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The Relation between Demographics and Art Discipline
As They Pertain to Success on Advanced Placement Exams

by

Terrance Souder

A Dissertation submitted to the Department of Leadership,
School Counseling & Sports Management
in partial fulfillment of the requirements for the degree of
Doctor of Education

UNIVERSITY OF NORTH FLORIDA
COLLEGE OF EDUCATION AND HUMAN SERVICES

May, 2020

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This dissertation titled The Relation between Demographics and Art Discipline
As They Pertain to Success on Advanced Placement Exams

Dr. Anne Swanson, Committee Chair

Dr. Hope Wilson, Committee Co-Chair

Dr. Daniel Dinsmore, Committee Member 2

Dr. Corey Thayer, Committee Member 3

DEDICATION

Note to self:

You're allowed to cry

You're allowed to scream

You're not allowed to give up

It will all get done somehow

Just breathe

These words were written on a white board by my daughter Taylor. Those words on that whiteboard served as a reminder to herself to not get frustrated by being overwhelmed by her troubles with school. I used to tell her that she needed to relax, take things one step at a time and magically the stuff gets done. On that note, I choose to live by these words now and I will share them with whomever will listen. It is a true testament to the insights that our children have when it comes to dealing with their world. She passed away during the writing of this dissertation, and I miss her dearly. That being said, she would have been very disappointed if I were have stopped working on one of my dreams just because she was not with me in body. So, I cried (a lot), I screamed (some), but I did not give up. And, yes, the dissertation got done, somehow. Her spirit and her words will continue to drive me through the rest of my life. No matter what lies ahead, every breath I take will be done for her in my lungs and with her in my heart. Just breathe.

-Love Dr. Dad (You have to call me that now, I have the piece of paper)

ACKNOWLEDGEMENTS

To my parents, Wayne and Judy, I thank you for being supportive in all my life's endeavors. For giving me the tools to question, and the drive to find the answers. To learn from the past, but not to dwell on it. To always look forward and finish what I started.

To Suzi, my strength – my love. Thank you for reminding me that this was important – now get to the library.

To my daughters, Megan, Emily, Peyton, and Taylor, thank you bringing so much joy to my life. Thank you for sacrificing family dinners and movie nights so that I could go back to grad school and finish one of my lifelong ambitions. I want you to know that I will always be there for you.

To Dr. Swanson – For all of the pep talks when times were tough, especially over the last year.

To Dr. Dinsmore – For the patience when trying to explain why certain analyses were better than other, even though I was being stubborn.

Dr. Wilson – For providing the terrific feedback throughout the entire process (Yes I want to publish this with you!) (I think I may have time in the near future)

Dr. Thayer – For stepping in on short notice and asking the tough questions relating to purpose.

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ABSTRACT

The purpose of this study is to examine the relation between the demographics of student and the artistic discipline of which they study at a dedicated magnet school located in the Southeastern United States as it pertains to their success on Advanced Placement (AP) exams. The literature has continually focused on several demographic indicators such as, race, gender, and socioeconomic status to examine the success on AP exams. However, there is very little research on the role that an artistic education plays as in the successful completion of an AP exam. This study examines whether there is an increase in the participation of AP courses as a result of a particular artistic discipline or not, and furthermore whether there is an increased pass rate for students on AP exams when the specific artistic disciplines are examined. For this study race and gender were examined as the socioeconomic status data was unavailable. Comparison studies were completed for the local dedicated magnet school of the arts against race and gender data acquired from the College Board. This information was then compared across the artistic disciplines looking for trends in participation and successful passing of the AP exams to determine if there is a relationship between race, gender, and artistic discipline and the success on AP exams.

Chapter 1: Introduction

Problem, Significance, and Purpose

The purpose of this study is to determine if there was a relationship between studying an artistic discipline and a passing score on academic Advanced Placement (AP) exams. While there was a large amount of information in the literature about the relationship between demographic subgroups and success on Advanced Placement exams, little attention has been paid to the possible benefits of studying an artistic discipline and how it relates to the passage rate on Advanced Placement exams. However, there is a large body of information on the addition of an artistic education into the Science, Technology, Engineering, and Mathematics (STEM) fields, thus creating STEAM, with the ‘A’ representing art education. This study was an investigation to the possible relationship that studying an artistic discipline has on the passage rate for Advanced Placement exams.

In the last 10 years the number of AP exams taken by students has nearly doubled (College Board, 2018). The reasons for this escalation in the number of exams taken are numerous with most being associated with students gaining acceptance to colleges and universities (Hood, 2010; Foust, Hertberg-Davis, & Callahan, 2008). Another example for the increased participation in AP programs centers on the notion that many school districts award weighted values to students that take a more rigorous academic course load, thus increasing the student’s grade point average (Barnard-Brak, McGaha-Garnett, and Burley, (2015). Yet, another reason for increased participation centers with the school’s administration team. A portion of the school’s perceived “quality” is rooted in the number of Advanced Placement exams attempted and the graduation rate for the school (Klopfenstein & Thomas, 2010). However, there is less regard for whether or not the students are successful on the AP exams. Much of the literature is focused on increasing access of underrepresented ethnic groups of students to a more advanced curriculum i.e., Advanced

Placement, International Baccalaureate, or Advanced International Certificate of Education (Gagnon & Mattingly, 2016; Davis, Slate, Moore & Barnes, 2015; Ohrt, Lambie & Ieva, 2009; Taliaferro & DeCuir-Gunby, 2008). Moreover, other portions of the literature are focused on whether or not there is a gender gap among the students that are enrolled in advanced academic courses (Clark, Moore, & Slate, 2012; Moore, Combs, Slate, 2012; Furgione, Evans, Russell & Jahani, 2018). Yet, other studies focus on the socioeconomic gap among the students that are participating in advanced academic courses (Corra, Carter, & Carter, 2011; Kolluri, 2018; Hallett & Venegas, 2011; Renbarger & Long, 2019). There is literature on the value of adding an arts curriculum to Science, Technology, Engineering, and Mathematics (STEM) curricula to create STEAM (Conradty & Bogner, 2019; Harris & de Bruin, 2017; Oner, Nite, Capraro & Capraro, 2016). However, the literature is lacking information on the role that a specific arts curriculum plays on the success of students in Advanced Placement or International Baccalaureate programs. This is especially the case for those fields outside of the STEM fields. Therefore, goal of this study was to establish the possibility of determining if there is an effect on the participation and passage rates on Advanced Placement exams when certain artistic disciplines are studied.

This work reviewed the type of art discipline studied by the students with a focus on the gender and ethnicity at the local dedicated magnet school of the arts in Southeastern United States. Grade point average, and socioeconomic status were originally to be evaluated as part of this study. These concepts are discussed in the review of literature but omitted in the analysis of the data as the author was not provided this information in a data request. Once these factors were controlled for, it could be determined whether the arts curriculum studied by the students had any effect on the passage rates on AP exams. If a correlation could be established, then perhaps guidance counselors, parents, teachers, and students could make an informed decision as to pursue a rigorous

curriculum with an arts curriculum in support of their academic pursuits. Furthermore, there may be implications that revolve around providing teachers with professional development opportunities to be trained in teaching the Advanced Placement curriculum.

Key Terms

Advanced Placement – The Advanced Placement Program is administered by the College Board. It is a program that enables willing and academically prepared student to pursue college-level studies while still in high school. The program consists of college-level courses developed by the Advanced Placement Program that high schools can choose to offer, and corresponding exams that are administered once a year. There are 38 AP courses spread across seven subject areas. Each AP course is modeled on a comparable introductory college course in the subject. Each May, AP exams are given in synchrony at testing locations all over the world (College Board, 2018).

Gender – Historically, the terms “sex” and “gender” have been used interchangeably, but their uses are becoming increasingly distinct. In general, “sex” refers to the biological differences between males and females, such as the genitalia and genetic differences (Medicalnewstoday.com, 2018). According Merriam-Webster, gender is defined as: the behavioral, cultural, or psychological traits typically associated with one sex (“Documentation”, n.d.). The World Health Organization defines gender as: “the socially constructed characteristics of women and men, such as norms, roles, and relationships of and between groups of women and men. It varies from society to society and can be changed” (www.who.int, 2019). For the purposes of the work, the term “gender” was determined to be more in line with the definition of “sex”. The school district in the Southeastern United States uses the sex identified on the birth certificate to identify students’ gender.

Ethnicity – Because ethnicity, race, and nationality are closely related and thus lumped together on Census.gov, they are easily confused, frequently conflated, and incorrectly understood as being interchangeable. Ethnicity is “the fact or state of belonging to a social group that has a common national or cultural tradition.” Race, e.g., Black, White, Hispanic or Asian, is defined as a group of people distinguished by shared physical characteristics. Nationality is the status of belonging to a particular nation by birth, or naturalization, e.g., American, Brazilian, or Congolese. For the purposes of this work, ethnicity was based primarily on racial norms (Daily Dot, 2018).

Grade Point Average – Grade point average (GPA) is a weighting system for summarizing a student’s academic record. An unweighted GPA typically assigns four points for a grade of ‘A’; three points for a grade of ‘B’; two points for a grade of ‘C’; one point for a grade of ‘D’; and zero points of a grade of ‘F’. In many school districts, including the school district that was examined, an extra point is assigned for an advanced class, such as Advanced Placement and International Baccalaureate courses thus making an ‘A’ worth five points.

Socioeconomic Status – According the American Psychological Association socioeconomic status is the social standing or class of an individual or group. It is often measured as a combination of education, income, and occupation. In many cases evaluations of socioeconomic status often reveal inequities in access to resources, plus issues related to privilege, power, and control. For the purposes of this work, socioeconomic status of the student’s parents will be determined by the student’s participation in free or reduced lunch programs. Participation is determined by household size and family income.

Arts Curriculum – The arts curriculum is the art discipline studied by the students of which there were 12 designated groups identified. Those groups are performance theatre, musical theatre technical theatre, dance, vocal music, piano, band, orchestra, guitar, cinematic arts, visual

arts, and creative writing. At the local dedicated magnet school for the arts, each student must complete 12 classes within their art discipline to receive an arts seal on their diploma. Within many of the arts disciplines a student may “major” in a sub-discipline, i.e. a visual artist can focus on photography, two-dimensional or three-dimensional art.

Organization of the Review

The review of literature begins with an overview of the creation of the Advanced Placement Program by the College Board. It is important to understand the history of the Advanced Placement Program. By gaining an understanding of the original purpose of the program, it then becomes possible to understand how the program has changed over the years. While the mission statement of the College Board with respect to the Advanced Placement Program has not effectively changed over the years, the importance of the program has definitely had a notable change in the recruitment and admission of students into colleges and universities. Included in this section of the review of literature were statistics outlining the changes in the participation of the students in the program.

The next section of the review of literature explores the evolution of the Advanced Placement Program from primarily serving elite private school advanced students to a more open policy allowing participation to most students that have an interest in completing an AP course. This portion of the literature review was the increase in participation among various groups of students as determined by gender, socioeconomic status and ethnicity. It was to examine the historical access gaps and success gaps among these groups of students, and what is currently being done to close these gaps.

The final section of the review of literature examines the benefits of an arts curriculum for students. While there is little research currently available on the possible effects that an arts

curriculum has on the potential success of students in AP courses, there is literature available on the inclusion of artistic programs with the STEM fields. This area of research was examined to provide a rationale to investigate the possible effects of artistic programs and the success of students in AP courses.

Conceptual Framework

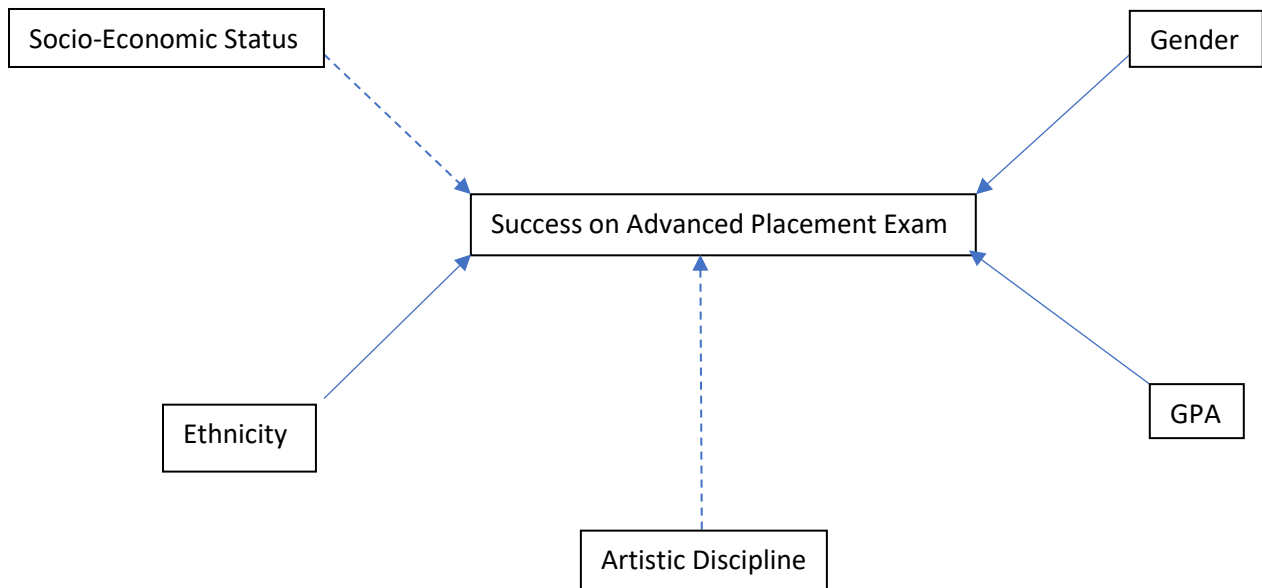
The conceptual framework for this work is to investigate whether any of several factors that are being examined have an effect of a curriculum that is emphasizing an artistic education and whether or not that has an influence on the success in AP courses as measured by the exams at the end of each of the courses taken. The author had made anecdotal observations that students in the specific artistic disciplines out-performed other students in different artistic disciplines on the same AP exam. This observation was corroborated in a subsequent pilot study completed in coursework as part of the doctoral program in Educational Leadership at the University of North Florida.

The previous literature that pertains to this study has focused on gender, ethnicity, and socioeconomic status as vital components to reporting on the successful passage of AP exams. Often these articles are only looking at one of these components in the study; rarely are they combined or compared against each other. While each of the components are important on an individual basis, it may be better measure them collectively to determine how each variable affects the successful passage rate for AP exams.

The position of the author at a dedicated magnet school of the arts provides another variable to consider when evaluating AP success: artistic discipline. It was been shown in the pilot study completed by the author that certain artistic disciplines have a higher percent passage rate on AP exams than other artistic disciplines. It was the purpose of this study to ascertain whether it is the

study of a particular artistic discipline that leads to a higher passage rate, or whether the demographic differences within the artistic disciplines contribute to significant differences found in the passage rates between the artistic disciplines. The model shown below is a representation of the perceived contributions to the effects of independent variables as they affect the dependent variable (successful passage rate on AP exams). In this model, the artistic discipline arrow is a dotted line to indicate an unknown effect on the passage rate for AP exams.

Conceptual Model



Conclusion

A tremendous amount of research has been done over the last 25 years on many aspects of the College Board's Advanced Placement Program. Those studies include a wide range of topic including, the ways this program has changed over the years, the impact of participating in Advanced Placement programs on college admission, and the inequality to access and participation based on gender, ethnicity, and socioeconomic status (Gagnon, & Mattingly, 2016; Warne, Larsen, Anderson, & Odasso, 2015; Shaw, Marini, & Mattern, 2013; Klopfenstein & Thomas, 2010; Schneider, 2009). While there have been studies completed on the effectiveness of studying an artistic curriculum within STEM fields, there is a gap in the research for the study of the effects on participation in an artistic discipline and success in Advanced Placement programs (Oner, Nite, Capraro, & Capraro, 2016). The goal of this study is to add to the literature by opening a new line of research possibilities with the goal of increasing participation in Advanced Placement programs, which, ultimately, may lead to increasing passage rates for Advanced placement exams.

Chapter 2: Review of Literature

History and Scope of the College Board's Advanced Placement Program

The College Board was founded in December of 1899 on the premise of expanding access to colleges and universities for students that would otherwise have been precluded from applying for admission (DiYanni, 2009). Beginning in the 1950s, this non-profit organization began to offer series of preparation courses and corresponding exams with the aim of identifying high school students that had an aptitude for a specific area of study (DiYanni, 2009; Hammond, 2009). At the outset, the AP program offered courses of study in English literature and composition, foreign languages, and the math and sciences, ten exams in all.

Enrollment Increase within Advanced Placement Programs

While the core goals of the AP program were, and remain today, to provide students with an aptitude for a specific area of interest an opportunity to study this material while still in high school, the AP program has expanded greatly. Today, the number AP courses being offered by the College Board is 38 including, art history, human geography, and environmental science (DiYanni, 2009; Hammond, 2009, College Board, 2018). Perhaps the more notable statistic lies in the increased level of participation of students and the number of exams given as part of the program; 10,000 exams were administered in 1960, while there 5.1 million exams administered in 2018. Those exams were completed by 2.81 million students (Ackerman, Kanfer, & Calderwood, 2013; College Board, 2018).

There are several possible reasons for this large increase in the number of participants in the AP programs. During the 1950s, the beginning of the AP program, the courses were offered primarily to seniors in high school with the exams being administered at the end of the year and after the college admission process had been completed. Since the application and admission

processes had already been completed, merely participating in the AP course became one of the variables that colleges and universities used as a selection criterion for admission to their schools (Shaw, Marini, & Mattern, 2013; Klopfenstein & Thomas, 2010). In today's admission decisions for colleges and universities, the students that are taking AP courses, International Baccalaureate (IB) courses, and dual enrollment courses are viewed quite favorably when compared to students that do not take the more academically rigorous courses in high school (Foust, Hertberg-Davis, & Callahan, 2008).

Another factor that has increased participation in AP programs in many high schools is how the courses are used in calculating a student's grade point average (GPA). Many high schools and school districts incentivize the AP programs by awarding an extra point in the calculation of the high school GPA for students (Ackerman et al., 2013). It is also common for these districts to award an extra point for taking honors classes. For example, a student taking eight courses, six of which were Advanced Placement or honors courses, could earn an A in all eight of the courses. On a traditional 4.0 scale where an 'A' is awarded four points, a 'B' three points, a 'C' two points, and a 'D' one point, the student mentioned above would have earned a GPA of 4.75 because of the extra points awarded by the districts for completing AP courses (Iatarola, Conger, & Long, 2011; Klopfenstein & Thomas, 2010; Foust et al., 2008).

Yet, another reason for the increased participation in AP programs comes at the behest of principals and district administrators in the form of school rankings. School rankings are partially determined by the number of participants in an AP program. The *Washington Post* and *Newsweek* magazine publish an annual report that ranks the best high schools in the United States. One of the measurement criteria used in that report is the number of students taking an AP course at the school versus the graduation rate for the school (Hood, 2010; Klopfenstein & Thomas, 2010; Foust et al.,

2008). One criticism of this system is that the students only need to be enrolled in the AP course and take the corresponding exam; whether or not the student passes the exam is not factored into the calculation for ranking the high school for the report (Hood, 2010). With the ever-increasing pressure to have “good schools”, principals and district administrators are encouraging students to enroll in the more rigorous AP, IB, and dual enrollment courses (K. Anderson, personal communication, December 10, 2018). By having more students in these demanding courses, principals are strengthening their school’s score for the national ranking. This is being done in many cases without regard to whether or not the students are capable of being successful in the more difficult courses (Berliner & Glass, 2014; Hood, 2010; Hammond, 2008). Twenty years ago, students that wanted to take the AP courses met with their parents, the guidance counselor, the teacher, and the principal. In this meeting the level of commitment and expectations from all parties involved were discussed; this level of guidance is no longer happening to the same degree (K. Anderson, personal communication, December 10, 2018).

Finally, and perhaps most importantly, is the issue of school funding. Many districts are awarded extra money for students from lower socio-economic households, as well as additionally money for any students that passage the exams (Bavis, Arey, & Leibforth, 2015; Barnard-Brak, McGaha-Garnett, & Burley, 2011; Hallet & Vanegas, 2011). Since the states or districts are paying for the cost of the administration of the exams, many principals and administrators having been enrolling more students into the AP courses (Hood, 2010; Foust et al., 2008).

The role of the admissions counselor for colleges and universities is to determine which applicants are the most qualified to accept for admission to the college or university. In many instances, they are finding it difficult to find qualified applicants for their schools (Klepfer & Hull, 2012). The universities themselves are being put under scrutiny by the various industries that have

charged these colleges and universities with training the future generations of employees; complaining that many of the college graduates are unprepared for the workplace (Bowen, Chingos, & McPherson, 2009). Therefore, the advocates for a rigorous curriculum in high school are turning to AP, IB, and other academically talented programs to better prepare students for the level of commitment that will be necessary to be successful in the college or university setting (Hallet & Venegas, 2011). In order to see the effects of this pressure on the admission counselors, look no further than the increase participation of AP courses over the last decade. In 2008, 1,580,821 students took 2,736,445 AP exams; compare that to the 2,808,990 students taking 5,090,324 exams in 2018 (College Board, 2018). That is an increase of 77.7% more students taking exams and an 86% increase in the number of exams taken.

Effectiveness of Advanced Placement Programs

The question becomes, does this increase in the participation among students in Advanced Placement courses prepare the students to be more successful in the college or university setting? There are scholars that would contend that the College Board is inflating the rewards of taking Advanced Placement courses. In the same decade of the rapid increase in the rise of the number of students taking AP exams, the results of these exams are telling a different story. The rate by which students receive a '5', the highest score has fallen by 6.62 %. The rate for scoring a '4' has fallen by 1.95%. The rate for scoring a '3' has fallen the most at 18.6%, and '2' is down by 5.93%. On the other hand, the number of students earning a '1' has risen by 85.1%. It is evident that the number of students taking exams may be increasing, but the overall passage rate is on the decline. Moreover, that means that these are not mastering the college-level material. That is important as research from the College Board itself has shown that only the students that are passing the exams

are actually reaping the rewards of the more rigorous curriculum (College Board, 2018; Hammond, 2009; Foust et al., 2008).

A study completed during this time frame at a university in Tennessee compared students that had taken AP courses in high school against students that had not completed any AP courses while in high school. The results of this study showed that there was no indication that having had AP courses in high school would increase the grade point average of the students in college (Thompson, 2007). Another study completed by researchers in Utah in 2015, using a two-year cohort study of student essentially corroborated the finding in Tennessee, using a more stringent set of statistical analyses to support their findings (Warne, Larsen, Anderson, & Odasso, 2015). Furthermore, simply taking an AP course does not necessarily equate to better scores on college entrance exams such as the SAT or ACT. Students that have taken AP courses and the subsequent exams but failed to make the passing score of a '3' did not show any increase in their average composite score over those students that did not complete an AP course (Hood, 2010; Hammond, 2009; Shaw et al, 2013). Even the students that scored a '3' only increased the composite score average by one point, from 21.4 to 22.4. It was only when the students that scored '4' or '5' that there was a marked increase in the composite score of the ACT exam, from 21.4 to 27.6 (Hood, 2010). These findings suggest that the scope of the Advanced Placement programs in the United States may have outpaced its usefulness and its intended purpose. The question then becomes how to fix this system of compelling students to enroll in AP classes, especially if the research is showing that simply completing an AP class does not generally show any correlation to success on the college entrance exams, such as, ACT or SAT or success in the freshman or sophomore years of college?

Are Advanced Placement Programs Preparing Students for College?

Understanding the benefits of succeeding in AP coursework, as opposed to simply participating in an AP course, is somewhat more straightforward. A score of 3 out of 5 is considered a passing score on an AP examination, with 5 out of 5 representing the highest possible score. One study found that passing an AP examination was correlated to better grades in college, this study also suggests that AP scores were a better indication for success than the SAT/ACT score (Keng & Dodd, 2008). Many colleges offer credit for passing AP examinations, although policies differ widely among participating colleges as to the required passing scores and number of credits earned across the various AP subjects (Hammond, 2009). These earned college credits may fulfill graduation requirements, and thus grant students more flexibility in which types of courses they will enroll. They could even pursue opportunities to study abroad, gain internships, enroll in electives, and perhaps start their more advanced coursework for their intended major that would otherwise not be feasible for students (Dougherty, Mellor, & Jian, 2006). Furthermore, students who earn enough AP credits may reduce tuition expenses through early graduation, even though this is more the exception than the rule (Challenge Success, 2013). Even if colleges offer limited credit options for AP coursework, most would argue that a high school transcript is looked at more favorably when it includes strong AP results, (Sathre & Blanco, 2006) 91% of colleges and universities consider AP experience in the application process. Ultimately, whether or not a district or school offers AP courses is an important indicator of equality of educational opportunity. In districts without AP access, even the most academically talented students might not have the opportunity to earn college credit in high school and could face a disadvantage in applying to elite colleges.

Despite the obstacles to studying the impact of AP course participation on college outcomes, many researchers have attempted to answer that question (Lacy, 2010; Klopfenstein, 2004; Lichten, 2000; Theokas & Saaris, 2013). Klopfenstein (2010) found that the observed a relationship in the student's non-AP course's rigor and motivation of the student were as strong an indicator of college success as participation in AP courses. One of the most cited articles by Geiser and Santelices (2004) found through a regression analysis that the benefit of taking an AP course is negligible with respect to first- and second-year college GPA. They reported that the addition of an AP course only accounted for a one percent increase in the variance. College readiness is enhanced not merely by taking AP courses but by successfully learning the material. Some studies have thus sought and found correlations between taking an AP class and passing the test and college outcomes. Many studies have found passing AP exams to be a better predictor of college success than merely taking the class (Dougherty et al 2006; Geiser & Santelices, 2004; Sadler & Sonnert, 2010). When Dougherty et al. disaggregated their findings by race and socioeconomic status, they found that the correlation between passing the AP exam and success in college is much stronger across all demographic groups for students that passage the AP exam. Research by the College Board reinforces the argument that college-related benefits of AP are only detected for students who passage AP exams (Klopfenstein & Thomas, 2010). While the correlation between AP exam passage rates and college outcomes are generally small and may be driven by school-level variables unassociated with AP participation, students who pass the exams are consistently shown to be more prepared for college than those who do not (Dougherty et al 2006; Geiser & Santelices, 2004; Sadler & Sonnert, 2010, Klopfenstein & Thomas, 2010).

A number of barriers exist to offering AP coursework, including the lack of a critical mass of academically talented and sufficiently prepared students, the lack of teachers prepared to teach

an AP course, and the financial costs associated with establishing an AP program. It can be assumed that rural schools, low-enrollment schools, high-minority, and economically disadvantaged schools face some, if not all, of these barriers, and therefore, it can be suggested that such schools will be less likely to provide access to AP coursework (Roza, 2009). Therefore, in order for the progress to be made in the areas where disparities exist, a call to action must be made to the direct stakeholders at the access points for AP coursework: the students, parents, teachers, and administrators.

The guidance counselor can be an important factor in the closing of the achievement gaps for the underrepresented student populations. The guidance counselor may have information on about students than classroom teachers. For example, teachers may not be aware past performance. Teachers may be unaware of capable students who have not been given the opportunity to showcase their academic talent as the result of the belief that they could not be successful due to of the color of their skin or the neighborhood in which they currently reside (Dougherty et al, 2006; Hargrove, Godin, & Dodd, 2008; Morgan & Klaric, 2007). For these minority students the effect of participating in an AP course in high school leads to three times more likelihood of earning a bachelor's degree (An, 2012).

In most high school settings, the guidance counselor is the gatekeeper to the Advanced Placement program within the school (Ndura, Robinson, & Ochs, 2003; Ohrt, Lambie & Ieva, , 2009). Because of this position in the school, many researchers have suggested that school counselors are in a strong position to reverse the institutional barriers that the underrepresented groups of students face. The counselors can challenge the teacher, parent, and student deficit thinking that propagates the Advanced Placement equity and excellence gaps (Ndura et al, 2003; Ohrt et al, 2009). Guidance counselors can use their influence to implement a holistic approach

that challenges the systemic barriers to AP access, promotes collaboration among educators and students, and provides a system of counseling interventions to bolster student achievement in AP coursework (Camizzi, Clark, Yacco, & Goodman, 2009). Camizzi and colleagues (2009) found that guidance counselors played an integral role in encouraging the selection of more rigorous coursework among minority and economically disadvantaged students. One bridge that must be crossed for a successful program is trust. Many students of color or low socioeconomic status have little trust in the academic system, they tend to not want to believe that the academic system is willing to change to work for them. This is where the guidance counselor can step in as a moderator to establish an open dialog among all of the stakeholders (Ford & Milner, 2005; VanSciver, 2006). In essence, there are many people that are involved in the development of a successful AP program.

While the AP program has been available to students since the mid-1950s, the early program was aimed at offering an opportunity for the more advanced students to prepare for college. More recently, however, the College Board has modified its position to include all students that desire to work hard and meet the demands of the rigorous coursework. According to the **AP Equity Policy Statement** (20:

The Board encourages the elimination of barriers that restrict access for AP courses to students

from ethnic, racial, and socioeconomic groups that have been traditionally

underrepresented in the AP Program. School should make every effort to ensure that

their AP classes reflect the diversity of their student population. (College Board, 2012, p.

2)

Overcoming the Equal Access Problem – Socioeconomics, Race, and Gender

From the outset the designers of the AP program wanted to provide service to the nation's elite students from the elite families that could afford the cost of a private school education (Dudley, 1958). One of the early directors of the AP program believed that all students were not created equally, and thus the AP program was established to serve best and brightest students (DiYanni, 2009). It was the role of the early AP program to identify and prepare these students for "advanced placement" into the elite colleges and universities of the northeastern United States (DiYanni, 2009). When the debate over prestige and privilege versus access to the program arose, the early stages of the AP program were dominated by prestige and privilege.

Over time, however, the AP program has evolved fairly consistently in the direction of greater access (Kolluri, 2018, Lacy, 2010). In the late 1960s and early 1970s, Lyndon Johnson's *Great Society* pushed educational leaders to consider more egalitarian approaches to education, and the AP program followed suit. The AP program course offerings were expanded to include more foreign languages and other liberal art courses. However, with the publication of 1983's *A Nation at Risk* report caused a slowdown in the AP program expansion as the schools began to reverse their course, once again cultivating the skills of the most elite students and moving away from equitable access to these programs.

The AP program began to expand again in the 1990s when federal funding for low-income communities were targeted for inclusion to programs for advanced studies, such as AP (Klopfenstein, 2004). Though there were persistent concerns about the degradation of the AP programs because of the incorporation of students with perceived inferior academic preparation (Lichten, 2000), the percentage of students of color in the AP program grew remarkably, from 12% in 1979 to 31% in 2002 (Schneider, 2009). While more students from diverse racial, ethnic,

and socioeconomic backgrounds have begun to engage with the AP curricula, a gap in participation continues to exist when the percent participation rates are compared (Table 1).

Table 1
Percent graduates with AP course credit, 1994 to 2013

	1994	2005	2009	2013
Race/ethnicity				
Asian	29.4	48.6	66.2	69.8
White	15.1	29.8	37.3	41.0
Black	9.0	18.3	22.2	27.0
Latina/o	14.8	28.5	33.8	36.5
Parent education				
Did not finish high school	8.4	22.1	26.9	29.1
Graduated college	24.1	38.2	47.9	54.4

Note. AP = Advanced Placement

Source. Malkus (2016) from the National Center for Education Statistics, a nationally representative sample of high school students (1994, 2005, 2009, 2013).

Data from the College Board’s “*The 10th AP Annual Report to the Nation*” indicates a marked increase in enrollment for groups that are historically underrepresented in AP programs (College Board, 2014). A cursory look at the data for the time period 2003 to 2013, which is found on the second page of the report indicates that while the total number of AP examinees nearly doubled, those from low-income households more quadrupled. It should be noted, however, that low-income students are overrepresented in public schools, and any expansion in private schools serving higher income students is excluded from this analysis (Kolluri, 2018). Theokas and Saaris (2013) find that the gaps remain significant based on socioeconomic status. They report that low-income students are enrolling in AP classes at a much lower rate, less than one-third, than that of their middle- and high-income peers when they both attend schools offering AP courses. As noted in table 1, Malkus (2016) used data from the National Center for Education Statistics (NCES) to show that students whose parents graduated from college are nearly twice as likely to participate in AP courses as students whose parents did not graduate from high school. The participation

advantage shown in 1994 by students whose parents had graduated from college has decreased substantially. However, despite the apparent gains in enrollment, socioeconomic gaps in AP participation remain.

Additionally, data from the College Board does show a dwindling gap in AP exam participation with respect to race and ethnicity. While there is an increase in participation, College Board data show a moderate underrepresentation of Black students, who make up 9.2% of exam takers, but 14.5% of the nationwide graduating class (College Board, 2014). Data for Latina/o students are show a proportional representation between the AP exam takers and the graduate population, both at 18.8% (College Board, 2014). Though participation in AP programs may be increasing for these underrepresented groups, Malkus (2016) reports that based on data from the NCES, a hidden participation gap exists. He notes that Asian students take an average of 4.1 AP credits, White students take 3.0 AP credits, Latina/o students take 2.5 AP credits and Black students take 2.4 AP credits.

Furthermore, when researchers look within subject areas, large enrollment inequities become very apparent. For example, AP STEM (science, technology, engineering, and mathematics) courses have enrollment rates that are well below that the participation in other subjects as noted in Table 2. Of particular concern is they participation rates for Black students in Calculus and Physics courses with participation rates hovering at or below 5%. Latina/o students are participating in these courses at lower rates as well either with participation rates of approximately 10%. These figures are well below that averages of high school graduates for these groups (College Board, 2014).

Table 2
Subject test^a participation by race/ethnicity, 2014

Subject Test	Total Number of AP exams taken	Percentage of Black ^b	Percentage of Latina/o ^c
Biology	162,381	7.5	13.2
Calculus AB	223,444	5.9	13.8
Calculus BC	78,291	2.9	8.3
Chemistry	107,431	5.7	10.3
Computer Science	22,273	4.2	9.0
English Language	390,754	9.4	17.5
English Literature	325,108	9.8	16.7
Environmental Science	97,918	7.5	15.9
European History	87,753	5.0	13.2
Human Geography	71,010	12.0	16.4
Macroeconomics	87,315	6.5	17.7
Microeconomics	49,013	5.7	12.2
Physics B	68,802	4.9	13.5
Physics C: Mechanics	31,959	2.8	8.7
Psychology	199,222	7.8	13.1
Spanish Language	106,199	1.9	65.6
Statistics	141,335	6.4	11.4
U.S. Government	216,944	7.7	17.1
U.S. History	366,641	7.9	16.3
World History	175,065	10.0	18.1

Note. AP = Advanced Placement

^a Participation rates reported for all tests with at least 20,000 participants.

^b Black students make up 14.5% of high school graduates.

^c Latina/o students make up 18.8% of high school graduates.

Source. College Board (2014)

Interestingly, there is a discrepancy among the Black students when it comes to gender. According to most measures relating to education, Black female students perform better than their male counterparts. Black male students are more likely to find themselves getting in trouble, failing classes, and ultimately dropping out or being permanently expelled from school than their female counterparts (Corra, Carter, & Carter, 2011). In addition, research shows that teachers generally hold more positive views of their Black female students than their Black male students.

Moreover, Black women have higher levels of college enrollment and are more likely to obtain a college degree than Black men (Hubbard, 2005).

Upon a review of participation and achievement in AP course and the subsequent exams, Black female students were twice as likely to take an AP exam than Black male students. However, Black male students taking AP exams did have a higher average score, 2.20, when compared to the Black female students' average score was only 2.06 (College Board, 2014).

Despite some level of higher achievement among Black female students when compared to Black male students, Black female students still do not fare as well academically as the White female students. Black female students scored lower on all standardized tests when compared to White female students (Rollock, 2007; Corra, Carter, & Carter, 2011). Black female students were also twice as likely to be expelled from high school as White female students (Rollock, 2007; Corra, Carter, & Carter, 2011). Varying explanations of persistent inequalities for Black students are discussed thoroughly in the literature. Historically, some scholars argued that the discrepancies resulted from differences in ability. That research has progressed to identify social factors such as stereotype threat, differential expectations, and race and gender hostility as leading to unequal educational outcomes (Corra, Carter, & Carter, 2011).

Scholars argue that educational achievement may be impacted by stereotype threat and differential expectations (Lovaglia, Lucas, Houser, Thye, & Markovsky, 1998; Steele, 1999). Steele and Aronson (1995) proposed the stereotype theory in which it is argued that limited academic success of minority students and gender segregation in education may be due to stereotypes and status distinction. These authors contend that lower status group member feel pressure to conform to stereotypes in moments of scrutiny. Stereotypes often present group members as being intellectually inferior in certain areas, thus decreasing the chances that these

groups would choose to enter certain specialized activities. Also, the likelihood of living up to the negative stereotype status producing underperformance will reinforce the stereotype, which, in turn, reinforces further the underperformance (Lovaglia et al., 1998). This theory proposes that by violating expectations about appropriate academic performance, top Black students open themselves to negative reactions. These negative consequences may come from multiple sources, including White and Black peers, teachers, and parents (Rollock, 2007; Corra, Carter, & Carter, 2011, Lovaglia et al, 1998, Steele & Aronson 1995).

The literature has shown that Black female students generally perform better academically than their male counterparts. This has prompted several groups of researchers to postulate that there may be a gendered racial culture (Adelabu, 2007; Hubbard, 2005; Rollock, 2007; Corra, Carter, & Carter, 2011). This means that Black female students generally fare better due to their higher levels of engagement and identification with the academic culture of a school. Conversely, Black male students maintain higher levels of rejection and disidentification with the academic culture, which contribute to their poorer performance. Even among highly successful Black public-school students, Hubbard (2005) found that Black male students viewed academic success as a means for advancement in sports while Black female students viewed academic as an end in its own right.

Still other researchers have suggested that the racial climate of the academic environment may result in unequal outcomes (Hubbard & Mehan, 1999; Feagin & Sikes, 1994, Fine, 1991). These researchers insist that advanced academic environments may be hostile toward Black students, subsequently discouraging them to enroll in advanced academic classes. They also argue that those Black students that are enrolled in these advanced academic classes have their performance hindered because of this hostility. Assuming Black students are underrepresented in

AP and honors high school courses, the environment in the classroom may reflect what Feagin and Sikes (1994) characterized as “White space,” where minority students feel alienated from teachers, classmates, and the course materials. From a gender perspective, such an environment may also exist in mathematics and the hard sciences – what is often referred to as male space – where female students may feel a similar type of disconnect. Consequently, Black male and female students may feel uncomfortable and unwilling to participate in AP or honors classes in an effort to protect themselves from potentially hostile environments. Black students are not the only ethnic group that has difficulty finding a place in the advanced academic settings, Latina/o students also have issues with enrollment in these class settings.

The representative numbers of Latina/o student participation in AP courses is in line with the demographic breakdown of the population as a nation. However, participation in AP courses at schools where the students are predominantly White is substantially lower for both Black and Latina/o students (Bjorklund, 2019). As with other studies involving the Black student achievement gap (Saunders & Maloney, 2005; Rothstein, 2015), Walker and Pearsall (2012) identified several underlying causes for the underrepresentation of Latina/o student in AP courses. What these groups had in common were a sense of isolation, a lack of encouragement and support from both the school and at home, and a sense of being undervalued as a group. One item that was not mentioned as a factor of underrepresentation was a lack of access (Walker & Pearsall, 2012). One of the interesting things to come out of the interviews from the qualitative study completed by Walker and Pearsall (2012) was that taking an AP class would be consider a waste of time. They had parents and students identifying the roadblock was not access to the AP class, but rather the likelihood of the student going on to college. The parents pointed out the strict residency

requirements as a hinderance to acceptance to college; therefore, why engage in difficult coursework that was not going to prepare their students for what lay ahead for them?

Research indicates that perceived racial bias and multicultural insensitivity were contributing factors in Latina/o student underachievement and underrepresentation. An ongoing failure to recognize the social, cultural, and economic factors that obscure the true nature of minority student potential needs to be addressed as part of an increasing awareness of multicultural diversity (Bjorklund, 2019; Witenko, Mireles-Rios, & Rios, 2017, Walker & Pearsall, 2012). Race and socioeconomic status do not predict what a student can learn, but they are factors that been shown to predict how educators and schools – through policy, procedure, and programming – will treat minority and economically disadvantaged students (Rothstein, 2015).

Changes in Gender Equity Relating to Advanced Placement

The gender inequality as it relates to AP courses requires a deeper look into the participation rates within the actual AP courses themselves. At the outset of the AP program in the 1950s participation rates were significantly higher for male students (Clark, Moore, & Slate, 2012). However, with the greater push for equality, the female students have caught, and in many areas surpassed male students (Moore, Slate, & Combs, 2012). From information gathered from Moore, Slate, and Combs' (2012), this author was able to determine that females took 1,516,917 AP exams compared to males taking 1,165,038 AP exams. These numbers were compiled from a table that had the top ten exams taken by students in 2011. In "*The 10th AP Annual Report to the Nation*," data is given to show the participation of males and females in each subject area. The data shows that a greater percentage of females enroll in language, literature and history courses whereas a greater percentage of males enroll in the math and science courses. Moreover, Kolluri (2018) reported that males tend to score higher in the math and sciences, and females tend to score

higher in the language, literature, and history courses. These results are somewhat corroborated by the research completed by Moore, Slate, and Combs (2012) showing that college readiness scores for male students in the reading portion was 39% compared to 51% for female students; whereas the mathematics readiness scores were 52% for male students compared to 44% for female students.

In the past female students consistently scored lower than boys on AP exams in the sciences (AAUW, 1998). For those girls that completed advanced science courses in high school, most of them did not continue with science courses in college (Martin, Mullis, Gonzales, O'Connor, Chrostowski, & Gregory, 2001). Now, however, female students are closing the gaps for participation in the AP courses. 58% of the AP Biology, 47% of the AP Chemistry, and 48% of AP calculus exams in 2016 were taken by female students. However, a gap remains for AP Physics where only 22% of the test takers were female (College Board, 2018). One area of research that aims to close this gap is in the area of adding an artistic component to the core requirements of the STEM fields, creating STEAM; Science, Technology, Engineering, Art, and Mathematics (Maeda, 2013; Platz, 2007).

Benefits of An Artistic Curriculum.

In many European countries educational departments have required implementation and instruction of the arts (Gullatt, 2008). These mandated arts programs are part of the general curriculum for students to complete (Bergonzi & Smith, 1996; Gullatt 2008). Through this instruction in the arts, teachers have enabled students to redesign, problem-solve, generate support for one's ideas, and achieve higher levels of learning (Sternberg, 2003). In another study, Eisner (2003) states, the importance of creative intelligence is its ability to improve all facets of student life, not just academics.

In his article about arts in education, Eisner (2003) explained the historical and contemporary perspective of aesthetics in our society. Historically, education has supported science over the arts because understanding art is considerably subjective, abstract, and generally not quantifiably measurable (Sousa & Pilecki, 2013). Arts were often regarded as superfluous, whereas science was seen as an integral part of the educational process. Science and mathematic programs are typically better funded through governmental grants and other sources of private corporate funding, whereas artistic programs rely on community programs and private benefactors for their support (Sousa & Pilecki, 2013). Eisner (2003) identifies six major advantages of artistic curriculum and rationalized thinking. Trust in one's self to make intuitive judgements, visualization, understanding and expressing in an alternate construct, resourcefulness, satisfaction in engagement, and bridging concepts are important principles education can learn from the arts. The result of gaining these aesthetic experiences will be transferrable to all disciplines, such as, technological, business and educational paradigms (Rosier, Locker, & Naufel, 2013).

In their study, Rosier et al. found that exposure to a visual art curriculum assisted with memory (2013). More importantly, artistic education may engage students in a creative task increasing the likelihood those experiences will be committed to memory. In essence, "by engaging in a highly creative act, individuals may be able to process information on a deeper level, and then generalize to another task" (p. 274). These aspects of learning are important and relevant to all subjects. In science, one may observe, interact, and experience certain topics of study. Rosier et al. (2013) utilized several prompts to investigate the power of visual arts on memory. The study focused on analyzing memory skills of students receiving visual arts stimuli versus those not receiving the stimuli. Initially, the researchers generalized that memory was improved because the students were able to draw, thus a kinesthetic aspect of moving may have increased memory recall.

However, in a subsequent experiment accounting for motor-sensory activity in both groups, the visual arts group continued to demonstrate a higher degree of memorization. The authors contributed this to two factors. First, the act of creating, not simply moving, accounts for the visual arts group's higher level of performance. Second, the results from the personality measures indicated a more positive reaction from those students involved with the arts. Essentially, arts may be a bridge between creativity and "physiological arousal" thus increasing the student's ability for recall (Rosier et al., p. 275, 2013).

In another study completed in Ohio by Wallace, Vuksanovich, and Calile (2010), the aim of strengthening skills necessary for a collegiate STEM program. The goal of the instruction was emphasizing experiential and inquiry-based learning to help students' problem-solving, collaboration, critical-thinking and research skills. In their study Wallace et al. (2010) introduced visual arts to students so that they would have kinesthetic learning opportunities and an increase in dialogue to learn collaboration. The results for this study showed an increase in cognitive abilities related to memory recall, as well as greater interpersonal skills (Wallace et al., 2010).

Summary

Using a wide lens to view the AP literature has uncovered a great deal about the program. Commendably, the College Board's increased focus on expanding access has been viewed as a success. More low-income students and students of color are engaging in the program, and deservedly so. The College Board should receive the credit for steps it has made for greater equality in the AP courses. However, gaps in AP enrollment by race, ethnicity, socioeconomic status, and gender remain both between and within schools. Attempts to close gaps in AP participation are still being met with challenges from institutions serving privileged groups who make decisions that maintain the inequities.

It is also known that while the expansion of the AP program has served more students from groups that have historically been excluded from the program had led to new curricular challenges. Many more students fail to pass the test. The failure rate presents a troublesome reality for the College Board as it applies to measure college readiness, especially if test passage is the only measure of an AP program for improved college readiness. There is data that shows a loose correlation between AP success and the associated college grades and degree completion. Does this mean that the expansion of access and the effectiveness of the program are inherently incompatible? Unfortunately, this literature review does not answer that question. Whether failure is the result of the student skill deficiencies, ineffective AP policies and pedagogies, or social forces beyond the reach of the College Board cannot be determined by the data provided in the reports from the College Board.

Chapter 3: Methodology

Rationale

The purpose of this study is to investigate the following question(s):

- (1) What are the effects of gender, ethnicity, and artistic discipline on the number of Advanced Placement exams attempted at a dedicated magnet school for the arts in the Southeastern United States?
- (2) What are the effects of gender, ethnicity, and artistic discipline on the number of Advanced Placement exams passed at a dedicated magnet school for the arts in the Southeastern United States?

The results yielded by this research question should provide empirical evidence needed to guide students, parents, teachers, and guidance counselors toward a successful placement into classes that would further a student's chance for academic success. The research questions suggest the following null hypotheses:

- (1) Gender, ethnicity, and artistic discipline have no effect on the number of Advanced Placement exams attempted at the dedicated magnet school for the arts in the Southeastern United States.
- (2) Gender, ethnicity and artistic discipline have no effect on the number of Advanced Placement exams passed at the dedicated magnet school for the arts in the Southeastern United States.

Research Design

A quantitative, nonexperimental approach with a comparative analysis was utilized to attempt to answer the research questions. Using the learning management system that is utilized by a large school district in the Southeastern United States, the author gathered the following demographic information about the students in the study, which were considered to be independent variables: gender, ethnicity, and artistic discipline. In order to address the question as to whether the artistic discipline plays a role in the enrollment the author also gathered the Advanced Placement exams attempted by the students and the scores on those exams. This study also limited the scope of the types of Advanced Placement exams analyzed. The primary focus of this study was to examine whether there was an effect on the passage of the Advanced Placement exams based on artistic disciplines at the local school of the arts in Southeastern United States. At this school not every Advanced Placement exam is offered or taken by the students at this school; nor do students at other schools take artistic specific exams. Therefore, only the academic Advanced Placement exams that were offered at the local school of the arts were compared at the local and national levels. The Advanced Placement exam data that was collected for comparison was limited to these 16 exams: Biology, Calculus AB, Calculus BC, Chemistry, Macroeconomics, Microeconomics, Language and Composition, Literature and Composition, Environmental Science, U.S. Government, Physics 1, Physics C – Mechanics, Psychology, Statistics, U.S. History, and World History. Since, the students at the local school of the arts are immersed in a dedicated study of a particular artistic discipline, the Advanced Placement exams with an artistic theme: Art History, Music Theory, and the three Studio Art exams were not examined for comparison. The author has the rationale that students in musical artistic disciplines: vocal music, orchestra, band, and guitar are extremely likely to passage the Advanced Placement music theory

exam. Additionally, those students in the visual arts discipline are more likely to the Advanced Placement exams for art history and studio design. These artistic disciplines have multiple courses at the local school of the arts where the primary goal is to passage those Advanced Placement exams. Therefore, the inclusion of the Advanced Placement exams for music theory, art history, and studio design would inflate the passage rates for some of the students but not others at the school of the arts, thus these exam scores were omitted from the study. Furthermore, the focus of this study was on the passage rates of all students on the 16 academic Advanced Placement exams.

Study Variables

Independent variables. The independent variables for the study are gender, ethnicity, socioeconomic status, grade point average and artistic discipline. A brief description of each is as follows:

Gender – This was determined to be the sex of the student, male or female, as stated on the birth certificate. This is the gender identifier that is used by the school district from the Southeastern United States.

Ethnicity – This was determined to the race of the student as reported by the parents to the district. This variable did not assess the cultural component of ethnicity, but the historical origin of the race.

Artistic Discipline – This information is the point of comparison for successful passage rates on the AP exams. It was treated as an independent variable in this study because it does not vary based on the results of AP exams. Each of these independent variables that is not a number was coded in order for the IBM SPSS program to be able to complete an appropriate analysis.

Dependent variables. The dependent variable for analysis one was the number of academic Advanced Placement exams attempted by students. The dependent variable for analysis two was the number of academic Advanced Placement exams passed by the students. As stated earlier, the purpose of this study was to attempt to determine if there is a relationship between the artistic discipline in which a student participates, and whether or not there is an effect on the participation in the Advanced Placement courses offered at the dedicated magnet school for the arts. In addition, this study examined the whether there is an effect on the number Advanced Placement exams passed by these students.

Table 3
Variables, Definitions, and Measures

Variable	Measure Identification	Definition	Scale of Measure
Independent			
Art Discipline	ArtsArea	The area of art studied by the student.	Categorical
Ethnicity	Ethnicity	The historical origin of a race for a student	Categorical
Gender	Gender	The biological sex of the student as reported on the birth certificate	Dichotomous
Dependent			
Number of AP exams attempted	Taken	The total number of academic AP exams attempted by students.	Continuous
Number of AP exams passed	Passed	The total number of academic AP exams passed by students	Continuous
Additional Information			

Passage rate for AP exams taken	PassageRate	The passage rate for the total number of academic AP exams attempted by students.	Continuous
Passage rate for passing at least one AP exam	PassageOne	The passage rate for the students that passed at least one academic AP exam attempted by students.	Continuous

Student Passage Rate Information. The author also gathered information about the rate of passage on Advanced Placement exams of students for each art discipline as a group. This information was gathered to show that there may be a difference among the artistic disciplines as to passage rates that cannot be explained by gender or ethnicity. The author also parsed the rate of passage information in a subcategory identifying the percentage of students that passed at least one Advanced Placement exam. The rationale for the subcategory for arises because the rate of passage can be skewed by the notion that one student taking 12 exams and passing 11 exams has a lower passage rate, than the student taking two exams and passing both of the exams taken. By creating the subcategory for students passing at least one exam, it equalizes the student’s contribution to the passage rate statistic.

Data Analysis

Multiple Regression.

Multiple regression is an extension of simple linear regression. It is used when a prediction is to be made about a dependent variable when compared to two or more independent variables. Multiple regression will allow the researcher to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained. A caveat to using multiple regression lay in that the data chosen must meet certain assumptions to allow for the analysis software to perform the test (Pallant, 2015).

The first assumption that has to be met for a multiple regression analysis is that the dependent variable is measured on a continuous scale. In other words, the dependent variable is a number. For this study there are two dependent variables being investigated, separately, against the same independent variables; they are the rate of participation of students taking Advanced Placement exams and the rate of passing those exams. The next assumption that needs to be met for this study is that there are at least two independent variables, which can be either continuous or categorical. This study uses three categorical independent variables gender, ethnicity, and artistic discipline. The third assumption that must be met is that each of the observations be independent, meaning that the data points collected represented one student's gender, ethnicity, artistic discipline, and test score information for each of the 1,586 students examined. The fourth assumption of a multiple regression analysis is that there is a linear relationship between each of the independent variable with the dependent variable. This linearity between the variable can be determined by using Microsoft Excel or IBM SPSS to generate scatterplots. The next assumption to be met is that the data needs to show homoscedasticity. This shows that the variance of each point on the best fit line is similar all the way along the line; that the number of outliers in the data is minimal. Also, the data must not show multicollinearity, which means the data between two of the independent variables should not be highly correlated. And the final assumption that needs to be met for a multiple regression analysis is that the residuals, or errors, are relatively normally distributed. This can be validated using IBM SPSS to generate a histogram and a Normal P-P plot.

Chapter 4: Results and Discussion

Data was retrieved from a large school district located in the Southeastern United States, specifically referencing three dedicated magnet schools within the district: two college preparatory magnet schools and the school for the arts. These data represent Advanced Placement exam that were completed for the years 2015 – 2019. Also, the national level data was retrieved from the College Board for the calendar year 2018. Information as to gender, ethnicity, and art discipline studied were compiled from each source and anonymized. Information pertaining to socioeconomic status was not provided by the school district and therefore omitted from the analysis. Gender, ethnicity, and artistic discipline were treated as independent variables for each of the analyses that were completed. The dependent variables for this study were AP exams attempted and AP exams passed. The completed analyses were descriptive statistics which include means and standard deviation for each of the independent variables; and multiple regression analyses for AP exams taken and AP exams passed.

Table 4.
Advanced Placement Passage Rates for Independent Variables

Gender	<i>N</i>	<i>Passage Rate - Overall(%)</i>	<i>Passage Rate for One Exam(%)</i>
Female	1153	42.28	55.31
Male	433	48.72	54.40
Totals	1586	44.00	55.06

Ethnicity	<i>N</i>	<i>Passage Rate – Overall(%)</i>	<i>Passage Rate for One Exam(%)</i>
White	1023	48.16	60.02
Black	355	30.75	40.11
Hispanic	140	42.19	56.43
Asian	68	49.16	58.82
Totals	1586	44.00	55.06

Artistic Discipline	<i>N</i>	<i>Passage Rate – Overall(%)</i>	<i>Passage Rate for One Exam(%)</i>
Band	150	43.43	47.33
Cinematic Arts	74	38.70	54.05
Creative Writing	170	54.46	77.65
Dance	159	30.66	38.99
Guitar	40	51.16	65.00
Musical Theatre	98	43.62	57.14
Orchestra	115	46.3	56.52
Performance Theatre	192	38.94	52.60
Piano	65	59.94	72.31
Technical Theatre	56	33.52	44.64
Visual Arts	275	50.10	60.36
Vocal Music	192	34.52	43.75
Totals	1586	44.00	55.06

With respect to gender, the data at the local school of the arts indicate that males have a higher passage rate on Advanced Placement exams than do females. This is in line with the national data where males also have a higher passage rate. With respect to ethnicity, the data for the local school of the arts indicate that Asian students have the highest passage rates on Advanced Placement exams, followed by White students, Hispanic students, and Black students. The Black

students having the lowest passage rate on Advanced Placement exams. This data is in line with the national data where the order of the rate of passage on Advanced Placement exams for Asian students is the highest, followed by White students, Hispanic students, and lastly Black students. With respect to artistic discipline, the data for the local school of the arts indicate that students that study piano have the highest passage rates on Advanced Placement exams, followed by creative writing and guitar students. The dance students having the lowest passage rate on Advanced Placement exams, with technical theatre and vocal music students doing marginally better. There is no national data for comparison for this independent variable. The rates of passage on Advanced Placement exams categorically show a rather large discrepancy, piano students and creative writing students passage rates at 59.94% and 54.46%, respectively and dance students and technical theatre student passage rates at 30.66% and 33.52% respectively.

Analysis of Advanced Placement Exams Attempted

Table 5 summarizes the means and participation for each of the independent variables. The data in table 5 shows the mean number of Advanced Placement exams taken by individual students while at the local school of the arts. The highest mean values are for piano students, guitar students, and creative writing students, with means of 5.11, 4.30, and 4.22 exams taken in their high school career. This data is very well aligned with the artistic disciplines that have the highest passage rates for Advanced Placement exams with piano students having the highest passage rate followed by creative writing students, then guitar students. The standard deviations (SD) for these groups appear to be high for these groups, but when the range of the number of Advanced Placement exams is considered, the standard deviation values begin to make sense. The number of exams attempted by the students in each artistic discipline was from a low of 1 exam to a high of 13 exams during the students' time at the local school of the arts.

Table 5
Mean Number of Advanced Placement Exams Attempted

Gender	Advanced Placement Exams Attempted		
	<i>N</i>	<i>M</i>	<i>SD</i>
Female	1153	3.78	2.69
Male	433	3.70	2.83

Ethnicity	Advanced Placement Exams Attempted		
	<i>N</i>	<i>M</i>	<i>SD</i>
White	1023	3.80	2.80
Black	355	3.46	1.58
Hispanic	140	3.98	2.73
Asian	68	4.37	3.11

Artistic Discipline	Advanced Placement Exams Attempted		
	<i>N</i>	<i>M</i>	<i>SD</i>
Band	150	3.81	2.98
Cinematic Arts	74	3.53	2.45
Creative Writing	170	4.22	2.64
Dance	159	3.61	2.81
Guitar	40	4.30	3.13
Musical Theatre	98	3.84	2.90
Orchestra	115	4.11	2.96
Performance Theatre	192	3.65	2.39
Piano	65	5.11	3.51
Technical Theatre	56	3.20	2.06
Visual Arts	275	3.60	2.65
Vocal Music	192	3.23	2.44

Note: *N* = 1586.

The analysis of Advanced Placement exams attempted that was completed looked at the relationships and the effects of the independent variables, gender, ethnicity, and artistic discipline on the number of Advanced Placement exams taken by students at the local school of the arts. The national data collected showed that there were 5,090,324 Advanced Placement exams taken by 2,808,990 individual students. This equates to approximately 1.81 exams attempted per student for the year 2018 (College Board, 2018). When this data was broken down by academic year, i.e. 12th grade, 11th grade, etc. the national numbers showed 2.16 exams for 12th grade, 1.94 exams for 11th grade, and 1.27 exams for 10th grade. This suggests that a typical high school student that

participates in an Advanced Placement program will take at least five exams in their high school career. While the data for the local school of the arts indicates a lower participation rate, there are factors that are not addressed by this study, e.g., the local school of the arts has a relatively high attrition rate from 10th grade year through to 12th grade year. A typical sophomore class at the local school of the arts will have approximate 325 students. The typical senior class has a number closer to 225 students. Therefore, there is a lower participation for these students because many students left the school after only taking one or two Advanced Placement exams. However, more than half of the students that attend the local school of the arts for all four years will attempt eight Advanced Placement exams before they graduate.

Table 6 shows the results of a multiple linear regression analysis that was completed using the IBM SPSS version 25 analysis software provided to students at the University of North Florida through the library website. Each of the independent variables were coded with numbers assigned to specific groups, e.g. females = 1, males = 2; Asian students =1, Black students = 2, etc. The interaction variables were coded by multiplying the interacting variable’s coded numbers, e.g. for gender and ethnicity Black female students would be coded as a 2 because the female = 1 and Black = 2 and 1 times 2 equals 2. Each of the artistic disciplines coded with a number that corresponded to its rank in alphabetic order.

Table 6
Summary of Multiple Regression Analysis for Model 1: Variables Predicting the Number of Advanced Placement Exams Attempted (N = 1586)

Variable	<i>B</i>	<i>SE B</i>	β	<i>Sig</i>
Gender	-1.643	1.085	-2.68	.130
Ethnicity	-.653	.454	-.230	.150
Art Discipline	-.391	.192	-.536	.042
Gender X Art Discipline	.250	.136	.533	.066
Ethnicity X Art Discipline	.110	.056	.584	.051
Gender X Ethnicity	.493	.317	.353	.121
Gender X Ethnicity X Art Discipline	-.080	.040	-.631	.046

Note: The negative values in this table should be viewed as absolute values.

The multiple linear regression was calculated to predict the factors that may affect the number of students taking Advanced Placement exams at a local dedicated magnet school for the arts. The criteria measured include gender, ethnicity, and art discipline; as well as the interaction effects for these criteria, gender x art discipline, ethnicity x art discipline, gender x ethnicity, and gender x ethnicity x art discipline. The resulting regression equation was found not to be significant, ($F(7,1578) = 1.570, p < .140$), with an R^2 of .003. When compared against the individual criteria measured in this model, the art discipline showed the highest effect, indicated by β in table 6, at .536 and had a significant result ($p < .042$) in the model as well. The interaction of gender, ethnicity, and art discipline showed the strongest effect at .631 and a significant result ($p < .046$). However, with the overall model not showing significance and an R^2 value of only .003 explaining only 0.3% of the variance, this is not a good model for predicting which students will likely take Advanced Placement exams.

Analysis of Advanced Placement Exams Passed

The data in table 7 shows the mean number of Advanced Placement exams passed by individual students while at the local school of the arts. As with the information in table 5, the highest mean values are for piano students, guitar students, and creative writing students, with means of 3.06, 2.20, and 2.30 exams passed in their high school career. This data is perfectly aligned with the artistic disciplines that have the highest passage rates for Advanced Placement exams with piano students having the highest passage rate followed by creative writing students, then guitar students. The standard deviations (SD) for these groups appear to be high for these groups, but when the range of the number of Advanced Placement exams is considered, the standard deviation values begin to make sense. The number of exams passed by the students in each artistic discipline was from a low of 1 exam to a high of 13 exams during the students' time

at the local school of the arts. Also included in table 7 is the passage rate for each of the independent variables in this study. The last column in table 7 is an analysis of the rate of passage for a student on at least one Advanced Placement exam. Using just the passage rate has its disadvantages, mainly that one student that passes 11 out of 12 exams taken has a lower passage rate than a student that takes 2 exams and passes both of those exams. Since both of the students passed at least one exam, this analysis viewed these students are equal. This information provides a different way to analyze passage rates by art discipline. The rate of passage of at least one Advanced Placement exam for all art disciplines is 56% compared to the overall passage rate of 44%. As expected, every independent variable increased for this measure, however, some increases were much higher than expected. For example, creative writing students increased to 77.65% of the students passing at least one exam.

Table 7

Mean Number of Advanced Placement Exams Passed and Passage Rates by Gender, Ethnicity, and Artistic Discipline

	<u>Advanced Placement Exams</u>			<u>Passage Rate (%)</u>	
	<u>Passaged</u>	<i>M</i>	<i>SD</i>	<i>Overall</i>	<i>At Least One Exam</i>
Gender	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Overall</i>	<i>At Least One Exam</i>
Female	1153	1.60	2.28	42.28	55.31
Male	433	1.80	2.62	48.72	54.40
Ethnicity	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Overall</i>	<i>At Least One Exam</i>
White	1023	1.83	2.48	48.16	60.02
Black	355	1.06	1.58	30.75	40.11
Hispanic	140	1.68	2.23	42.19	56.43
Asian	68	2.15	2.77	49.16	58.82
Artistic Discipline	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Overall</i>	<i>At Least One Exam</i>
Band	150	1.65	2.75	43.43	47.33
Cinematic Arts	74	1.36	1.92	38.70	54.05
Creative Writing	170	2.30	2.29	54.46	77.65
Dance	159	1.11	2.13	30.66	38.99
Guitar	40	2.20	3.06	51.16	65.00
Musical Theatre	98	1.67	2.16	43.62	57.14
Orchestra	115	1.90	2.67	46.30	56.52
Piano	192	3.06	3.46	59.94	72.31

Performance Theatre	65	1.42	2.10	38.94	52.60
Technical Theatre	56	1.07	1.66	33.52	44.64
Visual Art	275	1.80	2.29	50.10	60.36
Vocal Music	192	1.11	2.01	34.52	43.75

Note: $N = 1586$

The analysis of Advanced Placement exams passed that was completed looked at the relationships and the effects of the independent variables, gender, ethnicity, and artistic discipline on the number of Advanced Placement exams taken by students at the local school of the arts. The national data collected showed that there were 4,585,539 Advanced Placement exams taken by 2,683,182 individual students. These values for exams taken is different than reported earlier because there is no way for the author to know how many individual exams were taken by students on the national level when some of the national exam data is not being analyzed. Only exams that were taken at the local school of the arts were analyzed from the national data set. The mean passage rate for the national data set was 1.71 exams passed per student for the year 2018 (College Board, 2018). While the data for the local school of the arts indicates a lower passage rate, the same factors as before are not addressed by this study, e.g., the local school of the arts has a relatively high attrition rate from 10th grade year through to 12th grade year.

Table 8 shows the results of a multiple linear regression analysis that was completed using the IBM SPSS version 25 analysis software provided to students at the University of North Florida through the library website. Each of the independent variables were coded with numbers assigned to specific groups, e.g. females = 1, males = 2; Asian students =1, Black students = 2, etc. The interaction variables were coded by multiplying the interacting variable's coded numbers, e.g. for gender and ethnicity Black females would be coded as a 2 because the female = 1 and Black = 2 and 1 times 2 equals 2. Each of the artistic disciplines coded with a number that corresponded to its rank in alphabetic order.

Table 8

Summary of Multiple Regression Analysis for Model 1: Variables Predicting the Number of Advanced Placement Exams Passed (N = 1586)

Variable	<i>B</i>	<i>SE B</i>	β	<i>Sig</i>
Gender	-2.436	.939	-.456	.010
Ethnicity	-.909	.393	-.368	.021
Art Discipline	-.481	.167	-.757	.004
Gender X Art Discipline	.328	.118	.802	.005
Ethnicity X Art Discipline	.141	.049	.858	.004
Gender X Ethnicity	.810	.275	.666	.003
Gender X Ethnicity X Art Discipline	-.101	.035	-.917	.004

Note: The negative values in this table should be viewed as absolute values.

A multiple linear regression was calculated to predict the factors that may affect the number of students passing Advanced Placement exams at a local dedicated magnet school for the arts. The criteria measured include gender, ethnicity, and art discipline; as well as the interaction affects for these criteria, gender x art discipline, ethnicity x art discipline, gender x ethnicity, and gender x ethnicity x art discipline. The resulting regression equation was significant ($F(7,1578) = 3.768$, $p < .000$), with an R^2 of .016. The individual variable effects, as indicated by β , were, from lowest for ethnicity at .368, followed by gender at .456, and finally art discipline at .757. This indicated that for the individual criteria variable measured the art discipline studied had a 66% increase in effect size over gender and 106% increase in effect size over ethnicity. Furthermore, for each of the measurements that involved an interaction among the variables, those interactions that involved art discipline all had higher effect sizes. The effect size for gender x ethnicity had the lowest value among those interacting variables at .666. Gender x art discipline and ethnicity x art discipline both had higher effect sizes, .802 and .858 respectively, which correspond to increases of 20.4% and 22.4%, respectively. The highest effect size was the interaction of all three independent variables at .917. However, with only 1.6% of variance explained, this model is also weak predicting which students within artistic disciplines are passing Advanced Placement exams.

Demographic Comparison of National Data

Table 9 is a comparison of the demographic comparison for gender and ethnicity between the national data set and the data set collected from the local school of the arts. This table is presented to provide a concise overview of how the students at the local school of the arts compare to the national groups of students for participation and passage rates for gender and ethnicity.

Table 9

Demographic comparison of the National Passage Rate and Participation on Advanced Placement Exams and the Local School of the Arts.

Gender	Percentage of Participants		Passage Rate for Advanced Placement Exams		
	National	School of Arts	National – All	School of Arts All Exams	School of Arts One Exam
Female	55.5	72.3	52.76	42.28	55.31
Male	44.5	27.3	59.97	48.72	54.40

Ethnicity	National	School of Arts	National – All	School of Arts All Exams	School of Arts One Exam
White	54.95	64.50	43.51	48.16	60.02
Black	7.07	22.38	29.19	30.75	40.11
Hispanic	21.74	8.83	35.55	42.19	56.43
Asian	16.24	4.29	69.92	49.16	58.82

The comparison of data with regard to gender shows that at both the national and local level the percentage of females attempting Advanced Placement exams is higher than the percentage of males. The large increase in participation at the local school of the arts can be explained by the relatively high percentage of female students at the school – 73.4% of the student body is female. The artistic disciplines for dance, creative writing and visual arts each have female populations of greater than 80%. The only artistic disciplines that are at 50% or less female are piano, cinematic arts, and guitar. This information can be referenced in table 11 found in the appendix. The author can only speculate as to reasons for this distribution, but social pressures,

like a lack of sports teams, or the notion that girls participate in dance and boys play guitar may have much to contribute to the gender discrepancy found at the local school of the arts.

The demographic trends for ethnicity at the local school of the arts do not tend to follow the participation rates for Advanced Placement exams at the national level. The level of participation each ethnicity is dramatically different at the local school of the arts. There is a marked decline in the percentage of Advanced Placement exams attempted for Asian and Hispanic students at the local school of the arts. The Asian students went from 16.24% of the Advanced Placement exams attempted at the national level to 4.29% at the local school of the arts. The author can only speculate as to reason for this decline. There is another dedicated magnet high school in the district located in the Southeastern United States, this school is designed to be the college preparatory high school. The percentage of Asian students at this school that attempted Advanced Placement exams was 27.19%. This is nearly double the national average and more than 6 times percentage of Asian students at the school of the arts. Societal pressure towards academic success may be leading the Asian students to the college preparatory school and away from the local school of the arts. However, the author cannot speculate as to discrepancy in the attempted Advanced Placement exams for Hispanic students. Both the college preparatory school and the local school of the arts have substantially smaller numbers of Hispanic students attempting exams 6.41% and 8.83%, respectively, than the national average of 21.74%.

The demographic data comparison does show an increase in the other two ethnic groups: Black and White students. The percentage of Black students at the local school of the arts are attempting Advanced placement exams at a rate more than 3 times as high as the national percentage, 22.38% versus 7.07%. Though this increased participation is exciting, the author has no explanation for the increase in Black students attempting Advanced Placement exams.

The trend for the rate of passage on the Advanced Placement exams for gender and ethnicity falls in line with the national data set. Asian students had the highest passage rates for both the local school of the arts and at the national level. This is followed by White students, then Hispanic students, and, finally, Black students. However, there is a substantial drop in the passage rate for the Asian students, 29.69%. The author notes that this drop is significant but hard to draw conclusion from because of the relatively small number of Asian students attempting Advanced Placement exams at the local school of the arts. The other ethnic groups at the local school of the arts had gains in the passage rate on exams. The White students were 10.69% higher than the national average; Hispanic students were 18.68% higher than the national average; and Black students were 5.34% higher than the national average. A data table (Table 10) showing the participation rate for gender and ethnicity for each artistic discipline is provided in the appendix. A data table (Table 10) showing the rate of passage on Advanced Placement by gender and ethnicity is also provided in the appendix. Another data table (Table 11) showing the participation rate for gender and ethnicity for each artistic discipline is provided in the appendix.

Chapter 5: Conclusions

The purpose of this study was to investigate the effect that gender, ethnicity and artistic discipline have upon the number of Advanced Placement exams that are attempted and subsequently passed by the students at a dedicated magnet school for the arts in the Southeastern United States. This study was also able compare the national data set for gender and ethnicity to the local school of the arts.

Summary and Findings

The literature review for this study focused on the history and importance of the Advanced Placement program. The review of literature also focused on the impacts that several key demographic subgroups: gender, ethnicity, and socioeconomic status may have on the successful completion of an Advanced Placement course as evidenced with passing the exam with a 3 or higher. The review of literature illustrates that there has be a tremendous amount of research completed on gender, ethnicity and socioeconomic status. However, the literature is lacking in information as to how the study of an artistic discipline may have an impact on participation or success in Advanced Placement courses. There is a plethora of literature on the integration of art education in the Science, Technology, Engineering, and Mathematics (STEM) fields. The integration of art education in STEM fields has shown a strong positive correlation that the study of an artistic discipline has increased scores on tests for STEM fields. This study was able to determine that there is an increased effect on the passage rate due to the study of an artistic discipline.

For this research, three null hypotheses were developed. First, there is no difference as to the number of Advanced Placement exams attempted based on gender, ethnicity, or artistic discipline. Second, there is no difference as the number of Advanced Placement exams passed

based on gender, ethnicity, or artistic discipline. Third, there is no difference for the passage rates on Advanced Placement among the artistic disciplines studied at a local school of the arts.

The multiple regression that was completed to answer question 1 for this study, what are the effects of gender, ethnicity, and artistic discipline on the number of Advanced Placement exams attempted at the local school of the arts, resulted in the whole model being insignificant; therefore, the first null hypothesis was accepted. The multiple regression that was completed to answer question 2 for this study, what are the effects of gender, ethnicity, and artistic discipline on the number of Advanced Placement exams passed at the local school of the arts, resulted in the whole model being significant; therefore, the second null hypothesis was rejected.

Based on the analysis of the national data set from the College Board and the local data set provided by school district in the Southeastern United States, findings included:

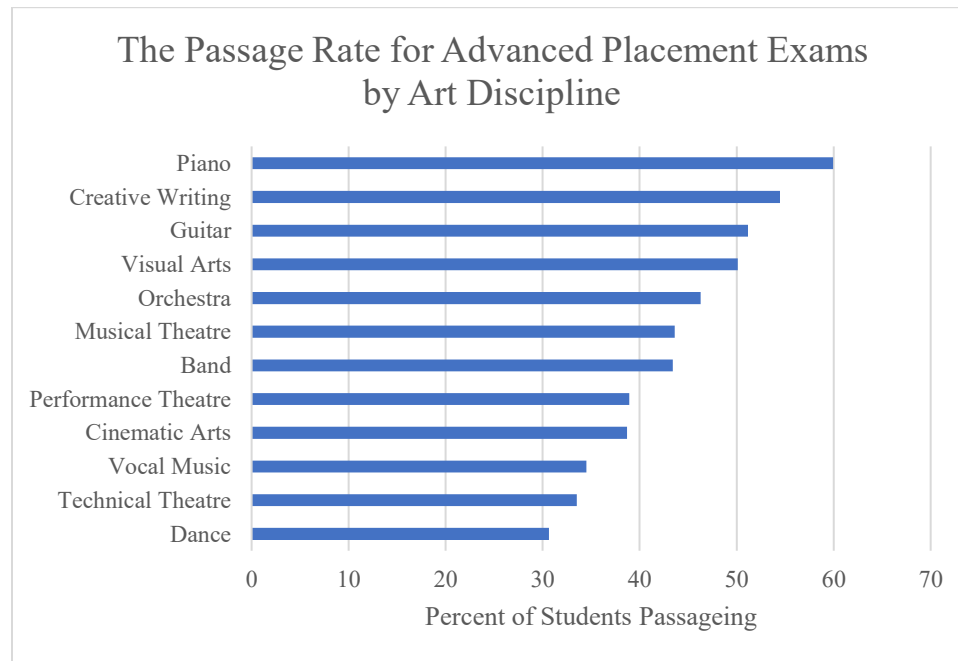
- 1) Though the multiple regression for the number of Advanced Placement exams attempted had no significance as a model, the arts discipline as an individual variable and the interaction of gender x ethnicity x art discipline of the analysis that did show significance.
- 2) The multiple regression for the number of Advanced Placement exams passed had significance as a model. Each of the independent variables and their interactions showed significance.
 - a. The β value for artistic discipline had the strongest effect of the individual variables tested in the model.
 - b. The β values for each of the interaction effects that included artistic discipline were also showing the strongest effects.

- 3) The demographic groups on the national level and the demographic groups of the local school of the arts had the same general trends with regard to the passage rate for Advanced Placement exams, with Asian students having the highest passage rates and Black students having the lowest passage rates. Also, though the males had a lower rate of participation on Advanced Placement exams, they had the higher rate of passage when compared to females.

Interpretations

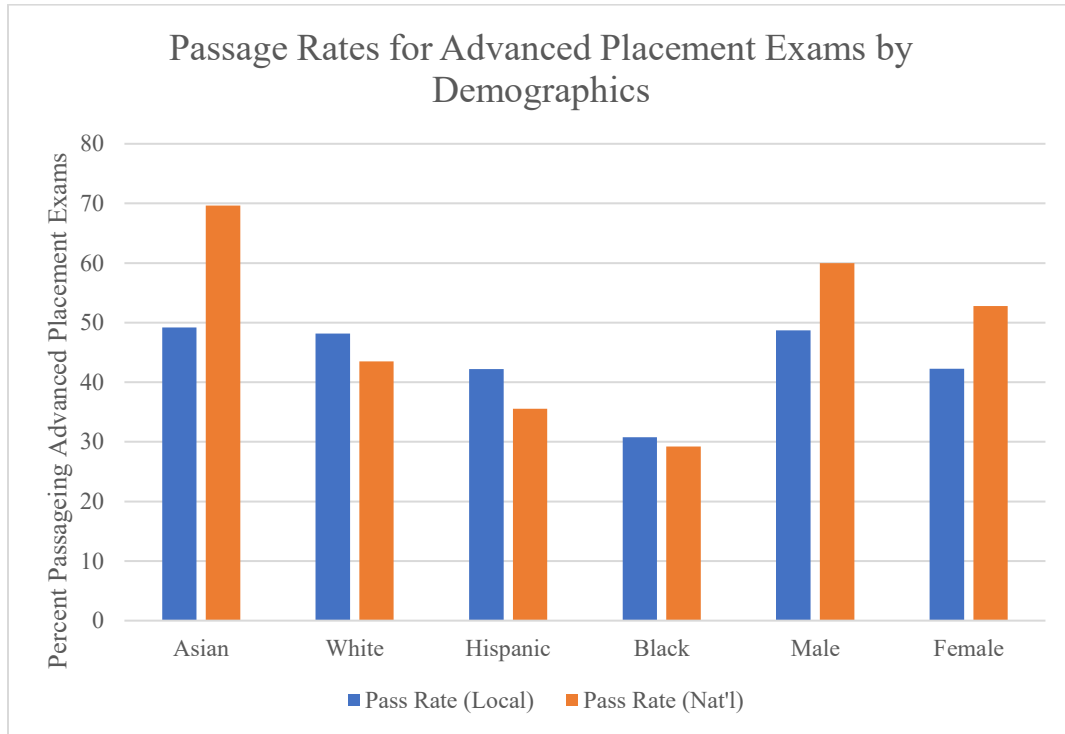
Results of this study support the argument that studying an artistic discipline has a positive relationship to the rate of passage on Advanced Placement exams. The results of the multiple regression analysis show that there is an effect on the passage of Advanced Placement exams at the local school of the arts. However, there is a distinct interaction with the other independent variables in this study. The results of a nonparametric analysis for the art discipline alone show that there is a difference among the passage rates for the students in the different disciplines. Figure 1 shows this discrepancy between art disciplines with piano students having the highest passage rates, and dance students having the lowest passage rate on Advanced Placement exams. However, while the discrepancy between the art disciplines is real, the author acknowledges that this study cannot suggest a plausible rationale for this difference between the artistic disciplines.

Figure 1. Bar Graph Ranking Passage Rates on Advanced Placement Exams by Art Discipline



The findings of this study generally support that studying an artistic discipline increases the passage rates for Black, Hispanic and White students on Advanced Placement exams as indicated in figure 2. Only the Asian students saw a decline in passage rate, which the author attributes to a low number of Asian students at the local school of the arts. Though piano students had the highest passage rate for all Advanced Placement exams taken at nearly 60%, the creative writing students and visual arts students were consistently ranking in the top three passage rates among the demographic groups examined, with the exception of Hispanic students where visual arts was ranked sixth.

Figure 2. Passage Rates on Advanced Placement Exams by Demographic Distribution



Implications

The implementation of an artistic education program can have far reaching affects for some groups of students, particularly Black and Hispanic students. These ethnic groups are typically underrepresented in Advanced Placement program offered throughout the United States. The passage rate on Advanced Placement exams for both of these ethnic groups at the local school of the arts increased over the national passage rate. Also, the participation rate for the Black students dramatically increased. These increases exemplify the need to increase artistic education as a method for a more inclusive educational experience for all ethnicities.

Introducing an artistic program can inform instructional practices, which include interdisciplinary teaching and co-teaching. As the students learn to process the multiple ways that different teachers present their subject matter, the students can gain new insights in how to approach problem solving techniques (Rosier, Locker, & Naufel, 2013). Educators can apply

creative, varied, and project-based techniques for students to explore knowledge. The brain welcomes variety, pattern, and holistic learning and students learn more deeply when knowledge is developed through abnormal tasks (Wilson & Conyers, 2013; Lake, 1994).

Within the last decade many of the Advanced Placement exams have undergone changes in the style and substance of the questions. In years past the number of multiple-choice questions was considerably higher than the number on recent exams. For example, the number of multiple-choice questions on the Advanced Placement biology exam from 1990 was 120; the 2019 exam had 63. The time to complete this section of the biology exam has not changed. The style of the question has changed. Upwards of 70% of the questions on the 1990 biology exam were level one, knowledge question or level two, application questions. The remaining 30% of the questions involved data interpretation from laboratory experiences. The 2019 exam had the examples of real-life experiments that were described to the student with data provided in the form of a table or a graph. On the 2019 exam the students are required to interpret and analyze data, which involve much higher-order thinking skills.

The large amount of research that has been completed on cross-curriculum instruction coupled with the recent evidence supporting artistic education in STEM programs. Integrating art education into instruction may better serve all students regardless of learning style, gender, ethnicity, or socioeconomic status.

While referencing economic and educational policies, John Meada (2013) pointed out the introduction of artistic education may further innovation which may lead to a greater national prosperity. He stated:

With global competition rising, America is at a critical juncture in defining its economic future. I believe that art and design are poised to transform our economy

in the twenty-first century like science and technology did in the last century, and the introduction artistic education is an opportunity for America to sustain its role as an innovator for the world (p. 2).

Art teaches creativity, enabling students to think of new ideas and solutions with resource that would have been otherwise unavailable. Yet, artistic education is one of the most consistently underfunded or understaffed departments in education (Howard, 2001). Twenty-first century workers that are exposed to an artistic education may be better qualified to fill the rising number of technological jobs. Art may no longer simply be an extra elective to fill a student's schedule but become essential to the schooling and creation of a viable workforce. In establishing a connection between participation in artistic education and achievement, policy makers can look to artistic education as a potential factor when making educational or economic decisions.

Sir Ken Robinson views the current educational systems of western countries as being based on the principles established by the manufacturing industry (2006). What Robinson points out is the linear pathway by which children move through the system based on age through the different grades. Another idea that is predicated on this industrial system is standardization. Just as age is standardization to a grade level, there is an assumption that certain activities or subjects are relevant to a particular level of education, thus we create an examination to test the quality control of our product, the student (Azzam, 2009; Robinson, 2006). This educational system was fine as long as the product of the system, the student, was going to get their diploma and work in the manufacturing industry for 30 – 40 years and retire. The workforce of today is no longer being satisfied by manufacturing in the United States. It has evolved into a professional, highly educated,

technological workforce (Cummins, 2014). The problem with this dynamic shift in the workforce is that the educational system has not changed to meet new challenges that are presented by this technological business climate. Throughout history tools have evolved as the human intellect has evolved. The tools themselves can't do anything; it takes a creative person to know how to use the tools. The educational tools, i.e. school districts, schools, and/or teachers, of the past 20 – 30 years, have not been keeping pace with the technological advancements. “There was a time when you had to go to school because that is where all of the books were. Now, with everything being online pretty much, it changes the role of teaching” (Bell, p. 33, 2015).

When the funding for education begins to run out, one of the first areas to be cut from the educational program at the K-12 level is artistic education. The author would like to recommend that a cost-to-benefit ratio study be completed to determine whether an artistic education is worthwhile. It is also suggested to complete this analysis on the various artistic disciplines on the premise to determine which would be the best artistic discipline to introduce based on cost.

Conclusions

This analysis of the passage rates on Advanced Placement students at a local school of the arts demonstrates that there is a positive effect on the passage rate when students are provided an opportunity to study an art discipline as part of their rigorous educational curriculum. While gender specific results did not show an increase over the national average, most of the ethnic groups studied at the local school of the arts did show an increase over the national average for the passage rate. Though the greatest effect was demonstrated as a result of the interaction of all of the independent variables, gender,

ethnicity, and artistic discipline, the independent variable with the largest individual effect was the artistic discipline. It goes without saying, the answer to the question about which artistic discipline is the best to study may never fully be answered. The notion that one artistic discipline is better than another at predicting overall academic success may be an impossible concept to fully examine. However, this study does show that certain artistic disciplines may be better suited at preparing students for success on Advanced Placement exams.

Limitations

The original research plan for this study was to include socioeconomic status for the students of the local school of the arts in the Southeastern United States. This information, however, was not provided by the school district. The only other way to acquire this information would have been to have students and parents fill out a survey which many may have reluctant to complete. Another limitation arose from the national data set from the College Board not having information as to number of exams that an individual student attempted. The information collected for this study was also not conducive for differentiating effects between artistic discipline. With regard to artistic discipline, another limitation for this study revolves around how the student ended up in the particular artistic discipline that he or she studied. Questions remain as to how the choice to pursue a particular artistic discipline with the answers to those questions being highly variable on a case-by-case basis. The final limitation for this study has to do with creativity. The author wanted to investigate whether there was a difference in creativity between the artistic disciplines, but there is not a widely accepted test of creativity that is not cost prohibitive.

Recommendations

Recommendations for further study would be to include a measure that will be able to tease out information with regard as to why certain artistic disciplines do better on Advanced Placement exams. Perhaps the Torrance Test of Creative Thinking could suffice to identify if students in different artistic disciplines have a different mindset for addressing the newer style of questions that are being asked on the Advanced Placement exams (Kim, 2011).

Further investigation is also warranted in determining how students selected the artistic discipline that they are studying. Many questions arise from this inquiry. Including the influence of the parents, the age at which the students began to study their artistic discipline, and the socioeconomic status of the family are just a few. Then there is the psychological aspect, do the students like their artistic discipline? Are the students involved in more than one artistic discipline? Are the students involved in sports?

Another area to investigate involves lesson plans and learning strategies. Do the teachers of the artistic disciplines develop different learning strategies for the students based on the artistic discipline? How do these strategies differ between the artistic disciplines? How are the students graded? How does the student's production of piece of art differ between the artistic disciplines? Does this difference in artistic expression lead to some students having better cognitive abilities?

In summary, the answer to which artistic discipline is best for increasing academic success for students may not be an answerable question. However, there is evidence provided by this study that participating in an artistic discipline does show a positive academic outcome for most students. Also, the data presented in this study suggest that

there is a difference in the outcome on Advanced Placement exams between the artistic disciplines studied at the local high school of the arts in the Southeastern United States.

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Appendix A

Table 10.
A Breakdown of the Rate of Passage on Advanced Placement Exams by Ethnicity

Artistic Discipline	<u>Asian</u>		<u>Black</u>		<u>Hispanic</u>		<u>White</u>	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
Band	34.48	47.06 _a	22.41	32.10	33.33 _a	40.42	57.82	46.11
Cinematic Arts	45.45 _a	0 _a	0 _a	20	38.89	45.45	35.56	44.90
Creative Writing	0 _a	69.23 _a	29.03	48.92	70 _a	54.32	72.86	53.74
Dance	0 _b	0 _b	11.11 _a	32.24	37.5 _a	30.77	54.55	29.62
Guitar	0 _a	0 _b	0 _b	0 _b	50 _a	100 _a	57.90	40
Musical Theatre	0 _b	21.43 _a	31.82	35.85	25	33.33 _a	59.18	46.67
Orchestra	50 _a	68.42 _a	5.26	46.75	42.86 _a	32	70.83	34.22
Performance Theatre	0 _a	20 _a	29.41	17.65	50 _a	49.15	44.12	46.15
Piano	68.75	18.75 _a	0 _b	25	100 _a	61.11	65.48	60.26
Technical Theatre	0 _b	0 _b	0 _b	30	0 _b	0 _b	34.09	36.73
Visual Arts	66.67 _a	57.69	35	39.09	42.86	41.51	61.83	52.33
Vocal Music	68.18	40 _a	42.86	10.26	0 _a	18.64	26.79	45.25
Overall Passage Rate	49.60	48.84	28	31.64	44.08	41.48	55.39	45.58

Note: (a) indicates that there are 0 participants for a particular category. (b) indicates that there are fewer than 5 participants for a particular category.

Table 11.

Demographic Breakdown by Art Discipline for the Local School of the Arts – (2019 – 2020 School Year)

Artistic Discipline	Total	Female		Male		Asian		Black		Hispanic		White	
		N	%	N	%	N	%	N	%	N	%	N	%
Band	108	59	54.63	49	45.37	4	3.70	22	20.37	6	5.56	76	70.37
Cinematic Arts	46	22	47.83	24	52.17	3	6.52	10	21.74	7	15.22	26	56.52
Creative Writing	93	79	84.95	14	15.05	3	3.23	27	29.03	4	4.30	58	62.37
Dance	126	114	90.48	12	9.52	2	1.59	37	29.37	7	5.56	78	61.90
Guitar	33	12	36.36	21	63.64	4	12.12	3	9.09	2	6.06	24	72.73
Musical Theatre	89	65	73.03	24	26.97	1	1.12	18	20.22	8	8.99	59	66.29
Orchestra	98	57	58.16	41	41.84	4	4.08	33	33.67	15	15.31	46	46.94
Performance Theatre	131	104	79.39	27	20.61	2	1.53	34	25.95	10	7.63	85	64.89
Piano	36	18	50.00	18	50.00	5	13.89	3	8.33	2	5.56	24	66.67
Technical Theatre	32	23	71.88	9	28.13	0	0.00	4	12.50	3	9.38	23	71.88
Visual Arts	223	185	82.96	38	17.04	17	7.62	51	22.87	23	10.31	132	59.19
Vocal Music	158	123	77.85	35	22.15	22	13.92	44	27.85	2	1.27	88	55.70
	1173	861	73.40	312	26.60	67	5.71	286	24.38	89	7.59	719	61.30