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Effect on Student Achievement of Relaxing Admission Criteria into Advanced Placement Courses at an Affluent Suburban High School

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EFFECT ON STUDENT ACHIEVEMENT OF RELAXING ADMISSION CRITERIA INTO ADVANCED PLACEMENT COURSES AT AN AFFLUENT SUBURBAN HIGH SCHOOL

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ABSTRACT

Effect on Student Achievement of Relaxing Admission Criteria into Advanced Placement Courses at an Affluent Suburban High School

Participation in the Advanced Placement program is perceived as a key to future success. Success in AP courses can help students get admitted into colleges and often provide college credit or advanced standing. The U.S. Department of Education has linked the Advanced Placement program with its goals of providing a challenging education to high school students of all race, religion, and economic status.

On the other hand, the College Board has instituted an audit of all AP classes in order to ensure the quality of high school courses conducted under its auspices. Teachers, also, want to protect the integrity of their courses and are concerned with maintaining the challenge of the curriculum and the quality of instruction. School officials fear pressures to expand student enrollment will result in a "watering down" of course content. A slower pace and shallow classroom dialogue may well be the consequence of an admissions policy relaxed to permit more students to take AP classes.

The purpose of this study is to examine the effect on student achievement in AP courses by increasing admissions into the Advanced Placement program. Student achievement will be measured two ways: by final grades received in the classroom and by the scores earned on the national AP tests administered in May. One suburban upper socioeconomic high school will be examined where both the number of AP students and number of tests administered increased approximately 20% between the school years 2005-06 and 2006-07. Students admitted into AP courses due to relaxed standards in the second year that would not have been admitted the first year will be referred to as fringe students. Analysis of Covariance tests will be used to compare achievement of students.

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Dedication

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INTRODUCTION

The tone and fiber of our society depends upon a perseverance and almost universal striving for good performance. And the society is bettered not only by those who achieve it but by those who are trying. – John Gardner in Excellence (1961).

Perception matters! In a wealthy New Jersey suburb of New York City, residents are acutely aware of the Advanced Placement (AP) course offerings of their local high school. Indeed, the stellar reputation of the high school is built largely on a trio of measurable criteria that includes college admissions, SAT scores, and Advanced Placement success. It is widely believed that the AP program enhances the mystique of the high school and contributes to the success of its students in their applications for college admission.

On a regular basis, this school, Millburn High School, gains recognition from one publication or another. In the fall of 2007, the United States Department of Education presented the school with its Blue Ribbon Award in recognition for sustained academic excellence. A few weeks later, the *U.S. News and World Report* magazine included Millburn in its list of 100 schools across the nation that attained its gold medal of achievement. For years, *New Jersey Monthly* magazine has ranked Millburn High School as one of New Jersey's finest. The Advanced Placement program weighed heavily in determining all of these rankings.

Admission into Advanced Placement courses is inextricably linked to college acceptances in the minds of the community. Consequently, participation in Advanced Placement course is coveted by both high school students and their parents. In a school where 98%-99% of its students regularly go on to college, participation in AP courses is a

very powerful motivator. It is widely believed that AP is an important key to opening up college doors for high school applicants (Isaacs, 2001). Unfortunately, then, for many Millburn students, acceptance into AP courses is restrictive. Periodically, an open admission policy is debated than inevitably rejected in favor of a competitive process. Students must take a qualifying test to be admitted into an Advanced Placement course and demonstrate excellence with past grades and other criteria.

In recent years, community pressure has increased to admit more students into the AP program. Qualifying criteria is too restrictive according to many students, parents, and even faculty members. Considering the publicity that the Advanced Placement program receives in Millburn it is no wonder that admission is increasingly coveted and contested. In response to this sentiment, the high school has increased its rate of AP acceptance and expanded the number of such sections that it offers.

There is much concern about the consequences of expanding student participation. Student achievement may well be vulnerable to the increase in AP participants. Between 2006 and 2007, approximately 20% more Millburn High School students took 20% more AP tests. This paper will compare student achievement between those 2 years in order to determine any negative consequences by increasing student enrollment in these courses.

Overview

I would never join a club that allows a person like me to become a member – G. Marx

Decisions regarding admissions into Advanced Placement courses have a large impact on student lives. Naturally, these decisions generate much interest and concern, and are inherently controversial. Admission affects not only those students admitted

individually but, also, may well have repercussions on the group. Increasing the number of students in a class may theoretically stimulate or impede the learning of the others. Determining the effect of these admission decisions is not easy. It is no wonder that there are invariably concerns about both the equity and efficiency of admission decisions.

Acceptance of additional members into an organization changes the complexion of the group. Each member brings a unique set of characteristics into the mix and affects the preexisting entity. The knowledge, skills, humor, communication, and cooperation of each member blend together to form the ensuing union. The interplay between personalities invariably will change as the group expands or contracts. As the group continues to grow, its resulting transformation is difficult to predict.

Increasing the size of a class has unpredictable effects on student achievement. Additional students might achieve a synergism between classmates boosting overall student achievement (Holloway, 2001). On the other hand, additional students might drain the limited resources of the teacher resulting in less instruction per student and lower student achievement (Neihart, 2007). Much depends on the personalities of the people in the classroom and their abilities and attitudes.

Of paramount interest are the effects on the original students in the group. The interactions between all class members are not predictable. The personalities and academic strengths and weaknesses of additional students will ultimately have a major role in the achievement of the class. Measuring student achievement is not necessarily simple; indeed, some achievement indicators may show progress while others demonstrate regression and a cause for alarm.

For example, if student participation and enthusiasm increase while grades decline, the overall progress of the class is not clear. Or consider a scenario where the

teacher increases rote drilling and the class become increasingly boring but more effective when measured by test scores. To minimize such paradoxes, for the purpose of this study, progress will be confined to two quantifiable measures: course grades and national AP test scores.

Another dilemma occurs if one group of students is helped and another group is hurt when increasing the size of the class (Ireson, Hallam, Hack, Clark & Plewis, 2002). Previous studies have not arrived at consistent conclusions when examining heterogeneously mixed classes. Some researchers argue that the lower ability students are helped by being placed in a mixed ability group because they are exposed to ideas and challenges that they otherwise would not experience. Other researchers (Argys, Rees & Brewer, 1996) argue that this mixed grouping hurts the lower ability students because of factors such as frustration and a learning pace that moves too fast. Likewise, the higher ability students might be helped or hurt by heterogeneous grouping. Detailed explanations offered to classmates may be to the benefit of the advanced group or just increase their boredom. Increasing the number of AP participants introduces a wider range of abilities into the class and it is not clear, a priori, who will benefit and who will be hurt.

Depending upon the gauge used, additional students of lesser ability could raise or lower the overall measure of the existing structure (Bracey, 1993). The newly accepted students might – or might not – benefit from this union. Marx's comment, while intended as a humorous one-liner, may be interpreted as an insight that speaks to the logical consequence of a complicated interaction of blending various personalities and abilities.

Once upon a time, the prevalent school structure comprised of one classroom for all children: the fabled one room schoolhouse, an inherently heterogeneous arrangement. As schools evolved into a system consisting of multiple classrooms questions arose regarding how to assign the students into the various sections. Separation by age is a convenient method for separating students. It is easily delineated; however, not necessarily effective for facilitating learning. Likewise, separation of students by gender is easy to identify and implement but fraught with complex implications interpreted differently across time and societies.

Separation by a random process is another method employed frequently across the years. Often, classes are divided based upon interests and electives offered in the arts or social studies illustrate the use of this strategy. Of course, separation by ability is the cornerstone of any leveling system employed by schools. Teaching similar students intuitively seems to be an easier task and potentially more effective than teaching students with diverse backgrounds. Ability is not as easy to quantify as age or sex but offers compulsive rationale for its use. Consequently, a large segment of our current system in high schools has evolved using ability groupings to separate students into the various sections.

Once we use measures, such as ability, that are not clearly delineated to all, we should expect arguments about the criteria. It is not possible to get universal agreement on ability measurements. Instead, doubts and anxieties surface. Ultimately, our educational system is used as a gateway to determine opportunities for future success. Acceptance criteria into AP courses are scrutinized by students and their parents in today's world. No wonder Groucho Marx chose to cast disparagement on the general selection process of any group.

Decisions to admit students into particular classes and programs impact future choices of the students and, consequently, generate anxiety. Students placed into different classes can have vastly different experiences. For one thing, admission decisions affect what teacher the students will get. Different teachers are best for different learning styles and have different competencies and different personalities. They interact differently with different students.

Another result of the admission process is in the composition of the classes. The peers in the class a student interacts with are a significant factor in determining learning. Student interaction in a classroom depends greatly on the personality and abilities of the other students comprising the class. There is much evidence that suggests that a student's success in school depends less on SES (socio-economic status) factors than on the composition of their classes (Opdenakker, Van Damme, DeFraine, Van Landeghem & Onghena, 2002).

Finally, admission decisions affect the subject material that a student will learn. The written and the taught curriculum are likely to differ between various sections of a class. At times, when colleges during their admission process are evaluating the rigor of a student's education this is a problem as much with appearance as with substance. Colleges often use Advanced Placement courses to determine if a student is taking the most rigorous courses available to them at their particular high school.

Decisions regarding acceptance into Advanced Placement courses raise all of the above concerns – and more. Those denied admission are directed down education paths perceived as less desirable. The resulting teachers are different; the classmates are not the same; and the course work changes in comparison to the opportunities offered in the

Advanced Placement track. Admission decisions in the Advanced Placement program can have profound effects on students.

Expanding admissions into Advanced Placement classes has multiple effects. The morale and motivation of students are likely to be affected although difficult to measure (Eder, 1981). Teachers may adjust the curriculum, consciously or otherwise. Interactions in the classroom are likely to change between students and teachers.

The effect of admission policies in Advanced Placement (AP) courses on student achievement is the focus of this study. Specifically, the question is whether or not easing admission requirements in AP courses affect student achievement. Student achievement will be measured both by course grades and AP test scores. Comparisons will be made between students regularly admitted and students admitted due to expansive policies.

Background of the Advanced Placement Program

The Advanced Placement program is conducted under the auspices of the College Board. In 2007-08 school year, 37 courses were offered across the nation in 22 disciplines. Not every high school offers every course. Indeed many high schools across that nation do not offer an AP program. National exams are administered in May with students receiving scores ranging from a low of 1 to a high of 5. The College Board recommends that colleges give credit and/or advanced placement to students who perform well on the AP tests. Scores of 3 and above are often described by the College Board as being "qualified" to receive college recognition.

Admission into Advanced Placement (AP) classes at Millburn High School is extremely competitive. Decisions to accept students into AP courses generally depend on three factors: historical grades, teacher recommendations, and the results of a qualifying

test. Students must take a qualifying entrance test during February and March of the previous year for each AP course for which they seek admission. The individual AP teachers create these tests and evaluate the results. They then use a rubric to aggregate the results of the grades in previous courses, the recommendations, and the qualifying tests results to determine which students are admitted into the AP course. Admission is typically granted students who score high on this rubric.

The percentage of students who get admitted into AP classes varies between departments and even varies between individual courses. Some courses, such as AP American History, usually draw a couple of hundred applicants while other courses, such as physics, have usually no more than 40 applicants. The rate of acceptance also varies. Almost all applicants may be accepted into AP Art History while less than a quarter of the applicants are typically accepted into AP Biology.

Once admitted, students are typically held to higher standards than the average high school honors students. For example, it is not unusual for students to be assigned an extensive summer assignment before the start of the school year administered a test during the first day of school based on these assignments. Students are given more work and more responsibilities during the school year as well. At the end of an AP course students are expected to take a national exam in the subject. Many high schools require this exam; other schools consider this a voluntary choice to be decided by the student and parents. The College Board charges a fee -- $75 and rising -- for taking this exam and, again, whether the school or student pays this fee depends upon the policies of the individual schools.

Impact of Advanced Placement Participation

National exams in each Advanced Placement course are administered in May with students receiving scores ranging from a low of 1 to a high of 5. The College Board recommends that colleges give credit and/or advanced placement to students who perform well on the AP tests. Scores of 3 and above are often described as "qualified" for receiving college recognition. However, colleges differ in their treatment of AP results. Colleges may factor in AP courses when making admission decisions or colleges may use AP results to determine course placement if the student is actually admitted.

Advanced Placement publications state that 90% of the colleges give credit and/or advanced standing to students who earn a 4 or a 5 in any particular AP course. Many universities allow their individual departments to determine what credit, if any, to give to incoming students. At one time, it was common for AP scores of 3's to be accepted by colleges for consideration of credit. Many schools are now requiring a minimum of a 4, and a few demand a 5. AP courses may or may not fulfill part of a college's graduation requirements. Regardless of the changing policies of colleges across the nation, the general perception of high school students and their parents is that AP courses result in "college credit".

Student participation in the AP program is generally beneficial in determining college acceptances. There are several reasons for this. Colleges use participation in Advanced Placement courses in order to measure the relative rigor of a student's schedule. Taking an AP course is one gauge to determine if students are taking the most rigorous courses available to them at their individual high school.

The scores the students receive on the AP national tests conducted in May are important, also, to the colleges. The AP scores that applicants take before senior year is a

factor in deciding college admissions. Colleges often use all AP results, including senior year, to determine an incoming freshman's placement in the various disciplines. Results on the AP test are often used to predict future college success.

Of course, college admission officers, also, look at a high school student's grade point average (GPA) in determining admission. Considering that the better students tend to take Advanced Placement courses, AP students generally have higher grade point averages than students who do not take AP's. AP students' GPAs further enhance their college applications.

Enhancing GPAs further is the practice of assigning higher grade points to grades earned in Advanced Placement courses. For example, Millburn High School assigns to an "A" in a standard, non-honors course, 4.0 points. An "A" in an honors course is valued higher, 4.333 points. An "A" earned in an AP course then is worth higher points still, 4.667 points. The student taking AP courses in high schools such as this may well graduate with a GPA significantly above the 4.0 GPA level once viewed as the highest possible. The GPAs of students are an important indicator that colleges use for admission decisions. No wonder high school students, parents, and guidance counselors feel that AP courses help a student's chances in being admitted to college!

Advanced Placement participation not only is a factor in college admissions but also appears to help students once they are enrolled in colleges. Success in AP courses translates into success during college. AP students receive higher grades in colleges than do non-AP students (Morgan & Ramist, 1998). The College Board has conducted studies that show AP scores are positively correlated with not only college grades but the difficulty of majors selected and negatively correlated with the number of years it takes to complete college.

Certainly, it is plausible that the college success seen with former Advanced Placement students is but an indication that AP students tend to be the better students and, consequently, will have the most future academic success. On the other hand, the rigor and demands of an AP course might go a long way in molding students into top college performers. Regardless of the explanation, colleges seem to recognize AP courses as a predictor of future success.

The rigor, demands, and expectations of the Advanced Placement program go a long way in molding students into collegiate high achievers. Former U.S. Secretary of Education, Richard Riley (1999), argued for an increase academic intensity of the high school curriculum. In part, his concern addresses equity and accessibility issues. In a speech, he urged "that every high school in America should be offering advanced placement (AP) or other advanced courses". The College Board concurs and encourages schools to give all students more AP opportunities.

Expansion may erode quality. Starting in the 2007-08 school year, the College Board began verifying the rigor of the Advanced Placement curricula of high schools. This audit process began in 2006 to help guarantee the consistency of Advanced Placement courses across the nation. In part, this audit is in response to students' transcripts showing "AP" as part of a course name or description despite not taking the May test. While the national test is not mandated, the College Board wants to ensure the quality of instruction in its AP courses. The organization and rigor of each AP course is examined in order to attest to the quality of the course. The College Board is disallowing use of its AP trademark on courses that do not pass this audit. Not surprisingly, the number of schools offering AP courses immediately declined for the 2007-08 school year (Cech, 2007).

Advanced Placement courses appear to help students get admitted to college. The lessons learned in AP courses help students succeed in college. It is hardly surprising then that students and parents perceive acceptance into AP courses as being critical for their future success. Thus, application to an AP course is often viewed as a major step in the college admission process. Acceptance into an AP course is a cornerstone for future academic success.

Unfortunately, every year, many students are disappointed in not qualifying for one, or more, of the AP courses that they seek. Considering the potential impact that AP participation has on their college future, it is predictable that students may be devastated. The rationale of a restrictive admission process into AP courses must be defendable otherwise admission standards should be relaxed.

Admissions into Advanced Placement Courses

Over the past few years, admissions into the best colleges have become more competitive as seen with more applicants vying for the same number of positions. The perceived importance of AP courses in college admission success has grown during this time. As a consequence, pressures for admission into AP courses has risen in recent years.

At the same time, the College Board is encouraging an expansion nationwide of the Advanced Placement program (The College Board, 2001). Some of their motivation for expansion has to do with the impact on minority students. Representation in AP courses has not been proportional across ethnic lines. The College Board is sensitive to criticism that its AP program has failed to achieve proportional representation for all students. Considering the implications of AP participation with college admissions and

performance, the AP program may well be erecting yet another barrier to a democratic society.

It is not just the College Board that advocates expansion of Advanced Placement. Nationwide, high schools and their communities see the need for all students to have access to the AP program. Civil liberty advocates make a compelling case for increased access into AP. The stakes of participation in AP classes continue to grow.

The Advanced Placement program satisfies some of the needs of many gifted students. Educators often struggle in meeting the demands for a gifted and talented program. In the rhetoric of many educational authorities, Advanced Placement is a viable response to those clamoring for a gifted and talented program. The Department of Education in many states offer AP as a response to international challenges pointing to the need to increase our academic rigor.

Furthermore, individual high schools point to the AP offerings as representative of the rigor of their academic offerings. College admission officers certainly seem to accept the fact that AP courses indicate student motivation, academic challenge, high achievement, and college potential. Student participation in Advanced Placement courses is universally recognized as a major factor in college admission decisions. As the stakes in AP participation continue to rise, so, too, will the pressures increase to admit more students into the AP program.

The Advanced Placement program enhances the reputation of high schools and further motivates AP participation. The number of courses offered, the number of students enrolled and the number of tests administered are all factors affecting the status of a high school in the eyes of its community, colleges, and various rankings of high schools across the state and nation. Undoubtedly, community pride and self-image are

intricately tied into the reputation of the school. It is widely believed that the reputation of the school has a major influence on the real estate market and prices of homes.

As attention to Advanced Placement has grown over the years so, too, has its importance. Increased visibility has increased the emotions surrounding acceptance and rejection. Parents and students are genuinely embarrassed when not accepted into an AP courses. This disappointment adds to the pressure to increase AP admissions. Unless there is an open admission policy, the acceptance decisions into AP courses will generate mixed emotions between those admitted and those who are not admitted.

As admissions into Advanced Placement courses increase, there is a risk of adverse effects. Some of the concern involves the admission process. Some of the concern involves the quality of instruction and the classroom-learning environment. Increasing admissions must be done with care.

Considering the college stakes involved, care needs to be taken to ensure that the AP admission process is fair and offers all students equal opportunities. Egalitarian arguments call for an AP admission that is not overly restrictive. Students who are capable of handling the academic rigor should be admitted.

At the same time, as the number of students in the Advanced Placement program grows, the quality of the AP education must not suffer. This is a concern whether class size increases or more AP teachers are required to handle the larger number of students or if the overall quality of students is compromised. Of course, the College Board is attempting to address these issues by introducing an audit of the courses in order to ensure that quality of the AP program is achieved.

Acceptance in Advanced Placement is perceived as a critical component in the academic career of students. No wonder then that admission decisions into AP courses

are scrutinized. No matter the admission process, there will always be students who agonize over how close they are to being admitted. These students will inevitably continue to scrutinize the admission process. Equity questions routinely arise each year during the admission process. Just as common are concerns about the reliability and consistency of the AP admission decisions. Over the last couple of years, in an attempt to ensure equitability and promote accessibility, teachers have been encouraged to accept more students and schools have opened more course sections.

At the same time, not everybody believes AP admissions should increase. There has been opposition for various reasons. Some reluctance may stem from feelings of elitism and a need to maintain a system of exclusivity for both students and teachers. Keeping students out might enhance the perceived brilliance of those admitted. Likewise, restricting the number of sections would require less teachers of AP and encourage those teaching AP to feel "superior" in teaching the better students. But it would be unfair to characterize the opposition as having such base motives.

There are valid arguments for restricting entrance into Advanced Placement courses. Increasing enrollment could easily have a negative effect on the top students who would always be admitted and who might be slowed by any attention given to less capable students. The intellectual level of classroom discussions might suffer and more time in class might be spend on the lower end of Bloom's Taxonomy.

Another concern to increasing AP enrollments concerns the reputation of the school if scores decline. That by itself is a legitimate concern. The problem is compounded because the school's reputation is based on its students' performance on AP tests. In turn, the reputation of a school goes a long way in influencing college admissions. All things being equal, colleges are influenced by the overall reputation of a

high school when making admission decisions. The colleges may not be so eager to admit students from a high school with a tarnished reputation.

Increasing admissions into an Advanced Placement program has an effect not just on the students but it can affect the entire community. Local realtors often use the school's reputation as a selling point for prospective buyers. Real estate prices are affected by the quality of the education available in its community.

A final concern to increasing AP enrollments is the effect it might have on individual teacher reputations. Accepting under qualified students into AP courses may lead to lower results. Average class grades may suffer for two reasons: a lower average quality of students and a negative peer effect upon the better students generated by the under qualified students.

The performance, effort and attitude students exhibit are of concern to teachers. In as much as increasing AP admissions affects student performance, teacher satisfaction and morale will surely be affected.

Admission decisions into the Advanced Placement program are not made lightly. The quantity and quality of students taking AP students have many implications. There are many reasons that prompt educators to expand the AP program. However, negative consequences may outweigh the benefits. Before relaxing the standards for admission into AP classes, it is prudent to ascertain the effects that may occur.

Statement of the Problem

The purpose of this study is to examine the effect on student achievement in AP courses by increasing admissions into the Advanced Placement program. Student achievement will be measured two ways: by final grades received in the classroom and

by the scores earned on the national AP tests administered in May. One suburban upper socioeconomic high school will be examined where the number of AP students increased dramatically in this school between the school years 2005-06 and 2006-07. Students admitted into AP courses due to relaxed standards in the second year that would not have been admitted the first year will be referred to as fringe students. Accordingly, AP scores earned by the high school's students in 2005-06 will be compared to the AP scores earned by students the following year. Also, final grades earned by these same students across the two years will be examined. The null hypothesis to be tested is that AP scores and final grades both years are the same. The alternate hypothesis is that scores and grades are significantly different.

Subsidiary Questions

1. How does the acceptance of fringe students affect the overall academic performance of an AP class?

These fringe students may bring down the average if they cannot perform as well as the regularly admitted students. On the other hand, the fringe students might rise to the level of the original class.

2. How does the acceptance of fringe students affect the students who are regularly admitted?

These fringe students may take time and attention away from the regular students and diminish the learning that occurs. On the other hand, the fringe students might stimulate the performance of the regular students because their questions and responses might serve to elucidate difficult concepts.

3. How does student achievement in 2005-06 compare with student achievement in 2006-07?

Student achievement will be measured both by AP scores and by final course grades. Comparisons will be made between all students and then with the fringe students omitted

4. How does student achievement in 2006-07 compare between the fringe students and those regularly admitted?

The criteria for admission predict that the fringe students will have lower achievement than the regularly admitted students.

5. How do comparisons of student achievement change from one academic department to the next?

The increase in students admitted into the Advanced Placement program was unevenly distributed through the courses. Some disciplines may be easier than others for the fringe students who are marginally qualified for admission.

6. What is the effect of preexisting differences in students as measured by GPAs, PSATs and AP experience on student achievement?

The PSAT is used to predict success in college. Prior AP experiences should benefit students in all academic areas. A student's grade point average is arguably the single best gauge of academic achievement and future potential. Each of these three measures should be related to achievement in AP courses. Comparisons of student achievement should include a correction for innate differences between students as measured by these measures.

Significance of Study

The Advanced Placement program offers the most challenging curriculum in high schools across the nation. Admission is generally guarded in order to protect the integrity of the program. The consequence of relaxing admission standards needs to be carefully evaluated. This study purports to examine the effects on academic achievement of admitting more students into the Advanced Placement classes.

School Boards of Education, Superintendents, and Principals must consider whether to expand the AP program in high schools. Schools often are conservative defenders of entrance requirements into advanced courses. Students that have the maturity, ability, and motivation should be permitted into AP courses. The difficulty lies in measuring these traits. A cost of restricting admissions and not admitting some students into AP classes is that some capable and deserving students will inevitably be denied admission.

The Advanced Placement program purports to offer college level curriculum and this opportunity should be provided to all interested and capable students. The hope, of course, is to deny admission for students who cannot handle the rigor of such a demanding course. Time and attention from teachers are finite and should not be diverted from deserving students to those who cannot reasonably succeed. Class discussions may well be stunted with the presence of students who have inordinate amount of difficulty learning challenging concepts and facts. The problem is that measurements of student potential are flawed and do not forecast success with 100% accuracy. This study attempts to measure the effect of relaxing admission standards so to include more students with potential success in the AP program. Some students will be accepted that should not; other students will be rejected that should be accepted. Any

modification in the acceptance procedure will decrease the risk of one at the expense of the other.

Teachers are reluctant to accept more students because they want to maintain quality classes. At Millburn High School teacher beliefs may well be anchored in practices encouraged during the 1990's that maintained exclusivity while proudly publicizing the high AP scores students earned. Persuading teachers to willingly accept more students into their AP courses is a leadership challenge. This study will examine evidence that might answer teacher concerns of relaxing admission criteria while providing data to justify changes in school policy.

Limitations of the Study

This study will narrow attention on a few manageable issues. Delimiting factors that will not be addressed include the growth of the student population, change in student demographics, and measures of student motivation. These factors should have minimal impact across a one-year comparison of achievement. Note that when discussing growth of population, this study will focus on primarily the size of the junior and senior classes. This population seems most pertinent considering that over 80% of the AP students fall into these grades.

The following limitations of this study are noted:

1. Comparisons will focus on 2 years of data: 2005-06 and 2006-07. An examination of past acceptance practices would be of limited accuracy.
2. No attempt will be made to measure, or compare, teacher expertise. There is no consensus among educators and researchers as to what makes a good teacher.

3. The change in the school population over the 2 years will be assumed to be negligible. Indeed, the 2005-06 population for grades 9-12 was 1278 and for grades 11-12 was 600. In 2006-07 corresponding population figures are 1288 and 632 respectively.

4. No attempt will be made to equate the qualifying criteria between the various AP courses. Each teacher determines the rationale for admission into the individual courses. Identification of the "fringe" students was made by the 2006-07 teacher of the course.

5. Data for AP Chinese will not be examined. This course is offered for the first time in 2006-07 so comparisons are limited.

6. Data for AP Latin data will not be examined. AP Latin actually alternates each year between two curricula: Virgil and Catallus.

7. Data for AP Art data will not be examined. The structure of the course is unique and it is the only AP exam graded by portfolios.

8. Data for AP music will not be examined. The structure of this course is, also, unique.

Definition of Terms.

Advanced Placement Program is described by the College Board as a cooperative endeavor between colleges and high schools. Students who participate take college-level courses while still in high school and often earn college credit for doing so. Guidelines for these courses are developed and published by the College Board (CollegeBoard AP Central, 2006).

College Board is a not-for-profit membership association of secondary schools and colleges that provides programs and services in assessment, college admissions, and teaching. The SAT, PSAT, and the Advanced Placement Program are among its best known products (CollegeBoard, 2006).

Educational Testing Service (ETS) is a nonprofit organization that provides a wide range of assessments and research to various institutions. Their largest client is the College Board who sponsors the SAT and AP program. The College Board constructs and administers the programs (ETS, 2006).

Regular student is defined for the purpose of this study as those students identified by the individual AP teacher as having met the criteria for admission established and utilized over the most recent past years.

Fringe student is defined for the purpose of this study as those students identified by the individual AP teacher as not having met the criteria for admission established and utilized over the most recent past years. However admission into the AP program has been granted for any of several possible reasons. Such factors include: (a) encouragement by school administrators; (b) directive from the building principal; or (c) special requests from parents.

Academic Performance is defined for the purpose of this study as a two-fold measure. One part is the final grade earned by the students as determined by the individual teacher. The second part is the AP scores earned by the student on the College Board's national test administered and graded by ETS in the Spring. The final grade consists of several components as decided by the individual teacher and is the best available measure of a student's performance during the course. The AP test score is graded by trained readers and may be compared to other students locally and nationally as an objective and non-biased measure of student achievement.

Chapter II

RELATED LITERATURE

Research literature on ability grouping used to be like the Bible. You could quote from it to support any position – (Kulik, 1992, p. ix)

A History of Advanced Placement

In 1951 the Ford Foundation sponsored two groups to discuss and formulate ways to coordinate efforts between high schools and colleges in order to improve the overall secondary education in the United States. The hope was to define and communicate vertical articulation of teaching from the last years of high school through the first years of college. The intended result would be to minimize duplication of efforts on the part of high schools and colleges and maximize the learning of United States students (DiYanni, 2007).

One sponsored group consisted of educators from three elite prep schools (Andover, Exeter, and Lawrenceville) and college educators from Princeton, Harvard, and Yale. This group is often referred to as the Andover group as much for the site of the meeting as the affiliation of their leader, English teacher Alan R. Blackmer. Their final report urged for high school seniors to do college-level work and be allowed to enter college with advanced standing. It is worth noting that the report focused on the needs of "superior students" as opposed to a possible more egalitarian philosophy. Also, of some interest, is the fact that the report actually used the term "advanced placement" (Rothschild, 1999).

The second sponsored group consisted of educators from 12 colleges and 12 secondary schools. The colleges included were Bowdoin, Brown, Carleton, Haverford,

Kenyon, M.I.T., Middlebury, Oberlin, Swarthmore, Wabash, Wesleyan, and Williams (Vance & Pieters, 1961). The committee was led by Kenyon College President Chalmers and their result is often referred to as the Kenyon Plan. In a major development, they began to develop college level courses that could be taught in high schools.

By 1952, the efforts of the two groups merged and resulted in the development of advanced courses in 11 subjects that were piloted in seven high schools. The first examinations were given in May, 1954 and administered by the Educational Testing Service. The College Board took over the administration of this program in the summer of 1955 and promptly appointed Charles R. Keller, a professor at Williams College, as the first director of the AP Program for the College Board. Keller directed the administration of the first tests in May 1956 (Rothschild, 1999).

The early years of the Advanced Placement program were marked with struggles to gain college acceptance. College professors were often reluctant to accept the AP program and give any recognition to students for taking these advanced classes. These professors did not acknowledge that high school teachers could teach nearly as effective as college instructors and largely believed that course knowledge could not possibly be covered in the depth or breadth in high school as it is in college. For 10 years or so, it was not unusual for colleges to demand students earn at least a B in an advanced course before AP credit of any type would be given to the student retroactively. This practice slowly died out as college began to give more credence to the AP program. The College Board began to publish studies of the college performance of former AP students and help bolster the academic reputation of Advanced Placement (Rothschild, 1999).

The Advanced Placement Program has now been in existence for over 50 years. After beginning with just a few offerings, for 2007-08, the College Board offered 37

courses in 22 disciplines. For years, the national examinations have been administered in May at the conclusion of the course with scores ranging from 1 (low) to 5 (high). The College Board suggests that colleges give advanced placement to students who perform well on the AP tests and, accordingly, describe scores of a 3 and above as "qualified" (The College Board, 2004). AP publications state that 90% of the colleges give credit +/or advanced standing to students who earn a 4 or a 5 in any particular course.

Much care is made by the College Board to ensure the reliability and validity of the scores. Tests are comprised of two parts. One portion of each AP exam consists of multiple-choice questions and is graded by machines. Repeat questions from one year to the next are utilized for comparisons of results between years. The second part of each AP test is generally a free-response section graded by trained readers to ensure anonymity and objectivity (The College Board, 2004). Although challenges are periodically poised for the need of two distinct parts, there is much empirical research to support this testing design (Kennedy & Walstand, 1997).

The College Board spends much time and effort in order to ensure accurate grading of the free-response sections. Readers are chosen from the college and high school ranks. The readers are brought to various sites around the nation such as Trinity College in Texas, Clemson University, and The College of New Jersey. There in early June, these readers grade the free response sections after intensive training. Chief readers have already met for a week to outline salient grading points. The readers typically spend two full days agreeing on a rubric and standards to use when grading student work. Typically, readers grade but one question. Scores are eventually accumulated between each free response question and the multiple-choice sections. A final grade between 1 and 5 is determined and results are sent to schools and individual students by early July.

Research on Advanced Placement Effectiveness

Various studies have determined that participation in Advanced Placement courses in high school give students an advantage in college. Studies have examined various measures of achievement. Most of the studies focused on AP students versus all other students; a few studies have compared AP students with other high achieving students. The overall findings indicate that the rigor of Advanced Placement help students in their college academic work.

Advanced Placement can help students get admitted to college because it is an indicator of the rigor of the courses taken. Once accepted, AP students often test out of lower level courses. Additionally, there is an economic advantage to skipping over any college courses in the sense that the full tuition does not need to be paid (Casserly, 1986; Santoli, 2002). Once the college courses commence, AP students are at further advantage.

Willingham and Morris (1986) did a study involving 1115 AP students and 3699 non-AP students. Their study found that AP students were more likely to graduate with a double major and major in difficult majors. AP students performed better academically as measured by grades earned in college. They also attempted to measure leadership and other accomplishments and, again, found that AP students did better in college than other students. Likewise, Thompson and Rust (2007) found that AP students have higher grades in colleges in English and natural science courses. Finally, Morgan and Crone (1993) examined biology, chemistry and calculus classes in colleges and found evidence that AP students outperformed other students.

Curry, MacDonald, and Morgan (1999) found that 75% of AP students scoring 3 or higher on their AP exams went on to obtain advanced college degrees. Curry et al. and

Morgan and Manechshana (2000) found that most of the AP students graduated with a minimum of a 3.0 GPA. In a different twist, Morgan and Manechshana found that AP students received their degrees within 4 years with more frequency than others. Horn and Kojaku (2001, p. 1) concluded that their "study demonstrated a consistent advantage experienced by students who completed rigorous high school curricula" such as an Advanced Placement.

In a slight variation of focus, Morgan and Ramist (1998) compared the course grades of former AP students in upper-level college courses where they had placed out of the college introductory course. Across 70 colleges, compared to college students who took the prerequisite introductory courses, the AP group performed better. Also, Simms (1982) and Casserly (1986) found that AP students tended to receive higher course grades in the first course beyond the introductory course than their non-AP classmates who took the introductory course.

In a rare departure from most findings, Geiser and Santelices (2004, p. 19) concluded that "the number of AP and other honors-level courses taken in high school bears little or no relationship to students' later performance in college". This is contrary to an oft referenced study from Adelman (1999, 2006) who concluded that the difficulty of a student's high school courses was indeed predictive of college success. However, the conclusion of Geiser and Sanelices was based on data that included students who did not take the AP exam. Mere enrollment in a course may not be a reliable predictor of college success. Indeed, this concern led the College Board to institute their AP Audit in 2007. When Geiser and Santelices narrowed their study to those students who completed the end of year AP exams, they did conclude that AP's predict college success.

There has been limited research on predicting success in Advanced Placement courses. Camara and Millsap (1998) found that PSAT scores may be used to identify students who may be successful in AP courses with the exception of Art and World Languages. This finding is confirmed by a smaller study by Palin (2001) who focused on AP US History. Palin found indications that a student's GPA could be used as a predictor of success. Ewing, Camara, Millsap did a follow up study (2006) for the College Board and confirmed the potency of the PSAT as a predictor of AP success.

Indeed, the College Board presently offers *AP Potential* (2007), "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 the research of Ewing, Camara and Millsap. Klopfenstein (2003) and others have stressed the importance of other factors to predict students entering an AP course are able and motivated. These other predictors are intuitively obvious: test scores, overall transcripts, teacher recommendations and interviews. However, the lack of consistency from one school to the next, or even one examiner to the next in the same school, makes quantitative comparisons difficult.

Homogeneous and Heterogeneous Grouping

Ability grouping has been described as the segregation of students by their abilities. Slavin (1990b, p. 471) states that "(a)bility grouping is defined as any school or classroom organization plan that is intended to reduce the heterogeneity of instructional groups". The benefits and disadvantages to learning of various grouping arrangements have been hotly debated for years. Indeed, Tunney's (1931, p. 228) article provides an early "critical study of homogeneous grouping".

Much controversy surrounding ability grouping exists. Its place in democratic societies is debatable. Its advocates argue out that it enables instruction to be matched with students' needs and interests. A homogeneous setting enables students to benefit from cooperation, mutual facilitation and studying at the same pace. Critics of ability groups consider the practice inconsistent with ideals of democracy and egalitarianism. At most, critics maintain, a minority may benefit from ability grouping; however, critics are certain that many students suffer. The effects on learning from ability grouping are certainly not universally agreed upon. (Toomela, Kikas, & Mottus, 2006).

The Advanced Placement (AP) program is a form of ability grouping. Indeed, one goal of the program since the 1950's is to accelerate "superior students". The degree to which the rigor of an AP course aids participating students is not known. A concern is the effect on the students who are not enrolled in Advanced Placement courses. It is one thing if AP students benefit from the program and the effect on other students is neutral, a Pareto Optimal situation. However, it is alarming it the other students suffer intellectually or emotionally from such an arrangement.

According to Terwel (2005), benefits of homogeneous grouping tend to accrue to the high achieving students at the expense of the low-achievers. This is not necessarily intuitively obvious, but, after years of study, is the sentiment held by many (Argys & Brewer, 1996; Gamoran, 1992a, 1992b; Oakes & Lipton, 1992; Oakes & Wells, 1998; Slavin, 1990b, Wheelock, 1992a). Of course, lower ability students might benefit from being in class with similarly challenged peers if instruction can be differentiated to their advantage for maximum learning. Also, high achieving students might benefit more if they were in a heterogeneous class where other students' questions would force teachers to provide elaboration on difficult topics.

Ability grouping may result in peer effects that are either positive or negative. Hallinan (1990) argues that student achievement may be enhanced by grouping students homogenously. From the perspective of the stronger academic students, absence of less gifted students can enable the pace of the class to quicken and conversations to deepen. From the perspective of the weaker students, a homogenous class avoids the disparity between students that might only serve to discourage and demoralize the weak students and result in poor academic performance. Neihart (2007) argues forcefully that homogeneous grouping can be an advantage for the students of lesser ability if instruction is properly differentiated.

On the other hand, Slavin (1990b) contends that heterogeneous classes are superior and he is unequivocally opposed to ability grouping. He supports his position with a meta-analytic study of 29 previous research works. Without such grouping, weaker students might benefit from the stimulation of academically gifted students. The performance of the relatively stronger students might increase due to such factors as peer tutoring and being forced to analyze and reflect on concepts that otherwise might be barely grasped.

Various studies have found that ability grouping helps the better students and hurt the weaker ones. Eder (1981) hypothesized that much of the effects of ability grouping occurs because of the level of disruption found in the class. This could well be a function of the students who comprise the class. Unfortunately, low ability students often find themselves in a classroom characterized by disruptive behavior. The better students, on the other hand, find themselves in a classroom much more conducive to learning. Taken in this light, it is no wonder that ability grouping would be beneficial for the good students but detrimental to the weaker students. Eder stresses that when examining the

effects of grouping students by ability one must take into account the social composition of the formed classes. As Sheppard and Kanevsky (1999) point out, in order to develop higher intellectual functions, students must interact with more capable peers.

Drawbacks to the less talented students are commonly found in the research. For example, Kulik (1992), concludes that most of the research finds that ability grouping has negative effects on the weaker students. Whether or not the better students gain slightly, if at all, is not clear by the research. Braddock and Slavin (1992) argue forcefully that society's needs are not met in many ways when some groups of students are placed at a disadvantage regardless of the benefit to others.

Whether or not high ability students gain from homogenous grouping is a question not answered consistently by researchers. Braddock and Slavin (1992) were among those who found no consistent benefit accruing to the stronger students. One might accept the sacrifice of the weaker students if this were to make the gifted students even better and there are those who would accept benefiting the talented at the expense of the others. Shields (1995) believes that homogeneous classes serve the needs of academically talented and gifted students without any detrimental effects to students of lesser ability. Feldhusen (2002) points out that grouping avoids boredom, needless repetitive drilling, and tedious slow instruction. A Hong Kong study (Cheung & Rudowicz, 2003) found no significant detrimental effect caused by the ability grouping although differences with United States society and culture are duly noted.

Advocates of ability grouping argue that gifted students benefit from the broadened and accelerated curricula. The depth of content works to their learning advantage (Kulik, 1992; Rogers, 2002, 2007). However, for many researchers, it is far

from certain that any students benefit from ability grouping so the weaker students may well be harmed at nobody's benefit.

The drawbacks of ability grouping to the less capable students seem well documented. According to Braddock and Slavin (1992), the self-esteem of these students are hurt. Their academic achievement is lowered. Social interactions with students that might be a positive role model lessen. To the degree we care about the egalitarian concerns as a cornerstone of our democratic society, all of these effects on a subgroup of our population have grave implications.

The harm to the relatively weak students caused by ability grouping is not universally accepted. The social and emotional impact is minimal according to some studies. One such exception was found in an examination of middle school students in Hong Kong. Cheung and Rudowicz (2003) note the de-emphasis of self-esteem in the Honk Kong society. Selflessness is highly valued in this culture. Indeed, emotion is a factor referred to by the authors, as merely an adjustment for the students easily made that does not lead to poorer academic performance.

Shields (1995) agrees that the weaker students are not automatically hurt. Shields argues that any detrimental effect is more a factor of such things as lower teacher expectations. Shields finds no negative effects of ability grouping when the curriculum and teaching methodology is held constant. Other studies such as Sheppard and Kanevsky (1999) concur that such factors as classroom atmosphere, peer interactions, and teacher expectations are the key components in determining whether student learning suffers in a homogeneous setting for those students of lower ability.

Whether ability grouping benefits the more capable students appears unclear. Many studies have concluded that the better students derive no benefit from

homogeneous grouping. Other studies have suggested that any benefit seems to only come to the true gifted, the top 5% or so of the student population.

Ireson et al. (2002) studied effects in England on achievement and found high ability students in mathematics benefited from grouping while equally capable students in English and Science did not benefit significantly. Because of the sequential nature of mathematics it seems that heterogeneous grouping might slow down student learning. On the other hand, other academic disciplines might benefit from a more diverse class discussion.

The costs and benefits of ability grouping often focus on student achievement. Other concepts such as self-esteem, confidence, and socialization are factors though more difficult to quantify, may well be more important in assessing the effects of segregating students by ability. Objections to different forms of leveling decisions typically raise all of these concerns.

Legal Issues

In as much as the Advanced Placement program is a form of ability grouping, various implications to this learning environment must be scrutinized. Benefits to AP students are universally assumed. Those not admitted into AP program are generally considered to be lacking in a desired educational opportunity. One major contention is that these students tend to be minority students.

Braddock (1993) points out that "American public education is based on a common school ideology that purports to promote equal access to all learners" (p. 324). Tracking is detrimental to those populations overrepresented among lower ability groups. These groups are your lower income, racial and ethnic subgroups. Blacks and Hispanics

tend to enroll in AP courses at half the rate of White students (Klopenstein, 2003). Such discrimination often leads to legal concerns in our society.

Indeed, various suits have been initiated throughout the country claiming groups of students are being denied equal access to educational opportunity. Some suits have been directed at schools for denying access to Advanced Placement programs. Other suits have attacked schools for their general tracking policies. The concern for discriminatory practices is not imagined. It must be carefully weighed with the fostering on academic achievement to those students who participate in the AP program (Berthelsen, 1999; Welner, 2003).

As the importance for college admissions of the Advanced Placement program has grown so, too, has scrutiny grown over the process permitting participation in an AP course. Many students are denied opportunity to take Advanced Placement courses. According to Berthelsen (1999), the court system needs to carefully consider the process that denies some students opportunities to succeed in secondary schools that, in turn, influences student success in college.

The courts have examined restrictive policies in areas other than Advanced Placement as well. No less of a concern are policies restricting admission to honors classes. The rationale for review is similar. In essence, the concern generally is whether or not restrictive policies are discriminatory to any population group such as defined by race, religion, or sex. Court decisions have examined differed in their conclusions.

Acceptance into the Advanced Placement program is viewed as an indication of academic excellence. Accordingly, Advanced Placement is considered an invaluable gate for entrance into colleges, the precursor to future success. Students denied admission into AP have an uphill struggle to climb as they make plans beyond high school. It is no

wonder that the fairness and consistency of the AP admission policies is questioned. There is much concern about the educational, social, emotional, and ultimately, financial opportunities that may be denied to students who are not admitted into AP courses.

Summary

The College Board spends much time, effort, and money into researching and promoting the strengths of Advanced Placement courses. Morgan and Ramist (1998) point to longitudinal studies comparing AP students exempted from introductory college courses with college students who take these beginning courses. They note that all indications point to AP students having an advantage over other students in their performance in college courses.

Research on the effects of homogeneous grouping indicates that ability grouping is detrimental to the lower ability student. These weaker students are deprived the benefit of interactions with the more capable students as they would receive in a heterogeneous setting. Not only does the academic performances of these weaker students suffer when grouped homogenously but also, their self-esteem, confidence, and attitudes are affected (Braddock & Slavin, 1992).

Whether ability grouping benefits students of higher ability is not clear. According to Ireson et al. (2002), benefits differ across subject disciplines. Other studies note that only the top 5% of the students truly benefit from such grouping arrangements. Other studies have found no positive effects of ability grouping (Braddock & Slavin, 1992) that truly calls into question a practice that harms one group of students without even benefiting others.

A distinction not made is for those students who are truly borderline in their qualifications. These students may benefit the most academically from studying in a class with students of higher ability than they. This benefit may well continue to accrue beyond high school into their college years. Assuming such students are admitted into AP courses the effect on them needs to be examined along with the ensuing effect on the students previously admitted into AP courses. The overall performance of the AP students is not accurately predictable without investigation.

Chapter III

METHODOLOGY

Demographics

Millburn High School serves a suburban community of approximately 20,000 that comprises the towns of Millburn and Short Hills, combined into Millburn Township. Millburn is located approximately 20 miles from New York City. The median income according to the 2000 census is $130,848 compared to the national median of $41,994. The town consists of 88.9% Caucasian, 8.4% Asian, 2% Hispanics, and 1.1% African-Americans. Nearly 80% of the adults in the community have a college degree, with half of those having completed some sort of graduate program (Township of Millburn, 2007)

The residents consist of a large number of professionals, corporate executives, and successful business entrepreneurs. Considering that 80% of the parents hold at least one college degree it is no surprise that over 95% of each graduating class go on to college. Newspapers, magazines, and books have consistently ranked the high school as one of the top ten in the state and one of the best in the nation. Certainly, standardized test scores have always been high across the grade levels. For example, typically 95% of the AP test scores earn a 3 or higher. The Class of 2005, for example, according to the school profile brochure, boasts 14 Semifinalists and 31 Commended students in the National Merit Program of the SAT. The Class of 2006 had 8 Semifinalists but 49 Commended students. The Class of 2007 had 8 Semifinalists and 31 commended students. The Class of 2008 had 9 Semifinalists and 37 commended students. (Millburn High School, 2005, 2006, 2007a).

Real estate brokers emphasize the school system to prospective buyers and often used the schools to lure families into the town. Each year, the community takes pride in the college placements of the graduating senior class. Advanced Placement courses are taken seriously both as a major academic component and as a college placement tool. As a consequence the community places much focus on the entire Advanced Placement program.

Advanced Placement in Perspective

Millburn High School has offered Advanced Placement courses for decades; indeed, since the inception of the AP program. In the last 10 years, the population of the school has grown as well as the number of AP participants. In 1996, 213 students took 460 exams. The school population for grades 11-12 was 354. By 2006, the school (grade 11-12) population had grown to 600 and 328 students took 777 exams. In 2007, the school (grade 11-12) populations were 642 and 392 students took 943 exams (see Table 1). During this time span, the number of AP courses offered both by the College Board and adopted by the high school has grown as well.

The high school offers Advanced Placement courses integrated as part of their overall curriculum. Many AP courses are the natural sequence of an academic curriculum that begins before high school. For example, AP Calculus, is the culmination of a progress of a mathematics program that includes Algebra I, Geometry, Algebra II and PreCalculus. Also, AP Spanish is offered as the culmination of language offerings that begin, somewhat casually, in elementary school, but continue through the middle and high school with Spanish I, II, III, and IV courses offerings.

Table 1

High School Populations 1994-2007

Year	AP Students	Total Scores	Gr 9	Gr 10	Gr 11	Gr 12	9-12	11-12
2006-07	392	943	315	341	331	301	1288	632
2005-06	328	777	345	333	301	299	1278	600
2004-05	262	659	332	302	305	255	1194	560
2003-04	249	680	299	306	254	263	1122	517
2002-03	259	692	309	255	260	245	1069	505
2001-02	246	580	253	266	250	218	987	468
2000-01	232	533	260	246	220	226	952	446
1999-00	207	541	242	210	220	186	858	406
1998-99	203	510	206	224	186	192	808	378
1997-98	202	453	220	186	202	189	797	391
1996-97	218	471	181	193	188	189	751	377
1995-96	213	460	191	186	182	172	731	354
1994-95	215	483	191	181	171	214	757	385
1993-94	198	434	183	164	209	171	727	380

Other AP courses have less direct connection to previous courses that the high school students have been offered. Courses such as AP Chemistry and AP Physics offer subject material that students have only been minimally exposed to during general science classes. Other schools, it is noted, mandate a year course in each of those subjects before a student is permitted to take the corresponding AP course. Other Advanced Placement courses such as in AP European History and AP American History also offer curriculum with minimal connection to previous student learning.

There are some AP courses that arguably have no connection with previous school offerings. AP Economics typically is the first exposure students have to the "dismal science". AP Art History offers students a unique first look at its subject. Also, AP Psychology is taken by students who have no expose to the field other than any treatment, they, themselves, may have undertaken.

The difficulty of the subject material is recognized by the school's grading system. Grades are assigned different numerical weights depending on the level of the

course. The high school offers different levels of challenge. Most courses are offered in three levels: Accelerated (Acc), College Prep A (CPA), and College Prep B (CPB). At one time, the high school designated the same levels differently: Honors, Standard, and Basic. Regardless of the names, the designations are designed to distinguish the depth and breadth of coverage for the particular courses.

Students are placed in the various levels almost exclusively due to their performance in the previous course in that discipline. Final grades determine placement. A student earning an "A" or an "A-" in a CPA or CPB course will be allowed to move up a level the following year. Likewise, a student receiving a "D" in Acc or CPA will be moved down a level the following year. AP courses are generally considered more difficult than Accelerated courses and have their own criteria for admission (see Table 2).

Admittedly, not all of the AP criteria are necessarily consistent with the general leveling criteria. For example, some of the AP criteria include teacher recommendations. Some AP courses require satisfactory grades in other subjects. In general, there is a conscious effort to permit all students an opportunity to try out for Advanced Placement courses that leads to a slight inconsistency in policy: students in CPA are permitted to try out even though they might be summarily denied permission to take an accelerated course due to low grades.

In various high school publications, criteria for admission to the different levels are made explicit as seen in the Level Placement insert. Grades determine placement for CPB, CPA, and Acc classes. For AP classes, a qualifying test plays a major part in admissions and teacher recommendations are reviewed for additional input. However, admissions, at all levels, are occasionally granted for other reasons

Table 2

Level Placements (from 2006-2007 Student/Parent Handbook)

The following will determine level placements:

Students who are currently in Accelerated courses:	
Final grade of A, A-, B+, B	Place in Acc
Final grade of B- or below	Place in CPA
Students who are currently in CPA courses:	
Final grade of A, A-	Place in Acc
Final grade of B+, B, B-, C+, C	Place in CPA
Final grade of C- or below	Place in CPB
Students who are currently in CPB courses:	
Final grade of A, A-	Place in CPA
Final grade of B+ or below	Place in CPB

Note: AP candidates who do not meet the Accelerated criteria above may be removed from the AP course over the summer.

Some nonstandard admission reasons have moral and ethical rationale. These cases are usually considered on a case to case basis by administrators, teachers, and guidance counselors. For one, a child with a major health problem that required hospitalization may be given special consideration. Students that have moved into the school district midway through the year will often be given the benefit of the doubt when it comes to admissions. Any major personal tragedy would warrant a review of the level placement.

Other reasons are undeniably less pure, and more political, in nature. Many of these reasons fall under the category of parental pressure. The underlying motivation is generally no more noble than because higher levels of academic courses impress college admissions more than lower levels. The rationale made by students and parents for these cases is varied. Former teachers may be blamed for inhibiting the potential of the student. Or personal hardships may be exaggerated. Often, student's proximity to

legitimate acceptance into an AP class is argued a reason for acceptance. This all goes to illustrate the concerns and pressures surrounding Advanced Placement acceptance.

Besides distinguished curriculum, the different levels earn students different points toward the calculating of GPA (see Table 3). Points are the same for CPA and CPB courses because it is felt that academically weak students are placed in double jeopardy in their college admissions if their transcripts not only read the low level of their course work but also has noticeably lower GPAs than other students. When examining the weighting system, note that the points awarded for low grades are the same for all levels reflecting the opinion that Acc and AP students should not be awarded extra weight for grades when performing poorly (see Table 3).

Table 3

Weighting System

	AP	Acc	CPA/CPB
A	4.667	4.333	4.000
A-	4.333	4.000	3.667
B+	4.000	3.667	3.333
B	3.667	3.333	3.000
B-	3.333	3.000	2.667
C+	2.667	2.667	2.333
C	2.000	2.000	2.000
C-	1.667	1.667	1.667
D+	1.333	1.333	1.333
D	1.000	1.000	1.000
D-	0.667	0.667	0.667
F	0.000	0.000	0.000

Another adjustment to GPA points began a few years ago. The guidance staff saw that the top students in the high school were attempting to take more AP courses primarily because of their effect on their GPA. Unfortunately, in many cases, this was

causing more stress as students tried to match their peers in the number of AP courses taken. In order to reduce this pressure, the high school began to limit the number of AP's a student could take *for enhanced weight.* Currently, students may take as many AP's as they wish, but after a while, the weighting points will be calculated as if the course was Accelerated.

Sophomores are allowed to take a maximum of two AP courses that will count for AP credit; juniors are permitted 3; and seniors are permitted 4. However, a total of 8 courses may be taken during high school for AP credit. Students may end up with a dozen AP courses, but, only 8 of them count for AP credit. Outsiders often think this system is convoluted, but it is generally accepted and not challenged by the high school community as the intent is well recognized as worthwhile. No studies have examined whether this policy is accomplishing its goal of reducing student anxiety.

Admission to AP classes is restrictive. The demand for entrance is large as parents and students perceive these courses increase student chances for college acceptance and, ultimately, lead to success in the lives of the students. The stakes are high. The actual effects of increasing AP admissions need to be determined.

The Problem

The study investigates the impact on student achievement when more students are admitted into Advanced Placement courses. From 2006 to 2007 the number of AP exams administered to Millburn High School students increased 21% from 777 tests to 943. Many Advanced Placement teachers accepted students with a lower qualifying score than in previous years that resulted in more students and more sections. Other AP teachers did

not alter their admission policies and accepted approximately the same number of students for 2006-07 as in previous years.

Population increase in the school does not explain the growth in AP tests. In 2005-06 the high school had a population consisting of 299 seniors, 301 juniors, and 332 sophomores for a total of 932 students (grade 10-12). In 2006-07 the high school had a population consisting of 301seniors, 332 juniors, and 341 sophomores for a total of 974 students (grade 10-12).

Rather, the growth is a reflection of a concerted effort on the part of administrators and staff to increase AP opportunities to more students. Not all courses warranted increased enrollment nor were all staff members in concurrence with this change in philosophy so increases were mixed across subject areas. More sections in particular courses were created. The size of some sections was increased. More students were admitted that due to a conscious decision.

The increase of students into AP courses was not uniform. Indeed, some of the AP courses did not rise at all and actually dropped by a few students. Approximately a third of the AP courses showed significant growth. Courses that did grow by more than 10% of the students or increased the number of sections are: AP Government and Politics (37%), AP French Language (90%), AP Spanish Language (72%), AP Calculus AB (26%), AP Calculus BC (15%), AP English Literature (77%), AP US History (20%), AP Biology (14%), AP Environmental Science (17%), AP English Language (38%). A full comparison of the sizes of the courses may be seen in Table 4.

Table 4

Comparisons of AP Enrollment 2006 v 2007

Total AP Tests	**2006**	**2007**	**Increase %**
Art History	16	16	0.00%
Biology	29	33	13.79%
Calculus AB	38	48	26.32%
Calculus BC	40	46	15.00%
Chemistry	25	25	0.00%
Chinese	0	10	N/A
Comp Sci A			
Comp Sci AB	23	15	-34.78%
Economics -Macro	25	34	36.00%
Economics-Micro	25	33	32.00%
English Lang/Comp	60	83	38.33%
English Lit/Comp	30	53	76.67%
Environmental	18	19	5.56%
European History	69	60	-13.04%
French Lang	30	57	90.00%
French Lit	13	10	-23.08%
German	1	0	N/A
Gov't & Politics Comp	6	2	-66.67%
Gov't & Politics US	43	59	37.21%
Human Geography			
Intn't Eng Lang			
Italian Lang	7	14	100.00%
Japanese Lang			
Latin Lit		11	N/A
Latin-Vergil	11		
Music Theory	8	13	62.50%
Physics B	24	24	0.00%
Physics C E&M	6	3	-50.00%
Physics C-Mech	6	3	-50.00%
Psychology	47	51	8.51%
Spanish Lang	46	79	71.74%
Spanish Lit	14	15	7.14%
Statistics	52	41	-21.15%
Studio Art-Drawin	8	8	0.00%
Studio Art 2D Design	1	10	900.00%
Studio Art 3D Design		1	N/A
US History	56	67	19.64%
World History			
Totals:	**777**	**943**	

Student achievement will be measured both by final grades received in the classroom and by the scores earned on the national AP tests administered in May. Accordingly, AP scores earned by the high school's students in 2005-06 will be compared to the AP scores earned by students the following year. Also, final grades earned by these same students across the two years will be examined. Letter grades will first converted to a number based on a scale that awards 12 points to an "A", 11 points for an "A-", 10 for a "B+", 9 for a "B", and so on.

The remainder of this chapter presents a discussion of the study's methodology and procedures that will include hypotheses, samples, research design, and analysis technique.

Hypotheses

A large increase in the number of AP students occurred between 2005-06 and 2006-07 resulting in an increase of test takers from 777 to 943. This 21% increase was a result of a conscious effort to accept "fringe" students who were close to the cutoff established in previous years. However, enrollment in every AP course did not change uniformly. Indeed, seven courses accounted for 86% of the increased enrollment. Student grades and AP scores can be compared across various measures. The following hypotheses emerged:

1. There is no significant difference in the overall AP scores achieved by students between the years 2005-06 and 2006-07. The increase in students participating in the Advanced Placement program does not deter from student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the

students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

2. There is no significant difference in the overall AP final course grades achieved by students between the years 2005-06 and 2006-07. The increase in students participating in the Advanced Placement program does not deter from student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

3. There is no significant difference in the overall AP scores achieved between students in 2005-06 and regularly admitted students in 2006-07. The increase in students participating in the Advanced Placement program does not deter from student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

4. There is no significant difference in the overall AP final course grades achieved between students in 2005-06 and regularly admitted students in 2006-07. The increase in students participating in the Advanced Placement program does not deter from student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

5. There is no significant difference in the overall AP scores achieved between students in 2005-06 and regularly admitted students in 2006-07 within each department. The increase in students participating in the Advanced Placement program does not deter

from student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

6. There is no significant difference in the overall AP scores achieved in 2006-07 between regularly admitted students and fringe students. The fringe students admitted when standards were lessened perform as well in the courses as regularly admitted students as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

7. There is no significant difference in the overall AP final course grades achieved in 2006-07 between regularly admitted students and fringe students. The fringe students admitted when standards were lessened perform as well in the courses as regularly admitted students as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

8. There is no significant difference in the overall AP scores achieved in 2006-07 between regularly admitted students and fringe students within each department. The fringe students admitted when standards were lessened perform as well in the courses as regularly admitted students as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

Accessible Population and Sample

Data was collected from the past 10 years of AP scores dating back to 1998 and going through 2007 in order to look for general trends even though the 2006 and 2007

scores were primarily used in this study. The College Board provides summary data every year in July, approximately 2 months after tests are administered. Each student in a particular school who has taken an AP test is listed along with each of their AP scores achieved in that year and previous years. Also, summary results are provided showing the distribution of scores by subject course for the school. Table 5 shows the 2006 distribution summary and Table 6 shows the summary for 2007.

Millburn High School is classified as a J District by the New Jersey Department of Education (NJDoE). The NJ DoE first used the District Factor Groups (DFG) in 1975 to help analyze results from tests given throughout the states. The categories are updated every ten years. The DFGs are often used as a measure of a school's socioeconomic status in examining comparing student test results across schools. Six categories determine a school's DFG: (1) Percent of adults with no high school diploma; (2) Percent of adults with some college education; (3) Occupational status; (4) Unemployment rate; (5) Percent of individuals in poverty; (6) Median family income.

The categories start at "A" for the schools with the lowest SES up to "J" for the schools with the highest SES. The NJDoE states that the average student performance on state tests are widely expected to increase as one looks at results starting from DFGs of A across the DFGs of J. (New Jersey Department of Education, 2004). The Advanced Placement offerings at Millburn High School are surely similar to those offerings at other I and J (DFG) schools. Qualification procedures are under scrutiny at all of these schools. The findings of this study may be easily generalized to these other similar schools.

Table 5

2006 AP Distribution

	5	4	3	2	1	Sum
Art History		5	6	5		16
Biology	26	2	1			29
Calculus AB	20	11	7			38
Calculus BC	33	5	2			40
Chemistry	21	3	1			25
Chinese						0
Comp Sci A						0
Comp Sci AB	12	7	3	1		23
Econ-Mac	12	12	1			25
Econ-Mic	15	9	1			25
Eng Lang/Comp	11	37	11	1		60
Eng Lit/Comp	17	12	1			30
Env Science	5	8	2	3		18
European Hist	24	31	13	1		69
French Lang	1	7	17	4	1	30
French Lit	2	3	6	1	1	13
German Lang	1					1
Gov&Pol Comp		2	3	1		6
Gov&Pol US	7	21	14	1		43
Human Geog						0
Intl Eng Lang						0
Italian	1		3	3		7
Japanese						
Latin-Lit						0
Latin-Virgil	1		5	3	2	11
Music Theory	5	2	1			8
Physics B	20	4				24
Physics C-E&M	6					6
Physics C-Mech	6					6
Psychology	32	13	1	1		47
Spanish Lang	6	14	21	5		46
Spanish Lit	4	4	5		1	14
Statistics	6	18	14	8	6	52
Studio Art-Drawing	1	2	3	1	1	8
Studio Art 2D Design					1	1
Studio Art 3D Design						0
US History	42	13	1			56
World History						0
	337	245	143	39	13	777
Percentage	43.40%	31.50%	18.40%	5.00%	1.70%	

# of students taking AP's	328
# of Seniors enrolled in high school	299
# of Juniors enrolled in high school	301
# of Sophomores enrolled in high school	333

Table 6

2007 AP Distribution

	5	4	3	2	1	Sum
Art History	5	8	3			16
Biology	30	3				33
Calculus AB	26	11	8	3		48
Calculus BC	41	3	1		1	46
Chemistry	14	11				25
Chinese	10					10
Comp Sci A						0
Comp Sci AB	10	4	1			15
Econ-Mac	16	16	1	1		34
Econ-Mic	16	15	2			33
Eng Lang/Comp	36	36	8	3		83
Eng Lit/Comp	26	23	3	1		53
Env Science	9	3	5	2		19
European Hist	26	10	14	8	2	60
French Lang	6	11	30	8	2	57
French Lit	3	1	2	4		10
German Lang						0
Gov&Pol Comp		2				2
Gov&Pol US	19	25	11	4		59
Human Geog						0
Intl Eng Lang						0
Italian	2		7	5		14
Japanese						
Latin-Lit			1	3	7	11
Latin-Virgil						0
Music Theory	4	3	5	1		13
Physics B	21	3				24
Physics C-E&M	3					3
Physics C-Mech	3					3
Psychology	43	7			1	51
Spanish Lang	18	29	19	9	4	79
Spanish Lit	3	6	5	1		15
Statistics	3	15	15	7	1	41
Studio Art-Drawing	1	2	5			8
Studio Art 2D Design		1	4	5		10
Studio Art 3D Design	1					1
US History	54	10	2	1		67
World History						0
	449	258	152	66	18	943
Percentage	47.60%	27.40%	16.10%	7.00%	1.90%	

# of students taking AP's	392
# of Seniors enrolled in high school	301
# of Juniors enrolled in high school	331
# of Sophomores enrolled in high school	341

Procedures

Course grades were compiled through an export from the school's Student Information System. At the same time, other information was gathered. The student's most recently calculated Grade Point Average (GPA) provided an overview of students' academic ability. Likewise, PSAT scores in all three components were examined as another measure of academic prowess. Similarly, prior AP experience was noted.

Advanced Placement scores was manually added to each student record. Every year, the College Board provides schools summaries of Advanced Placement results approximately 2 months after the tests are administered. Data is presented in different formats. A list of each course is provided with the AP scores of each class member. The scores are summarized by course giving the number of 1's, 2's, 3's, 4's and 5's. Finally, a listing of all high school students and their individual scores is provided.

After careful and lengthy deliberation, it was decided to use ANCOVA in order to compare the achievement results. Because the research design of this study utilized existing observed data it was not possible to manipulate variables. Statistical control was achieved by the analytic procedure analysis of covariance (ANCOVA).

ANCOVA permitted the statistical control of extraneous variables, covariates, when making comparisons. By removing the obscuring effects of pre-existing individual differences among subjects, ANCOVA avoids the need to have subjects initially sorted in the different conditions. One-way ANCOVA was utilized as the method of choice. Four different covariates were used alternately: GPA, PSAT scores (2 measures), and AP experience. PSAT scores were used both as a total of its three components and, also, as just its math component.

Prior to using ANCOVA procedures, data was examined by less sophisticated methods. The distribution of scores was examined. The percentage distribution of scores was also examined. Two independent sample t-tests were conducted comparing the means of the scores in 2006 with the means of the scores in 2007. Means were examined for the total tests, tests by department and, even, by course.

In June of 2006, teachers of Advanced Placement courses for the 2006-07 school year were asked to identify students as regularly admitted or fringe students admitted using more relaxed criteria. Comparisons were made between the academic performances in 2007 of the two groups as measured by both by AP scores and final course grades. Further comparisons involved comparing achievement of students in 2006 versus regularly admitted students in 2007.

Individual colleges decide independently whether to grant credit and/or advanced placement to students based on their AP scores. Some colleges accept scores of 3 and above for credit, others 4 and above, while other colleges give no consideration at all to AP scores. The credit recommended by the College Board is presented in Table 7.

Table 7

College Board Recommendations

Grade	Meaning
5	Extremely well qualified
4	Well qualified
3	Qualified
2	Possibly qualified
1	No recommendation

Letter course grades are given at Millburn High School ranging from A down to an F. For analytic purposes, the grades were converted to numbers using a system not uncommon across educational institutions. As described in the 2007-2008 Student/Parent Handbook (see Table 8) a conversion system is used and grades could be averaged and means compared (Milburn High School, 2007b).

Table 8

Grade Conversion System

A = 12	A- = 11	B+ = 10	B = 9	B- = 8	C+ = 7
C = 6	C- = 5	D+ = 4	D = 3	D- = 2	F = 0

Preliminary Findings

A cursory examination of the Advanced Placement scores indicates no readily visible differences in AP scores between 2006 and 2007 that would indicate a decline of scores due to the expansion of student acceptances (see Tables 9 and 10).

Table 9

Advanced Placement Scores – 2006-2007 (Number of Students)

Year	AP Students	Total Scores	1's	2's	3's	4's	5's
2007	392	943	18	66	152	258	449
2006	328	777	13	39	143	245	337

Table 10

Advanced Placement Scores – 2006-2007 (Percentage of Students)

Year	AP Students	Total Scores	1's	2's	3's	4's	5's
2007	392	943	1.91	7.00	16.11	27.36	47.61
2006	328	777	1.67	5.02	18.40	31.53	43.37

Indeed the percentage of 5's increased from 2006 to 2007 (43.37% vs. 47.61%). Of course the total of 4's and 5's remained practically the same (74.90% vs. 74.97%). Admittedly, the number of 3's dropped 2% from 2006 to 2007 with scores shifting downward to 2's.

Moreover, minimal differences are found when conducting t-tests comparing the means of the scores between 2006 and 2007. Such comparisons were conducted between scores in their entirety and by 10 of the individual courses that had the largest percentage of student growth (see Table 4).

Mean AP score in 2006 compared to Mean AP score in 2007. According to a two independent sample t-tests, the total AP scores for 2006 ($\overline{X}$ = 4.10, s = 0.98, n = 777) are not significantly different from the total AP scores for 2007 ($\overline{X}$ =4.12, s = 1.04, n = 943). The degrees of freedom = 1718 for the test, t = -.380 and p = .704. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Calculus AB: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Calculus AB for 2006 ($\overline{X}$ = 4.34, s = 0.78, n = 38) are not significantly different from AP scores in Calculus AB for 2007 ($\overline{X}$ = 4.25, s = 0.96, n = 48). The degrees of freedom = 84 for the test, t = .480 and p = .632. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Calculus BC: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Calculus BC for 2006 ($\overline{X}$ = 4.78, s = 0.53, n = 40) are not significantly different from AP scores in Calculus BC for 2007 ($\overline{X}$ = 4.87, s = 0.40, n = 46). The degrees of freedom = 84 for the test, t = -.940 and p = .350. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Macro Economics: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Macro for 2006 ($\overline{X}$ = 4.44, s = 0.58, n = 25) are not significantly different from AP scores in Macro for 2007 ($\overline{X}$ = 4.41, s = 0.61, n = 34). The degrees of freedom = 57 for the test, t = .179 and p = .858. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Micro Economics: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Micro for 2006 ($\overline{X}$ = 4.56, s = 0.58, n = 25) are not significantly different from AP scores in Micro for 2007 ($\overline{X}$ = 4.42, s = 0.61, n = 33). The degrees of freedom = 56 for the test, t = .852 and p = .398. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

English Language: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Eng Lang for 2006 ($\overline{X}$ = 3.97, s = 0.66, n = 60) are significantly different from AP scores in Eng Lang for 2007 ($\overline{X}$ = 4.27, s = 0.78, n = 83). The degrees of freedom = 141 for the test, t = -2.397 and p = 0.018. We reject the hypothesis that the means of the test scores in the 2 years are equal with a 95% confidence level. The means of the scores in 2007 are higher than the means of the scores in 2006.

English Literature: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Eng Lit for 2006 ($\overline{X}$ = 4.53, s = 0.57, n = 30) are not significantly different from AP scores in Eng Lit for 2007 ($\overline{X}$ = 4.38, s = 0.77, n = 53). The degrees of freedom = 81 for the test, t = .972 and p = .334. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

French Language: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in French Lang for 2006 ($\overline{X}$ = 3.13, s = 0.86, n = 30) are not significantly different from AP scores in French Lang for 2007 ($\overline{X}$ = 3.19, s = 0.93, n = 57). The degrees of freedom = 85 for the test, t = -.291 and p = .772. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Government & Politics: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Gov't for 2006 ($\overline{X}$ = 3.79, s = 0.74, n = 43) are not significantly different from AP scores in Gov't for 2007 ($\overline{X}$ = 4.00, s = 0.89, n = 59). The degrees of freedom = 100 for the test, t = -1.256 and p = .212. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Spanish Language: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in Spanish Lang for 2006 ($\overline{X}$ = 3.46, s = 0.86, n = 46) are not significantly different from AP scores in Spanish Lang for 2007 ($\overline{X}$ = 3.61, s = 1.11, n = 79). The degrees of freedom = 123 for the test, t = -.792 and p = .430. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

United States History: AP scores in 2007 compared to AP scores in 2007. According to a two independent sample t-tests, AP scores in US History for 2006 ($\overline{X}$ = 4.73, s = 0.49, n = 56) are not significantly different from AP scores in US History for 2007 ($\overline{X}$ = 4.75, s = 0.59, n = 67). The degrees of freedom = 121 for the test, t = -.144 and p = .886. We cannot reject the hypothesis that the means of the test scores in the 2 years are equal.

Summary of the Eleven t-tests

Ten of the eleven t-tests found no significant differences in the means of AP scores. The only significance difference was found between the means of the English Language scores – and they favored the 2007 scores! The t-tests demonstrate no indication that 2007 scores suffered due to expansion in students admitted. Further investigation is warranted.

Research Design

This study proposes to examine the effect on student achievement by increasing admissions into advanced placement courses. The decisions to accept students are made by the individual AP teacher in conjunction with their department supervisor. These decisions are not within the control of the researcher.

This study will utilize an ex post factor design, otherwise known as casual-comparative design. It is not feasible to manipulate which students are admitted into Advanced Placement courses and, in turn, precludes an experimental design. Cause and effect will not be possible to fully identify. However, the possible relationship between admissions and student achievement will be fully explored (Leedy & Ormrod, 2005, p. 232).

Analysis of Covariance is warranted in order to control for variability when experimental control cannot be used, as in this case. By choosing our covariates carefully, the hope is to remove the confounding effect of extraneous variables. Three such factors are examined: Grade Point Averages, PSAT scores, and previous experience in other Advanced Placement courses. There is intuitive rationale for each of these three covariates to have predictive value on the dependent variables of achievement.

Controlling for their effects through ANCOVA will reveal more about the relationships between the measures of student achievement. The observed variations in student achievement can be reduced by the variation of each covariate, in turn.

Data Analysis

Data was collected from summary sheets the College Board shares with its participant schools. Each year within 2 months after Advanced Placement students sit for the May Advanced Placement exams, tests are graded, scores are collated, results are shared with the students, and summaries for their students are provided to the schools. These Advanced Placement summaries will serve the basis for analysis.

In 2005-06, 777 tests were administered to 328 students. The following year, 943 tests were administered to 392 students that represented an increase of approximately 20% in each category. Some courses increased enrollments from one year to the next; others did not substantially change (see Table 3). Results on these tests are collected from the summaries provided by the College Board.

The summaries, also, provided information regarding students' prior experience in AP courses. Advanced Placement course grades were collected for these students in both years through the Student Information System utilized by the school and converted to numbers based upon a 12-point scale. Also, the (most recent) Grade Point Averages were gathered from the Student Information System. PSAT scores were obtained through the files of the guidance department.

PSAT scores were chosen over SAT scores for a couple of reasons. First, the PSATs are taken by students usually a year earlier than SAT scores. This increases the chance that AP students under study will have scores to examine and compare. Also, the

format of the PSAT/SAT test changed in 2006 to include a third section in writing. Using the SATs would run the risk of comparing scores from two differently designed tests across the various students. Hence, PSAT scores were utilized.

ANCOVA tests were run in order to test the hypotheses. A comparison of the AP scores was made between years in total and by department. Likewise, for 2007, a comparison of the AP scores was made between students regularly admitted and those fringe students admitted into the AP class under relaxed criteria. Analysis of Covariance was chosen so that exogenous variables could be accounted for in the variation in the achievement measures. This process was repeated using an alternate measure of achievement: student final grades in the AP class.

Summary

The purpose of this study is to investigate the impact on student achievement when more students are admitted into Advanced Placement courses. Data was examined for Advanced Placement students in both the 2005-06 and 2006-07 school year. The data was acquired from school records of grades and summary information of AP scores supplied by the College Board. Also, information on PSAT scores from guidance records was examined.

Several pieces of data were associated with each student: their AP scores; their AP final course grades; PSAT scores, whether or not they had previous AP experience, their Grade Point Average, and whether they were admitted as a "regular" or "fringe" student in each AP course.

The measure of student achievement was done in two ways: by AP scores and by AP final course grades. Arguably, AP scores are more narrowly defined but are a reliable

and valid measure scrutinized by the Educational Testing Service. Final course grades are a broader measure of achievement, graded relatively holistically, and is a less statistically valid measure.

Comparisons were made between the exhibited achievements using Analysis of Covariance. This enabled mitigating variables to be taken into account. The covariates examined one at a time were GPA, PSAT's, and AP experience. Also, achievement was examined between the regularly admitted students and the fringe students.

Chapter IV

RESULTS

This chapter presents and analyzes the data collected from a suburban high school in northern New Jersey on students enrolled in Advanced Placement classes. Community pressure to allow more students into the AP program led this high school to accept practically 20% more students (392 vs. 328) into its various AP offerings in 2007 than in 2006, resulting in more than 20% more AP tests (943 vs. 777) being administered. This study examines the effect of an increase in Advanced Placement enrollment on student achievement in the AP classes.

AP students are classified as either regular students admitted under preexisting criteria or fringe students admitted under relaxed criteria. It is assumed that all of the students in 2006 were regularly admitted. The fringe students of 2007 were so identified by their individual AP teachers in June, 2006 upon request of the researcher.

Student achievement is measured in two ways: both by AP scores and final course grades. The AP scores were gathered from annual reports sent to the school from the College Board summarizing student scores earned on the College Board Advanced Placement tests administered each May. These scores range from a low of a "1" to a high of a "5".

Final course grades in the course were retrieved and collated from the high school's Student Information System. At this high school, grades are assigned a letter from a scale with "A" as the highest. For the purpose of this study, these letter grades were converted to a numerical equivalent. An "A" converts to a 12; an "A-" to an 11 (see

Table 8). This conversion is employed by the high school under study and is not uncommon across the nation.

In order to examine the impact of the change in AP acceptance policy, Analysis of Covariance (ANCOVA) tests were used to compare student achievement in 2006 with 2007. Also, ANCOVA tests were used to compare regularly admitted students in 2007 with fringe students admitted under relaxed criteria. The covariates employed were Grade Point Averages, AP experience, PSAT (total) scores and PSAT (math) scores. Both measures of PSAT were used in order to test the possibility that one was a better predictor of AP scores than the other.

The study tested eight null hypotheses to analyze the data. The first 5 hypotheses examined relationships between measures of student achievement in 2006 versus 2007. The last 3 hypotheses examined measures of student achievement between regularly admitted students in 2007 versus those fringe students in 2007 admitted under relaxed criteria.

Overview of Data

The following 4 tables give an overview of data used in this study.

Table 11 is an overview of the number of AP students in 2006 and 2007, tests administered, and the number of regular and fringe test takers in 2007.

Table 12 gives the mean and standard deviation of Covariates for 2006 and 2007.

Table 13 is an overview of the AP Scores, Final Course Grades, and GPA of students by course.

Table 14 is a comparison of 2007 Regular v Fringe AP Scores, Final Grades and GPA.

Table 11

Overview of Number of AP Students, Tests Administered, Regular/Fringe Test Takers

Year	AP Students	Test Administered	Regular Test Takers	Fringe Test Takers
2006	328	777	777	0
2007	392	943	802	141

Table 12

Mean and Standard Deviation of Covariates

	2006 Mean	2006 Std Dev	2007 Mean	2007 Std Dev
PSAT - Critical	63.2	8.4	63.3	8.7
PSAT - Math	67.1	7.8	65.4	8.1
PSAT - Writing	67.9	8.5	65.2	8.6
PSAT - Math	198.2	20.4	194	20.9
GPA	4.018	0.329	4.019	0.329
AP Experience	.50	.6	.45	.5

Table 13

Comparison of 2006 v 2007 Course AP Scores, Final Grades and GPA

Total AP Tests	2006	Mean Scores			2007	Mean Scores		
	#Tests	AP score	Fnl Gr	GPA	#Tests	AP score	Fnl Gr	GPA
Art History	16	3.00	10.19	3.83	16	4.13	11.00	3.90
Biology	29	4.86	10.54	4.18	33	4.91	10.44	4.14
Calculus AB	38	4.34	8.78	3.88	48	4.25	8.46	3.94
Calculus BC	40	4.78	11.34	4.17	46	4.80	11.29	4.15
Chemistry	25	4.80	10.50	4.20	25	4.56	10.32	4.20
Chinese	0	---	---	---	10	5.00	11.67	3.74
Comp Sci AB	23	4.30	10.54	3.98	15	4.60	10.42	3.80
Economics –Macro	25	4.44	11.23	4.19	34	4.38	10.85	4.14
Economics-Micro	25	4.56	11.23	4.19	33	4.42	10.85	4.14
English Lang/Comp	60	3.97	10.77	4.04	83	4.27	10.99	4.01
English Lit/Comp	30	4.53	10.83	4.07	53	4.40	10.67	4.00
Environmental	18	3.83	9.70	3.89	19	4.00	10.63	3.99
European History	69	4.13	11.06	4.09	60	3.83	10.69	4.01
French Lang	30	3.10	10.72	3.93	57	3.19	10.86	4.04
French Lit	13	3.31	10.77	4.06	10	3.30	10.45	3.92
German	1	---	---	---	0	---	---	---
Gov't & Politics Comp	6	---	---	---	2	---	---	---
Gov't & Politics US	43	3.80	11.02	4.01	59	4.00	11.13	4.07
Italian Lang	7	2.86	10.75	3.74	14	2.93	11.14	3.83
Latin Lit		---	---	---	11	1.45	10.63	3.88
Latin-Vergil	11	2.55	11.09	4.03		---	---	---
Music Theory	8	4.50	---	---	13	3.77	---	---
Physics B	24	4.83	9.84	4.15	24	4.88	9.75	4.15
Physics C E&M	6	5.00	---	---	3	5.00	---	---
Physics C-Mech	6	5.00	---	---	3	5.00	---	---
Psychology	47	4.62	11.00	4.09	51	4.78	10.86	4.05
Spanish Lang	46	3.46	10.63	4.06	79	3.61	10.70	4.03
Spanish Lit	14	3.92	10.85	3.94	15	3.73	10.87	4.01
Statistics	52	3.22	9.43	3.87	41	3.29	10.30	3.90
Studio Art-Drawing	8	2.89	11.61	3.57	8	4.00	11.31	3.77
Studio Art 2D Design	1	---	---	---	10	2.79	10.80	3.69
Studio Art 3D Design		---	---	---	1	---	---	---
US History	56	4.73	10.18	4.07	67	4.75	10.47	4.11
World History		---	---	---		---	---	---
TOTALS	777				943			

Table 14

Comparison of 2007 Regular v Fringe AP Scores, Final Grades and GPA

	2006 n	2007 n	2007 Regular#	2007 Fringe#	Regular Mean AP Score	Fringe Mean AP Score	Regular Mean Grade	Fringe Mean Grade	Regular Mean GPA	Fringe Mean GPA
Art History	16	16	15	1	3.88	4.00	11.13	9.00	3.920	3.633
Biology	29	33	33	0	4.63	N/A	9.54	N/A	3.787	N/A
Calc AB	38	48	40	8	4.38	3.63	8.73	7.13	3.954	3.842
Calc BC	40	46	46	0	4.80	N/A	11.04	N/A	4.058	N/A
Chemistry	25	25	25	0	4.56	N/A	10.32	N/A	4.202	N/A
Chinese	0	10	10	0	4.50	N/A	10.50	N/A	3.369	N/A
Comp Sci A	0	0	0	0				N/A	N/A	
Comp Sci AB	23	15	12	3	3.81	2.67	10.63	9.33	3.861	3.448
Econ-Mac	25	34	34	0	4.38	N/A	10.53	N/A	4.141	N/A
Econ-Mic	25	33	33	0	4.29	N/A	10.53	N/A	4.141	N/A
Eng Lang/C	60	83	70	13	4.19	4.00	10.88	10.77	4.025	3.903
Eng Lit/Co	30	53	37	16	4.49	4.19	10.57	10.25	3.994	3.880
Env Sci	18	19	19	0	3.80	N/A	10.10	N/A	3.987	N/A
European Hist	69	60	60	0	3.71	N/A	10.69	N/A	4.015	N/A
French Lang	30	57	36	21	3.37	2.57	10.58	10.33	3.973	3.962
French Lit	13	10	10	0	3.00	N/A	10.45	N/A	3.922	N/A
Germ Lang	1	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Gov & Pol C	6	2	2	0	4.00	N/A	11.50	N/A	4.304	N/A
Gov & Pol US	43	59	34	25	4.17	3.44	11.06	10.76	4.120	3.984
Human Geo	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Intl Eng La	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Italian	7	14	11	3	3.18	2.00	11.18	11.00	3.836	3.791
Latin-Lit	0	11	8	3	0.92	1.33	10.70	10.00	3.913	3.754
Latin-Virgil	11	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
Music Thry	8	13	13	0	N/A	N/A	N/A	N/A	N/A	N/A
Physics B	24	24	24	0	4.88	N/A	9.75	N/A	4.153	N/A
Physics E&M	6	3	3	0	5.00	N/A	10.67	N/A	4.175	N/A
Physics Mech	6	3	3	0	5.00	N/A	10.67	N/A	4.175	N/A
Psychology	47	51	51	0	4.78	N/A	10.65	N/A	3.967	N/A
Span Lang	46	79	55	24	3.63	3.25	10.74	10.63	3.907	3.996
Spanish Lit	14	15	15	0	3.73	N/A	10.87	N/A	4.010	N/A
Statistics	52	41	24	17	3.31	2.88	10.31	10.29	3.939	3.831
St Art-Dra	8	8	8	0	4.00	N/A	11.80	N/A	3.770	N/A
St Art 2D	1	10	10	0	2.25	N/A	10.13	N/A	3.456	N/A
St Art 3D	0	1	1	0	5.00	N/A	12.00	N/A	3.770	N/A
US History	56	67	60	7	4.65	4.29	10.05	9.71	3.989	3.996
World History	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	777	943	802	141						

Hypotheses

Hypothesis 1

There is no significant difference in the overall AP scores for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of year (2006 vs. 2007) on AP performance. The four covariates employed were GPA, AP prior experience, and PSAT scores – both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 15, 16, 17, and 18.

Table 15

Analysis of Covariance for AP (all) Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	256.822	295.859	.000	.152
Main Effect						
Year	Between Subjects	1	.167	.192	.661	.000
Error	Between Subjects	1646				

Note: Dependent variable was AP scores.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that the AP scores achieved by students between 2006 and 2007

are the same. When adjusting for GPA, the main effect of year is not significant, F = .192, df = 1,1646, p < .661. After adjusting for this covariate, the difference of .021 of the mean AP score of students in 2006 (M = 4.088, SE = .034, n = 738) and the mean AP score of students in 2007 (M = 4.209, SE = .031, n = 911) is not statistically significant.

Table 16

Analysis of Covariance for AP (all) Scores Based on Year - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Exp	Between Subjects	1	82.869	85.335	.000	.048
Main Effect						
Year	Between Subjects	1	.252	.259	.611	.000
Error	Between Subjects	1695				

Note: Dependent variable was AP scores.

The null hypothesis is retained when AP experience is treated as the covariate: one cannot reject the null hypothesis that the AP scores achieved by students between 2006 and 2007 are the same. When adjusting for AP experience, the main effect of year is not significant, F = .259, df = 1,1695, p < .611. After adjusting for this covariate, the difference of .024 of the mean AP score of students in 2006 (M = 4.093 SE = .036, n = 764) and the mean AP score of students in 2007 (M = 4.117, SE = .032, n = 934) is not statistically significant.

Table 17

Analysis of Covariance for AP (all) Scores Based on Year - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	349.159	433.039	.000	.212
Main Effect						
Year	Between Subjects	1	5.661	7.021	.008	.004
Error	Between Subjects	1605				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (total) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved by students between 2006 and 2007 are the same. When adjusting for PSAT (total) scores, the main effect of year is significant, $F = 7.021$, $df = 1,1605$, $p < .008$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.034$, $SE = .033$, $n = 736$) is statistically significantly lower than the mean AP score of students in 2007 ($M = 4.154$, $SE = .031$, $n = 872$).

Table 18

Analysis of Covariance for AP (all) Scores Based on Year - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	225.254	254.957	.000	.137
Main Effect						
Year	Between Subjects	1	3.951	4.472	.035	.003
Error	Between Subjects	1605				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (math) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved by students between 2006 and 2007 are the same. When adjusting for PSAT (math) scores, the main effect of year is significant, $F = 4.472$, $df = 1,1605$, $p < .035$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.044$, $SE = .035$, $n = 736$) is statistically significantly lower than the mean AP score of students in 2007 ($M = 4.145$, $SE = .032$, $n = 872$).

Hypothesis 2

There is no significant difference in the overall AP final course grades for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of year (2006 vs. 2007) on AP performance. The four covariates employed were GPA, AP prior experience, and PSAT scores – both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 19, 20, 21, and 22.

Table 19

Analysis of Covariance for AP Final Course (all) Grades Based on Year-Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	964.334	774.653	.000	.321
Main Effect						
Year	Between Subjects	1	3.372	2.709	.100	.002
Error	Between Subjects	1640				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved by students between 2006 and 2007 are the same. When adjusting for GPA, the main effect is not significant, $F = 2.709$, $df = 1, 1640$, $p < .100$. After adjusting for this covariate, the difference of .101 of the mean AP final course grade of students in 2006 ($M = 10.568$, $SE = .041$, $n = 738$) and the mean AP final course grade of students in 2007 ($M = 10.659$, $SE = .037$, $n = 905$) is not statistically significant.

Table 20

Analysis of Covariance for AP (all) Grades Based on Year - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Exp	Between Subjects	1	12.711	6.965	.008	.004
Main Effect						
Year	Between Subjects	1	2.773	1.520	.218	.001
Error	Between Subjects	1643				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when AP experience is treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved by students between 2006 and 2007 are the same. When adjusting for AP experience, the main effect of year is not significant, $F = 1.520$, $df = 1,1643$, $p < .218$. After adjusting for this covariate, the difference of .082 of the mean AP final course grade of students in 2006 ($M = 10.575$, $SE = .050$, $n = 738$) and the mean AP final course grade of students in 2007 ($M = 10.657$, $SE = .045$, $n = 908$) is not statistically significant.

Table 21

Analysis of Covariance for AP (all) Grades Based on Year - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	236.461	141.012	.000	.081
Main Effect						
Year	Between Subjects	1	10.831	6.459	.011	.004
Error	Between Subjects	1599				

Note: Dependent variable was AP final course.

The null hypothesis is rejected when PSAT (total) scores are treated as the covariate: one cannot accept the null hypothesis that the AP final course grades achieved by students between 2006 and 2007 are the same. When adjusting for PSAT (total) scores, the main effect of year is significant, $F = 6.459$, $df = 1, 1599$, $p < .011$. After adjusting for this covariate, the mean AP course grade of students in 2006 ($M = 10.529$, $SE = .048$, $n = 736$) is statistically significantly lower than the mean AP course grade of students in 2007 ($M = 10.696$, $SE = .044$, $n = 866$).

Table 22

Analysis of Covariance for AP (all) Grades Based on Year - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	84.069	47.438	.000	.029
Main Effect						
Year	Between Subjects	1	6.545	3.693	.055	.002
Error	Between Subjects	1599				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when PSAT (math) scores are treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved by students between 2006 and 2007 are the same. When adjusting for PSAT (math) scores, the main effect is not significant, $F = 3.693$, $df = 1, 1599$, $p < .055$. After adjusting for this covariate, the difference of .130 of the mean AP final course grade of students in 2006 ($M = 10.549$, $SE = .049$, $n = 736$) and the mean AP final course grade of students in 2007 ($M = 10.679$, $SE = .045$, $n = 866$) is not statistically significant.

Hypothesis 3

There is no significant difference in the overall AP scores achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of year (2006 vs. 2007) on AP performance for regularly admitted students. The four covariates employed were GPA, AP prior experience, and PSAT scores – both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 23, 24, 25, and 26.

Table 23

Analysis of Covariance for AP (reg) Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	227.734	277.808	.000	.155
Main Effect						
Year	Between Subjects	1	4.220	5.148	.023	.003
Error	Between Subjects	1510				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when GPA is treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved between students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is significant, $F = 5.148$, $df = 1, 1510$, $p < .023$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.102$, $SE = .033$, $n = 738$) is statistically significantly lower than the mean AP scores of regularly admitted students in 2007 ($M = 4.208$, $SE = .033$, $n = 775$).

Table 24

Analysis of Covariance for AP (reg) Scores Based on Year - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Exp	Between Subjects	1	58.323	62.717	.000	.039
Main Effect						
Year	Between Subjects	1	5.430	5.839	.016	.004
Error	Between Subjects	1559				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when AP experience is treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved between students in 2006 and regularly admitted students in 2007 are the same. When adjusting for AP experience, the main effect of year is significant, $F = 5.839$, $df = 1, 1559$, $p < .016$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.101$, $SE = .035$, $n = 764$) is statistically significantly lower than the mean AP score of regularly admitted students in 2007 ($M = 4.219$, $SE = .034$, $n = 798$).

Table 25

Analysis of Covariance for AP (reg) Scores Based on Year - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	293.017	378.831	.000	.204
Main Effect						
Year	Between Subjects	1	12.575	16.258	.000	.011
Error	Between Subjects	1477				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (total) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved between students in 2006 and regularly admitted students in 2007 are the same. When adjusting for PSAT (total) scores, the main effect of year is significant, $F = 16.258$, $df = 1, 1477$, $p < .000$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.060$, $SE = .032$, $n = 736$) is statistically significantly lower than the mean AP score of regularly admitted students in 2007 ($M = 4.245$, $SE = .032$, $n = 744$).

Table 26

Analysis of Covariance for AP (reg) Scores Based on Year - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	192.528	228.788	.000	.134
Main Effect						
Year	Between Subjects	1	12.184	14.479	.000	.010
Error	Between Subjects	1477				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (math) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved between students in 2006 and regularly admitted students in 2007 are the same. When adjusting for PSAT (math) scores, the main effect of year is significant, $F = 14.479$, $df = 1, 1477$, $p < .000$. After adjusting for this covariate, the mean AP score of students in 2006 ($M = 4.062$, $SE = .034$, $n = 736$) is statistically significantly lower than the mean AP scores of regularly admitted students in 2007 ($M = 4.244$, $SE = .034$, $n = 744$).

Hypothesis 4

There is no significant difference in the overall AP final course grades achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of year (2006 vs. 2007) on AP performance. The four covariates employed were GPA, AP prior experience, and PSAT scores – both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 27, 28, 29, and 30.

Table 27

Analysis of Covariance for AP (reg) Grades Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	905.130	713.469	.000	.322
Main Effect						
Year	Between Subjects	1	3.134	2.471	.116	.002
Error	Between Subjects	1504				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, $F = 2.471$, $df = 1, 1504$, $p < .116$. After adjusting for this covariate, the difference of .092 of the mean AP final course grade of students in 2006 ($M = 10.594$, $SE = .041$, $n = 738$) and the mean AP final course grade of regularly admitted students in 2007 ($M = 10.686$, $SE = .041$, $n = 769$) is not statistically significant.

Table 28

Analysis of Covariance for AP (reg) Grades Based on Year - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Exp	Between Subjects	1	12.141	6.520	.011	.004
Main Effect						
Year	Between Subjects	1	6.193	3.326	.068	.002
Error	Between Subjects	1507				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when AP experience is treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for AP experience, the main effect of year is not significant, $F = 3.326$, $df = 1, 1507$, $p < .068$. After adjusting for this covariate, the difference of .128 of the mean AP final course grade of students in 2006 ($M = 10.578$, $SE = .050$, $n = 738$) and the mean AP final course grade of regularly admitted students in 2007 ($M = 10.706$, $SE = .049$, $n = 772$) is not statistically significant.

Table 29

Analysis of Covariance for AP (reg) Grades Based on Year - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	233.451	137.184	.000	.085
Main Effect						
Year	Between Subjects	1	12.999	7.639	.006	.005
Error	Between Subjects	1471				

Note: Dependent variable was AP final course grades.

The null hypothesis is rejected when PSAT (totals) scores are treated as the covariate: one cannot accept the null hypothesis that the AP final course grades achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for PSAT (totals) scores, the main effect of year is significant, $F = 7.639$, $df = 1, 1471$, $p < .006$. After adjusting for this covariate, the mean AP final course grade of students in 2006 ($M = 10.549$, $SE = .048$, $n = 736$) is statistically significantly lower than the mean AP final course grade of regularly admitted students in 2007 ($M = 10.737$, $SE = .048$, $n = 738$).

Table 30

Analysis of Covariance for AP (reg) Grades Based on Year - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	82.324	45.622	.000	.030
Main Effect						
Year	Between Subjects	1	10.467	5.801	.016	.004
Error	Between Subjects	1471				

Note: Dependent variable was AP final course grades.

The null hypothesis is rejected when PSAT (math) scores are treated as the covariate: one cannot accept the null hypothesis that the AP final course grades achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for PSAT (math) scores, the main effect of year is significant, $F = 5.801$, $df = 1, 1471$, $p < .016$. After adjusting for this covariate, the mean AP final course grade of students in 2006 ($M = 10.558$, $SE = .050$, $n = 736$) is statistically significantly lower than the mean AP final course grade of regularly admitted students in 2007 ($M = 10.728$, $SE = .050$, $n = 738$).

Hypothesis 5

There is no significant difference in the overall AP scores achieved within each department between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

To test this hypothesis an Analysis of Covariance was used to determine the effects of years on AP performance within each department. The five departments examined were English, Social Studies, Mathematics, Science and World Languages. The covariate employed was GPA. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 31, 32, 33, 34, and 35.

Table 31

Analysis of Covariance for AP English Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	15.922	36.449	.000	.142
Main Effect						
Year	Between Subjects	1	1.430	3.275	.072	.015
Error	Between Subjects	220				

Note: Dependent variable was AP scores in English.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the English Department the AP scores achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, $F = 3.275$, $df = 1, 220$, $p < .072$. After adjusting for this covariate, the difference of .164 of the mean AP score of students in 2006 ($M = 4.161$, $SE = .071$, $n = 88$) and the mean AP score of regularly admitted students in 2007 ($M = 4.325$, $SE = .057$, $n = 135$) is not statistically significant.

Table 32

Analysis of Covariance for AP Social Studies Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	76.019	126.009	.000	.175
Main Effect						
Year	Between Subjects	1	.510	.845	.358	.001
Error	Between Subjects	595				

Note: Dependent variable was AP scores in Social Studies.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the Social Studies Department the AP scores achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, F = .845, df = 1, 595, p < .358. After adjusting for this covariate, the difference of .059 of the mean AP score of students in 2006 (M = 4.276, SE = .047, n = 279) and the mean AP score of regularly admitted students in 2007 (M = 4.335, SE = .043, n = 319) is not statistically significant.

Table 33

Analysis of Covariance for AP Mathematics Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	49.150	4.983	.000	.144
Main Effect						
Year	Between Subjects	1	1.196	1.216	.271	.004
Error	Between Subjects	297				

Note: Dependent variable was AP scores in Mathematics.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the Mathematics Department the AP scores achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, F = 1.216, df = 1, 297, p < .271. After adjusting for this covariate, the difference of .126 of the mean AP score of students in 2006 (M = 4.061, SE = .081, n = 151) and the mean AP score of regularly admitted students in 2007 (M = 4.187, SE = .081, n = 149) is not statistically significant.

Table 34

Analysis of Covariance for AP Science Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	14.396	35.925	.000	.161
Main Effect						
Year	Between Subjects	1	.128	.321	.572	.002
Error	Between Subjects	187				

Note: Dependent variable was AP scores in Science.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the Science Department the AP scores achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, $F = .321$, $df = 1, 187$, $p < .572$. After adjusting for this covariate, the difference of .052 of the mean AP score of students in 2006 ($M = 4.674$, $SE = .066$, $n = 92$) and the mean AP score of regularly admitted students in 2007 ($M = 4.622$, $SE = .064$, $n = 98$) is not statistically significant.

Table 35

Analysis of Covariance for AP World Languages Scores Based on Year - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	46.609	44.680	.000	.127
Main Effect						
Year	Between Subjects	1	.348	.334	.564	.001
Error	Between Subjects	308				

Note: Dependent variable was AP scores in World Languages.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the World Languages Department the AP scores achieved by students in 2006 and regularly admitted students in 2007 are the same. When adjusting for GPA, the main effect of year is not significant, $F = .334$, $df = 1, 308$, $p < .564$. After adjusting for this covariate, the difference of .069 of the mean AP score of students in 2006 ($M = 3.282$, $SE = .094$, $n = 119$) and the mean AP score of regularly admitted students in 2007 ($M = 3.351$, $SE = .074$, $n = 192$) is not statistically significant.

Hypothesis 6

There is no significant difference in the overall AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of admission criteria (regular vs. fringe) on AP performance. The four covariates employed were GPA, AP prior experience and PSAT scores – both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 36, 37, 38, and 39.

Table 36

ANCOVA for AP Scores Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	119.766	135.742	.000	.130
Main Effect						
Regular/Fringe	Between Subjects	1	37.944	43.006	.000	.045
Error	Between Subjects	908				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when GPA is treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is significant, $F = 43.006$, $df = 1, 908$, $p < .000$. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 ($M = 4.191$, $SE = .034$, $n = 775$) is statistically significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 ($M = 3.611$, $SE = .081$, $n = 136$).

Table 37

ANCOVA for AP Scores Based on Admission Criteria - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Experience	Between Subjects	1	33.709	34.554	.000	.036
Main Effect						
Regular/Fringe	Between Subjects	1	48.792	50.015	.000	.051
Error	Between Subjects	931				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when AP experience is treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for AP experience, the main effect of admission criteria is significant, $F = 50.015$, $df = 1, 931$, $p < .000$. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 ($M = 4.205$, $SE = .035$, $n = 798$) is statistically significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 ($M = 3.548$, $SE = .086$, $n = 136$).

Table 38

ANCOVA for AP Scores Based on Admission Criteria - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	154.408	183.117	.000	.174
Main Effect						
Regular/Fringe	Between Subjects	1	25.601	30.361	.000	.034
Error	Between Subjects	869				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (total) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for PSAT (total) scores, the main effect of admission criteria is significant, $F = 30.361$, $df = 1, 869$, $p < .000$. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 ($M = 4.173$, $SE = .034$, $n =$

744) is statistically significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 (M = 3.679, SE = .083, n = 128).

Table 39

ANCOVA for AP Scores Based on Admission Criteria - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	95.383	104.685	.000	.108
Main Effect						
Regular/Fringe	Between Subjects	1	37.869	41.562	.000	.046
Error	Between Subjects	869				

Note: Dependent variable was AP scores.

The null hypothesis is rejected when PSAT (math) scores are treated as the covariate: one cannot accept the null hypothesis that the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for PSAT (total) scores, the main effect of admission criteria is significant, F = 41.562, df = 1, 869, p < .000. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 (M = 4.188, SE = .035, n = 744) is statistically significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 (M = 3.592, SE = .085, n = 128).

Hypothesis 7

There is no significant difference in the overall AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the

students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

To test this hypothesis an Analysis of Covariance was used to determine the effects of admission criteria (regular vs. fringe) on AP performance. The four covariates employed were GPA, AP prior experience and PSAT scores: both total PSAT scores and math PSAT scores. Some scores were missing resulting in slightly different sample sizes in the various tests. Results of the corresponding ANCOVA tests are shown in Tables 40. 41, 42, and 43.

Table 40

ANCOVA for AP Grades Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	498.769	420.542	.000	.318
Main Effect						
Regular/Fringe	Between Subjects	1	0.000	.002	.967	.000
Error	Between Subjects	902				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is not significant, $F = .002$, $df = 1, 902$, $p < .967$. After adjusting for this covariate, the difference of .004 of the mean AP final course grade of regularly admitted students in 2007 ($M = 10.650$, $SE =$

.039, n = 769) and the mean AP final course grade of fringe students admitted under relaxed criteria in 2007 (M = 10.646, SE = .094, n = 136) is not statistically significant.

Table 41

ANCOVA for AP Grades Based on Admission Criteria - Covariate AP Experience

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
AP Experience	Between Subjects	1	.000	.000	.995	.000
Main Effect						
Regular/Fringe	Between Subjects	1	13.406	7.710	.006	.008
Error	Between Subjects	905				

Note: Dependent variable was AP final course grades.

The null hypothesis is rejected when AP experience is treated as the covariate: one cannot accept the null hypothesis that the AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for AP experience, the main effect of admission criteria is significant, F = 7.710, df = 1, 905, p < .006. After adjusting for this covariate, the mean AP final course grade of regularly admitted students in 2007 (M = 10.706, SE = .048, n = 772) is statistically significantly higher than the mean AP final course grade of fringe students admitted under relaxed criteria in 2007 (M = 10.360, SE = .114, n = 136).

Table 42

ANCOVA for AP Scores Based on Admission Criteria - Covariate PSAT (totals)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (totals)	Between Subjects	1	100.278	62.610	.000	.068
Main Effect						
Regular/Fringe	Between Subjects	1	2.750	1.717	.190	.002
Error	Between Subjects	863				

Note: Dependent variable was AP final course grades.

The null hypothesis is retained when PSAT (totals) scores are treated as the covariate: one cannot reject the null hypothesis that the AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for PSAT (math) scores, the main effect of admission criteria is not significant, $F = 1.717$, $df = 1, 863$, $p < .190$. After adjusting for this covariate, the difference of .162 of the mean AP final course grade of regularly admitted students in 2007 ($M = 10.675$, $SE = .047$, $n = 738$) and the mean AP final course grade of fringe students admitted under relaxed criteria in 2007 ($M = 10.513$, $SE = .114$, $n = 128$) is not statistically significant.

Table 43

ANCOVA for AP Grades Based on Admission Criteria - Covariate PSAT (math)

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
PSAT (math)	Between Subjects	1	24.932	14.762	.000	.017
Main Effect						
Regular/Fringe	Between Subjects	1	8.793	5.206	.023	.006
Error	Between Subjects	863				

Note: Dependent variable was AP final course grades.

The null hypothesis is rejected when PSAT (math) scores are treated as the covariate: one cannot accept the null hypothesis that the AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for PSAT (math) scores, the main effect of admission criteria is significant, $F = 5.206$, $df = 1, 863$, $p < .023$. After adjusting for this covariate, the mean AP final course grade of regularly admitted students in 2007 ($M = 10.694$, $SE = .048$, $n = 738$) is statistically significantly higher than the mean AP final course grade of fringe students admitted under relaxed criteria in 2007 ($M = 10.406$, $SE = .116$, $n = 128$).

Hypothesis 8

There is no significant difference in the overall AP scores achieved in 2007 within each department between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

To test this hypothesis an Analysis of Covariance was used to determine the effects of admission criteria (regular vs. fringe) on AP performance within each department (other than Science which did not admit fringe students). The four departments examined were English, Social Studies, Mathematics and World Languages. The covariate employed was GPA. Some scores were missing resulting in slightly different sample sizes in the various tests. Sample sizes were equalized by a random selection of regular admitted students. Results of the corresponding ANCOVA tests are shown in Tables 44, 45, 46, and 47.

Table 44

ANCOVA for AP English Scores Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	8.147	13.682	.001	.199
Main Effect						
Regular/Fringe	Between Subjects	1	0.000	.003	.960	.000
Error	Between Subjects	55				

Note: Dependent variable was AP scores in English.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the English Department the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is not significant, $F = .003$, $df = 1, 55$, $p < .960$. After adjusting for this covariate, the difference of .010 of the mean AP score of regularly admitted students in 2007 (M =

4.212, SE = .146, n = 29) and the mean AP score of fringe students admitted under relaxed criteria in 2007 (M = 4.202, SE = .146, n = 29) is not statistically significant.

Table 45

ANCOVA for AP Social Studies Scores Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	7.142	11.248	.001	.156
Main Effect						
Regular/Fringe	Between Subjects	1	4.355	6.859	.011	.101
Error	Between Subjects	61				

Note: Dependent variable was AP scores in Social Studies.

The null hypothesis is rejected when GPA is treated as the covariate: one cannot accept the null hypothesis that within the Social Studies Department the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is significant, F = 6.859, df = 1, 61, $p < .011$. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 (M = 4.361, SE = .143, n = 32) is statistically significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 (M = 3.826, SE = .143, n = 32).

Table 46

ANCOVA for AP Mathematics Scores Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	3.112	3.050	.087	.059
Main Effect						
Regular/Fringe	Between Subjects	1	3.550	3.479	.068	.066
Error	Between Subjects	49				

Note: Dependent variable was AP scores in Mathematics.

The null hypothesis is retained when GPA is treated as the covariate: one cannot reject the null hypothesis that within the Mathematics Department the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is not significant, $F = 3.479$, $df = 1, 49$, $p < .068$. After adjusting for this covariate, the difference of .555 of the mean AP score of regularly admitted students in 2007 ($M = 4.143$, $SE = .204$, $n = 26$) and the mean AP score of fringe students admitted under relaxed criteria in 2007 ($M = 3.588$, $SE = .204$, $n = 26$) is not statistically significant.

Table 47

ANCOVA for AP World Languages Scores Based on Admission Criteria - Covariate GPA

Effect	Source	df	SS	F	P	$(Eta)^2$
Covariate Effect						
GPA	Between Subjects	1	20.212	19.179	.000	.168
Main Effect						
Regular/Fringe	Between Subjects	1	5.481	5.201	.025	.052
Error	Between Subjects	95				

Note: Dependent variable was AP scores in World Languages.

The null hypothesis is rejected when GPA is treated as the covariate: one cannot accept the null hypothesis that within the World Languages Department the AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria are the same. When adjusting for GPA, the main effect of admission criteria is significant, $F = 5.201$, $df = 1, 95$, $p < .025$. After adjusting for this covariate, the mean AP score of regularly admitted students in 2007 ($M = 3.390$, $SE = .147$, $n = 49$) is significantly higher than the mean AP score of fringe students admitted under relaxed criteria in 2007 ($M = 2.916$, $SE = .147$, $n = 49$).

Summary of Results

The purpose of this chapter was to examine the academic achievement resulting in relaxing the entrance criteria into Advanced Placement courses. Comparisons were made between 2006 and 2007 results as well as between students in 2007 regularly admitted and those fringe students admitted under relaxed criteria. The following is a summary of the results and analysis of each hypothesis.

Hypothesis 1

There is no significant difference in the overall AP scores for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. AP scores did not decrease from 2006 to 2007. Indeed, in the two tests using PSAT (totals) and PSAT (math), it was found that 2007 mean scores had actually significantly increased from 2006. In the other two tests, we could not reject the hypothesis that the mean AP scores in 2007 were the same as in 2006 although, still, the 2007 mean scores were higher than the 2006 mean scores. There was no indication that AP scores decreased due to the relaxed acceptance policy.

Hypothesis 2

There is no significant difference in the overall AP final course grades for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. AP final course grades did not decrease from 2006 to 2007. Indeed, in the test using PSAT (totals), we found that 2007 mean grades had actually significantly increased from 2006. In the other three tests, we could not reject the hypothesis that the mean AP final grades in 2007 were the same as in 2006 although, still, the 2007 mean grades were higher than the 2006 mean grades. There was no indication that AP grades decreased due to the relaxed acceptance policy.

Hypothesis 3

There is no significant difference in the overall AP scores achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. AP scores of regularly admitted students achieved actually significantly increased from 2006 to 2007. This was supported by each test.

Hypothesis 4

There is no significant difference in the overall AP final course grades achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. AP final course grades did not decrease from 2006 to 2007. Indeed, in two tests using PSAT (total scores) and PSAT (math), we found that 2007 mean grades had actually significantly increased from 2006. In the other two tests, we could not reject the hypothesis that the mean AP final grades in 2007 were the same as in 2006 although, still,

the 2007 mean grades were higher than the 2006 mean grades. There was no indication that AP grades decreased due to the relaxed acceptance policy.

Hypothesis 5

There is no significant difference in the overall AP scores achieved within each department between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

Summary. Five ANCOVA tests were conducted with the same covariate (GPA) but using one academic department at a time. AP scores did not decrease from 2006 to 2007 in any department. Although not significantly different, mean scores in each department other than Science actually increased. There was no indication that AP scores decreased due to the relaxed acceptance policy.

Hypothesis 6

There is no significant difference in the overall AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. The mean AP score in 2007 of regularly admitted students is significantly higher than the mean AP score in 2007 of fringe students. After controlling for pre-existing individual

differences among the students, the means differ by approximately 0.50. This was supported by each test.

Hypothesis 7

There is no significant difference in the overall AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Summary. Four ANCOVA tests were conducted with four different covariates. In two of the tests, the mean AP final course grades in 2007 of regularly admitted students were significantly higher than the grades of the fringe students. In the other two tests, there was not a significant difference between the means of the two sets of course grades although the means of the regularly admitted students were larger than the means of the fringe students.

Hypothesis 8

There is no significant difference in the overall AP scores achieved in 2007 within each department between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

Summary. Four ANCOVA tests were conducted using GPA as the covariate. A separate test was performed for each department: English, Social Studies, Math and World Language. Science was not feasible because no science students were designated

as being fringe. In two departments, Social Studies and World Languages, the means of the regularly admitted students were significantly higher than the means of fringe students. In English and Mathematics, although the regularly admitted students had a higher mean grade, the difference of the means of the fringe students was not statistically significant.

Another summary of the results is provided in Table 48. Each hypothesis is repeated. Covariates are named. The means being compared are given. Whether the hypotheses are accepted or rejected is stated.

Table 48

Tabular Summary of Results

Hypothesis	Covariate	Means		Retain/Reject H_0
H1: There is no significant difference in the overall AP scores for the years 2006 and 2007.	GPA	4.088	4.109	Accept
	AP Experience	4.093	4.117	Accept
	PSAT (totals)	4.034	4.154	Reject
	PSAT (math)	4.044	4.145	Reject
H2: There is no significant difference in the overall AP final course grades for the years 2006 and 2007.	GPA	10.568	10.659	Accept
	AP Experience	10.575	10.657	Accept
	PSAT (totals)	10.529	10.696	Reject
	PSAT (math)	10.549	10.679	Accept
H3: There is no significant difference in the overall AP scores achieved betw students in 2006 and regularly admitted students in 2007.	GPA	4.102	4.208	Reject
	AP Experience	4.101	4.219	Reject
	PSAT (totals)	4.060	4.245	Reject
	PSAT (math)	4.062	4.244	Reject
H4: There is no significant difference in the overall AP final course grades achieved between students in 2006 and regularly admitted students in 2007	GPA	10.594	10.686	Accept
	AP Experience	10.578	10.706	Accept
	PSAT (totals)	10.549	10.737	Reject
	PSAT (math)	10.558	10.728	Reject
H5: There is no significant difference in the overall AP scores achieved within each department between students in 2006 and regularly admitted students in 2007	GPA (English)	4.161	4.325	Accept
	GPA (Soc Stu)	4.276	4.335	Accept
	GPA (Math)	4.061	4.187	Accept
	GPA (Science)	4.674	4.622	Accept
	GPA (WrlLng)	3.282	3.351	Accept

Table 48 (continued)				
Hypothesis	Covariate	Means		Retain/Reject H_0
H6: There is no significant difference in the overall AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria.	GPA	4.191	3.611	Reject
	AP Experience	4.205	3.548	Reject
	PSAT (totals)	4.173	3.679	Reject
	PSAT (math)	4.188	3.592	Reject
H7: There is no significant difference in the overall AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria.	GPA	10.650	10.646	Accept
	AP Experience	10.706	10.360	Reject
	PSAT (totals)	10.675	10.513	Accept
	PSAT (math)	10.694	10.406	Reject
H8: There is no significant difference in the overall AP scores achieved in 2007 within each department between regularly admitted students and fringe students admitted under relaxed criteria.	GPA (English)	4.212	4.202	Accept
	GPA (Soc Stu)	4.361	3.826	Reject
	GPA (Math)	4.143	3.588	Accept
	GPA (Science)	N/A		N/A
	GPA (WrlLng)	3.390	2.916	Reject

Summation

No statistically significant evidence was found that relaxing admission criteria from 2006 to 2007 affected student achievement negatively. AP scores did not go down from one year to the next, rather, there was indication that scores actually went up when controlling for pre-existing differences in students as measured by the covariates. Nor was there evidence found that the inclusion of fringe students in the courses compromised the achievement of the regularly admitted students. Rather, AP scores went up for regularly admitted students. Likewise, final course grades in the AP courses did not go down and, indeed, may have risen. Across the five academic departments there was, also, no evidence that relaxing admission criteria compromised AP scores.

Fringe students admitted under relaxed criteria had statistically significant lower AP scores than regularly admitted students in 2007. The AP scores were approximately half a grade (0.5) lower for these fringe students regardless of which covariate was employed. The final course grades of the fringe students dropped even less dramatically and not significantly lower depending on which covariate was employed. When AP scores were examined by departments, no significant difference was found for English scores. Math scores did not demonstrate significant differences either although that may be a factor of the small sample size.

Chapter V

Summary, Conclusions and Recommendations

This chapter presents a summary of the results of the impact that relaxing Advanced Placement admission criteria has on student achievement in AP scores and final course grades. Scores and grades are examined between 2 years, 2006 and 2007, and distinguished between regular students admitted under prevailing criteria and those fringe students admitted under less restrictive criteria. The chapter also interprets these results and makes recommendations for future research.

Two forces today tug participation in the Advanced Placement program in opposite directions. One force is the advocate for expansion that sees AP as a gatekeeper for college admissions, college credit and general college success. This force views admission standards as inconsistent with ideals of democracy and egalitarianism. The other force pulls in the opposite direction if not to decrease admissions than to at least slow down the rate of growth. This force is motivated by a concern to protect the integrity of the program and to ensure that the level of instruction is not compromised by a classroom of students not motivated nor prepared to successfully meet the challenges of an Advanced Placement curriculum.

This study has found no evidence that increasing the heterogeneity of AP classes has harmed the higher ability students. Instead, Slavin's 1990 meta-analysis is confirmed where the performance of the relatively stronger students increase in heterogeneous classes for such reasons as peer tutoring and being forced to analyze and reflect on concepts that otherwise might be barely grasped. The concern of Eder (1981) who argued that the higher ability students might be distracted by less academically committed

students in a heterogeneous classroom is not confirmed although fringe students in this study would not be expected to represent unmotivated students. Sheppard and Kanevsky's argument (1999) that students need interaction with higher ability students to fully develop intellectually seem confirmed by the success of both regularly admitted students and those fringe students admitted under relaxed criteria.

The findings of the study contradicts Kulik's (1992) claim that high ability students perform better when placed in a homogenous setting. Kulik argues that ability grouping works for these better students for various reasons. However, this study found that there was no significant difference in the grades or AP scores of the regularly admitted students before, to after, the influx of lower ability, fringe, students. If anything, the results favored the scores and grades after 20% more students of lesser ability were admitted into the high school. Likewise, although Feldhusen (2002), Shields (1995), and Rogers (2002, 2007) are concerned that the needs of higher ability students is served best in a homogeneous setting to avoid unnecessarily tedious repetition, this study found no confirmation of such "doomsday" prediction.

The lower ability students, the fringe students accepted under relaxed criteria, appear to have benefited from their involvement in AP classes. This is evidenced by both AP scores and final course grades earned that are not much lower than those scores and grades of regularly admitted students. This finding is consistent with findings from Terwel (2005) and Slavin (1990b) who argue that homogeneous grouping is at the expense of the low achievers who don't get the benefit of sufficient intellectual stimulation. Braddock (1993) and Klopenstein (2003) extend this position stressing equity issues that underscore the under representation of minorities and economically disadvantaged students in advanced classes.

This study dispels the notions of Hallinan (1990) who feels that a homogeneous class avoids the disparity between students that only serves to discourage and demoralize the weaker students. Instead, this study, sees evidence that the weaker fringe students appear to benefit from their interaction with the stronger regularly admitted students as predicted by Shepard and Kanevsky (1999). While Neihart (2007) points out that instruction may be best differentiated for the lower ability students in a homogeneous setting, this evidence indicates that the fringe students learn just fine in an environment of wider ability levels.

A major concern of teachers is that relaxing admission standards into Advanced Placement classes will have adversarial effect since instruction must be tailored for the newly admitted students of lesser academic ability. They fear that lower ability students will suffer due to frustrations experienced when challenged unmercifully. No evidence was found in this study of such a negative effect on final grades or AP scores.

This study found that the findings were consistent across the various departments. In each department, no evidence demonstrated weaker performance by increasing the heterogeneity of the classes. Although Ireson et al. (2002) found some disciplines such as mathematics benefited in terms of student achievement from ability groupings while others such as English did not, this research indicates a benefit accruing to students across all disciplines. It is reminded that science did not expand their admissions in this study.

Student success in Advanced Placement courses seems predictable. Fringe students did not do as well in either AP scores or course grades as regularly admitted students. AP scores were approximately half a grade lower for fringe students than regular students. AP final course grades, in general, were lower, albeit less dramatically,

for fringe students as well. Camara and Millsap (1998) and Ewing, Camara, and Millsap (2006) found PSAT scores were reliable predictors. In this study, the predictor differed from course to course but generally focused on a qualifying test and previous course grades. The teachers in this school were able to successfully identify those students who were most likely to succeed in Advanced Placement courses. PSATs are not the only reliable predictor. Other instruments can be used and as Klopenstein (2003) points out includes test scores, transcripts, and teacher recommendations; indeed, the general criteria that most teachers in this study used to decide admission into their AP class.

The reader is reminded that the admission of fringe students in this study represented only an incremental increase in class heterogeneity. The study does not purport to speak to the effects of changing to an open admission policy where any student with minimal qualifications is permitted admission. The study does attempt to address the concerns of those who fear any relaxation of admission policy. The evidence indicates that the teachers have traditionally placed too high of a bar for AP admissions.

Further relaxation of admission criteria is warranted. It is recommended that the criteria continues to be relaxed gradually so to monitor for a potential "critical point" where student achievement might diminish. Also, PSAT scores and student GPAs might be used as an appeal process to admit students otherwise denied admission to the AP program. Increasing AP enrollment has not led to "doomsday" and should be further encouraged.

Hypotheses

Grouping by ability is a practice that schools have followed for years and generated much discussion and debate. The effect on students is far from clear.

Theoretical arguments whether students learn best in a homogeneous or heterogeneous classroom are abundant and disagree. This investigation examined the impact that admission practices had on student achievement as measured by AP scores and AP final course grades. Results from 2006 and 2007 are examined. The first five hypotheses compare student achievement between the 2 years. The other three hypotheses compare the achievement attained between regularly admitted students and those fringe students that might not normally have been accepted into the AP program.

Preliminary analysis of student achievement supported the assertion that AP scores did not decrease from 2006 to 2007. The percentage of 5's actually increased more than 4% from 43.4 % of the students to 47.6%. The percentage of 4's and 5's total remained almost identical at nearly 75% of all AP tests taken. Admittedly, the year 2007 saw 2.5% less tests earning a "3", with the numbers seemingly shifted lower, primarily to scores of "2". When the ten individual courses that had the largest percentage of student growth were examined, no significant differences were found in the means of the AP scores with the exception in AP Language where the difference actually favored the 2007 scores.

A further concern is how accepting more students into Advanced Placement courses impacts the achievement of those students that would be regularly admitted. Pre-existing individual differences between the students was examined as measured by GPA, PSAT scores, and previous AP experience. With this in mind, the following were the hypotheses examined concerned with student achievement as measured by AP scores and AP final course grades in the years 2006 and 2007:

Hypothesis 1

There is no significant difference in the overall AP scores for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 2

There is no significant difference in the overall AP final course grades for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 3

There is no significant difference in the overall AP scores achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 4

There is no significant difference in the overall AP final course grades achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 5

There is no significant difference in the overall AP scores achieved within each department between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

Hypothesis 6

There is no significant difference in the overall AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 7

There is no significant difference in the overall AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

Hypothesis 8

There is no significant difference in the overall AP scores achieved in 2007 within each department between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

Limitations of the Study

This summary of results, conclusions and recommendations for further study should be understood with the limitations that follow.

The sample was limited to only one high school in New Jersey that belonged to the wealthiest District Factor Grouping, J, which measures schools social and economic level in comparison to other New Jersey schools.

The study was limited to 2 years of data.

Fringe students were identified by the teachers of the individual AP courses. No attempt was made to verify the consistency of acceptance into the program from one year to the next.

The most recent GPA of students was used and treated as a measurement of individual differences among the students that is stable over time.

The fact that the curriculum of World Languages is under revision and its course of study has been slightly modified between the observed years was not taken into account.

The 2006 AP students were considered regularly admitted despite the reality that some were likely accepted into the program for reasons other than their merit and could be considered as fringe students.

The increase in enrollment was only 20% and those extra students admitted into AP courses while "lower ability" were not "low ability".

No attempt was made to compare the achievement of fringe students in AP classes with their achievement in non-AP courses. Whether or not they benefited from enrollment in AP courses is difficult to determine.

No attempt was made to determine consistency of individual teachers' grades.

The school year (Grade 9 or 10 or 11 or 12) was not taken into account.

Summary of Findings and Conclusions

The purpose of this study as stated in Chapter I is to examine the effect on student achievement in Advanced Placement courses when increasing admissions into AP courses. Student achievement is measured in two ways: by the AP scores and by final course grades in the particular AP course. Students are designated as either regular students admitted under prevailing criteria or as fringe students admitted under relaxed criteria.

Participation in the Advanced Placement program is perceived as a key to future success. College acceptances are influenced by AP performance. Placement in college courses depend on AP performance. AP success is highly correlated with success in college. For years, the College Board has been urging expansion of AP offerings so much so that they have instituted an audit in order to ensure the quality of high school courses conducted under its auspices. The U.S. Department of Education has linked the Advanced Placement program with its goals of challenging students and providing a gifted education to high school students of all race, religion, and economic status. Naturally, students and parents want a share of that key.

On the other hand, teachers want to protect the integrity of their courses. Teachers are concerned with maintaining the challenge of the curriculum and the quality of instruction. They fear pressures to "water down" their course content in order to adjust to the limitations of an expanded student enrollment. A slower pace and shallow classroom dialogue is envisioned and deeply feared as the consequence of an admissions policy relaxed to permit more students to take AP classes.

Predicting success in Advanced Placement courses is not easy. Camara and Millsap (1998) found that PSAT scores may be used to identify students who may find success in AP courses. This finding was confirmed in 2006 by Ewing, Camara and Millsap. Klopfenstein (2003) and others have looked at other predictors of AP success such as test scores, teacher recommendations and overall transcripts.

The effect on student achievement by increasing the heterogeneity of classes is not clear from the research alone. Lower ability students seem to benefit from such an arrangement but possibly at the expense of the learning of those students with higher ability. This study examines the effect on student achievement.

Hypothesis 1

There is no significant difference in the overall AP scores for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP scores did not decrease from 2006 to 2007 as teachers feared when enrollment in the Advanced Placement courses increased. Scores actually increased a bit especially when pre-existing individual differences among the students was removed. Indeed, when PSAT scores (both total and math only) were used as the covariate in ANCOVA tests, the differences in mean scores between 2006 and 2007 were statistically significant and demonstrated an increase in scores when enrollment in AP courses increased.

The variance in the scores for 2007 (1.04) was slightly greater than in 2006 (0.97). This suggests that the addition of fringe students may have resulted in a larger spread of AP scores. This is consistent with the belief that the fringe students increase the heterogeneity of the class.

Since the average score has risen in 2007 despite the inclusion of the fringe students, scores of regular students must be greater in 2007 than in 2006. It appears that the addition of fringe students has increased the academic achievement of the regular students. This was not an expected result, but, it is consistent with the findings of Slavin (1990a) that suggest that weaker students can provide stimulation of the academically stronger students.

Several reasons might explain the benefit to the academically stronger students labeled as being regular. For one thing, the teacher may be modifying their classroom delivery in order to address the needs of the fringe students. Concepts may be introduced in more depth. Less enrichment material extraneous to the AP test may be taught out of a need to master the AP curriculum for fringe students with the result that more teaching is directed to the test. More questions on the core curriculum may be raised by students and explicitly answered by the teacher. By making adjustments to meet the needs of fringe student, it is possible that the demands on regular students actually lessen resulting in an increase in AP test scores.

Hypothesis 2

There is no significant difference in the overall AP final course grades for the years 2006 and 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP final course grades did not decrease from 2006 to 2007 as teachers might have feared when enrollment in the Advanced Placement courses increased. If anything, grades may have increased a bit especially when pre-existing individual differences among the students was removed. Indeed, when PSAT total scores were used as the covariate in ANCOVA tests, the difference in mean scores between 2006 and 2007 is significant and demonstrated an increase in scores when enrollment in AP courses increased.

The variance in the scores for 2007 (1.32) was slightly lower than in 2006 (1.39). This result is somewhat counterintuitive since the addition of fringe students would suggest a larger spread of AP scores. However, course grades reflect the performance of students on a wider range of criteria than just test results. Class participation, effort and informal personality judgments can all come into play when a teacher is determining course grades. There is no conclusive expectation as to the course grades of fringe students who most likely are just marginally weaker than regularly admitted students.

Since the average grade has risen in 2007 despite the inclusion of the fringe students, grades of regular students must be greater in 2007 than in 2006. Again, it appears that the addition of fringe students has increased the academic achievement of the regular students. This is, again, consistent with the findings of various researchers that suggest that weaker students can provide stimulation of the academically stronger students.

Course grades are an intriguing measure of student achievement when compared to AP test scores. While course grades are dependent upon objective criteria set by the teacher, department and school, other more subjective criteria, also, enter into their calculations. This is in contrast to the more consistently objective Advanced Placement tests administered by the College Board.

However, course grades can also be used a gauge of teacher self-efficacy. One of the concerns by teachers center around their increased anxiety caused by admitting students with an inferior academic potential. The reservations and concerns teachers have regarding fringe students can be reflected by the grades they assign to students. There is no question that teachers have the control of the grades and even whether or not to adjust their scaling and rubrics that they use. The findings that mean grades did not

decrease from 2006 to 2007 seem to indicate that teachers did not find that their fears materialized.

Hypothesis 3

There is no significant difference in the overall AP scores achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP scores did not decrease from 2006 to 2007 for the regular students when enrollment in the Advanced Placement courses increased by 20%. Instead, scores of the students regularly admitted significantly increased when pre-existing individual differences among the students was removed. This finding was consistent throughout the four tests.

This finding was certainly counterintuitive to what had been expected. The concern for increasing student enrollment is that the extra students will dilute the class. Attention given to the fringe students admitted under relaxed criteria might well impair the learning of the other students admitted under preexisting criteria.

Instead, no evidence of impairment was seen. Rather, scores of the regularly admitted students were significantly greater in 2007 than in 2006. This result may have occurred for several reasons. First, as Slavin (1990b) has pointed out, the performance of the regularly admitted students might have increased due to such factors as peer tutoring

and being given extra time to analyze and reflect on concepts that otherwise might have been only cursorily reviewed.

On the other hand, Feldhusen (2002) concerns about repetitive drilling and tediously slow instruction did not appear to bear fruition. This may well be because Advanced Placement courses stress so much concepts and critical thinking especially on the free response section. The AP test tends to deemphasize rote memory even on the multiple choice section which tests very little factual information without at least some analysis required.

There is a final reason why the regularly admitted students grades may have benefited from the addition of the fringe students. Teachers may have actually introduced less extraneous enrichment material and emphasized the core AP material more. Conceivably, this change of curriculum focus may arguably have resulted in less overall learning but better preparation for the AP test itself.

Hypothesis 4

There is no significant difference in the overall AP final course grades achieved between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP final course grades. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP final course grades did not decrease from 2006 to 2007 for the regular students when enrollment in the Advanced Placement courses increased by 20%.

Instead, scores of the students regularly admitted significantly increased when pre-existing individual differences among the students was removed when PSAT (totals) and PSAT (math) were used as the covariates. When GPA and AP Experience were used as the covariates, an increase was still observed, although not statistically significant.

This finding is consistent with the findings from Hypothesis 3 that examined AP scores instead. Of course, teacher's grades tend not to be as objective as the scores on the nationally administered AP tests. Various factors come into play with a teacher's determination of students' grades.

We cannot discount the possibility that the grades of regularly admitted students are affected by a teacher's expectations. The grades can be a result of a self-fulfilling prophecy. The grades may well indeed be in response to the performance of those fringe students admitted under relaxed criteria. This response could work in two ways.

First, a teacher may scale their grades in response to poor performance on the part of the students with less ability. This may result in higher grades for the regularly admitted students. Second, teachers may be responding to a "halo" effect caused by the realization that the regularly admitted students are "presumed" to be better students than the fringe students. Of course the increase in grades may be the result of factors discussed above such as peer tutoring which may improve the actual performance of the regularly admitted students.

For the most part, teachers of Advanced Placement tend to use clearly defined grading rubrics in determining student grades. Any increase in student achievement as measured by grades is measurable by the criteria established by the teacher and tested through time. There is no indications that student achievement of those regularly admitted has suffered due to the expansion of acceptances into the program.

Hypothesis 5

There is no significant difference in the overall AP scores achieved within each department between students in 2006 (all "regularly" admitted) and regularly admitted students in 2007. The 20% increase in students participating in the Advanced Placement program between 2006 and 2007 does not compromise student achievement as measured by AP scores. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

The mean AP score did not decrease from 2006 to 2007 within each department for the regular students when enrollment in the Advanced Placement courses increased by 20%. Instead, scores of the students regularly admitted increased in all departments, other than Science, when pre-existing individual differences as measured by GPA among the students was removed. None of these five tests in the different departments resulted in significant differences in the scores. The null hypotheses is accepted in each case that there were no change in AP scores from 2006 to 2007.

It is interesting that only in Science did the AP scores of regularly admitted students decrease from 2006 to 2007, although not significantly. Science is the only department that did not accept any fringe students admitted under relaxed criteria. The difference in AP scores from 2006 to 2007 was small (.052) and insignificant. We cannot reject the null hypothesis There is no indication that the mean AP score changed from one year to the next.

The result found in the Science department may have led us to assume that changes would be found in the other four departments that did accept fringe students. Instead, no significant differences were found. The differences that were observed

tended to favor the students in 2007. Again, we see no observed detrimental effects on the regularly admitted students by the admission of fringe students.

Hypothesis 6

There is no significant difference in the overall AP scores achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP scores for regularly admitted students are significantly higher than the mean AP scores for fringe students admitted under relaxed criteria. Not only are the differences between the scores significant but, also, they are sizeable. Indeed, the difference in the means is approximately 0.6 in each test using a different covariate.

This is not a surprising result. The Advanced Placement teachers had identified these fringe students as less qualified to enter their courses. The general fear was that these students would be receiving 2's and 3's rather than 4's and 5's. Instead, the drop off in scores was much less dramatic: essentially a half of a score lower. This is more like the regular student's scores with some lower 3's thrown in to lower the mean for the group.

Ewing, Camara and Millsap (2006) have confirmed Camara and Millsap's original 1998 study that PSAT scores may be used to predict AP success with a high degree of reliability. Other measures may be used. Indeed, Klopfenstein (2003, p. 6) points out that "(t)est scores, transcripts, teacher recommendations, and personal interviews can all be used to assure that students who enter the AP Program are both capable and highly motivated".

Assuredly, the teachers of the Advanced Placement courses under study have come up with similar conclusions. They have devised entrance rubrics to determine who are the best qualified to enter their AP courses. Apparently, their rubrics have successfully distinguished between students who may be regularly admitted and those students who are only admitted under relaxed criteria. That there is a difference is the mean AP scores is to be expected. That the difference is relatively small is a result that these fringe students were the next tier of students to be accepted into the program.

Hypothesis 7

There is no significant difference in the overall AP final course grades achieved in 2007 between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students such as: (a) Grade Point Averages (GPA), (b) AP experience, and (c) PSAT scores.

The mean AP final course grades for regularly admitted students are higher than the mean AP final course grades for fringe students admitted under relaxed criteria. However, the difference is not consistently significant across the four tests with different covariates. Indeed, the null hypothesis is accepted when GPA is used as the covariate and the mean grades are practically identical (10.650 versus 10.646). Also, the difference (0.162) in the mean grades when PSAT (totals) is the covariate leads us to accept the null hypothesis in this case, also. Even in the other two cases where the null hypothesis is rejected, the difference in the grades is less than 0.4. The grades of the regularly admitted students are not appreciably higher than the grades of the fringe students.

Compared to the results for Hypothesis 6, this is a bit unexpected. It appears that the teachers have identified the fringe students as being less prepared for the AP courses than those regularly admitted students. The AP scores confirm this. However, the difference in course grades is small.

It can be argued that course grades reflect many more factors than a national test. Participation and effort may be rewarded in explicit or subtle ways. Not all "A's" are truly equal and grade inflation is a malady that any teacher may succumb to while determining marks for a class.

Another factor minimizes the reliability of the course grades for predicting AP scores. The final grades include assessments given after the AP exam is administered. It is not unusual for this period of time in May and June to be more relaxed and less demanding on student work. The result would be to inflate student grades. This, in turn, would decrease the variability of the grades in classes. "A" students cannot inflate; therefore, it is the lower grades that tend to rise during this period. This would partly account for grades being equalized between regularly admitted students and fringe students

Ewing, Camara and Millsap (2006) , Camara and Millsap (1998) and Klopfenstein (2003) discuss predicting AP success as measured by AP scores. However, it can be argued that measuring a student's success in an AP course is better left to a teacher in determining course grades than a nationally administered standardized test that can only assess a small component of student work. The difference in the course grades between regularly admitted students and the fringe students is minimal and may well reflect the true success the students encountered with the Advanced Placement program.

Hypothesis 8

There is no significant difference in the overall AP scores achieved in 2007 within each department between regularly admitted students and fringe students admitted under relaxed criteria. This is true even if you remove pre-existing individual differences among the students from Grade Point Averages (GPA).

The idiosyncrasies of the individual departments result in varied results. In the Science department, standards were not relaxed and no ANCOVA test was performed as was not applicable. In the other departments, the mean AP scores for regularly admitted students are higher than the mean AP scores for fringe students admitted under relaxed criteria.

However, in English the difference is miniscule as the means differed by 0.01 (4.212 v. 4.202). We cannot reject the null hypothesis that the differences of the means are equal. It appears that the English department could accept more students into their courses without diminishing their results.

In the Mathematics department, the mean scores differ by 0.50 but we cannot reject the null hypothesis that the differences of the means are equal. This is in part due to the small sample size ($n = 26$) and, in part, due to the confidence interval chosen consistently in this study (95% versus 90%).

In the other two departments, Social Studies and World Languages, we reject the null hypothesis that the difference of the means of the AP scores of regularly admitted students and the means of the fringe students are equal. In both departments, the difference are approximately 0.5. The size of the samples in each (32 and 49 respectively) are slightly larger than with the other two departments (29 and 26).

As with Hypothesis 6, it seems that other than English, the fringe students have scored a bit lower on the AP national tests. Again, the Advanced Placement teachers had identified these fringe students as less qualified to enter their courses. This is not a drastic drop in scores between the two groups; rather, this is essentially a half of a score lower and similar to the regular student's scores with some lower 3's thrown in to lower the mean for the group.

The teachers of the Advanced Placement courses have devised entrance rubrics to determine who are the best qualified to enter their AP courses and successfully distinguish between students who may be regularly admitted and those students who are only admitted under relaxed criteria. That there is a difference is the mean AP scores is to be expected. That the difference is relatively small is a result that these fringe students were the next tier of students to be accepted into the program.

Stability of the Advanced Placement Program

Despite the enrollment increase of 20%, the basic structure and quality of the AP courses were preserved. More sections were added to accommodate the additional students. Teachers kept the same course load by dropping one non-AP course in order to teach an additional AP section. The quality of the teachers remained relatively constant as well. Also, although teachers and parents generally feel free to share complaints, none surfaced regarding the aforementioned topics. Any other hypothetical problems such as a higher student dropout rate or differences in application numbers or quality were not evidenced. The AP program can be characterized as stable over the two years of the study other than the increased in student participation.

The number of sections in a course is determined by administrators and is a function of the number of students enrolled and the perceived abilities of the teacher. Overall, there is no absolute critical number of students that warrants an additional section. In 2006, the high school under study had 42 sections of Advanced Placement courses consisting of 777 students for an average class size of 18.5 for these courses. In 2007, the high school increased the number of Advanced Placement sections to 49 consisting of 943 students for an average class size of 19.2 students. There was no appreciable change in the average class size from 2006 to 2007 that might have an effect on student achievement.

Teacher quality did not appreciably change from 2006 to 2007. The course load of the teachers was not increased. If a teacher taught an extra section of Advanced Placement, they taught one less class of another level. Five teachers in 2007 were new to teaching Advanced Placement and, per school custom, these five were given one less class assignment. The policy of the school at the time was for teachers to teach five classes; except, when teaching an AP class for the first time, teachers were to teach only four classes. This policy was discontinued for the 2007-08 school year.

Typically, teachers assigned AP classes are respected. Their quality is further ensured by providing them workshops. The College Board sponsors 5-day workshops especially designed for teachers new to the AP curriculum. These teachers took advantage of such summer workshops and, also, had colleagues who provided much peer guidance and support.

This study examined the effects on student achievement. The size of the classes stayed relatively constant. The quality of the teachers remained stable. No appreciable

change in the Advanced Placement program is recognized. Student achievement did not decrease when more students were accepted into Advanced Placement classes.

A comparison is offered above between the regular students admitted under preexisting criteria and the fringe students admitted under relaxed criteria. The means of student GPA's, PSAT (total) and PSAT (math) scores are presented. The means are shown for all the students as a whole and, also, broken down by department. Science is not applicable since no fringe students were admitted into that department.

Table 49

Comparison Between Regular vs. Fringe Students Admitted for 2006-07

	Regular	Fringe
All Subjects combined		
GPA	4.036	3.915
PSAT (total)	195.50	184.72
PSAT (math)	65.86	62.86
Language Arts only		
GPA	4.051	3.890
PSAT (total)	199.95	185.96
PSAT (math)	65.75	62.04
Social Studies only		
GPA	4.081	3.976
PSAT (total)	198.17	186.52
PSAT (math)	65.92	62.82

Table 49 (continued)

Comparison Between Regular vs. Fringe Students Admitted for 2006-07

	Regular	Fringe
Mathematics only		
GPA	4.007	3.798
PSAT (total)	194.66	184.19
PSAT (math)	68.31	65.50
Science only	N/A	N/A
World Languages only		
GPA	3.997	3.955
PSAT (total)	189.40	183.00
PSAT (math)	63.48	61.89

The profile of a fringe student is not easily discernable. The regularly admitted students have only a slightly higher mean GPA than do the fringe students admitted under relaxed criteria. In each comparison, the difference is not large since the mean for the regular students is close to 4.000, while the mean for the fringe students hovers around 3.900. Note that the mean for fringe math candidates is a bit lower (3.798) that might indicate that math acceptances have been high over the last five years and the pool of admitted students already somewhat saturated.

When the mean of the PSAT scores (both total and math only) are examined, a larger difference is observed between regular and fringe students. Not surprisingly, the PSAT math scores for math students tend to be higher than for students in the other disciplines. Similarly, for World Language students, the PSAT math scores tend to be a

bit lower which might be an indication of a disconnect between language fluency and math.

The findings of this study indicate that individual AP teachers do a relatively good job in distinguishing between regular and fringe students by their qualifying process unique to their subject course. However, both regular and fringe students demonstrate GPA's and PSAT's that are commendable. The real value in examining these GPA and PSAT mean scores lies elsewhere.

It appears that GPA and PSAT scores may be used to allow more students into AP courses. For example, possibly any student with a 3.667 (an "A-" average) or greater GPA might be permitted entrance into at least one Advanced Placement course. Likewise, students with PSAT scores, for example, of 180 total (or 60 in math) might be admitted into at least one AP course. It might be interesting to see how many additional students would be eligible for admission into the AP courses if these two "safety net" criteria were to be implemented to "capture" more worthy fringe students.

Implications for Policy Decisions

The Advanced Placement program provides much positive publicity to this school district. Scores on the nationally administered AP exams each May are high. Participation in the AP program is high; indeed, over 60% of seniors take at least one AP course. Students enrolled in the courses are expected to take the AP exams. The perception by students, teachers and general community is that colleges are aware of all of this and make favorable college admission decisions each year in appreciation of these various factors. Changes to this high school's Advanced Placement program are done cautiously with a concern of the potential impact on scores and college admissions.

This study has demonstrated that a 20% increase in AP admissions resulted in no appreciable harm to student achievement as measured by AP scores or final course grades. The additional students had good academic credentials; however, these students scores and grades demonstrated that they were the next lower tier of ability from those regularly admitted students. The Advanced Placement "mystique" showed no damage.

This high school can continue to increase the number of students it admits into the AP program. Class sections should continue to increase as well in order to maintain a low student-teacher ratio. The increase should be done incrementally.

Expansion can be done in two areas. First, most of the additional students added to the AP program were concentrated in a dozen or so courses. Teachers in the other courses should admit more students and this study can be used to encourage them to do so. Second, even those courses that were expanded already should be encouraged to further expand their admissions.

Nothing in this study examined the effect of increasing enrollment with students who are weak academically. The students admitted under relaxed criteria were 'lower' ability, not 'low' ability. The merits of an open admissions policy are not examined.

The existing Advanced Placement program in this high school is strong enough to absorb some lower scores. Stakeholders at all levels need to come to grips that expansion will bring some relatively low AP scores. It is the job of the administrators to communicate that this is acceptable. A higher participation rate is generally valued and will more than balance a slight dilution of top scores.

Since this study has shown no irrevocable harm by expansion of its admissions, an appeal process should be reexamined. In the past, students not admitted into an AP course could appeal the decision. However, rarely was the admission decision changed.

A consistent and uniform policy is recommended that would allow more "fringe" students into AP courses. For example, PSAT scores or Grade Point Averages might be used as indicators of student AP potential and examined upon appeal.

This study has shown that students on the fringe can succeed in AP courses. There is no evidence that these students detract from the performance of students admitted under preexisting criteria. Further expansion of admissions is warranted.

Recommendations for Future Research

This study has focused on a small portion of the AP program. During the course of this study, questions have arisen that were not answered because they were not part of the research questions. It is recommended that further research be conducted based on the findings of this study in the areas that follow.

A study of the progress, if any, of the "fringe" students during the school year is needed to determine if their interaction with regularly admitted students helps or hinders their achievement as measured by marking period grades.

A study of the grade level of students to examine the notions that "senior slump" tends to adversely affect students in grade 12 and "lack of maturity" adversely affects students in grade 10.

A study measuring teacher efficacy might examine teacher frustrations, anxieties, concerns and self-satisfaction before and after the AP exam results are announced in June within courses that have, and have not, admitted fringe students.

A study of the relationship between student achievement and number of years of teaching experience, both in AP courses and overall, within courses that have, and have not, admitted fringe students.

A study of the relationship between AP final course grades and AP scores within courses that have, and have not, admitted fringe students.

A study examining the relationship between a student's GPA and AP scores.

A study examining the relationship between a students PSAT scores and AP scores.

A study examining the variability of AP scores within courses that have admitted fringe students versus those courses that have not admitted fringe students.

A study examining the effects of the types of instruction (eg: lecture, group work, participatory and grading policies) on student achievement.

A study of the community support for increasing the student participation in Advanced Placement program at the risk of lower AP scores.

A study of students' overall course grades and their grade in AP courses.

A study of increased admissions in science courses (Biology, Chemistry, Physics and Environmental Science) need to be examined upon occurrence considering this department identified/admitted no fringe students in the years within this study.

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