%) that College Board professional development related to AP had provided them with a deeper understanding of AP examinations. Finally, a difference was reported between math teachers (87.8%) and the whole sample population (82.5%) that College Board professional development related to AP had provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work.

Science Teachers

When compared to the whole sample population (M = 7.69, SD = 8.53), science teachers had taught for more years (M = 8.57, SD = 6.10). Science teachers had earned more graduate hours in their content area (M = 21.13, SD = 22.76) than the whole sample population (M = 19.71, SD = 21.62). There was a difference in the percent of students scoring a 3 or higher on AP exams between the whole sample population (M = 54.81, SD = 31.11), with science teachers students scoring a 3 less often (M = 50.37, SD = 32.52). Teachers of science had more hours spent in College Board professional development related to AP (M = 84.26, SD = 89.34), than the whole sample population (M = 64.21, SD = 94.10). Finally, there was little difference between the whole sample population (M = 22.88, SD = 5.49) and science teachers (M = 22.57, SD = 4.35) in the composite effectiveness rating of College Board professional development (Table 9).

Table 9

Number and (Percentage) of Responses to Perceptions of Effectiveness of College Board Professional Development by Science Teachers

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	0 (0.0%)	2 (4.3%)	4 (8.7%)	6 (13.0%)	26 (56.5%)	8 (17.4%)
New ideas to assess	0 (0.0%)	2 (4.3%)	8 (17.4%)	13 (28.3%)	15 (32.6%)	8 (17.4%)
Deeper understanding of the content	1 (2.2%)	5 (10.9%)	7 (15.2%)	13 (28.3%)	15 (32.6%)	5 (10.9%)
Deeper understanding of AP exams	0 (0.0%)	2 (4.3%)	1 (2.2%)	8 (17.4%)	20 (43.5%)	15 (32.6%)
Awareness of appropriate rigor	0 (0.0%)	5 (10.9%)	4 (8.7%)	14 (30.4%)	17 (37.0%)	6 (13.0%)

Almost no difference was reported between science teachers (86.9%) and the whole sample population (87.5%) who responded they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. The whole sample population reported more frequently (81.5%) they somewhat agreed, agreed, or strongly agreed than science teachers (78.3%) that College Board professional development related to AP provided them with new ideas to assess students in AP courses. Similar to that finding, science teachers reported less frequently (71.8%) than the whole sample population (77.8%) they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with a deeper

understanding of the content they were teaching. The whole sample population responded less often (90.3%) than the science teachers (93.5%) that College Board professional development related to AP had provided them with a deeper understanding of AP examinations. Finally, a difference was reported between science teachers (80.4%) and the whole sample population (82.5%) that College Board professional development related to AP had provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work.

Social Studies Teachers

When compared to the whole sample population (M = 7.69, SD = 8.53), social studies teachers had taught for a similar number of years (M = 7.06, SD = 4.97). Social studies teachers had earned fewer graduate hours in their content area (M = 12.88, SD = 18.24) than the whole sample population (M = 19.71, SD = 21.62). There was a difference in the percent of students scoring a 3 or higher on AP exams between the whole sample population (M = 54.81, SD = 31.11), and social studies teachers students who scored a 3 less often (M = 51.18, SD = 25.64). Teachers of social studies had fewer hours spent in College Board professional development related to AP (M = 57.78, SD = 100.58), than the whole sample population (M = 64.21, SD = 94.10). Finally, there was no difference between the whole sample population (M = 22.88, SD = 5.49) and social studies teachers (M = 22.80, SD = 4.37) in the composite effectiveness rating of College Board professional development (Table 10).

Table 10

Number and (Percentage) of Responses to Perceptions of Effectiveness of College Board Professional Development by Social Studies Teachers

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	1 (2.0%)	2 (4.0%)	2 (4.0%)	14 (28.0%)	23 (46.0%)	8 (16.0%)
New ideas to assess	1 (2.0%)	2 (4.0%)	3 (6.0%)	20 (40.0%)	24 (48.0%)	0 (0.0%)
Deeper understanding of the content	1 (2.0%)	4 (8.0%)	5 (10.0%)	10 (20.0%)	24 (48.0%)	6 (12.0%)
Deeper understanding of AP exams	1 (2.0%)	2 (4.0%)	0 (0.0%)	8 (16%)	23 (46.0%)	16 (32%)
Awareness of appropriate rigor	1 (2.0%)	1 (2.0%)	6 (12.0%)	10 (20.0%)	25 (50.0%)	7 (14.0%)

A difference was reported between social studies teachers (90.0%) and the whole sample population (87.5%) who responded they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. The whole sample population reported less frequently (81.5%) they somewhat agreed, agreed, or strongly agreed than social studies teachers (88.0%) that College Board professional development related to AP provided them with new ideas to assess students in AP courses. Similar to that finding, social studies teachers reported more frequently (80.0%) than the whole sample population (77.8%) they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with a deeper

understanding of the content they were teaching. The whole sample population responded less often (90.3%) than the social studies teachers (94.0%) that College Board professional development related to AP had provided them with a deeper understanding of AP examinations. Finally, a difference is reported between social studies teachers (84.0%) and the whole sample population (82.5%) that College Board professional development related to AP had provided them with increased awareness on the appropriate amount of rigor to ensure students were ready for college-level work.

Other Teachers

When compared to the whole sample population ($M = 7.69$, $SD = 8.53$), other teachers had taught for fewer number of years ($M = 4.37$, $SD = 2.84$). Other teachers had earned more graduate hours in their content area ($M = 27.47$, $SD = 26.14$) than the whole sample population ($M = 19.71$, $SD = 21.62$). There was a difference in the percent of students scoring a 3 or higher on AP exams between the whole sample population ($M = 54.81$, $SD = 31.11$), and other teachers students who scored a 3 more often ($M = 65.17$, $SD = 36.61$). Teachers of other subjects had fewer hours spent in College Board professional development related to AP ($M = 34.76$, $SD = 25.44$), than the whole sample population ($M = 64.21$, $SD = 94.10$). Finally, there was a slight difference between the whole sample population ($M = 22.88$, $SD = 5.49$) and other teachers ($M = 21.61$, $SD = 7.00$) in the composite effectiveness rating of College Board professional development (Table 11).

Table 11

Number and (Percentage) of Responses to Perceptions of Effectiveness of College Board Professional Development by Other Teachers

Perception	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
New ideas to instruct	3 (7.9%)	4 (10.5%)	0 (0.0%)	6 (15.8%)	14 (36.8%)	11 (28.9%)
New ideas to assess	2 (5.3%)	4 (10.5%)	3 (7.9%)	7 (18.4%)	16 (42.1%)	6 (15.8%)
Deeper understanding of the content	4 (10.5%)	6 (15.8%)	2 (5.3%)	8 (21.1%)	10 (26.3%)	8 (21.1%)
Deeper understanding of AP exams	2 (5.3%)	5 (13.2%)	0 (0.0%)	6 (15.8%)	10 (26.3%)	15 (39.5%)
Awareness of appropriate rigor	2 (5.3%)	4 (10.5%)	3 (7.9%)	11 (28.9%)	12 (31.6%)	6 (15.8%)

A difference was reported between other teachers (81.5%) and the whole sample population (87.5%) who responded they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with new ideas to instruct students in AP courses. The whole sample population reported more frequently (81.5%) they somewhat agreed, agreed, or strongly agreed than other teachers (76.3%) that College Board professional development related to AP provided them with new ideas to assess students in AP courses. Similar to that finding, other teachers reported less frequently (68.5%) than the whole sample population (77.8%) they somewhat agreed, agreed, or strongly agreed that College Board professional development related to AP provided them with a deeper understanding of the

content they were teaching. The whole sample population responded more often (90.3%) than the other teachers (81.6%) that College Board professional development related to AP had provided them with a deeper understanding of AP examinations. Finally, a difference was reported between other teachers (76.3%) and the whole sample population (82.5%) that College Board professional development related to AP had provided them with increased awareness on the appropriate amount of rigor to ensure students were ready for college-level work.

Inferential Analysis

The following hypotheses were formulated to guide this study. Each hypothesis is presented individually with the analysis of the results that determined the acceptance or rejection of each. The significance level of .05 was determined as appropriate for all of the hypotheses which were tested in the null form.

$H_0$1. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of English/language arts.

$H_0$2. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of mathematics.

$H_0$3. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of science.

$H_0$4. AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background, do not serve as predictors of student success on AP tests in the area of social studies.

Null Hypothesis 1

The first null hypothesis examined whether AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background were predictors of student success on AP tests in the area of English/language arts. This null was tested using multiple regression. The assumptions within a multiple regression were examined to ensure the results were valid. The assumptions of independence of residuals, linearity, homoscedasticity, multicollinearity, detecting outliers, and normality of residuals were not violated during this test. Independence of residuals ensures that there is no correlation between the residuals within the model (Lomax & Hahs-Vaughn, 2012). A Durbin-Watson test, with values ranging from 0 – 4, to be met looked for a value close to 2. In this study, the Durbin-Watson score was approximately 2, so the assumption was met. For the assumption of linearity to be met, the collective linear relationship is examined by plotting standardized residuals versus the unstandardized predicted values (Lomax & Hahs-Vaughn, 2012). In this study, the residuals formed a horizontal band, indicating a linear relationship between the collective predictor variables and the criterion variable, so the assumption was met. The assumption of homoscedasticity, "also known as homogeneity of variance" (Lomax & Hahs-Vaughn, 2012, p. 20), is tested with the plot of standardized residuals versus unstandardized predicted values. For this study, the assumption was met when the plot did not show evidence of the residual spread increasing or decreasing as the predicted value of the criterion variable increased. Multicollinearity ensures that the predictor variables are not too heavily correlated, which would result in being unable to determine which predictor variable was explaining the variance within the criterion variable (Lomax & Hahs-Vaughn, 2012). Examination of the standardized residuals determined that no data point was more than 1.5 standard deviations from the typical pattern of

points, which meant there were no outliers discovered; therefore, this assumption was met. The assumption of normality was examined using the normal *p-p* plot of the regression standardized residual, which ensures that the residuals within the model are normally distributed (Lomax & Hahs-Vaughn, 2012). In this study, evidence was present that the residuals were aligned with the diagonal line on the normal *p-p* plot of the regression standardized residual, so the assumption was met.

Respondent scores were used to calculate a Pearson *R*. The resulting multiple correlation coefficient for this hypothesis was $R = .567$. "The Pearson correlation measures the degree and the direction of the linear relationship between two variables" (Gravetter & Wallnau, 2013, p. 514). The correlation value, *R*, will range between 0 – 1, and the closer the value is to 1, the stronger the relationship that exists between the predictor variables and the criterion variables. R^2, the multiple coefficient of determination, explains how much variance in the criterion variable is explained by the predictor variable (Gravetter & Wallnau, 2013). The R^2 for this hypothesis was 32.1%. Adjusted R^2 was a more conservative estimate taking into consideration the sample size and number of predictors. The adjusted R^2 for this hypothesis was .224; and shrinkage of the model was .097; therefore, 9.7% of the explained variance was lost. Standard error of estimate is the average residual distance from the regression line, also called the line of best fit or prediction line (Gravetter & Wallnau, 2013). The standard error of estimate for this hypothesis was 24.54.

The model was statistically significant, $R^2 = .321$, adjusted $R^2 = .22$, $F(4, 28) = 3.32$, $p = .024$. The number of years teaching *AP* ($t = -2.52$, $p = .018$) and the number of hours spent in College Board professional development ($t = 2.93$, $p = .007$) were statistically significant predictors of student success on AP exams; whereas, other predictor variables were not

significant. As years teaching AP English/language arts increases, passing rates on student exams are predicted to decrease. For every additional year a teacher has taught the AP English/language arts course, the predicted passing rates on student exams is expected to decrease by 2.27%, while holding all other predictors constant. For every additional hour of College Board professional development a teacher earns, the predicted passing rates on student exams is expected to increase by 1.12%, while holding all other predictors constant. The beta weight of .570 indicated hours of College Board professional development is a stronger predictor than years of teaching experience. Table 12 shows the results of the responses for English/language arts teachers.

Table 12

Regression Coefficients English/Language Arts

Variable	*B*	Sb	Beta	*t*	Sig
Years teaching AP	-2.27	.90	-.50	-2.52	.018
Graduate Hours	-.11	.21	-.09	-.53	.602
College Board PD Hours	.11	.04	.57	2.93	.007
Effectiveness Rating	.59	.76	.13	.77	.448

Null Hypothesis 2

The second null hypothesis examined whether AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background were predictors of student success on AP tests in the area of mathematics. This null

was tested using multiple regression. The assumptions within a multiple regression were examined to ensure the results were valid.

Respondent scores were used to calculate a Pearson *R*. The resulting correlation coefficient for this hypothesis was $R = .313$. The R^2 for this hypothesis was 9.8%. The adjusted R^2 for this hypothesis was .016; and shrinkage of the model was .082; therefore, 8.2% of the explained variance was lost. The standard error of estimate for this hypothesis was 31.42. The model was not statistically significant, $R^2 = .098$, adjusted $R^2 = .016$, $F(4, 44) = 1.195$, $p = .326$. The predictor variables within this test did not explain a significant amount of variance in the math scores to allow them to predict the criterion variable.

Null Hypothesis 3

The third null hypothesis examined whether AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background were predictors of student success on AP tests in the area of science. This null was tested using multiple regression. The assumptions within a multiple regression were examined to ensure the results are valid.

Respondent scores were used to calculate a Pearson *R*. The resulting correlation coefficient for this hypothesis was $R = .293$. The R^2 for this hypothesis was 8.6%. The adjusted R^2 for this hypothesis was .000; and shrinkage of the model was .086; therefore, 8.6% of the explained variance was lost. The standard error of estimate for this hypothesis was 32.58. The model was not statistically significant, $R^2 = .086$, adjusted $R^2 = .000$, $F(4, 41) = .961$, $p = .439$. The predictor variables within this test did not explain a significant amount of variance in the science scores to allow them to predict the criterion variable.

Null Hypothesis 4

The fourth null hypothesis examined whether AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background were predictors of student success on AP tests in the area of social studies. This null was tested using multiple regression. The assumptions within a multiple regression were examined to ensure the results are valid.

Respondent scores were used to calculate a Pearson *R*. The resulting correlation coefficient for this hypothesis was $R = .489$. The R^2 for this hypothesis was 23.9%. The adjusted R^2 for this hypothesis was .171; and shrinkage of the model was .068; therefore, 6.8% of the explained variance was lost. The standard error of estimate for this hypothesis was 23.34.

The model was statistically significant, $R^2 = .239$, adjusted $R^2 = .17$, $F(4, 45) = 3.53$, $p = .014$. The number of years teaching AP ($t = 2.77$, $p = .008$) were statistically significant predictors of student success on AP exams; whereas, other predictor variables were not significant. As years teaching AP social studies increases, passing rates on student exams are predicted to increase. For every additional year a teacher has taught the AP social studies course, the predicted passing rates on student exams is expected to increase by 1.95%, while holding all other predictors constant. Table 13 shows the results of the responses for social studies teachers.

Table 13

Regression Coefficients Social Studies

Variable	*b*	Sb	Beta	*t*	Sig

Years teaching AP	1.95	.70	.38	2.77	.008
Graduate Hours	.06	.19	.04	.33	.745
College Board PD Hours	.05	.03	.21	1.59	.118
Effectiveness Rating	.51	.77	.09	.66	.510

Summary

Throughout this chapter, quantitative data were used to find answers to the four research questions in the study. Research Question 1 demonstrated that AP teachers in English/language arts were predicted to have lower passing rates on the AP exam as years of teaching experience increases, and as hours of professional development provided by the College Board increased, student success on AP exams is predicted to increase. Research Questions 2 and 3 demonstrated no significant findings for student success rates on AP exams as teacher predictor variables in mathematics and science were evaluated. Research Question 4 demonstrated that as years of teaching experience increased for social studies teachers, student success on AP exams is predicted to increase.

CHAPTER 5

SUMMARY OF FINDINGS, RESULTS, IMPLICATIONS, AREAS OF FUTURE RESEARCH

This chapter is organized into four sections: the summary of findings, results, implications, and recommendations for future studies. The summary of findings provides an overview of what this study discovered. The results section provides the specific results of the study as related to each research question. The implications section describes the impact this study may have on educational leadership practices related to the AP program in the state of Indiana. Recommendations for future studies offer possible topics for future research regarding the AP program.

The significance of this quantitative study was to add to existing educational literature on the role of the AP teacher in AP course success for students, including the role teacher professional development plays in those courses. As this study is reaching a conclusion, it coincides with the typical timeline that the College Board releases its annual report. The current AP *Report to the Nation* (College Board, 2014e) is worthy of revisiting at this point in this study. Released on February 11, 2014 *The 10th Annual AP Report to the Nation* begins with this sentence: "From the moment students step into an AP classroom, they notice the difference—in the teacher's approach to the subject . . ." (College Board, 2014e, p. 5). That the College Board chose that statement to open its report on a decade's worth of data is indicative of the growing emphasis placed on teacher professional development and the impact of that professional

development on student success on AP exams. Over 132,000 high school teachers in the United States taught an AP course in 2012-2013, and over 5,200 college and university instructors and professors reviewed syllabi, developed curriculum, and scored AP exams (College Board, 2014e). The College Board stated in the 10th annual report,

> Through high-quality professional development and active teacher participation in the online AP teacher community, successful strategies are shared beyond individual classrooms. These groups of high school teachers and college and university personnel come together to evaluate actual student work—allowing themselves to be invested in this process from the beginning to the end. (College Board, 2014e, p. 17)

At the state level, the AP-TIP, located at the University of Notre Dame, South Bend, Indiana, just published information advertising "Free Professional Development Opportunity–A 'Taste of LTF'" (AP-TIP, 2015). Laying the Foundation (LTF) "provides teaching strategies and content knowledge that increase rigor in the classroom; offering educators a variety of opportunities to strengthen their knowledge and practice" (AP-TIP, 2015, para. 2). Informational sessions about LTF are being provided in February 2015, with the LTF training taking place over four days in the summer of 2015 (AP-TIP, 2015).

This study investigated four research questions related to AP teachers' professional development. The four research questions were

1. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of English/language arts?

2. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of mathematics?
3. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of science?
4. Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of social studies?

This study utilized a survey that was sent to all public school AP teachers in the state of Indiana in 2013-2014. The survey quantitatively measured the perceptions of the effectiveness of College Board professional development for AP teachers. In the survey each respondent was asked to rate his or her perception of the effectiveness of College Board professional development using a 6-point Likert scale with a range of strongly disagree to strongly agree. The results of the survey were statistically analyzed and interpreted in order to answer the research questions.

Summary of Findings

The survey results showed that 216 AP teachers responded to the survey. The survey results indicated 87.5% of AP teachers showed some level of agreement (somewhat agreed, agreed, strongly agreed) that College Board professional development was a resource which provided them with new ideas to instruct students in AP courses, and 81.5% showed some level of agreement that College Board professional development was a resource for new ideas to assess students in AP courses. When responding to the survey question about developing a

deeper understanding of the content they were teaching, 77.8% of AP teachers showed some level of agreement that the College Board was a resource. Of the AP teachers who responded to the survey, 90.3% showed at least some level of agreement that the College Board professional development provided them with a deeper understanding of AP exams. Relevant to appropriate levels of rigor to ensure students are ready for college-level work, 82.5% of AP teachers agreed on some level that the College Board was a provider of professional development in this area.

The College Board offers 34 courses for high school students, two in English/language arts, three in mathematics, six in science, nine in social studies, and 14 other courses (College Board, 2014e). As survey responses were considered among the type of teacher (English/language arts, mathematics, science, social studies, and other), the data revealed some trends. When asked to respond to the level of agreement that College Board professional development provides teachers with new ideas to instruct students in AP courses, social studies teachers demonstrated at least some level of agreement at a higher percent (90.0%) than math teachers (89.7%), English/language arts teachers (87.8%), science teachers (86.9%), with other teachers responding with the lowest percent of some level of agreement (81.5%).

Survey respondents were asked if College Board professional development provided them with new ideas to assess students in AP courses. Like the responses to instruction, social studies teachers demonstrated at least some level of agreement at a higher percent (88.0%) than math teachers (85.7%), science teachers (78.3%), other teachers (76.3%), with English/language arts teachers responding with the lowest percent of some level of agreement (75.7%).

The survey question that asked if College Board professional development provided teachers with a deeper understanding of the content they were teaching found English/language arts teachers to have at least some level of agreement at a higher percent (84.8%) than math

teachers (83.7%), social studies teachers (80.0%), science teachers (71.8%), and other teachers responding with the lowest percent of some level of agreement (68.5%).

Respondents in all subjects reported the highest percent of some level of agreement when answering the survey question about College Board professional development providing them with a deeper understanding of AP examinations. Social studies teachers reported the highest percent of agreement (94.0%), followed by science teachers (93.5%), math teachers (91.8%), English/language arts teachers (88.0%), and other teachers (81.6%).

The final survey question asked respondents if College Board professional development provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work. Math teachers reported the highest percent of at least some level of agreement (87.8%), followed by social studies teachers (84.0%), English/language arts teachers (81.8%), science teachers (80.4%), and other teachers (76.3%).

Worth noting is a finding among the responses to the survey question about College Board professional development providing teachers with a deeper understanding of the content they were teaching. Although math teachers, science teachers, social studies teachers, and other teachers reported this as their lowest percent of at least some level of agreement, English/language arts teachers reported this as their highest percent of some level of agreement. This is interesting given that this study found as years teaching AP English/language arts increases, passing rates on student exams are predicted to decrease, and for every additional hour of College Board professional development a teacher earns, predicted passing rates on student exams are expected to increase. It seems reasonable that English/language arts professional development provided by the College Board could focus less on content, which English/language

arts teachers respond about most favorably, and increase levels of training on English/language arts AP exams.

Another finding to consider was associated with social studies teachers. On three of the five survey questions (new ideas to instruct, new ideas to assess, and deeper understanding of AP exams) social studies teachers reported higher percents of at least some level of agreement than teachers of English/language arts, mathematics, science, and other teachers. This level of agreement may explain the finding in this study that as years teaching AP social studies increased, passing rates on student exams are predicted to increase.

When looking at the group of teachers in the other category it was important to keep in mind that these AP courses might be considered electives. The 14 courses (Art History, Chinese Language & Culture, Computer Science A, French Language & Culture, German Language & Culture, Italian Language & Culture, Japanese Language & Culture, Latin—Vergil, Music Theory, Spanish Language, Spanish Literature, Studio Art—Drawing, Studio Art—2 D Design, and Studio Art—3 D Design), and the teachers who responded to the survey for this study, demonstrated the lowest percent of at least some level of agreement on four of the five survey questions (new ideas to instruct, deeper understanding of the content, deeper understanding of AP exams, and awareness of appropriate rigor).

Also worth a closer look was the way teachers answered *strongly agree* to the five survey questions about their perceptions of College Board professional development. On all five questions (new ideas to instruct, new ideas to assess, deeper understanding of the content, deeper understanding of AP exams, and awareness of appropriate rigor) math teachers had the highest percent of teachers who responded *strongly agree*. Regarding new ideas to instruct, 40.8% of math teachers indicated strong agreement that College Board professional development provided

them with new ideas to instruct students in AP courses, the next highest percent of strong agreement was among English/language arts teachers (39.4%). Math teachers strongly agreed at a level of 30.6% that College Board professional development provided them with new ideas to assess students in AP courses. The next highest percent of strong agreement was from English/language arts teachers (18.2%). Math teachers also strongly agreed at a level of 28.6% that College Board professional development provided them with a deeper understanding of the content they are teaching, the next highest percent of strong agreement was among other teachers (21.1%). College Board professional development providing teachers with a deeper understanding of AP exams was the area where math teachers demonstrated the highest level of strong agreement (57.1%), followed by English/language arts teachers at 45.5%. Finally, math teachers indicated 32.7% of the time strong agreement that College Board professional development provided them with increased awareness on the appropriate amount of rigor to ensure students are ready for college-level work, followed by other teachers (15.8%).

Results

Research Question 1

Research Question 1 asked, "Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of English/language arts?" This study revealed that for teachers of English/language arts in the state of Indiana during the 2013-2014 school year, as years of teaching AP English/language arts increased, passing rates on student exams were predicted to decrease. For every additional year a teacher has taught the AP English/language arts course, the predicted passing rates on student exams was expected to decrease by 2.27%. The study also revealed that for every additional hour of College

Board professional development a teacher earns, the predicted passing rates on student exams in English/language arts was expected to increase by 1.12%. A potential reason for English/language arts students' AP exam scores increasing could be that College Board professional development provides teachers with a greater understanding of how exams are scored, and teachers provide students with insights into how to structure responses on the exam. When English/language arts teachers' years of teaching experience increases, and exam scores are predicted to decrease, it is possible that teachers with more years teaching experience do not attend training because they think there is nothing new to gain. Furthermore, it is possible that teachers new to the profession, and new to AP courses, have attended more recent professional development opportunities than those with more years of teaching experience.

Research Question 2

Research Question 2 asked, "Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of mathematics?" This study did not reveal statistically significant data in the area of mathematics. One potential reason why no significance was found among math teachers could be related to what the College Board reports nationally, and in Indiana, about the students who take AP math courses and the corresponding AP exam. Across the United States in 2013, fewer graduates left high school "having taken an AP exam" in the areas of math and science, 527,001 students, compared to graduates in 2013 who left high school "having taken an AP exam" in the areas of English/language arts and social studies, 828,186 students (College Board, 2014a, p. 14). The same was reflected in data from Indiana. In 2013, the "percentage of graduates leaving high school having taken an AP exam" was 13.4% in mathematics, 13.5% in science, 15.7% in

English/language, and 20.7% in social studies" (College Board, 2014a, p. 7). Nationally, more students graduated in 2013 scoring at least a 3 on an AP exam in English/language arts and social studies (56.5%) than in mathematics and science (55.4%; College Board, 2014a, p. 14). In Indiana where data are reported separately for the four content areas, 5.2% of graduates scored at least a 3 on an AP exam in science, 6.0% scored at least a 3 on an AP exam in math, 7.5% scored at least a 3 on an AP exam in English/language arts, and 8.4% scored at least a 3 on an AP exam in social studies (College Board, 2014a, p. 7).

Research Question 3

Research Question 3 asked, "Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of science?" This study did not reveal statistical significance in the area of science. As reported in Research Question 2, the national data and data from Indiana indicate that fewer students take courses in AP science and math, and those who do score at least a 3 on the exams less often than their peers who take AP courses in English/language arts and social studies. Another possible reason for this study finding no significance in the area of science could be the variety of content areas classified as science. Within the AP data, science reflects the subjects of biology, chemistry, environmental science, and physics. It is possible that teachers of biology have different perceptions than chemistry teachers about College Board professional development. Another potential reason for finding no significance in the area of science could be the way particular schools in Indiana sequence the science curriculum, thus allowing for greater numbers of students to take a class in a particular year, and not the next year.

Research Question 4

Research Question 4 asked, "Does AP teaching experience, total professional development hours, effectiveness rating for professional development, and educational background serve as predictors of student success on AP tests in the area of social studies?" This study revealed that the number of years teaching AP social studies courses were statistically significant predictors of student success on AP exams. As years teaching AP social studies increases, passing rates on student exams are predicted to increase. For every additional year a teacher has taught the AP social studies course, the predicted passing rates on student exams is expected to increase by 1.95%. This statistically significant predictor could be explained because as social studies teachers gain years of experience, they are better prepared to identify the bigger concepts in the social studies, and are more confident in what to leave out of instruction.

Implications

The need for high quality, accessible, and affordable professional development for teachers of AP courses, as well as for all teachers, is evident. The changes to Indiana standardized tests, and the changes to how public school teachers are evaluated in Indiana, bring to light the urgency with which professional development must be embedded into the daily experiences of classroom teachers at all levels. As discussed in the literature review for this study, the state of Indiana holds high schools responsible for its AP program through the state's accountability measures and performance goals (Pope, 2012). Indiana, since 2009, has required high schools to offer a minimum of two AP courses and requires school districts to provide AP science and math courses (Holstead et al., 2010). This study supports the idea that simply requiring high schools to offer a minimum of two AP courses may not be enough. The leaders of

Indiana public high schools, principals, assistant principals, teachers, and curriculum leaders will need to begin utilizing the tools available to increase the courses offered in AP, to increase the number of students in AP courses, and to encourage and support teachers in the pursuit of and implementation of professional development.

When considering who will teach AP courses, high school principals should consider factors other than the teachers who volunteer. This study provides some evidence that years of teaching experience may benefit AP students in social studies, but may be a detriment for students in English/language arts. This study provides some indication that hours earned in College Board professional development may benefit students in English/language arts. Increasingly, the College Board is placing emphasis on the importance of the AP reading, "on the surface, this is simply an operational and logistical feat. At its heart, it is the strength of the AP program" (College Board, 2014a, p. 18).

> The AP Reading offers a unique opportunity for collaboration and professional development among high school and higher education faculty that ultimately benefits students. It is an example of a truly meaningful P-16 initiative—secondary and postsecondary educators work side by side toward the common goal of scoring exams fairly. In doing so, they achieve several goals of P-16 initiatives: raising academic standards, conducting appropriate assessments, improving teacher quality, and generally smoothing student transitions from one level of learning to the next. (College Board, 2014a, p. 21)

Instructional leaders responsible for increasing student access and success in their school's AP program should investigate the process for gaining access to the AP Reading opportunity for their teachers. Specific to instructional leaders in Indiana, the opportunities

provided by the AP-TIP are worth pursuing. In the summer of 2015, AP teachers in English/language arts, math, and science can acquire approximately 28 hours of professional development (AP-TIP, 2015).

Areas for Further Research

This study focused on the opinions and perceptions of AP teachers in Indiana public high schools during the 2013-2014 school year relevant to professional development provided by the College Board. I provide the following recommendations to further this study.

One might conduct a study, using both quantitative and qualitative methodology, to gain a better understanding of why AP teachers of English/language arts courses, when years of experience teaching AP increases, are predicted to have a decrease in student exam scores.

One might conduct a qualitative study where teachers of AP courses are selected and interviewed about their opinions and perceptions of College Board professional development. This qualitative study could explore more specifically the perceptions of each content area of teaching, English/language arts, math, science and social studies. Further, the teachers identified as other could provide greater depth to their perceptions about College Board professional development.

One might conduct a regional study that gathers information from a broader group of AP teachers. This data would offer more statistical power to the study. A regional study may provide insights about the access and affordability of College Board professional development.

One might conduct a national study that gathers information from a still broader group of AP teachers, adding more statistical power to the study. Similar to the regional study, a national study could highlight areas of the United States where College Board professional development is readily available, and where it is not.

One might conduct a study that gathers input from other stakeholders, students, parents, etc. The opportunity for stakeholders to share their perceptions of the AP program could assist educational leaders with ideas to improve student access to and success in AP courses.

One might replicate this study to follow changes in the perceptions of College Board professional development. A replication of this study one-year, five-years, and 10-years from now could validate this study, and add to the field of educational literature and research related to the AP program.

Summary

Chapter 5 was organized into four sections. The summary of findings highlighted the survey responses from 216 AP teachers in the state of Indiana about their perceptions of College Board professional development. The results section discussed each of four research questions. Implications of this study attempted to identify some of the next steps for educational leaders to consider for improving their current AP programs. Finally, areas for further research were suggested.

As educational leaders consider allocation of limited resources, teacher professional development demands attention. Opportunities available through the College Board specific to teachers of AP courses, when taken advantage of, can provide benefits to teachers throughout a school building. The sharing of content knowledge, and instructional strategies proven to increase student success on AP exams, has merit across all curricular areas.

REFERENCES

Advanced Placement Training & Incentive Program. (2015). *Free professional development opportunity, a taste of ltf.* Retrieved from iei.nd.edu/aptipin

AP Enviro-Science. (n.d.). *Exam scoring guide.* Retrieved from https://sites.google.com/a/durablegoodz.com/apes/Home/The-Exam/exam-scoring-guide

Banchero, S., & Porter, C. (2013, February 20). AP scores up, reversing stagnation. *The Wall Street Journal Online.* Retrieved from http://online.wsj.com/

Bodenhausen, J. (1989). Advanced Placement instruction. Teacher credentials and student outcomes. *College Board Review, 153,* 48-51, 55-56.

Bracey, G. W. (2002). *What you should know about the war against America's public schools.* Boston, MA: Allyn & Bacon.

Breland, H., Maxey, J., Gernand, R., Cumming, T., & Trapani, C. (2002). *Trends in college admission 2000: A report of a national survey of undergraduate admissions policies, practices, and procedures.* Retrieved from http://www.semworks.net/about-us/resources/docs/trends_in_college_admission.pdf

Burham, P., & Hewitt, B. (1967). *Study of Advanced Placement examination scores of the college entrance examination board.* New Haven, CT: Yale University.

Burton, N. W., Whitman, N. B., Yepes-Baraya, M., Cline, F., & Kim, R. M. (2002). *Minority student success: The role of teachers in Advanced Placement courses.* (The College Board Research Report No. 2002-8). Retrieved from http://www.ets.org/Media/Research/pdf/RR-02-17-Burton.pdf

Callahan, C. M. (2003). Advanced Placement courses/exams. In J. W. Guthrie (Ed.), *Encyclopedia of education.* (2nd ed., Vol. 1, pp. 56-58). New York, NY: MacMillan.

Campus Beast. (2014). *The idiocy of Newsweek's high school rankings.* Retrieved from http://campusbeast.com/the-idiocy-of-newsweeks-high-school-rankings/

Casserly, P. L. (1986). *Advanced Placement revisited.* (College Board Report 86-6.) New York, NY: College Entrance Examination Board.

College Board. (n.d.). *Fee reduction for AP exams: Eligibility criteria.* Retrieved from https://professionals.collegeboard.com/testing/waivers/guidelines/ap

College Board. (2003). *A brief history of the Advanced Placement program.* Retrieved from www.collegeboard.com

College Board. (2005). *What's new in AP.* Retrieved from www.collegeboard.com

College Board. (2007a). *AP report to the nation 2007.* Retrieved from http://collegeboard.com/prod_downloads/about/news.info/ap/2007/ap-report_07.pdf

College Board. (2007b). *The value of the AP program: A presentation for parents.* Retrieved from http://apcentral.collegeboard.com/apc/public/repository/ap04_parentsnight_fin.ppt

College Board. (2008). *Bulletin for AP students and parents.* Retrieved from http://professionals.collegeboard.com/profdownload/ap-bulletin-students-parents.pdf

College Board. (2010). *History.* Retrieved from http://about.collegeboard.org/history

College Board. (2011). *Scholar counts.* Retrieved from http://professionals.collegeboard.com/k-12/awards/ap-scholar

College Board. (2011-2014). *District honor roll.* Retrieved from http://professionals.collegeboard.com/k-12/awards/ap-district-honor-roll

College Board. (2012). *Program participation and performance data 2012.* Retrieved from http://research.collegeboard.org/programs/ap/data/participation/2012

College Board. (2013a). *Exam fees and reductions: 2013.* Retrieved from http://apcentral.collegeboard.com/apc/public/exam/calendar/190165.html

College Board. (2013b) *Exam scores.* Retrieved from http://aphigered.collegeboard.org/exams/scoring

College Board. (2013c). *Program participation and performance data 2013.* Retrieved from http://research.collegeboard.org/programs/ap/data/participation/2013

College Board. (2013d) *Scholar awards.* Retrieved from http://professionals.collegeboard.com/k-12/awards/ap-scholar

College Board. (2013e). *The Advanced Placement program.* Retrieved from http://apcentral.collegeboard.com/apc/public/program/index.html

College Board. (2013f). *Training AP teachers.* Retrieved from http://professionals.collegeboard.com/k-12/assessments/ap/plan/training

College Board. (2014a). *2014 Details by state: AP exam fee assistance.* Retrieved from http://professionals.collegeboard.com/testing/ap/coordinate/details-state

College Board. (2014b). *AP scholarships.* Retrieved from www.collegeboard.com

College Board. (2014c). *Professional development workshops for educators: The official AP and Pre-AP 2014-2015 catalog.* Retrieved from www.collegeboard.org/apworkshops

College Board. (2014d). *The 10th annual AP report to the nation.* Retrieved from http://media.collegeboard.com/digitalServices/pdf/ap/rtn/10th-annual/10th-annual-ap-report.pdf

College Board. (2014e). *The 10th annual AP report to the nation: State supplement.* Retrieved from http://media.collegeboard.com/digitalServices/pdf/ap/rtn/10th-annual/10th-annual-ap-report-state-supplement-indiana.pdf

College Board. (2014f). *The 10th annual AP report to the nation: Subject supplement.* Retrieved from http://media.collegeboard.com/digitalServices/pdf/ap/rtn/10th-annual/10th-annual-ap-report-subject-supplement-spanish-language.pdf

Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives, 8*(1), 1-44. Retrieved from http://epaa.asu.edu/ojs/article/view/392/515

Darling-Hammond, L. (2001). *Doing what matters most: Investing in quality teaching.* New York, NY: National Commission on Teaching & America's Future.

Drew, C. (2011, January 9). Rethinking Advanced Placement. *New York Times.* Retrieved from http://www.nytimes.com/2011/01/09/education/edlife/09ap-t.html?pagewanted=all&_r=0

Duffett, A., & Farkas, S. (2009). *Growing pains in the Advanced Placement program: Do tough trade-offs lie ahead?* Washington, DC: Thomas B. Fordham Foundation & Institute. Retrieved from http://files.eric.ed.gov/fulltext/ED505527.pdf

Duke Talent Identification Program. (2007). *First ever AP course audit benefits stakeholders.* Retrieved from http://tip.duke.edu/node/896

Escalente, J., & Dirmann, J. (1990). The Jaime Escalante math program. *Journal of Negro Education, 59,* 407-423. Retrieved from http://www.journalnegroed.org/archive.html

Fatum, L. G. (2012). *Annual Indiana advanced placement performance report 2012.* Indianapolis, IN: Indiana Department of Education. Retrieved from http://www.in.gov/sboe/files/2012-ap-final-report.pdf

Ferguson, P., & Womack, S. T. (1993). The impact of subject matter and education coursework on teaching performance. *Journal of Teacher Education, 44*(1), 55-63.

Fowler, F. (2014). *Survey research methods.* Thousand Oaks, CA: Sage.

Fund for the Advancement of Education. (1957). *They went to college early.* New York, NY: Author. Retrieved from https://archive.org/details/TheyWentToCollegeEarly

Funding Universe. (2014). *No GRE graduate schools.* Retrieved from http://www.fundinguniverse.com/company-histories/educational-testing-service-history/

Furry, W., & Hecsh, I. (2001). *Characteristics and performance of Advanced Placement classes in California.* Sacramento, CA: Institute for Education Reform. Retrieved from http://www.docstoc.com/docs/135643765/Characteristics-and-Performance-of-Advanced-Placement-Classes-in

Garet, M., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38,* 915-945. Retrieved from http://www.jstor.org/stable/3202507

Gravetter, F. J., & Wallnau, L. B. (2013). *Statistics for the behavioral sciences* (9th ed.). Belmont, CA: Wadsworth.

Grove, A. (2013). *AP classes – Why they matter.* Retrieved from http://collegeapps.about.com/od/apadvancedplacement/tp/ap-classes.htm

Gruendyke, M. (2012). *Certificate in teaching Advanced Placement programs.* Retrieved from http://www.extension.ucr.edu/academics/certificates/teaching_ap.html

Guskey, T. (2009). *Closing the knowledge gap on effective professional development.* Educational HORIZONS. Retrieved from http://files.eric.ed.gov/fulltext/EJ849021.pdf

Hanover Research. (2012). *Improving AP student performance.* Washington, DC: Author. Retrieved from http://www.hanoverresearch.com

Hansen, A. (2005). *Research brief: Success in Advanced Placement courses.* Retrieved from http://www.educationpartnerships.org/

Hansen, K., Reeve, S., Gonzalez, J., Sudweeks, R. R., Hatch, G. L., Esplin, P., & Bradshaw, W. S. (2006). Are Advanced Placement English and first-year college composition equivalent? A comparison of outcomes in the writing of three groups of sophomore college students. *Research in the Teaching of English, 40,* 461-501. Retrieved from http://www.jstor.org/stable/40171711

Hargrove, L. (2007). *AP students* "*significantly outperform*" *peers according to two landmark studies by University of Texas at Austin researchers.* Austin, TX: Office of Public Affairs. Retrieved from http://www.utexas.edu/news/2007/03/26/education/

Holstead, M. S., Spradlin, T. E., McGillivray, M. E., & Burroughs, N. (2010). The impact of Advanced Placement incentive programs. *Education Policy Brief, 8*(1). Center for Evaluation & Education Policy, Bloomington, IN. Retrieved from http://files.eric.ed.gov/fulltext/ED510967.pdf

Hood, L. (2010). Putting AP to the test. *Harvard Education Letter, 26*(3). Retrieved from http://hepg.org/hel-home/issues/26_3/helarticle/putting-ap-to-the-test_466

Indiana College and Career Ready Standards. (2014). Retrieved from www.in.gov/sboe/files/Indiana_College-_and_Career-Ready_Standards_Presentation.pdf

Indiana Department of Education. (2010). *Annual report.* Retrieved from http://www.in.gov/legislative/ic/2010/title20/ar36/ch3.pdf

Imig, A. (2009). *A case study of teacher effectiveness in Advanced Placement courses* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3349287)

Institute for Educational Initiatives. (2013). *Advanced Placement training and incentive program* (APTIP). Notre Dame, IN: University of Notre Dame. Retrieved from http://iei.nd.edu/programs/advanced-placement-training-incentive-program-ap-tip-in/

Johnson, L. (2005). *Why is it important to take challenging classes? Davidson Institute for Talent Development.* Retrieved from http://www.davidsongifted.org/db/Articles_id_10330.aspx

Kantrowitz, B. (2005, May 15). The 100 best high schools in America. *Newsweek*. Retrieved from http://www.newsweek.com/100-best-high-schools-america-118685

King, B. M., Rosopa, P. J., & Minium, E. W. (2011). *Statistical reasoning in the behavioral sciences* (6th ed.). Danvers, MA: Wiley.

Kline, D. (2012). *Training AP teachers.* Retrieved from http://professionals.collegeboard.com/k-12/assessment/ap/plan/training

Klopfenstein, K. (2003). Recommendation for maintaining the quality of Advanced Placement programs. *American Secondary Education, 32*(1). Retrieved from http://www.utdallas.edu/research/tsp-erc/pdf/jrnl_klopfenstein_2004_recommendations_maintaining_ap_programs.pdf

Koos, L. (1925). Overlapping in high school and college. *The Journal of Educational Research, 11,* 322-336. Retrieved from http://www.jstor.org/stable/27523097

Kyburg, R. M., Hertberg-Davis, H., & Callahan, C. M. (2007). Advanced Placement and international baccalaureate programs: Optimal learning environments for talented minorities? *Journal of Advanced Academics, 18,* 172-215. Retrieved from http://www.prufrock.com/client/client_pages/prufrock_jm_jaa.cfm

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

Lomax, R. G., & Hahs-Vaughn, D. L. (2012). *Statistical concepts, a second course* (4th ed.). New York, NY: Taylor & Francis.

Mason, J. C. (2010). *The role of the teacher in Advanced Placement (AP) access* (Doctoral dissertation, California State University, Sacramento). Retrieved from http://www.csus.edu/coe/academics/doctorate/research/dissertations/cohort-1/assets/mason-justin-role-teacher-advanced.pdf

Mathews, J. (2005, May 10). How to build a better high school. *Washington Post.* Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2005/05/10/AR2005051001100.html

Milewski, G. B., & Gillie, J. M. (2002). *What are the characteristics of Advanced Placement teachers? An examination of survey research.* New York, NY: College Entrance Examination Board.

Miller, L. (1994). *Effects of racial and socioeconomic factors on Advanced Placement programs* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 9606827)

Mills, H. C. (1935). Duplication of effort between high school and college. *The School Review, 43,* 363-370. Retrieved from http://www.jstor.org/stable/1080271

Morgan, R., & Crone, C. (1993). *Advanced Placement examinees at the University of California: An examination of the freshman year courses and grades of examinees in biology, calculus, and chemistry* (Statistical Report 93-210). Princeton, NJ: Educational Testing Service.

Murnane, R. J., & Phillips, B. R. (1981). Learning by doing, vintage, and selection: Three pieces of the puzzle relating teaching experience and teaching performance. *Economics of Education Review, 1*(4), 453-465. doi:10.1016/0272-7757(81)90015-7

Oberjuege, M. (1999). Raising the bar: Historically disadvantaged students can meet the AP challenge. *The History Teacher, 32,* 263-267. Retrieved from http://www.jstor.org/stable/494446

Paek, P. L., Ponte, E., Sigel, I., Braun, H., & Powers, D. (2005). *A portrait of Advanced Placement teachers' practices* (Research Report No. 2005-7). New York, NY: College Entrance Examination Board. Retrieved from http://www.ets.org/Media/Research/pdf/RR-05-09.pdf

Parker, F. (1961). Continuity between high school and college. *Education Leadership, 18,* 346-350. Retrieved from http://www.ascd.org/ASCD/pdf/journals/ed_lead/el_196103_parker.pdf

Patterson, B. F., & Laitusis, V. (2006). *AP professional development in Florida: Effects on AP exam participation* (Research Notes, RN-27). New York, NY: College Board. Retrieved from http://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2006-27-ap-professional-development-florida-participation.pdf

Pettigrew, T., & Tropp, L. (2005). Relationships between intergroup and prejudice among minority & majority status groups. *Psychological Science, 16,* 951-957.

Pope, J. (2012, May 6). Advanced Placement tests on the rise. *Louisville Courier-Journal,* A5.

Santoli, S. P. (2002). Is there an advanced placement advantage? *American Secondary Education, 30*(3), 23-35. Retrieved from http://www.jstor.org/stable/41064460

Sawchuk, S. (2009, April 29). AP teachers divided over push to open classes to all. *Education Week.* Retrieved from http://www.edweek.org/ew/articles/2009/04/29/31ap.h28.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+EducationWeekTeachers+(Education+Week+Topic%3A+Teachers)

Schmitt, W. (2013). *AP innovation progress pays: More prepared to succeed in college.* Retrieved from http://iei.nd.edu/news/43080-ap-tip-in-success-story-from-indiana-education-insight/

Simms, D. (1982). *Comparison of academic performance between AP and non-AP students at the University of Michigan.* [Unpublished manuscript].

Stanford University. (2009). *College Board Advanced Placement (AP) chart 2009-10.* Retrieved from http://registrar.stanford.edu/pdf/AP_Chart_2009-10.pdf

State of Washington. (2014). *Elementary and Secondary Education Act.* Olympia, WA: Office of the State Superintendent of Instruction. Retrieved from http://www.k12.wa.us/esea/

Teicher, S. A. (2000, October 17). In this AP program, it pays to study. *Christian Science Monitor, 18.* Retrieved from http://www.csmonitor.com/2000/1017/p18s1.html

Toppo, G. (2013, February 20). Advanced placement aid varies. *USA Today.* Retrieved from http://www.usatoday.com/story/news/nation/2013/02/20/advanced-placement-high-school-classes/1928913/

VanderArk, T., & Cargill, S. (2012). *College Board improves AP exams & support for deeper learning & college readiness.* Retrieved from http://gettingsmart.com/cms/blog/2012/11/college-board-improves-ap-courses-exams-for-deeper-learning-college-readiness/

Wilbur, F., & Chapman, D. W. (1978). *College courses in the high school.* Reston, VA: National Association of Secondary School Principals.

Willingham, W. W., & Morris, M. (1986). *Four years later: A longitudinal study of Advanced Placement students in college.* New York, NY: College Entrance Examination Board.

Winebrenner, S. (2006). Effective teaching strategies for open enrollment honors and AP classes. *The Journal of Secondary Gifted Education, 17*(3), 159-177. Retrieved from http://www.prufrock.com/client/client_pages/prufrock_jm_jsge.cfm

APPENDIX A: TEACHER SURVEY

This survey will take approximately 10 minutes to complete. It consists of 11 questions, and the entire survey must be completed for data to be tabulated.

1. During the 2013-2014 school year, did you teach an Advanced Placement course?
   No
   Yes

2. For how many years, including 2013-2014, have you been teaching Advanced Placement courses? **Do not include 2014-2015.** _____ years

3. How many **graduate hours** have you earned in your **content** area? _____ hours

4. In which Advanced Placement content area(s) did you teach in the 2013-2014 school year?
   English/Language Arts _____ Mathematics _____
   Science _____ Social Studies _____
   Other _____

5. For the Advanced Placement exams taken by your students in 2013-2014, what percent of your students scored a 3 or higher? _____ percent scored a 3 or higher

6. How many total hours have you spent in College Board professional development related to Advanced Placement courses? _____ hours

   Rate your level of agreement on the next five questions. Ratings are Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree.

7. College Board professional development related to Advanced Placement has provided me with **new ideas to instruct** students in Advanced Placement courses.
   Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree

8. College Board professional development related to Advanced Placement has provided me with **new ideas to assess** students in Advanced Placement courses.
   Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree

9. College Board professional development related to Advanced Placement has provided me with a **deeper understanding of the content** I am teaching.
   Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree

10. College Board professional development related to Advanced Placement has provided me with a **deeper understanding of AP examinations**.
    Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree

11. College Board professional development related to Advanced Placement has provided me with increased awareness on the **appropriate amount of rigor** to ensure students are ready for college-level work.
    Strongly Disagree, Disagree, Somewhat Disagree, Somewhat Agree, Agree, Strongly Agree