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Improving Equity through Master Scheduling

By

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And

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A dissertation Presented in Partial Fulfillment
Of the Requirements for the Degree
Educational Doctorate

Lynn University

ABSTRACT

A real and measurable gap exists in our country, and our educational system has served to increase this gap. Our system has failed to provide equitable access to advanced coursework for Black and Hispanic students. Implementing a deliberate and strategic system for scheduling high school students will provide historically underrepresented student groups equitable access to college credit and college-level courses. Quantitative research will determine how such an approach impacts high school students at an urban district in the southeastern United States when principals, and principal supervisors, create systems to schedule students equitably.

Clear and present gaps exist in the rate of participation in advanced coursework across student groups in United States public high schools. Both Black and Hispanic students are significantly underrepresented when compared to White students and to their respective overall representation of the student population. The research will determine the scope, cause(s), and impacts this gap has on high school students as measured by their academic success. The study will drill down to specific actions that schools, through their administrative processes, take when designing and implementing their master schedules on an annual basis. This research will examine how principals and principals' supervisors play a crucial role in shrinking the opportunity gap and aligning school and district resources to strive for and achieve equity.

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Many helped us throughout our journey.

First, we would like to thank Dr. Weigel and Dr. Lesh.

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To our families, thank you for encouraging us by providing words of inspiration.

Lastly, this work is dedicated to the most important stakeholders in this process, our students.

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INTRODUCTION

A real and measurable gap exists in our country, and our educational system has served to increase this gap. Our system has failed to provide equitable access to advanced coursework for Black and Hispanic students. Implementing a deliberate and strategic system for scheduling high school students will provide historically underrepresented student groups equitable access to college credit and college-level courses. Quantitative research will determine how such an approach can impact high school students at an urban district in the southeastern United States when principals, and principal supervisors, create systems to schedule students equitably.

Research Questions

1. How does access to advanced coursework impact student outcomes in underrepresented groups?
2. What impact does equitable master scheduling have on closing the achievement gap?

Statement of the Problem

Clear and present gaps exist in the rate of participation in advanced coursework across student groups in United States public high schools. Both Black and Hispanic students are significantly underrepresented when compared to White students and to their respective overall representation of the student population. The research will determine the scope, cause(s), and impacts this gap has on high school students as measured by their academic success. The study will drill down to specific actions that schools, through their administrative processes, take when designing and implementing their master schedules on an annual basis. This research will examine how principals and principals' supervisors play a crucial role in shrinking the opportunity gap and aligning school and district resources to strive for and achieve equity.

Research Issues

The overall results from our efforts in the field of education are genuinely alarming. Begging the question, despite all the money and resources. is this even working? Apparently not, according to Betsy DeVos, who exclaims there is a student achievement crisis (Green & Goldstein, 2019). Our Nation's 2019 report card, written by the National Center for Education Statistics (NAEP), summarizes results for over 600,000 students in every state and Washington DC, representing 27 large, urban districts. A national assessment test is given to students attending public and Catholic schools across the U.S.; the most recent publication reveals a drop for math proficiency by one point for eighth graders from the last test date in 2017 (NAEP, 2017). Although this decline is not substantial, math progress on this instrument rose by 19 points during the years 1990 to 2015 and has plateaued since 2009. No apparent reasons are being noted for the recent stagnated math scores. An increase for math achievement on the 2019 test was noted in only three states while a decline was noted in six states. There was a significant drop for American Indian/Alaska Native eighth grade math scores this year, falling from a score of 282 down to 262 on a top score of 500. NAEP results mirror the demographic changes across the country. There was no significant change in the score gap between Caucasian and African American and Caucasian and Hispanic students (NAEP, 2019).

Unfortunately, the outlook appears to be even more catastrophic for our historically underperforming student groups, according to Mike Magee. Mr. Magee, the Chief Executive of Chiefs for Change, is a nonprofit organization of nationwide superintendents and secretaries of education. They represented state and district education and was quoted saying, this is a disturbing pattern, one that is consistent with our Nation's growing economic inequality and history of structural discrimination in education, housing, and access to opportunity (Green &

Goldstein, 2019). Peggy Carr, Associate Commissioner of the National Center for Education Statistics, highlights the results concerning our at-risk student population. Over the past decade, there has been no progress in either mathematics or reading performance, and the lowest-performing students are doing worse. If social circumstances were different for these children, a higher level of achievement would be possible (Benerjee, 2016). Summaries of systematic research into this problem across our Nation have been ongoing and are certainly warranted. Benerjee (2016) states that as the levels of poverty and other adverse factors mentioned above increase, wider achievement gaps are noted in subjects such as science, technology, engineering, and mathematics. Factors such as gender, ethnicity, poverty, or neighborhood location can adversely affect students' achievement scores.

According to the ACT Condition of College and Career Readiness 2018 Report, high school test scores for math have been declining since 2012, and have now hit a 20-year low (Learning-Liftoff, 2019). It is reported that only 40% of tested students are reaching the math benchmark considered as being ready for college Algebra class. The National Council of Teachers of Mathematics (NCTM) reports that one possibility for this decline is the style of teaching in public schools. According to the report, Create Positive Change for High School Mathematics in 2018, math courses are taught at too shallow a level. By creating a curriculum that is leaner, but more in-depth, students may fully understand the concepts being taught, and then be able to implement the concepts with greater understanding rather than absorbing a wider array of concepts superficially and not truly understanding or even recalling (Learning-Liftoff, 2019).

The Organization for Economic Co-Operation and Development (OECD) conducts a survey every three years around the world known as the Program for International Students

Assessment (PISA). The survey consists of 15-year old students around the world and how they perform on proficiency assessments in science, reading, and mathematics. The assessment does not just ascertain whether students can reproduce knowledge; it also examines how well students can extrapolate from what they have learned and how they can apply that knowledge in unfamiliar settings, both in and outside of school. This approach reflects the fact that modern economies reward individuals not for what they know, but for what they can do with what they know (PISA Report, 2015).

According to mathematics results gathered from 70 countries who participated in the report, the United States scored 39th (score = 47). When comparing the United States progress achieved from the previous 2012 test results, our nation slipped by three rankings: 36th for 2012 to the current 39th for 2015. The three top countries in 2015 were Singapore (56.4), Hong Kong (54.8), and China (54.4). The three lowest scoring countries were the Dominican Republic (36.2), Algeria (36), and Kosovo (36.2). The three highest achieving states in the US for 2015 were Massachusetts, North Carolina, and Puerto Rico. The 2015 results are published in five volumes covering topics such as equity in education, policies and practices for successful schools, and students' well- being, how they are learning and living, students' financial literacy levels, and students' ability to conduct collaborative problem-solving strategies (PISA Report, 2015). It is a comprehensive handbook approach to aid high schools around the world for STEM subject success. If the United States is to maintain the highest standards possible for our high school graduates, so that they may continue their education and enter the workforce as productive citizens in a global economy, it appears as if our nation has some catching up to do, especially in the area of mathematics.

Theoretical Frameworks and Conceptual Theory Design

Some studies have determined a correlation between a teacher's sense of efficacy in the classroom and successful student academic performance (Protheroe, 2008). When a teacher is open to a flexible protocol of teaching methods, student needs are met with greater efficiency. According to Protheroe (2008), these types of teachers are more resilient when changes are needed, and more experimental with new techniques and applications to serve the individuals in their classrooms. Additionally, the type of teacher who is more apt to understand the imperfections of learning styles, as well as their differences, based on the previous educational experiences ESOL, ESE, and disadvantaged, are less inclined to give up on students who are behaviorally or academically unable to achieve in their classroom. This situation creates an environment where teachers can become gatekeepers towards recommending underrepresented students into advanced coursework. Several theories have been put forward as to why this occurs. This includes both a lack of teacher efficacy and lack of strategic systems to deconstruct systemic racism, as prescribed by the Critical Race Theory. According to Protheroe (2008), the theories include the following frameworks:

- The rigor and difficulty level of the course content is directly relevant to student success. It is worth noting that socioeconomic factors, on both the school and student level, can become an intervening variable that can influence expected student academic outcomes.
- Students placed into courses that are more rigorous will benefit academically. This success will be demonstrated through increased student and school-wide academic achievement.

- Placing an emphasis on the decision making of student academic placement with an equity lens creates a more equitable academic environment.

Theoretical Framework

The theoretical framework includes two dimensions that define how to improve student learning and ensures that all students have equal opportunities to a rigorous learning environment as their counterparts. Race must be considered when tracking access to advanced coursework on the high school level so that gaps can be identified and removed. Critical Race Theory argues that educators must consider race and racism to disrupt practices of the past to enable equitable opportunities for all students in our educational system (Ledesma & Calderón, 2015).

Dimension 1: The student achievement gap decreases under the following conditions, and subsequently increases when they are absent.

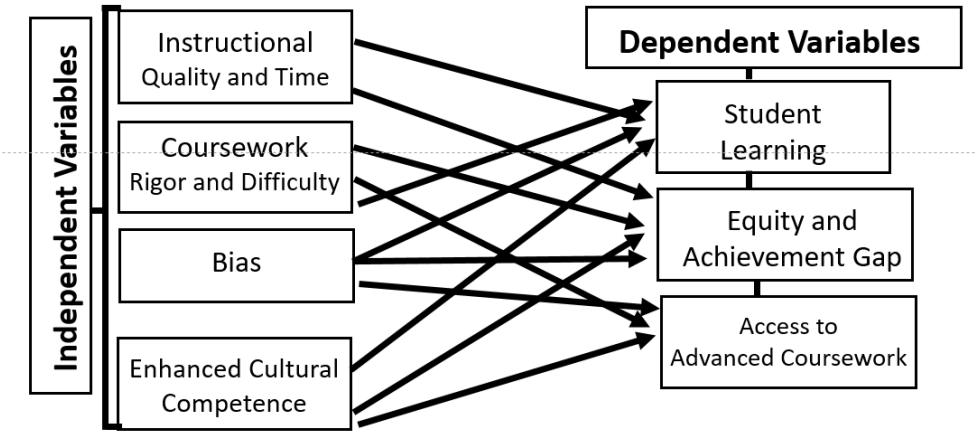
- With the strategic placement of students into the appropriate content courses, student academic performance will increase.
- When students are placed into the most challenging and rigorous courses, they can handle, student performance will increase.

Dimension 2: Equity becomes more prevalent when student placement in advanced coursework is completed with open access and choice for all students.

- Black and Hispanic students have not been given open access to advanced coursework at the same rate as their White counterparts.
- The equity and opportunity gap is decreased when the staff's cultural competency is enhanced, including administration, guidance, and teachers.

Conceptual Framework

Figure 1. Conceptual Theory Map.



Rationale of the Study

When developing master schedules, one philosophy to follow is to encourage all achievement levels to enroll in advanced coursework including AICE, AP, IB, and DE classes during the four-year high school experience. Schools that offer extra support for students such as in-class tutors and extra help tutoring after school via homework centers serve as a support challenge to students who never would have considered this type of course. Preventing the disproportionately low-income and minority students from enrolling in Advanced courses because of teacher or guidance recommendation is a common practice known as tracking (Barshay, 2016). In a study performed by the NAEP in 2009, 75% of all states tracked math students. Four years later in 2013, the states that tracked students achieved the highest math scores on the AP exams. Barshay reports that schools that do not track by levels of achievement tend to produce a watered-down curriculum. However, by adopting the tracking master schedule approach, only higher-level students would be enrolled in the advanced and honors STEM classes.

Black and Hispanic students comprise the majority of lower socioeconomic students in our nation's schools and while SAT scores have continued to improve, the gap for these students when compared to others has increased. Although Brown notes that in 2017, only seven percentages of all AP classes' enrolled African American students and only five percentages are enrolled in STEM classes, Cross points out that college admissions officers are impressed with students who enroll in higher level Advanced Placement classes, looking for a rigorous program of study. He notes that most participants in the AP program have been affluent high school students, predominantly living in the White suburbs of major cities (Cross, 2008).

High School administrators must decide whether achieving competitive achievement scores within their district or state overrides providing a fair opportunity to all students regardless of social or heritage factors (Cross, 2008). One negative factor surrounding the inclusion of lower-academic students into advanced placement and advanced coursework is the cost effectiveness versus the pass rate ratio (Davis, et al., 2015). College Board data covering a 16-year period from 1997-2012, revealed that African American students in Texas, New York, and Florida's ratio of passing score costs to failing score costs were negative for every year. The study noted that because of the limited education budgets in many states, dollars have to be spent wisely (Cross, 2008).

In the urban district in the southeastern United States, many schools endorse open enrollment for all high school students, endorsing the philosophy of open enrollment. However, it is very important that although at first the passing rates declined once open access enrollment was implemented; there was a consistent increase over time.

Figure 2. Global Annual AP Exam Participation.

	5		4		3		2		1		
	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	Mean Score
2000	189,262	14.9	268,223	21.1	355,845	28.0	295,662	23.2	163,325	12.8	3.02
2001	196,862	13.9	287,836	20.4	387,043	27.4	355,028	25.1	187,618	13.3	2.97
2002	230,967	14.6	340,225	21.5	434,264	27.4	364,218	23.0	215,812	13.6	3.00
2003	244,959	14.1	354,890	20.4	471,590	27.1	417,317	24.0	248,475	14.3	2.96
2004	275,345	14.6	388,445	20.6	499,323	26.5	428,931	22.7	295,726	15.7	2.96
2005	284,639	13.5	423,744	20.1	546,243	25.9	488,161	23.2	363,016	17.2	2.90
2006	319,055	13.8	465,824	20.1	593,627	25.6	532,633	23.0	401,472	17.4	2.90
2007	353,833	14.0	512,462	20.2	636,071	25.1	564,524	22.3	466,541	18.4	2.89
2008	389,943	14.2	531,651	19.4	659,708	24.1	584,038	21.3	571,105	20.9	2.85
2009	450,843	15.4	582,135	19.9	692,190	23.6	612,364	20.9	592,397	20.2	2.89
2010	485,686	15.1	625,640	19.5	750,343	23.4	658,460	20.5	693,096	21.6	2.86
2011	514,423	14.9	676,536	19.6	812,852	23.5	721,988	20.9	730,221	21.1	2.86
2012	574,567	15.5	742,512	20.1	874,393	23.6	776,280	21.0	730,655	19.8	2.91
2013	563,805	14.3	785,114	19.9	974,238	24.7	872,724	22.2	742,219	18.8	2.89
2014	587,262	14.1	837,560	20.1	1,043,989	25.0	927,152	22.2	780,237	18.7	2.89
2015	597,286	13.3	872,132	19.5	1,126,317	25.1	991,608	22.1	891,593	19.9	2.84
2016	664,898	14.1	914,612	19.4	1,149,533	24.4	1,075,237	22.9	900,700	19.1	2.87
2017	660,098	13.3	967,205	19.5	1,250,486	25.2	1,168,692	23.6	911,450	18.4	2.86
2018	721,962	14.2	1,014,499	19.9	1,266,167	24.9	1,177,295	23.1	910,401	17.9	2.89
2019	731,191	14.3	1,023,018	20.1	1,286,949	25.2	1,163,858	22.8	893,799	17.5	2.91
2020	754,754	15.9	1,040,965	21.9	1,261,429	26.5	983,724	20.7	711,085	15.0	3.03

Adapted from AP Central – College Board, March 31, 2020

Figure 2, illustrates the annual enrollment in Advanced Placement course exams, globally, from the 1998-1999 school through the most recent scored exam administration in

2018-2019. The 2019-2020 score reports, including participation and success, have not been released at this time of this study. The argument could be made that these scores would be an outlier due to their first being delivered through a distance-learning model, due to Covid-19. This data shows that participation has nearly doubled in terms of the number of schools, and has more than quadrupled in exams. While at the same time, figure three illustrates truly impressive data. It is determined that passing rates, as measured by level three and above, dropped only six points, from 65% to 59%. Truly excellent work internationally considering the increase in exam volume.

Figure 3. Global Annual AP Score Distribution All Subjects.

	5		4		3		2		1		
	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	No. of Exams	% at Score	Mean Score
1999	171,352	14.9	242,415	21.1	319,418	27.8	276,197	24.0	140,133	12.2	3.02
2000	189,262	14.9	268,223	21.1	355,845	28.0	295,662	23.2	163,325	12.8	3.02
2001	196,862	13.9	287,836	20.4	387,043	27.4	355,028	25.1	187,618	13.3	2.97
2002	230,967	14.6	340,225	21.5	434,264	27.4	364,218	23.0	215,812	13.6	3.00
2003	244,959	14.1	354,890	20.4	471,590	27.1	417,317	24.0	248,475	14.3	2.96
2004	275,345	14.6	388,445	20.6	499,323	26.5	428,931	22.7	295,726	15.7	2.96
2005	284,639	13.5	423,744	20.1	546,243	25.9	488,161	23.2	363,016	17.2	2.90
2006	319,055	13.8	465,824	20.1	593,627	25.6	532,633	23.0	401,472	17.4	2.90
2007	353,833	14.0	512,462	20.2	636,071	25.1	564,524	22.3	466,541	18.4	2.89
2008	389,943	14.2	531,651	19.4	659,708	24.1	584,038	21.3	571,105	20.9	2.85
2009	450,843	15.4	582,135	19.9	692,190	23.6	612,364	20.9	592,397	20.2	2.89
2010	485,686	15.1	625,640	19.5	750,343	23.4	658,460	20.5	693,096	21.6	2.86
2011	514,423	14.9	676,536	19.6	812,852	23.5	721,988	20.9	730,221	21.1	2.86
2012	574,567	15.5	742,512	20.1	874,393	23.6	776,280	21.0	730,655	19.8	2.91
2013	563,805	14.3	785,114	19.9	974,238	24.7	872,724	22.2	742,219	18.8	2.89
2014	587,262	14.1	837,560	20.1	1,043,989	25.0	927,152	22.2	780,237	18.7	2.89
2015	597,286	13.3	872,132	19.5	1,126,317	25.1	991,608	22.1	891,593	19.9	2.84
2016	664,898	14.1	914,612	19.4	1,149,533	24.4	1,075,237	22.9	900,700	19.1	2.87
2017	660,098	13.3	967,205	19.5	1,250,486	25.2	1,168,692	23.6	911,450	18.4	2.86
2018	721,962	14.2	1,014,499	19.9	1,266,167	24.9	1,177,295	23.1	910,401	17.9	2.89
2019	731,191	14.3	1,023,018	20.1	1,286,949	25.2	1,163,858	22.8	893,799	17.5	2.91

Adapted from AP Central – College Board, March 31, 2020

Figure 4. Urban District Annual AP/AICE/IB Exam Participation.

	Number of Test Takers					Participation Rates				
	FY14	FY15	FY16	FY17	FY18	FY14	FY15	FY16	FY17	FY18
Asian	849	846	741	751	791	99.8%	95.8%	83.2%	86.6%	83.5%
Black	1,872	1,571	1,449	1,570	1,614	24.5%	19.7%	17.8%	18.2%	17.0%
Hispanic	3,047	2,972	3,373	3,898	4,108	42.6%	38.5%	40.8%	43.8%	40.1%
Indian	33	28	18	19	13	21.8%	13.5%	7.3%	5.8%	3.6%
White	6,426	6,214	5,647	5,999	5,870	59.1%	58.2%	52.9%	56.4%	52.1%
District	12,945	12,499	11,856	12,962	13,189	47.2%	44.2%	40.8%	43.0%	39.7%

Adapted from Executive Summary – School District of Palm Beach County, 2018

Figure 5. Urban District Annual AP/AICE/IB Exam Passing Rates.

	Number of AP Tests Taken					Percent of AP Tests Passed				
	FY14	FY15	FY16	FY17	FY18	FY14	FY15	FY16	FY17	FY18
Asian	2,253	2,217	2,003	2,059	2,070	65.2%	67.5%	71.4%	67.4%	69.1%
Black	3,042	2,615	2,339	2,476	2,592	31.3%	36.4%	35.0%	34.9%	36.1%
Hispanic	5,803	5,646	6,106	7,259	7,669	54.7%	55.5%	56.9%	55.5%	55.6%
Indian	65	68	38	31	16	41.5%	54.4%	50.0%	54.8%	25.0%
White	13,469	13,333	12,228	13,222	13,120	62.3%	61.9%	62.2%	61.4%	60.8%
District	25,814	25,309	23,907	26,483	26,926	56.4%	57.6%	58.9%	57.5%	57.1%

Adapted from Executive Summary – School District of Palm Beach County, 2018

Figures 4 and 5 illustrates equally impressive data regarding the advanced coursework success for the urban district in the southeastern United States currently being studied, essentially demonstrating the same trend of increased success by increasing Black and Hispanic students' passing rates from FY14 – FY18. This data includes each of the college-level course offerings provided to students for the College Board Advanced Placement (AP) program. This urban district has also experienced a rapid increase in the number of Cambridge AICE and International Baccalaureate (IB) coursework, which has a negative impact on this large urban county in the southeastern United States in the AP participation rates.

There are several possible barriers and limitations when designing and conducting an action research study on this topic because the school administration determines each school site master schedule. Timing is also a concern since these schedules are designed beginning in January, typically before the next school year. Throughout that semester, there are many individuals and departments responsible for finalizing the master schedule. This can include guidance counselors who conduct the course selection—the assistant principal who works with a data processor to finalize student scheduling options. The scheduling work is completed over the summer, and then, of course, the student and family aspects of options are being provided by conducting a research study. This scheduling stage can be challenging since all stakeholders must be considered, as well as the timing of this effort.

Several other factors can become barriers to the study that are unrelated to the scheduling process. Changes in state standards, personnel, assessment techniques, state-imposed remediation mandates as well as other external forces can and will become significant influences when developing and finalizing the master schedule. The research study believes the best way to examine a particular master schedule is to focus on a small number of schools, where the administration is open to examining better ways to implement their master schedule.

Investigation of the project includes reviewing and analyzing articles that discuss the different practices in which the master schedule can be customized. Furthermore, looking at those changes or initiatives that will lead to the most significant amount of student success. The research study specifically examines the different times of the day to offer different types of courses. It also examines the terms of case studies and the most practical ways for assigning teachers to the courses that best match their skill set. In addition, the research study examines and provides the differences between the timing related to the length of the class. When

comparing a regular/traditional schedule to block-schedule, some articles look at techniques that group students based on their prior performance before looking at student grades in pre-requisite courses or achievement placement on standardized tests. The primary options show the most significant when assigning teachers to the courses that best match their skill set when implemented at a school or schools.

The researchers are personally invested in this subject. The administrators and the urban district in the southeastern United States have prior experience with re-designing and implementing master schedules at multiple site-based locations. This process can range from the role of teacher, guidance counselor, assistant principal, principal, principal supervisor and district leadership. This topic is significant because not only does it address student achievement across disciplines, but it is vital to addressing the achievement gap and equity and access issues. The emphasis of the research study must focus on the local urban district high schools. The success of a high school master schedule, or secondary school, is often determined by the planning process months before the year begins.

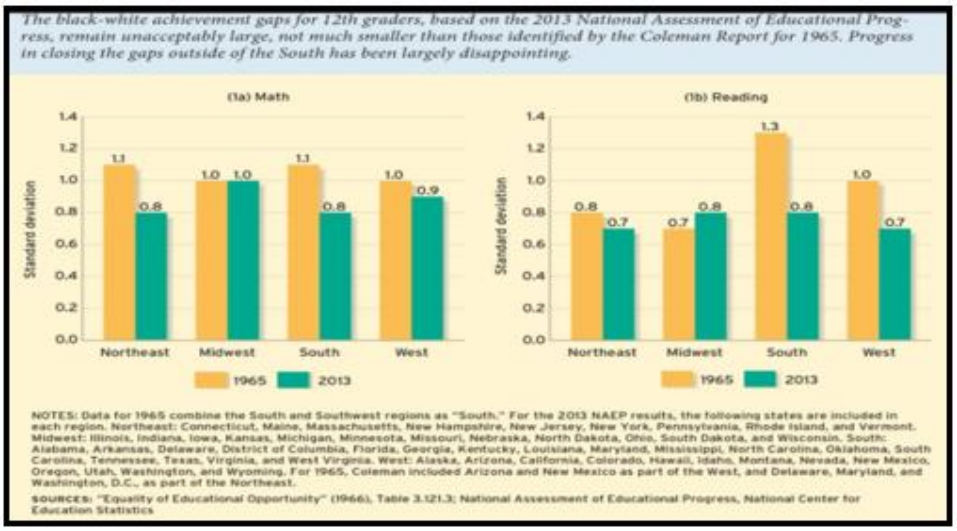
Student placement is a much-debated topic. Every year students across the country go through a process called course selection, where input and feedback is derived from multiple sources that include students, parents, teachers, guidance counselors and administration. Often times not all parties agree on what is the most appropriate student placement. This type of complicated scenario creates the need for administrators to develop create criteria and systems. Many urban district high schools are implementing new strategic master scheduling initiatives that can be researched. The research study will examine the urban district's master scheduling system and design a process that will address the problems that currently exist.

Existence of the Problem

A significant gap exists between the achievement of our White students in comparison to their Black and Hispanic classmates. Unfortunately, despite our efforts, the achievement gap between White students and Black students has not been eradicated despite many efforts. In fact, over the last 50 years, the gap has mostly remained constant (Coleman Report, 1966).

Looking back at work mentioned in the Equality of Education Opportunity, also known as the Coleman Report (1966), it was discovered that in both math and reading the average Black student in grade 12 placed in the 13th percentile of the score distribution, meaning that 87 percent of White students in grade 12 scored ahead of the average Black 12th grader. Unfortunately, 50 years later, the average 12th-grade Black student placed only in the 19th percentile. In reading, the achievement gap has improved slightly as the average Black student scores at just the 22nd percentile (Coleman Report, 1966).

Figure 6. Achievement gap between White and Black students is still gaping.



Adapted from Achievement Gap, Camera, 2016

Figure 6 illustrates the Black-White achievement gaps from 1965 to 2013 for 12th graders is based on a 2013 study that Math and Reading remain unacceptably large, and closing the gap in the South has not changed much in over 48 years.

Figure 7. FY2010-2014 Federal Graduation Rate for FL.& Urban District for Black Students.

	Subgroup	FY15	FY16	FY17	FY18	FY19	1-Year Change	5-Year Change
Florida	Black	68.0%	72.3%	74.8%	80.9%	81.5%	0.6%	13.5%
	Hispanic	76.7%	79.5%	81.3%	85.1%	85.9%	0.8%	9.2%
	White	82.8%	85.1%	86.2%	89.0%	90.2%	1.2%	7.4%
	ELL	59.5%	62.0%	67.3%	75.0%	75.0%	0.0%	15.5%
	FRL	70.4%	74.4%	76.8%	82.0%	82.9%	0.9%	12.5%
	SWD	56.8%	61.6%	66.0%	77.0%	80.6%	3.6%	23.8%
Urban District	Black	69.1%	73.7%	79.1%	82.9%	83.6%	0.7%	14.5%
	Hispanic	76.3%	79.5%	82.9%	84.7%	84.9%	0.2%	8.6%
	White	88.5%	90.7%	90.9%	93.2%	93.0%	-0.2%	4.5%
	ELL	50.9%	56.7%	67.0%	71.8%	68.7%	-3.1%	17.8%
	FRL	70.8%	75.9%	80.0%	83.1%	82.7%	-0.4%	11.9%
	SWD	64.1%	68.9%	71.2%	79.2%	82.6%	3.4%	18.5%

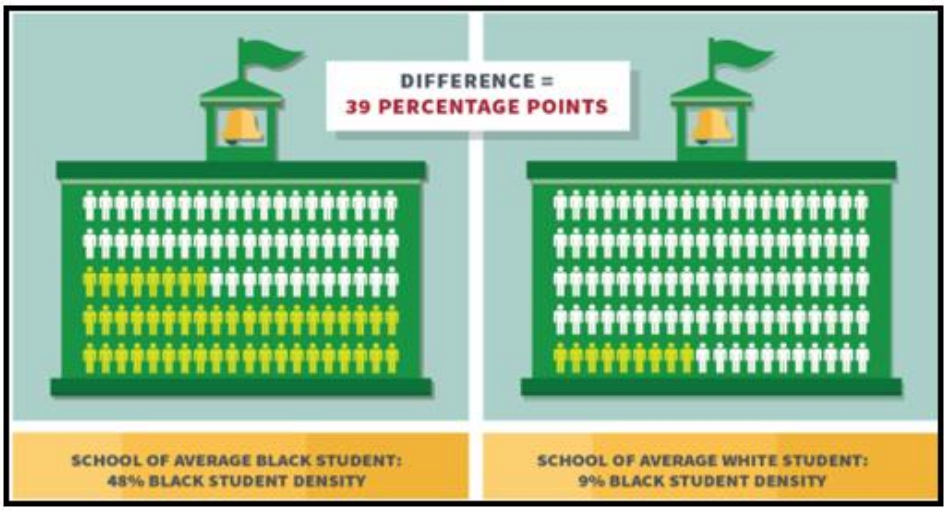
Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 7 confirms the graduation rate from 2015 - 2019 for Florida and the urban district in the southeastern United States for Black, Hispanic, and White students. In 2019, Black students graduated at a rate of 81.5% compared to 85.9% for Hispanic students and 90.2% for White students across the state of Florida. The figure also illustrates the urban district in the southeastern United States graduation rates are very similar with Blacks and Hispanic students trailing White students at a statistically significant rate. Despite the increases in graduation rates across each student group since 2014, this gap actually exceeds the state average Black student graduation rate in the urban district was 83.6%, Hispanic was 84.9% and White was 93%.

Distribution of students is also unusual as, on average, White students attended schools that were nine percent Black. In comparison, when looking at figure 8, Black students attended schools that were 48 percent Black, indicating a vast difference in average Black student density

nationally. Analysis of the relationship between the percentage of students in a school who were Black and achievement showed that achievement for both Black and White students was lower in the highest Black student density schools than in the lowest density schools.

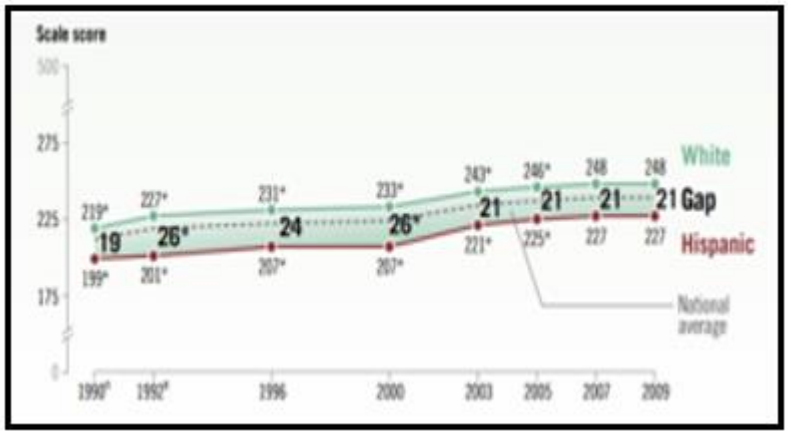
Figure 8. Average percentage of students who are Black in schools, for White and Black students.



Adapted from School Composition and the Black-White Achievement Gap -nces.ed.gov, 2015

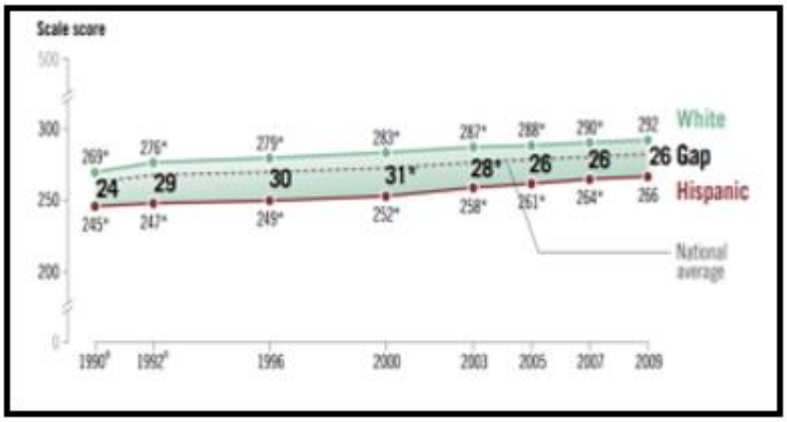
Moving on to the gap between Hispanic and White students**,** in regards to Reading scores on the national level, there is a similar trend. While scores increased for both White and Hispanic students, unfortunately, the achievement gap did not change for either fourth- or eighth-graders from 1992 to 2009 (Bohrnstedt, et al., 2015).

Figure 9. Mathematics achievement score gaps between Hispanic and White public school student at grade four: Various years, 1990-2009.



Adapted from Bohrnstedt, et al., 2015

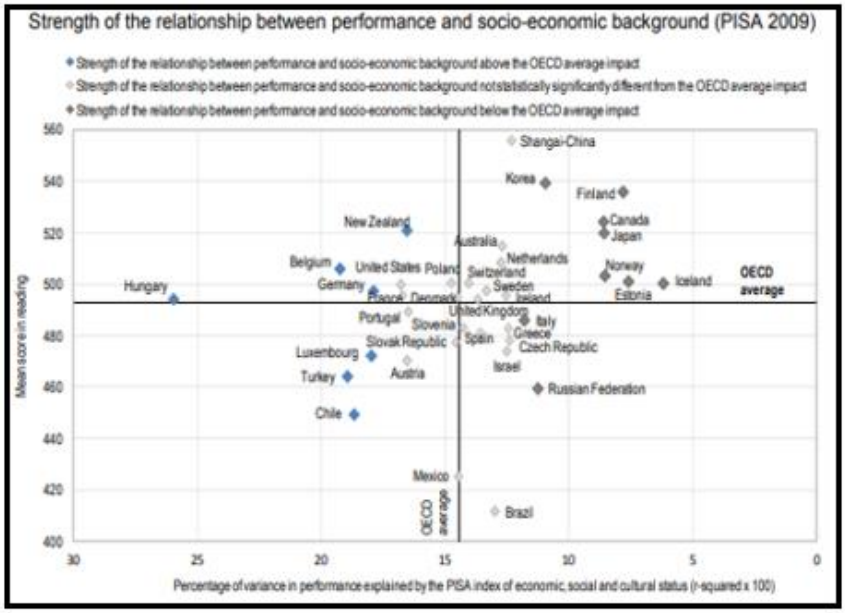
Figure 10. Mathematics achievement score gaps between Hispanic and White public school student at grade eight: Various years, 1990-2009.



Adapted from Hemphill & Vanneman, 2011

According to The Organization for Economic Co-operation and Development (OECD), all parties benefit from promoting equity in education, not just the underserved populations. There are many tertiary benefits beyond students learning, ranging from school failure reduction and saving taxpayers even more funds for other causes and efforts, which can become more critical considering the future economic outlook. The figure below highlights how countries have combined equity with quality.

Figure 11. High performing education systems combine equity with quality.



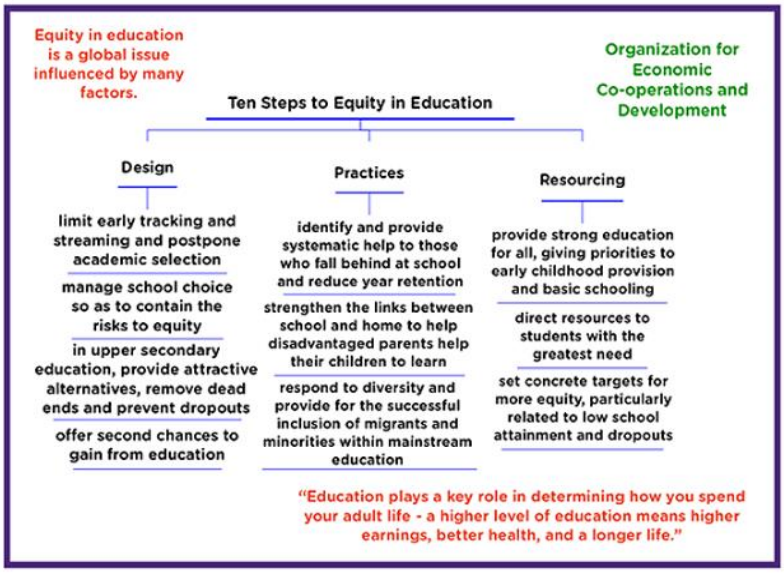
Adapted from Equity and Quality in Education – OCED, 2012

There are also many failures, in the sense of lost opportunities for success, when schools and school districts fail to put measures in place to enrich and support students academically. As mentioned in the research study Equity and Quality in Education (2019), at the school level, school failure can be defined as the incapacity of a school to provide appropriate and inclusive education and an adequate learning environment for students to achieve the outcomes worthy of their effort and ability. From an individual perspective, school failure can be defined as the failure of a student to obtain a minimum level of knowledge and skills, which can, at the extreme, lead to dropping out of school.

The research must strive towards success to avoid failure, and such complex efforts require educational administrators to make systemic or design improvements. These improvements to systems must lead to becoming the school or school district's practices, whether they become official policy or not. Once practices are in place to shrink the equity gap, resources must then be made available to ensure that successful outcomes are produced. The

Organisation for Economic and Co-Operations Development outlines a Ten Steps to Equity in Education that shows this very relationship between design, practices, and resources below.

Figure 12. Ten Steps to Equity in Education.



Adapted from Equity in Education, April 4, 2019

Promoting Equity at the School and Classroom Level

While some aspects of equity in education must be addressed on a broader systemic scale, many things can be done at the individual school and classroom level to create a more equitable environment for students. Achieving equity is closely tied to personalized learning that requires understanding each student's individual needs and designing educational experiences that will help all students achieve success (Equity in Education, 2019).

The 2019 research suggests that in an equitable, as opposed to the merely equal classroom, each student is given the support and scaffolding they need to optimize their educational progress. The goal is for all students to work in their zone of proximal development, which refers to the difference between what a learner can do without help and what he or she can achieve with guidance and encouragement from a skilled partner. That may mean that:

- Some students will have different expectations on an assignment, such as only writing three paragraphs instead of five.
- Some students will have extra time to complete an assignment or other accommodations designed to meet their educational needs.
- Some students will have resource teachers or aides that provide additional support in the classroom or in a pullout environment.
- Some students will have resources provided at a different reading level or in a different language.
- At the school and district level, educational leaders have a responsibility to ensure that teachers have the materials, resources, and training they need to design an equitable classroom.
- Provide access to programs and strategies that support the goal of equity and enable all students to succeed.
- Support teachers when addressing parent concerns—for example, when explaining why some students were given more time on an assignment than others.
- Ensure that there is a fair and objective way to determine student academic needs, monitor academic progress, and implement support systems that serve all students.

College Level Coursework

Advanced Placement (AP), Advanced International Certification Exam (AICE) and International Baccalaureate (IB). College Board's AP exams can earn a student anywhere from three to eight college credits per course completed. Although there are some exceptions to the rule, most schools require a score of three at the end of the year exam score. Scores are measured from one to five, with five being the highest. College Boards offers up to 30 different AP courses across

Language Arts, Math, Science, History, Languages, and Art. According to College Board, 85% of selective colleges and universities report that a student's AP experience favorably impacts admission decision Discover the Benefits of AP: AP Central - College Board, 2020). Independent studies have confirmed the positive correlation between AP coursework and college readiness (Warne, 2017).

Cambridge Advanced International Certification Exam AICE, (2020) is a rapidly expanding high school program giving students opportunities to earn college credits. AICE prepares students for future studies at colleges and universities, offering both AS & A Level qualifications and approximately 50 different exams across four subject groups. The groups of study include Mathematics and Sciences, Languages, Arts and Humanities, and Interdisciplinary subjects. The goal is to allow students to earn knowledge, understanding and skills in the following areas:

- Independent thinking
- Applying knowledge and understanding to new as well as familiar situations
- Handling and evaluating different types of information source
- Thinking logically and presenting ordered and coherent arguments
- Making judgements, recommendations and decisions
- Presenting reasoned explanations, understanding implications and communicating them logically and clearly
- Working and communicating in English.

There is also a program called the AICE Diploma, which requires students to pass exams across multiple disciplines over a twenty-five-month period. To earn an AICE Diploma, students must attain seven credits at a minimum, one from each subject group one, two, and three.

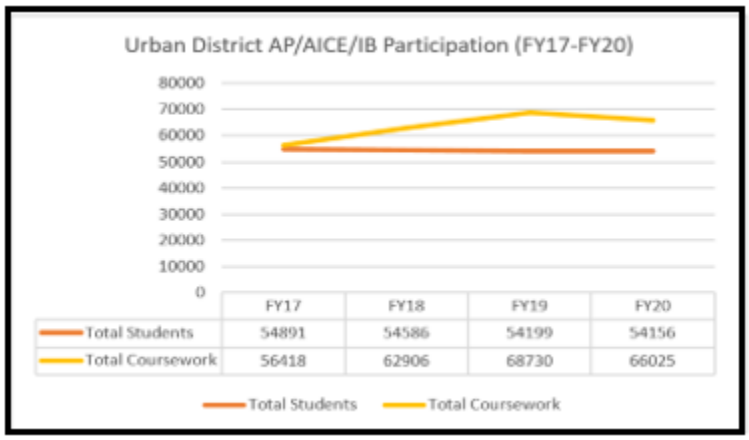
Students must also complete the AS Level Global Perspectives & Research course (Cambridge, 2020).

International Baccalaureate (IB) courses are accessible both inside and outside of the US, offering college-level credit for high school students. IB tests require students to complete the coursework before sitting for the course IB exam, which is not required for AICE and AP. Students can earn the IB diploma, which takes two years to complete and requires coursework to be completed across six disciplines. IB's approach requires students to complete courses across multiple disciplines in a holistic approach, including language and literature, language acquisition, individuals and societies, sciences, mathematics, and arts. Within these subjects, there are three core elements; Theory of knowledge, the extended essay, and a creativity, activity, service project. Students must study more than just the traditional subjects, including science and math, and are required to study the languages, complete essays, community projects, and pass an exam in each content area. Students taking an exam to earn a score from one through seven, and scoring with a four, is typically considered passing by colleges for purposes of earning college credits (Best Schools, 2020). Like the AP program, different colleges have their scale of offering credits depending on the strength of students' exam scores.

Dual Enrollment (DE) is unique compared to AP, AICE, and IB because the passing of an end of year exam is not a requirement for earning college credit. A grade of “C” or higher is the minimum, and an end of year exam is not required because students must report to a local college or university campus to take the course. However, some high schools offer Dual Enrollment classes on their campuses). Most colleges and universities honor all credits earned from Dual Enrollment with a course grade of “C” score or higher.

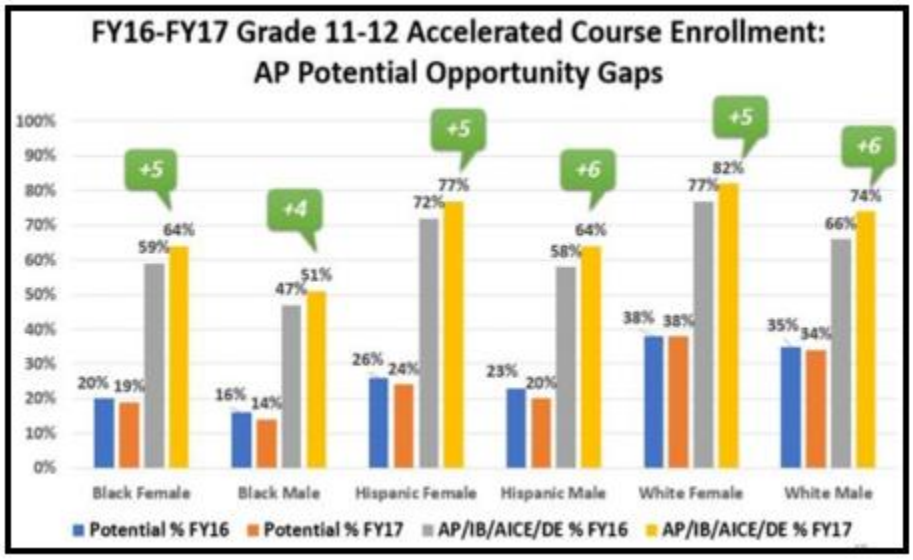
Looking at the number of exams given in the urban district in the southeastern United States, we see that students have increased in unduplicated enrollment in AP/AICE/IB course. Unduplicated enrollment has increased from 21,967 students in 2017 to 24,836 in 2020, representing an increase of more than 13%. The more significant increase in that same time/period is the number of overall exams given, which increased from 2.45 in 2017 to 2.49 in 2019, representing a slight increase. This shows that student participation is not only increasing, but it is not necessarily increasing at a higher rate. In 2019, White students, on average, took 2.74 exams. Hispanic students took 2.32 exams, and Black students took 1.92 exams. Hispanic student exams per student increased from 2018, and Black student exams per students has remained flat (Cambridge, 2020).

Figure 13. Number of Students and Courses Completed (Quarter 1, FY17-21).



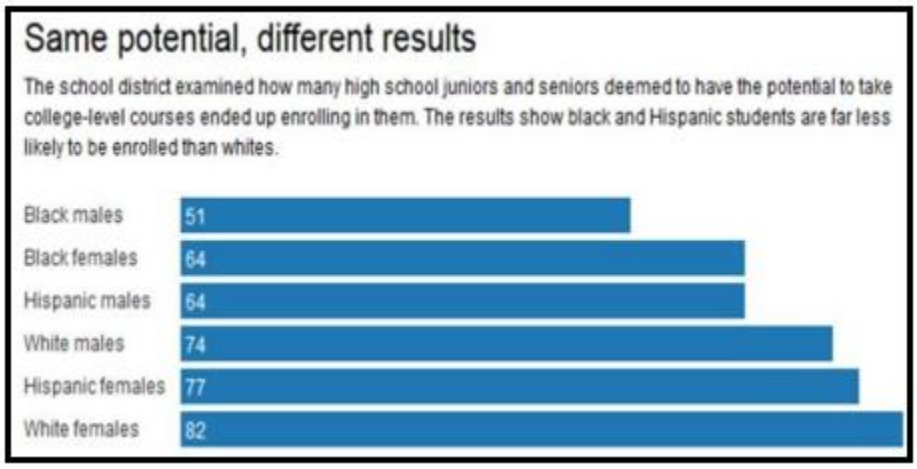
Although figure 13 illustrates a positive trend, figure 14 below illustrates concern from an equity standpoint. At the same time, there has been an increased overall advanced coursework participation, and there is a glaring gap of coursework access based on ethnicity. When examining high school juniors and seniors during FY16 and FY17 that have earned PSAT scores demonstrating the potential to take advanced coursework. The data illustrates that Black and Hispanic students are denied access at a higher rate than White students have.

Figure 14. Opportunity Gap based on AP Potential.



Adapted from Palm Beach Post, Marra, 2017

Figure 14.1. Opportunity Gap based on AP Potential – Same potential, different results.

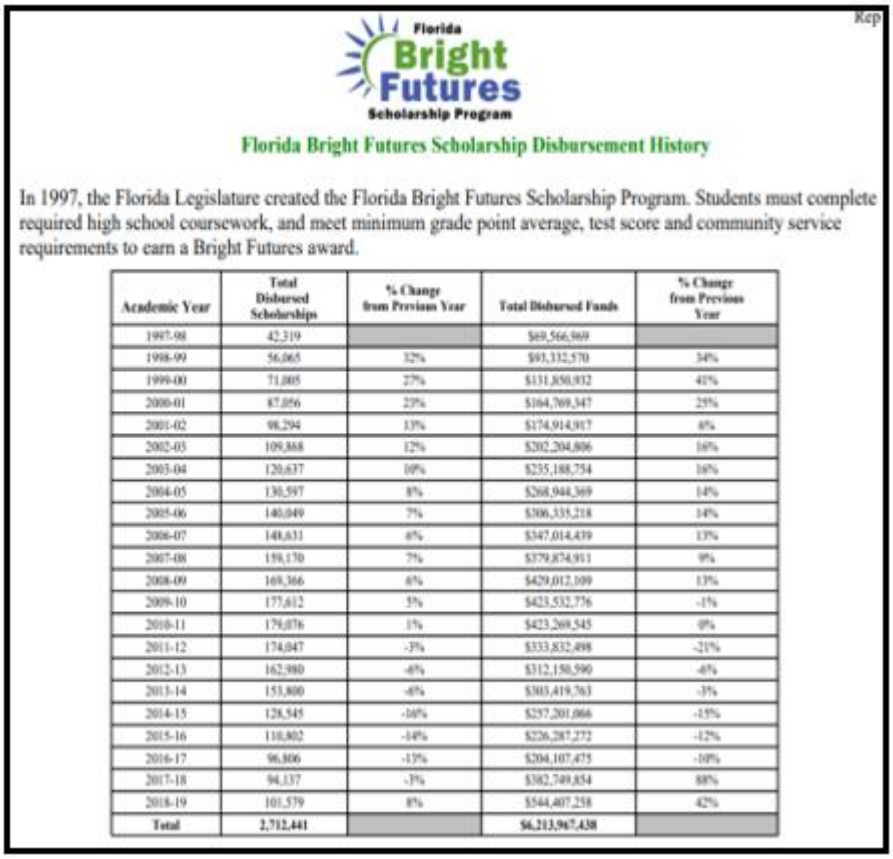


Adapted from Palm Beach Post, Marra, 2017

Advanced Coursework provides an opportunity for students to earn scholarship funds. Bright Futures is the name of a scholarship program in the state of Florida. It is funded by the Florida Lottery and was first started in 1997. The Florida Bright Futures Scholarship Program provides scholarships based on merit-based high school academic achievement. Florida Medallion Scholars will receive 75% of tuition and applicable fees in fall and spring**.** In the state

of Florida, students that earn either the AICE of IB Diploma designations qualify for a full Bright Futures Scholarship that can cover up to 100% of college tuition and fees. The figure below highlights the number of scholarship dollars awarded to students in the state of Florida, with more than $500 million in 2018-2019. The figure highlights a positive correlation in scholarship amounts awarded to the number of college-level courses offered in the state (Bright Futures, 2020).

Figure 15. Florida Bright Futures Scholarship Disbursement History.



Florida Bright Futures Scholarship Program

Florida Bright Futures Scholarship Disbursement History

In 1997, the Florida Legislature created the Florida Bright Futures Scholarship Program. Students must complete required high school coursework, and meet minimum grade point average, test score and community service requirements to earn a Bright Futures award.

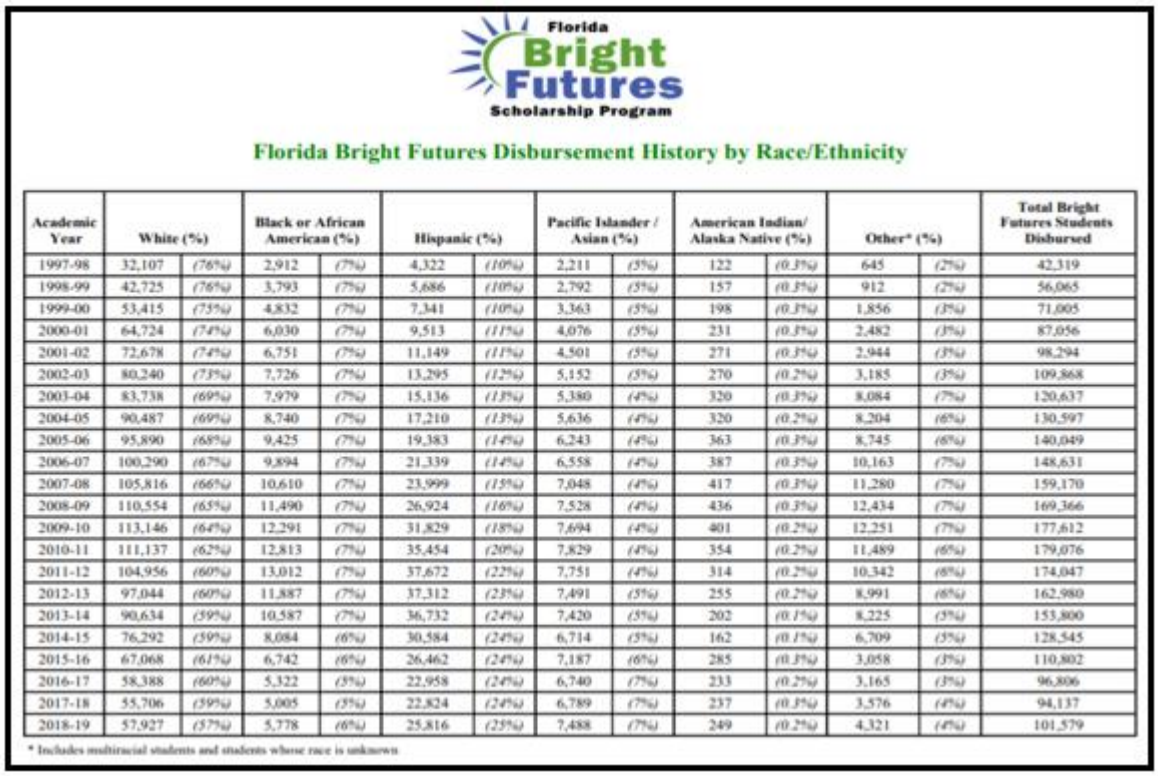
Academic Year	Total Disbursed Scholarships	% Change from Previous Year	Total Disbursed Funds	% Change from Previous Year
1997-98	42,319		$69,566,969	
1998-99	56,065	32%	$93,332,570	34%
1999-00	71,005	27%	$131,850,932	41%
2000-01	87,056	23%	$164,769,347	25%
2001-02	98,294	13%	$174,914,917	6%
2002-03	109,868	12%	$202,204,806	16%
2003-04	120,637	10%	$235,188,754	16%
2004-05	130,597	8%	$268,944,369	14%
2005-06	140,049	7%	$306,335,218	14%
2006-07	148,631	6%	$347,014,439	13%
2007-08	159,170	7%	$379,874,911	9%
2008-09	169,366	6%	$429,012,109	13%
2009-10	177,612	5%	$423,532,776	-1%
2010-11	179,076	1%	$423,269,545	0%
2011-12	174,047	-3%	$333,832,498	-21%
2012-13	162,980	-6%	$312,150,590	-6%
2013-14	153,800	-6%	$303,419,763	-3%
2014-15	128,545	-16%	$257,201,066	-15%
2015-16	110,802	-14%	$226,287,272	-12%
2016-17	96,806	-13%	$204,107,475	-10%
2017-18	94,137	-3%	$382,749,854	88%
2018-19	101,579	8%	$544,407,258	42%
Total	**2,712,441**		**$6,213,967,438**	

Adapted from Bright Futures, July 10, 2020

Figure 16 highlights the significant overall growth in the number of scholarship dollars awarded to students from 1998 to 2019; looking a little deeper, it illustrates the significant gaps based on student demographics. Both Black and Hispanic students are significantly underrepresented when comparing the percentage of students exiting grade twelve to the

percentage of students earning Bright Futures Scholarships. There has been some criticism by others and the Home Education Foundation that the Bright Futures Scholarship Program - Merit Scholarship should be a needs-based scholarship rather than a merit-based scholarship. They argued that low-income students could not go to college because the state did not provide enough needs-based scholarships (The Home Education Foundation, 2020).

Figure 16. Florida Bright Futures Scholarship Disbursement History by Race/Ethnicity.



Florida Bright Futures Scholarship Program

Florida Bright Futures Disbursement History by Race/Ethnicity

Academic Year	White (%)		Black or African American (%)		Hispanic (%)		Pacific Islander / Asian (%)		American Indian/ Alaska Native (%)		Other* (%)		Total Bright Futures Students Disbursed
1997-98	32,107	(76%)	2,912	(7%)	4,322	(10%)	2,211	(5%)	122	(0.3%)	645	(2%)	42,319
1998-99	42,725	(76%)	3,793	(7%)	5,686	(10%)	2,792	(5%)	157	(0.3%)	912	(2%)	56,065
1999-00	53,415	(75%)	4,832	(7%)	7,341	(10%)	3,363	(5%)	198	(0.3%)	1,856	(3%)	71,005
2000-01	64,724	(74%)	6,030	(7%)	9,513	(11%)	4,076	(5%)	231	(0.3%)	2,482	(3%)	87,056
2001-02	72,678	(74%)	6,751	(7%)	11,149	(11%)	4,501	(5%)	271	(0.3%)	2,944	(3%)	98,294
2002-03	80,240	(73%)	7,726	(7%)	13,295	(12%)	5,152	(5%)	270	(0.2%)	3,185	(3%)	109,868
2003-04	83,738	(69%)	7,979	(7%)	15,136	(13%)	5,380	(4%)	320	(0.3%)	8,084	(7%)	120,637
2004-05	90,487	(69%)	8,740	(7%)	17,210	(13%)	5,636	(4%)	320	(0.2%)	8,204	(6%)	130,597
2005-06	95,890	(68%)	9,425	(7%)	19,383	(14%)	6,243	(4%)	363	(0.3%)	8,745	(6%)	140,049
2006-07	100,290	(67%)	9,894	(7%)	21,339	(14%)	6,558	(4%)	387	(0.3%)	10,163	(7%)	148,631
2007-08	105,816	(66%)	10,610	(7%)	23,999	(15%)	7,048	(4%)	417	(0.3%)	11,280	(7%)	159,170
2008-09	110,554	(65%)	11,490	(7%)	26,924	(16%)	7,528	(4%)	436	(0.3%)	12,434	(7%)	169,366
2009-10	113,146	(64%)	12,291	(7%)	31,829	(18%)	7,694	(4%)	401	(0.2%)	12,251	(7%)	177,612
2010-11	111,137	(62%)	12,813	(7%)	35,454	(20%)	7,829	(4%)	354	(0.2%)	11,489	(6%)	179,076
2011-12	104,956	(60%)	13,012	(7%)	37,672	(22%)	7,751	(4%)	314	(0.2%)	10,342	(6%)	174,047
2012-13	97,044	(60%)	11,887	(7%)	37,312	(23%)	7,491	(5%)	255	(0.2%)	8,991	(6%)	162,980
2013-14	90,634	(59%)	10,587	(7%)	36,732	(24%)	7,420	(5%)	202	(0.1%)	8,225	(5%)	153,800
2014-15	76,292	(59%)	8,084	(6%)	30,584	(24%)	6,714	(5%)	162	(0.1%)	6,709	(5%)	128,545
2015-16	67,068	(61%)	6,742	(6%)	26,462	(24%)	7,187	(6%)	285	(0.3%)	3,058	(3%)	110,802
2016-17	58,388	(60%)	5,322	(5%)	22,958	(24%)	6,740	(7%)	233	(0.2%)	3,165	(3%)	96,806
2017-18	55,706	(59%)	5,005	(5%)	22,824	(24%)	6,789	(7%)	237	(0.3%)	3,576	(4%)	94,137
2018-19	57,927	(57%)	5,778	(6%)	25,816	(25%)	7,488	(7%)	249	(0.2%)	4,321	(4%)	101,579

* Includes multiracial students and students whose race is unknown

Adapted from Bright Futures, July 10, 2020

Figure 16 lists the scholarships awarded in 2019 by racial groups, and we see that White students earned 57% of the scholarship dollars, Black students earned 6%, and Hispanic students earned 25%. However, when looking at figure 17 below, we see the student enrollment listed by overall and percentage for Grade 12 students across the state of Florida. The data is listed from 2016 to 2019, with White students representing 38.6% of the grade 12 students, Hispanic students representing 32.6%, and Black students representing 22.4%. Comparing enrollment to

scholarship award percentages, White students are over-represented for Bright Futures scholarships by 19%. Under-represented students include Hispanics by nearly eight percentages points and Blacks are the most significant under-representation by 16% points, as their student enrollment at 22% is 16% points higher than their six percentages scholarship award rate.

Figure 17. Florida Grade 12 Student Enrollment by Race.

Year	2015-16		2016-17		2017-18		2018-19	
	# of Students	% of students	# of Students	% of students	# of Students	% of students	# of Students	% of students
1-White	79,926	41.4%	80,235	40.5%	80,195	39.5%	79,821	38.6%
2-Hispanic	57,151	29.6%	60,273	30.4%	63,879	31.5%	67,567	32.6%
3-Black	44,139	22.9%	45,536	23.0%	45,971	22.6%	46,305	22.4%
4-Two or More Races	5,259	2.7%	5,432	2.7%	5,906	2.9%	5,995	2.9%
5-Asian	5,434	2.8%	5,476	2.8%	5,982	2.9%	6,269	3.0%
6-American Indian	756	0.4%	775	0.4%	797	0.4%	723	0.3%
7-Pacific Islander	212	0.1%	226	0.1%	272	0.1%	293	0.1%
Total	192,877	100.0%	197,953	100.0%	203,002	100.0%	206,973	100.0%

Adapted from Florida Department of Education, 2019

Importance for Minority Student Enrollment in Advanced Placement Courses

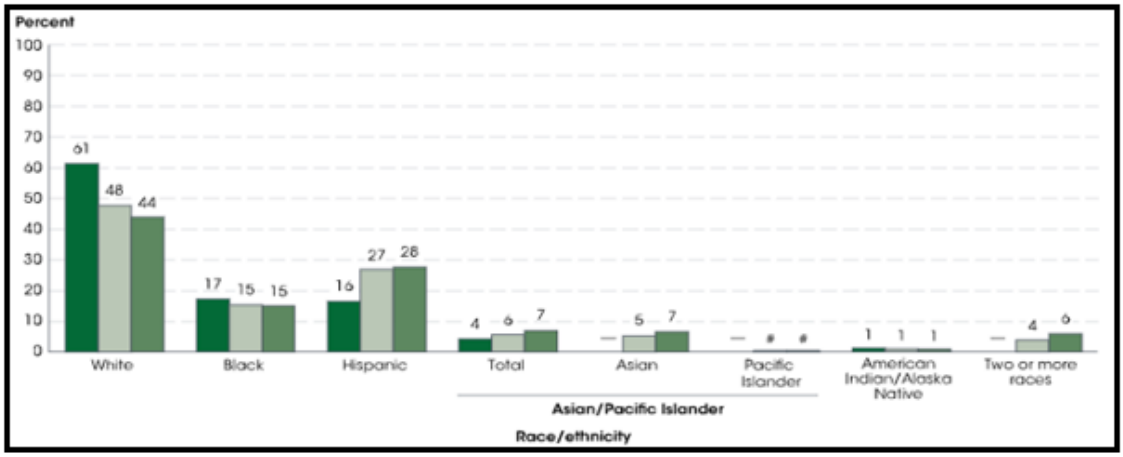
When the Advanced Placement program started in 1955, the original design served a college-bound student population by offering them the opportunity to earn college credits while attending high school at the school site. At this time, student segregated schools rarely collected and published enrollment data based on ethnicity, and it was not until the 1954 landmark decision of Brown v. Board of Education that segregation in schools became unconstitutional (Boozer et al., 1992). It took ten years before schools began to integrate on a wide-scale basis.

According to Boozer et al., (1992) during this time, the difference in educational opportunities created some racial earnings gap between the two groups. By the 1980s, the AP program expanded into a competitive selection process whereby selected colleges and universities would evaluate the rigor of the courses taken. Since the growing number of applicants to higher education institutions rose at this time, students with an increased number of college credits taken on the high school level were considered better applicants (Geiser &

Santelices, 2004). Between 1980 and 2008, the Racial/Ethnic composition of the US also shifted. The White enrollment in schools across our nation decreased from 80% to 66%, Hispanic enrollment increased from six percentages to 15%, Black enrollment remained the same at 12%, Asian Pacific Islander enrollment increased from two percentages to four percentages, and Indian/Alaskan Natives were added as one percentages of the population (Aud et al., 2010). While applications for college acceptance became more ethnically diverse during this time, AP and other college-level courses taken in high school became more important.

In today's world, virtually all colleges will evaluate AP and other higher-level college classes on a student transcript as positive (Geiser & Santelices, 2006). Not only has the total enrollment in public elementary and secondary schools in the US increased from 47.2 million to 50.7 million with a projected enrollment of 51.1 million by the year 2029, but Racial/Ethnic enrollment in the public schools has also continued to change. It will continue to change, as indicated in the figure below (NCES, 2020). The previously identified minority populations attending our nation's schools have become the majority, and their needs must be addressed, as seen in the figure 18.

Figure 18. Percentage distribution of students enrolled in public elementary and secondary schools, by Race/Ethnicity: Fall 2000, Fall 2017, and Fall 2020



Adapted from nces.ed.gov/programs/coe/indicator, n.d.

National and state-level data reveal that minority students and students who are identified as being from a lower socioeconomic household do not participate in AP programs at the same rate as their peers. This lack of enrollment is identified as the participation gap (Hanover Research, 2015). Furthermore, there is a direct and positive correlation between taking AP level classes and post-secondary success. This research defined advanced coursework AP, AICE and International Baccalaureate (IB) courses. Additionally, early childhood educational experiences and whom we become as adults have a direct connection with a successful educational experience. The courses and accomplishments accumulated throughout a person's educational history will directly affect their career choice, usually determined by the selection of a college major. The National College Attainment Network Connecting College and Career Success purports on its website (NCAR) that college access and success cannot be separated from the act of preparing for college during childhood (Frazier, 2019).

The most recent data available at the time of this writing offers a snapshot of salary potentials for individuals who earn higher education degrees. The more you learn, the more you

earn. For Doctoral degrees, the average earning potential is $1,750/week; Professional degree is $1,850/week; Master's degree is $1,400/week; Bachelor's is $1,150/week, Associate's degree is $800/week; Some college with no degree is $750/week, high school diploma is $725/week, and less than high school is $500/week. It is still relevant, therefore, for all students to prepare for and continue to college (Elka, 2018).

A study performed by Office Depot confirmed that forming habits early in a child's educational experience is a great way to form a pathway towards career success. Students who earned above-average grades in elementary school were more likely to earn a postgraduate degree; those individuals who earned average or below-average grades were more likely to cut ties with formal education after high school. Thus, if the highest paying jobs in our society require a higher level of education, which is directly linked to higher grades during the required years, then it becomes not only a moral issue to address the learning gap but also an economic and geopolitical one if the US is to continue to maintain its world standing. Unfortunately, the gap between earning higher grades and average or lower grades seems to widen in the middle school years (Frazier, 2019). The study also concluded that the student's self-concept or mindset also mattered with the successful planning of future educational and career goals. School districts should vertically align advanced coursework before high school to boost the accomplishments of our students, raising their self-concept and academic achievements and goals.

Detractors for Minority Student Enrollment

As stated by Klopfenstein (2004), the one characteristic that may be identified as a detractor for minority student enrollment in Advanced Placement (AP) programs and other types of college-level classes is lower socioeconomic income level. Additional detractors such as

advanced course availability in rural and inner-city schools, lack of diversity of student population between urban and suburban schools, and the method of screening students for college-level classes on the high school level have also been identified (Scott et al., 2010). The conclusion is obvious that these students face many obstacles that prevent them from enrolling in the Advanced courses if they have access to the AP programs at all. Two specific obstacles identified are the lack of student preparation and lack of support (Hanover Research, 2015).

Regardless of whether a county or individual high school offers open enrollment to AP classes, there are still issues with completing the coursework rigor. Another consideration includes the background and qualifications of the instructors who, by necessity, might have to support the student through the curriculum creatively. Additionally, student preparation for a curriculum of rigor becomes a requirement before entry, thus confirming the argument offered above of providing special programs not only in middle school but extending as far back as elementary school.

Therefore, the lack of preparation can become not only a practical detractor if a student does not have an appropriate reading level, to understand the material, but also a detractor to the student emotionally if there is no support system built into the high school curriculum to help an under-prepared student succeed. The Hanover Research Study strongly urges school systems to market the benefits of the AP programs to increase enrollment so that the lack of information to students, parents, and other stakeholders is not a barrier, even if it is open enrollment access. The study also confirms creating support systems such as extended course length and providing peer support groups when students complete higher-level courses. The benefits result in monetary savings for college tuition, a raise in GPA stats, and increased opportunities to qualify for academic scholarships.

According to Dougherty et al., (2006), students enrolled in and who pass AP exams are the best AP related indicators of whether the high school is preparing an increasing percentage of students to graduate from college. Therefore, it follows that merely offering open access to all students regardless of GPA or previous preparation classes is not a complete approach to closing the participation gap mentioned previously (Dougherty et al., 2006).

This study also examines the quality of teaching and attempts to improve academic preparation before enrollment is required. Black and Hispanic enrollment in AP courses is approximately 50% that of the rate of their White counterparts. In particular, magnet schools promote AP participation among the White students but do not for Black and Hispanic students. Another approach would equalize the participation rate while still maintaining flexibility across academic tracks: creating a school within a school. She also confirms that the hiring of qualified AP teachers to mentor students actively is essential to academic success (Klopfenstein, 2004).

Regardless of ethnicity, gender, class rank, or SAT score, students with AP credits earned higher first-semester college GPAs than their counterparts with similar high school academic characteristics, but who lacked AP credit (Scott et al., 2010). Although more opportunities exist for low-income students; it does not necessarily equate to automatic success passing a rigorous curriculum. A comparison of college performance for AP versus non-AP student groups was conducted in ten subject areas. They compared students who passed the AP test, students who only passed the AP course, students who participated in Dual Enrollment, and non-AP students and found that the AP credit students outperformed, even though they possessed a similar academic ability. Therefore, returning to the premise that the student might not bring about the desired outcome is possible; however, one that might be worth taking for ultimate success on the college level (Keng & Dodd, 2010).

However, it seems relevant that the support as mentioned earlier programs would enhance not only the preparation for advanced coursework by starting programs in middle school as well as providing specialized support programs involving stakeholders in the advanced programs via tutoring, outreach communication, and marketing, as well as individualized teacher/student relationships in the classroom for students. They need additional support and review, especially before the AP exam. It is also important to note that the overall participation has remained steady within the District. It would be prudent to analyze each school's enrollment as an independent case study to provide equity to both urban and suburban schools with different demographics to provide all students with an opportunity to achieve success by participating in advanced course studies.

The benefits of college-level coursework completion are not isolated to students, as schools and school districts greatly benefit from substantial funding as a reward based on student performance. Schools receive additional Full-Time Equivalent (FTE) funding for each student that passes an AP/AICE/IB exam. Based on the AP/AICE/IB exam results from the FY20 school year applying the funding formula for Bonus FTE, schools in the state of Florida can earn more than one to two million dollars in additional funding. Schools allocate these additional funds to purchase items and instructional positions to enhance and improve their AP/AICE/IB programs. Examples of purchases allowed include teaching units and extra duty supplements, tutorial salaries, technology items including computers and chrome books, textbooks, subscriptions and study guides, and many other academic resources. Schools generating more than $250,000 in AP/IB/AICE revenue receive 80%, while schools generating less than $250,000 in AP/IB/AICE revenue receive 100% AP/AICE and 80%. Charter schools and teachers benefit as well, as public

school districts are required to submit funds to each charter school for AP/ IB/AICE student success (FLDOE, org).

Teachers also can earn a significant incentive, in the form of a salary bonus, by receiving $50 for each successful exam pass three or higher on an AP exam, four or higher on IB exam, or "C "or above on AICE exam by students assigned to their roster for the course they teach. There is no cap to this amount as there was in the past, as the only limit is the number of students that an individual teacher can accommodate. If the student is in a half-credit AICE course, then the bonus amount is $25 for each student who receives a score of "C" or above on the AICE exam. Teachers at a "D or F" rated school that has at least one student scoring three or above (AP), four or above (IB), or "C" or above (AICE) earn an additional bonus of $500. The additional bonus is $250 if the qualifying exam is for a half-credit AICE course. Based on the number of exams passed in FY20, a school in the urban district in the southeastern United States can generate nearly $300,000 in teacher bonuses. If a teacher has 100 students pass an AP/AICE/IB exam, it would be possible to earn more than $5,000 per year under this incentive based program model (FLDOE, org).

Figure 19. Hypothetical School AP/AICE/IB Budget

Bonus FTE Budget From AP/AICE/IB exams passed and and diplomas earned

	n	Total Weighted FTE $ Earned	Less 20% to District	Gross Funds to School	Funds to Teachers	Net Funds to School
AP Exams passed	1,000	691,118.40	138,224	552,894.72	50,000.00	502,894.72
AP Capstone Diplomas earned	50	64,792.35	12,958	51,833.88		51,833.88
AICE Exams passed	3,000	2,073,355.20	414,671	1,658,684.16	150,000.00	1,508,684.16
AICE Diplomas Earned	100	129,584.70	25,917	103,667.76		103,667.76
	School Total	*2,958,850.65*	*591,770*	*2,367,080.52*	*200,000.00*	*2,167,080.52*
Base Student FTE $ 2021	*4,319.49*					
Weighted FTE from AP/AICE/IB Exams	*0.16*					
Weighted FTE from AP/AICE/IB Diploma	*0.3*					
Teacher Bonus per exam passed	*$50*					

Adapted from 2020-21 Funding for Florida School Districts/FLDOE, December 12, 2020

Figure 19 illustrates a hypothetical budget for how a school in the state of Florida would generate bonus FTE funds.

School Districts withhold 20% of the gross funding amounts to ensure an equitable distribution of funds and provide centralized support for the AP/AICE/IB programs. This support includes district professional development, SAT/ACT/PSAT exam opportunities for students, software, and many other central support items. Districts can also use the 20% to assist schools and feeder schools that are an emerging growth state with AP/AICE/IB programs and face initial expense investments. Unfortunately, similar gaps when comparing full-time equivalent (FTE) revenue at majority Black and Hispanic schools to those with a higher population of White students. Schools with a higher percentage of students enrolled in AP/AICE/IB coursework, with a higher success rate will generate more funding than those with smaller enrollments and success rates. Although this does serve to reward good behavior it does raise questions of equity and appear to compound the gap that already exists.

Figure 20: FY19 Urban District Access to Accelerated Coursework (By Ethnicity)

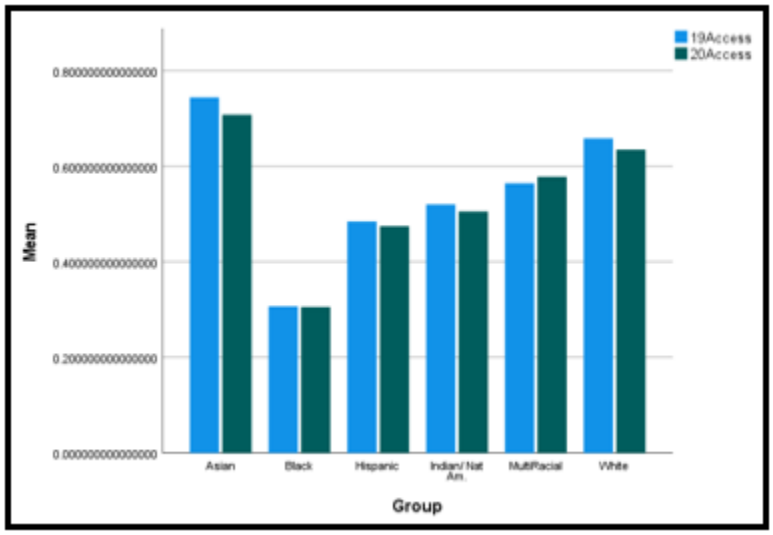


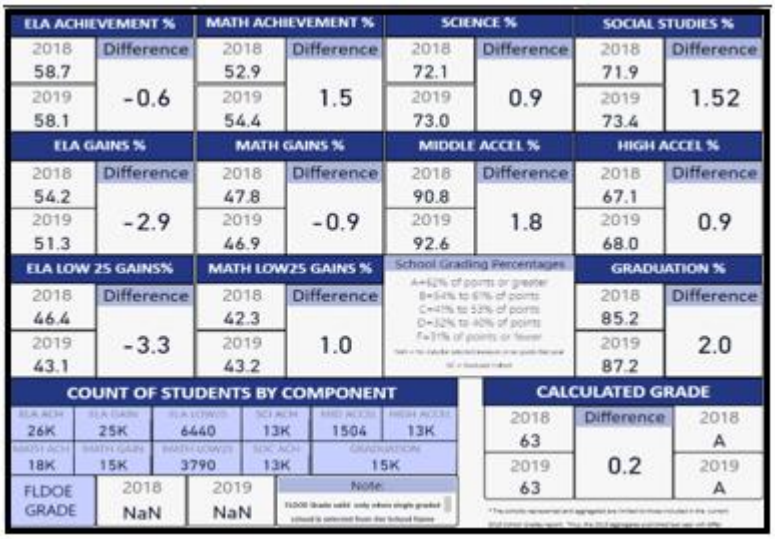
Figure 20 illustrates that there is still an overwhelming gap for access to advanced coursework when comparing Black and Hispanic students to other student groups in the urban

District. During the 2019 school year, 74% of Asian students were enrolled, 31% of Black students, 48% of Hispanic students, 52% of Indian students, 56% of Multiracial students, and 66% of White students. Additionally, when examining school in 2020, both Hispanic and Black student participation continues to lag.

A look at performance of student groups in the Urban District

Figures 4 and 5 illustrates what can be considered outstanding results. However, when digging a little deeper, the numbers paint a picture that not all is perfect. When looking at the urban district in the southeastern United States with an equity lens, comparing success of different student groups and when comparing similar schools to one another, a performance and equity gap clearly exists. The data below will show just how clearly equity is tied to academic performance as test scores and equity access are highlighted (School Grade Analysis Tool: Research & Evaluation, 2020).

Figure 21: Urban District Total Performance on Florida Standards Assessments.

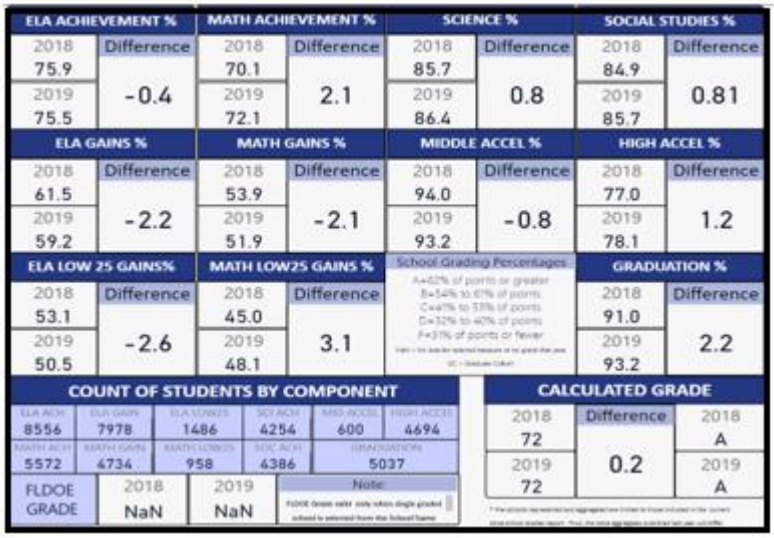


Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 21 illustrates the total performance on the School Grade Accountability cells for 2018-2019 also known as the report card as measured by the Florida Department of Education

for the urban district in the southeastern United States. The percentage of total points earned for All students is 63%, which calculates to an "A" school grade. The figure illustrates the relationship of increased student enrollment in AP, IB, AICE and DE and its positive correlation to enhanced proficiency in Florida Standards Assessments in Reading, Math, Social Studies and Science. This positive correlation is intuitive, because college level coursework provides students exposure to academic content that is grade levels above the Florida Standards Assessments. As students receive instruction in these courses, they receive the requisite skills needed for mastery. It also worth mentioning that students earn more than just proficiency scores, they become eligible for scholarships, earn college credit and readiness, and can be considered college ready while in high school.

Figure 22. Urban District White Performance on Florida Standards Assessments.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
75.9		70.1		85.7		84.9	
2019	-0.4	2019	2.1	2019	0.8	2019	0.81
75.5		72.1		86.4		85.7	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
61.5		53.9		94.0		77.0	
2019	-2.2	2019	-2.1	2019	-0.8	2019	1.2
59.2		51.9		93.2		78.1	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
53.1		45.0			91.0	
2019	-2.6	2019	3.1		2019	2.2
50.5		48.1			93.2	

COUNT OF STUDENTS BY COMPONENT					
8556	7978	1486	4254	600	4694
5572	4734	958	4386	5037	

FLDOE GRADE	2018	2019	Note:
	NaN	NaN	

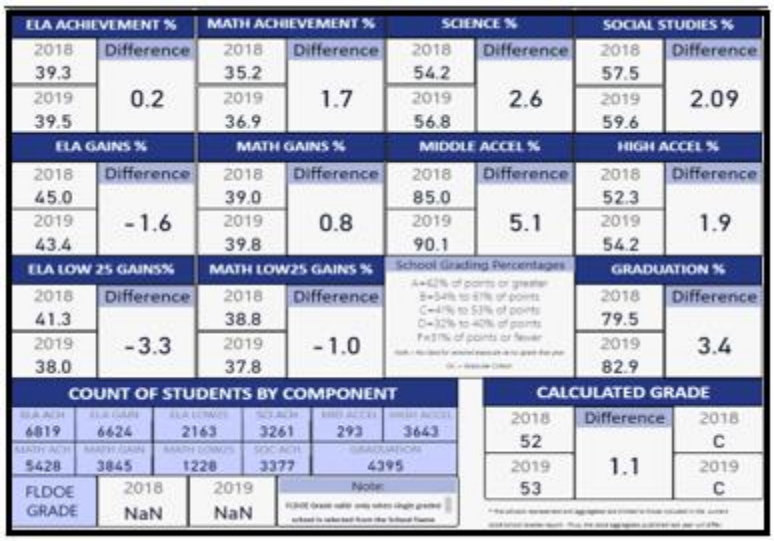
CALCULATED GRADE		
2018	Difference	2018
72		A
2019	0.2	2019
72		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 22 illustrates the total performance on the School Grade Accountability cells for White students in 2018-2019, as measured by the Florida Department of Education for the urban district in the southeastern United States. The percentage point earned for all students is 72%, which calculates to an "A" school grade for this subgroup. This represents a score that is nine

percentages higher than the district average for All students at 63%. The figure illustrates the relationship of increased student enrollment in AP, IB, AICE and DE for White students that mirrors the FLDOE report card for that subgroup as being the highest of the three racial subgroups in both measures.

Figure 23. Urban District Black Performance on Florida Standards Assessments.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018 39.3	Difference	2018 35.2	Difference	2018 54.2	Difference	2018 57.5	Difference
2019 39.5	0.2	2019 36.9	1.7	2019 56.8	2.6	2019 59.6	2.09
ELA GAINS %		**MATH GAINS %**		**MIDDLE ACCEL %**		**HIGH ACCEL %**	
2018 45.0	Difference	2018 39.0	Difference	2018 85.0	Difference	2018 52.3	Difference
2019 43.4	-1.6	2019 39.8	0.8	2019 90.1	5.1	2019 54.2	1.9
ELA LOW 25 GAINS%		**MATH LOW25 GAINS %**		School Grading Percentages		**GRADUATION %**	
2018 41.3	Difference	2018 38.8	Difference			2018 79.5	Difference
2019 38.0	-3.3	2019 37.8	-1.0			2019 82.9	3.4

COUNT OF STUDENTS BY COMPONENT					
6819	6624	2163	3261	293	3643
5428	3845	1228	3377	4395	

FLDOE GRADE	2018	2019	Note:
	NaN	NaN	

CALCULATED GRADE		
2018 52	Difference	2018 C
2019 53	1.1	2019 C

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 23 identifies the total performance on the School Grade Accountability cells for Black students in 2018-2019, as measured by the Florida Department of Education for the urban district in the southeastern United States. The percentage of total points earned for all students is 53%, which calculates to a "C" school grade for this subgroup. This represents a score that ten percentages lower than the entire district average, 20% lower than White students, and nine percentages lower than Hispanic students. The figure further illustrates the correlation of student enrollment in AP, IB, AICE and DE to Florida Standards Assessments scores. Unfortunately, however, since Black student enrollment is lowest in advanced coursework of the three subgroups, so too is the performance on the report card for Florida Standards Assessments.

Figure 24. Urban District Hispanic Performance on Florida Standards Assessments.

ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
52.9		49.9		69.1		68.2	
2019	-0.4	2019	2.1	2019	0.6	2019	1.32
52.6		52.0		69.7		69.5	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
52.7		47.7		88.3		65.8	
2019	-3.7	2019	-0.7	2019	4.4	2019	0.8
49.0		47.0		92.7		66.7	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
45.8		43.1			83.0	
2019	-3.0	2019	1.2		2019	1.8
42.9		44.3			84.7	

COUNT OF STUDENTS BY COMPONENT					
ELA ACH	ELA GAIN	ELA LOW25	SCI ACH	MID ACCEL	HIGH ACCEL
8576	8472	2500	4136	464	3878
MATH ACH	MATH GAIN	MATH LOW25	SOC ACH	GRADUATION	
6267	5125	1420	4252	4576	

FLDOE GRADE	2018	2019	Note:
	NaN	NaN	

CALCULATED GRADE		
2018	Difference	2018
61		B
2019	0.4	2019
61		B

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 24 illustrates the total performance on the School Grade Accountability cells for Hispanic students in 2018-2019, as measured by the Florida Department of Education for the urban district in the southeastern United States. The percentage point of total points earned for Hispanic students is 61%, which calculates to a "B" school grade for this subgroup. This represents a score that is two percentages lower than the district average for all students, 12% lower than White students, but eight percentages higher than Black students. The figure further illustrates the correlation of student enrollment in AP, IB, AICE and DE to Florida Standards Assessments scores. Unfortunately, however, since Hispanic student enrollment is lower in advanced coursework to the urban district average, so too is the performance on the report card for Florida Standards Assessments.

A look at two schools in the Urban District

The research will compare two high schools in the urban district in the southeastern United States, urban high School 1 and urban high school 2, comparing state report card

performance to student participation in advanced coursework. Both schools have very similar characteristics, including size, demographics, academic/choice programs, student enrollment, faculty/staff and location.

Figure 25. Urban High School 1 Access to Accelerated Coursework.

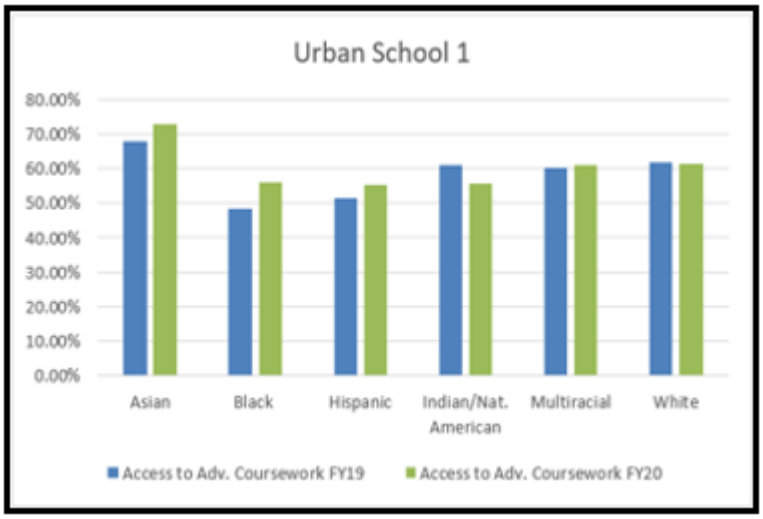
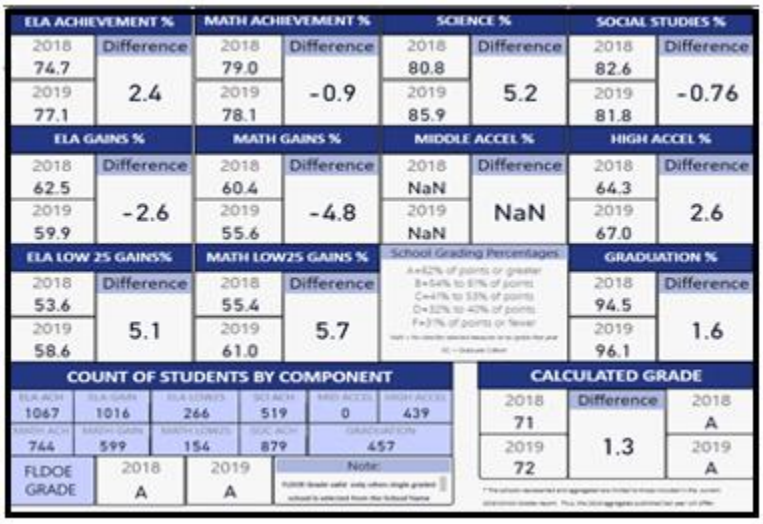


Figure 25 illustrates that urban high school 1 has a near equitable distribution of access to accelerated coursework for each student group. Providing access to courses for Asian students is 68% in FY19 and 73% in FY20, Black students is 48% in FY19 and 56% in FY 20, Hispanic students is 52% in FY19, and 56% in FY20, Indian/Native American students is 61% in FY19 and 56% in FY20, Multiracial students is 60% in FY19 and 61% in FY20 and White students is 62% in FY19 and 61% in FY20. This school has almost removed the opportunity gap based on race.

Figure 26. Urban High School 1 Total Performance on Florida Standards Assessments cells.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
74.7	2.4	79.0	-0.9	80.8	5.2	82.6	-0.76
2019		2019		2019		2019	
77.1		78.1		85.9		81.8	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
62.5	-2.6	60.4	-4.8	NaN	NaN	64.3	2.6
2019		2019		2019		2019	
59.9		55.6		NaN		67.0	

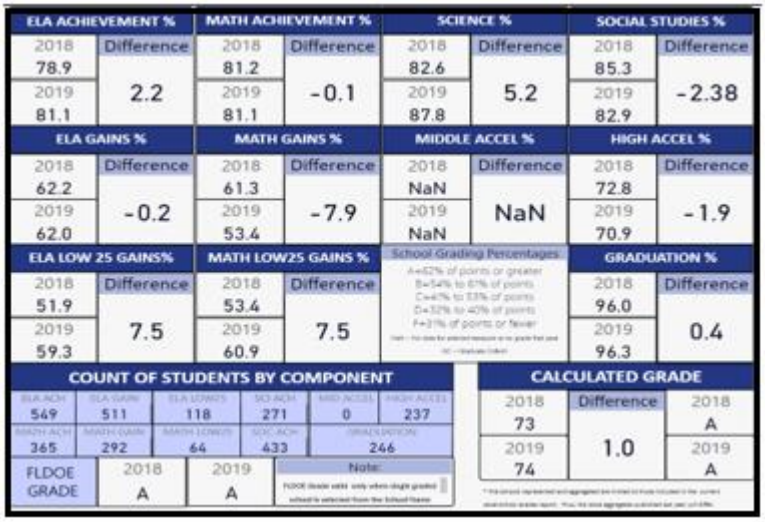
ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
53.6	5.1	55.4	5.7		94.5	1.6
2019		2019			2019	
58.6		61.0			96.1	

COUNT OF STUDENTS BY COMPONENT						CALCULATED GRADE		
1067	1016	266	519	0	439	2018	Difference	2018
744	599	154	879	457		71	1.3	A
FLDOE GRADE	2018	2019	Note:			2019		2019
	A	A				72		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 26 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 1 is at 72% for all students, which calculates to an "A" grade on the state report card.

Figure 27. Urban High School 1 White student Performance on Florida Standards Assessments cells.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
78.9	2.2	81.2	-0.1	82.6	5.2	85.3	-2.38
2019		2019		2019		2019	
81.1		81.1		87.8		82.9	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
62.2	-0.2	61.3	-7.9	NaN	NaN	72.8	-1.9
2019		2019		2019		2019	
62.0		53.4		NaN		70.9	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
51.9	7.5	53.4	7.5		96.0	0.4
2019		2019			2019	
59.3		60.9			96.3	

COUNT OF STUDENTS BY COMPONENT						CALCULATED GRADE		
549	511	118	271	0	237	2018	Difference	2018
365	292	64	433	246		73	1.0	A
FLDOE GRADE	2018	2019	Note:			2019		2019
	A	A				74		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 27 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 1 is at 74% for White students, which calculates to an “A” grade on the state report card. This represent a two percentages increase over the entire school average.

Figure 28. Urban High School 1 Black student Performance on Florida Standards Assessments cells.

ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
71.0		76.6		68.2		69.2	
2019	-8.1	2019	-9.4	2019	19.6	2019	12.46
62.8		67.1		87.8		81.7	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
63.0		63.8		NaN		44.4	
2019	-15.0	2019	-17.8	2019	NaN	2019	2.6
48.1		46.0		NaN		47.1	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference	A=62% of points or greater B=54% to 61% of points C=41% to 53% of points D=32% to 40% of points F=31% of points or fewer	2018	Difference
69.7		68.2			95.7	
2019	-28.0	2019	1.8		2019	-1.3
41.7		70.0			94.4	

COUNT OF STUDENTS BY COMPONENT					
ELA ACH	ELA GAIN	ELA LOWEST	SCI ACH	MID ACCEL	HIGH ACCEL
78	77	24	41	0	34
MATH ACH	MATH GAIN	MATH LOWEST	SOC ACH	GRADUATION	
70	50	10	71	36	

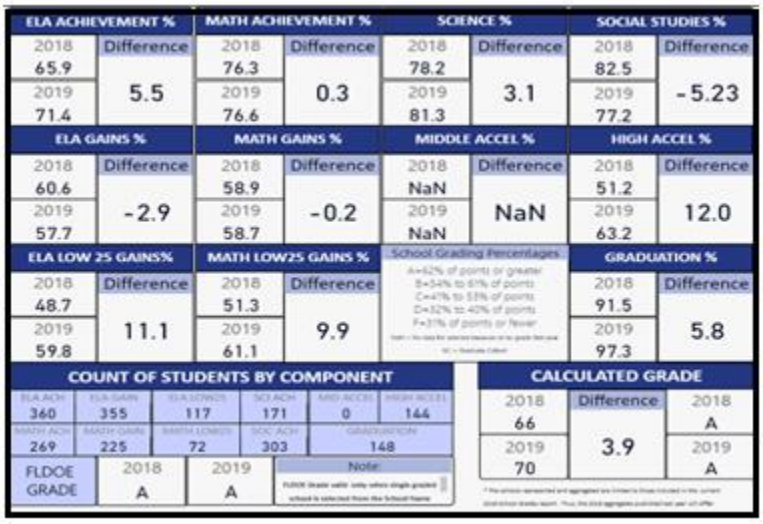
FLDOE GRADE	2018	2019	Note:
	A	A	

CALCULATED GRADE		
2018	Difference	2018
69		A
2019	-4.3	2019
65		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 28 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 1 is at 65% for Black students, which calculates to an “A” grade on the state report card. This represents a seven percentages decrease below the entire school average.

Figure 29. Urban High School 1 Hispanic student Performance on Florida Standards Assessments cells.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018 65.9	Difference	2018 76.3	Difference	2018 78.2	Difference	2018 82.5	Difference
2019 71.4	5.5	2019 76.6	0.3	2019 81.3	3.1	2019 77.2	-5.23
ELA GAINS %		**MATH GAINS %**		**MIDDLE ACCEL %**		**HIGH ACCEL %**	
2018 60.6	Difference	2018 58.9	Difference	2018 NaN	Difference	2018 51.2	Difference
2019 57.7	-2.9	2019 58.7	-0.2	2019 NaN	NaN	2019 63.2	12.0
ELA LOW 25 GAINS%		**MATH LOW25 GAINS %**		School Grading Percentages		**GRADUATION %**	
2018 48.7	Difference	2018 51.3	Difference	A=62% of points or greater B=54% to 61% of points C=41% to 53% of points D=32% to 40% of points F=31% of points or fewer		2018 91.5	Difference
2019 59.8	11.1	2019 61.1	9.9			2019 97.3	5.8

COUNT OF STUDENTS BY COMPONENT					
ELA ACH 360	ELA GAIN 355	ELA LOWEST 117	SCI ACH 171	MID ACCEL 0	HIGH ACCEL 144
MATH ACH 269	MATH GAIN 225	MATH LOWEST 72	SOC ACH 303	GRADUATION 148	

FLDOE GRADE	2018	2019	Note
	A	A	

CALCULATED GRADE		
2018 66	Difference	2018 A
2019 70	3.9	2019 A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 29 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 1 is at 70% for Hispanic students, which calculates to an "A" grade on the state report card. This represents a two percentages decrease below the entire school average.

Figure 30. Urban High School 2 Access to Accelerated Coursework.

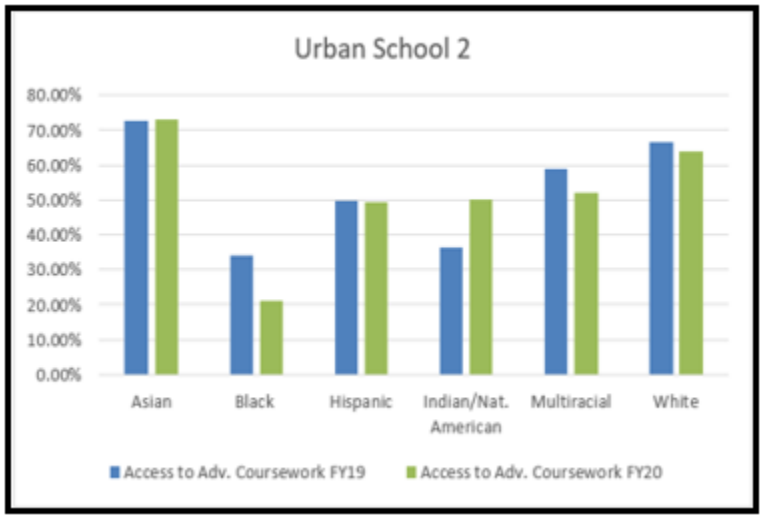
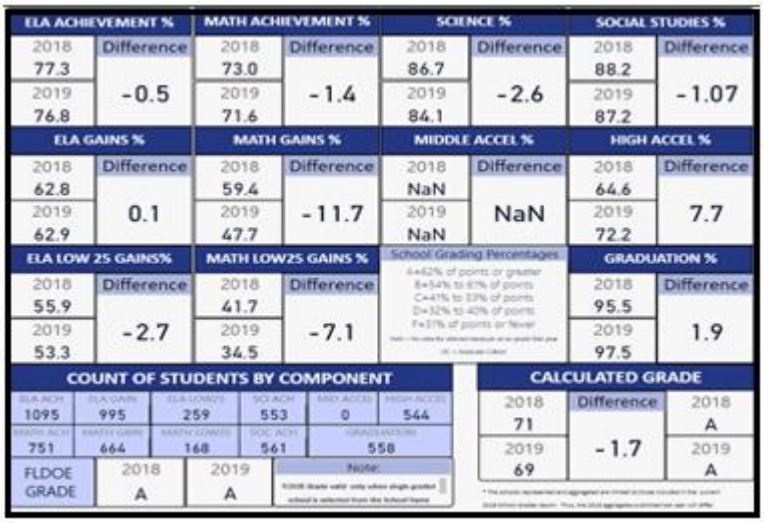


Figure 30 illustrates that urban high school 2 does not have an equitable distribution of access to accelerated coursework for each student group. Providing access to courses for Asian students is 73% in FY19 and 73% in FY20, Black students are 34% in FY19 and 21% in FY 20, Hispanic students are 50% in FY19, and 49% in FY20, Indian/Native American students is 36% in FY19 and 50% in FY20, Multiracial students are 59% in FY19, and 52% in FY20 and White students is 67% in FY19 and 64% in FY20. This school has increased the opportunity gap based on race, and the gap increased from FY19 in comparison to FY20.

Figure 31. Urban High School 2 Total Performance on Florida Standards Assessments cells.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
77.3		73.0		86.7		88.2	
2019	-0.5	2019	-1.4	2019	-2.6	2019	-1.07
76.8		71.6		84.1		87.2	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
62.8		59.4		NaN		64.6	
2019	0.1	2019	-11.7	2019	NaN	2019	7.7
62.9		47.7		NaN		72.2	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
55.9		41.7			95.5	
2019	-2.7	2019	-7.1		2019	1.9
53.3		34.5			97.5	

COUNT OF STUDENTS BY COMPONENT					
1095	995	259	553	0	544
751	664	168	561	558	

FLDOE GRADE	2018	2019	Note:
	A	A	

CALCULATED GRADE		
2018	Difference	2018
71		A
2019	-1.7	2019
69		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 31 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 2 is at 69% for all students, which calculates to an “A” grade on the state report card.

Figure 32. Urban High School 2 White student Performance on Florida Standards Assessments cells.

ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
81.3		79.6		90.8		87.2	
2019	1.7	2019	-0.3	2019	-0.8	2019	4.73
83.0		79.3		90.0		91.9	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
62.7		63.8		NaN		68.1	
2019	4.8	2019	-11.8	2019	NaN	2019	9.0
67.5		52.0		NaN		77.1	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
54.2		43.9			96.1	
2019	6.1	2019	-6.6		2019	2.2
60.4		37.3			98.3	

COUNT OF STUDENTS BY COMPONENT					
ELA ACH	ELA GAIN	ELA LOWES	SCI ACH	MID ACCEL	HIGH ACCEL
637	563	111	319	0	349
MATH ACH	MATH GAIN	MATH LOWES	SCI ACH	GRAD MEDIA	
401	348	67	321	355	

FLDOE GRADE	2018	2019	Note:
	A	A	

CALCULATED GRADE		
2018	Difference	2018
73		A
2019	0.9	2019
74		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 32 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 2 is at 74% for White students, which calculates to an “A” grade on the state report card. This represent a five percentages increase over the entire school average.

Figure 33. Urban High School 2 Black student Performance on Florida Standards Assessments cells.

ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
57.3		44.6		66.7		69.4	
2019	-13.2	2019	-10.7	2019	-7.2	2019	12.13
44.1		33.9		59.5		81.6	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
54.5		44.2		NaN		40.5	
2019	-7.6	2019	-20.2	2019	NaN	2019	5.4
47.0		24.1		NaN		45.9	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
51.5		40.7			90.2	
2019	-13.7	2019	-19.0		2019	4.6
37.8		21.7			94.9	

COUNT OF STUDENTS BY COMPONENT					
68	66	37	37	0	37
59	54	23	38	39	

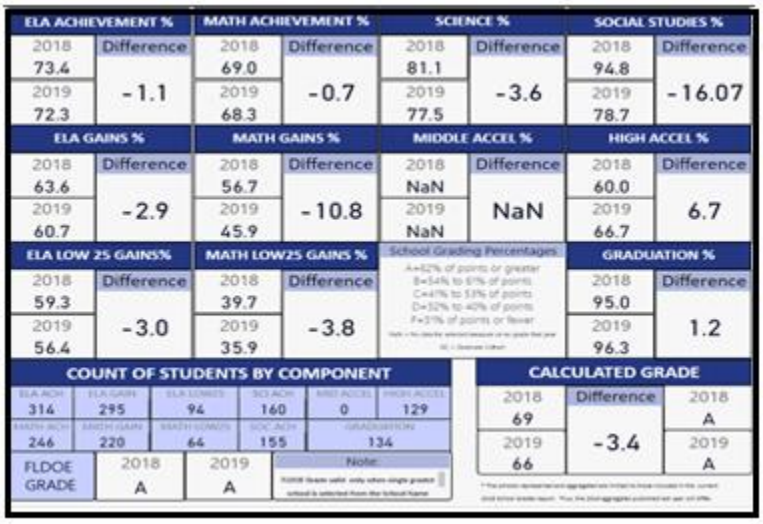
FLDOE GRADE	2018	2019	Note:
	A	A	

CALCULATED GRADE		
2018	Difference	2018
56		B
2019	-6.9	2019
49		C

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 33 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 2 is at 49% for Black students, which calculates to a “C” grade on the state report card. This represents a 20% decrease below the entire school average, 17% lower than Hispanic students and 25% lower than White students.

Figure 34. Urban High School 2 Hispanic student Performance on Florida Standards Assessments cells.



ELA ACHIEVEMENT %		MATH ACHIEVEMENT %		SCIENCE %		SOCIAL STUDIES %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
73.4		69.0		81.1		94.8	
2019	-1.1	2019	-0.7	2019	-3.6	2019	-16.07
72.3		68.3		77.5		78.7	

ELA GAINS %		MATH GAINS %		MIDDLE ACCEL %		HIGH ACCEL %	
2018	Difference	2018	Difference	2018	Difference	2018	Difference
63.6		56.7		NaN		60.0	
2019	-2.9	2019	-10.8	2019	NaN	2019	6.7
60.7		45.9		NaN		66.7	

ELA LOW 25 GAINS%		MATH LOW25 GAINS %		School Grading Percentages	GRADUATION %	
2018	Difference	2018	Difference		2018	Difference
59.3		39.7			95.0	
2019	-3.0	2019	-3.8		2019	1.2
56.4		35.9			96.3	

COUNT OF STUDENTS BY COMPONENT					
ELA ACH	ELA GAIN	ELA LOW25	SCI ACH	MIST ACCEL	HIGH ACCEL
314	295	94	160	0	129
MATH ACH	MATH GAIN	MATH LOW25	SOC ACH	GRADUATION	
246	220	64	155	134	

FLDOE GRADE	2018	2019	Note:
	A	A	

CALCULATED GRADE		
2018	Difference	2018
69		A
2019	-3.4	2019
66		A

Adapted from Palm Beach County Schools – Research & Evaluation, June 30, 2020

Figure 34 illustrates the total performance on the Florida Standards Assessments for 2018-2019 for urban high school 2 is at 66% for Black students, which calculates to an "A" grade on the state report card. This represents a three percentages decrease below the entire school average, eight percentages lower than White students but 17% higher than Black students.

Proposed Research Problem

For the research questions, the researchers have selected a quantitative analysis, looking at pre and post data from two sources. The first set of data represents the percentage and number of enrolled students in advanced coursework for high schools in a local large urban district in the southeastern United States, prior to a deliberate system being put into effect by the principal and the principal's supervisor. The second data set will be examining the results of the efforts by examining the change in enrollment for the following school year.

CHAPTER II

LITERATURE REVIEW

The review of literature presents an analysis of three topic categories relevant to building a model high school master schedule for a large urban district in the southeastern United States. It also involves applied research as well as theoretical information on opportunity gaps in today's schools while focusing on the master schedule, scheduling designs, time of day issues, teaching style, and factors affecting the national, state, and local achievement scores. The organization of this literature review will focus primarily on:

- Opportunity Gap in Our Nation's Schools: Critical Race Theory and Deconstructing Racism concerning minority enrollment as well as achievement in higher-level Advanced Placement and other college level-type classes; International, National, and Local factors affecting math Achievement.
- Master Scheduling Review: A general review of high school scheduling problems in our society at the current time and how they affect student achievement concerning the schedule design block versus traditional, time of day, and management of resources.
- Teacher Bias and Efficacy: The style of instruction conducted in the classroom, including the addition of computer tutoring programs and one-on-one teacher tutoring and how a personalized presentation format for the at-risk students can be beneficial.

Opportunity Gap

In our Nation. The overall results from our efforts to close the opportunity gap in the field of education are genuinely alarming. Begging the question, despite all the money and resources, is this even working? According to Betsy DeVos, apparently not, who exclaims we have a student achievement crisis (Green & Goldstein, 2019). Our nation's 2019 report card, written by the

National Center for Education Statistics (NAEP), summarizes results for over 600,000 students in every state and Washington DC representing 27 large urban districts. A national assessment test is administered to students attending public and Catholic schools across the U.S.; the most recent publication reveals a drop for math proficiency by one point for eighth graders from the last test date in 2017 (NAEP, 2019).

Although this decline is not substantial, math progress on this instrument rose by 19 points during the years 1990 to 2015 and has plateaued since 2009. No apparent reasons are noted for the recent stagnated math scores. An increase for math achievement on the 2019 test was noted in only three states, while a decline is noted in six states. There was a significant drop for American Indian/Alaska Native eighth grade math scores this year, falling from a score of 282 down to 262 on a top score of 500. NAEP results mirror the demographic changes across the country. There was no significant change in the score gap between Caucasian and African American and Caucasian and Hispanic students (NAEP, 2019).

Unfortunately, the outlook appears to be even direr for our historically underperforming student groups, according to Mike Magee. Magee is the Chief Executive of Chiefs for Change, a nonprofit organization of nationwide superintendents and secretaries of education that represents state and district education. Magee quoted this is a disturbing pattern, and one that is consistent with our Nation's growing economic inequality and history of structural discrimination in education, housing, and access to opportunity (Green & Goldstein, 2019). Peggy Carr, Associate Commissioner of the National Center for Education Statistics, highlights the results concerning our at-risk student population, Over the past decade, there has been no progress in either mathematics or reading performance, and the lowest-performing students are doing worse (Camera, 2019). If social circumstances were different for these children, a higher level of

achievement would be possible (Benerjee, 2015). Summaries of systematic research into this problem across our nation have been ongoing and are certainly warranted. Banerjee states that as the levels of poverty and other adverse factors mentioned above increase, wider achievement gaps are noted in subjects such as science, technology, engineering, and mathematics. Factors such as gender, ethnicity, poverty, or neighborhood location can adversely affect students' achievement scores.

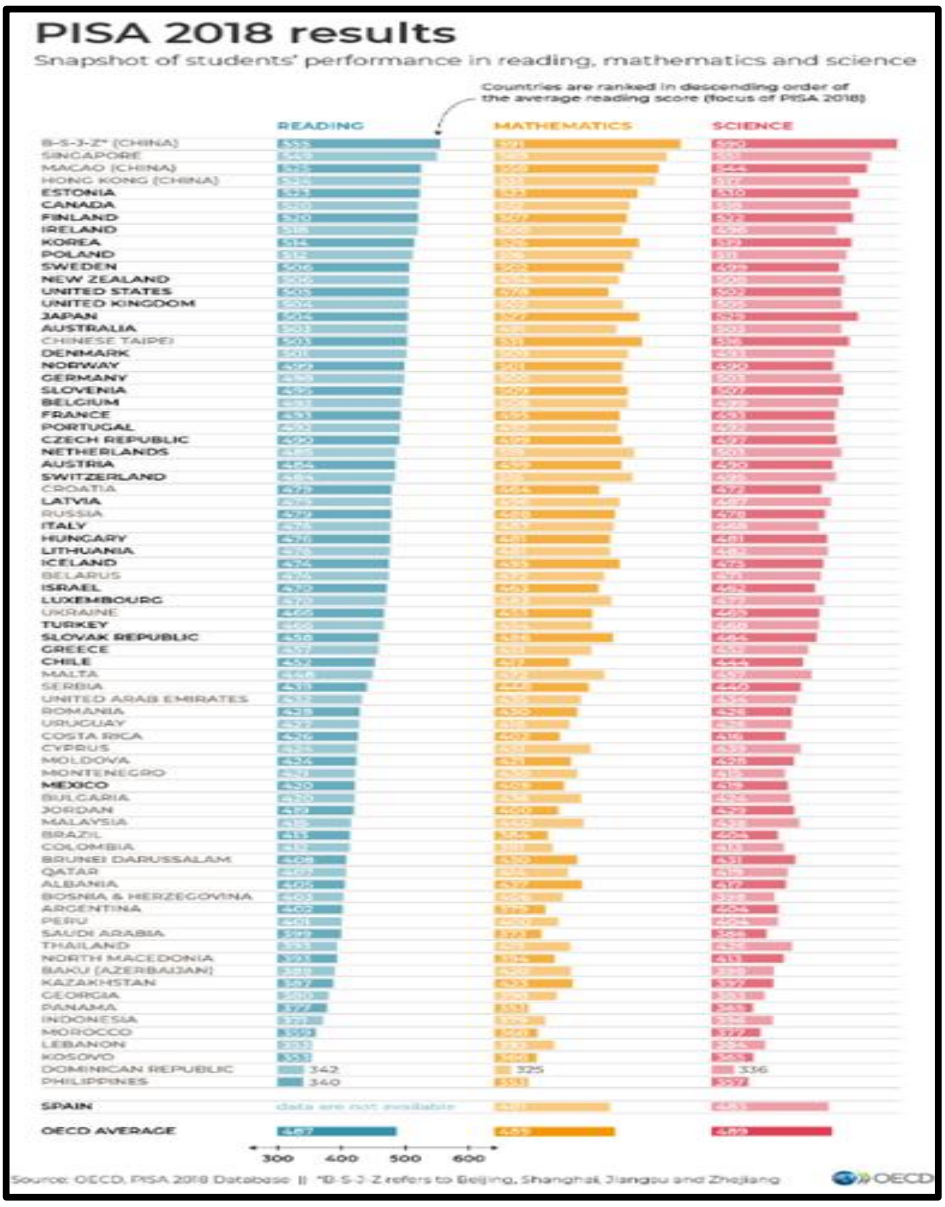
According to the ACT Condition of College and Career Readiness 2018 Report, high school test scores for math have been declining since 2012, and have now hit a 20-year low. It has reported that only 40% of tested students are reaching the math benchmark considered as being ready for college Algebra class. The National Council of Teachers of Mathematics (NCTM) reports that one possibility for this decline is the style of teaching in public schools. According to their report, Create Positive Change for High School Mathematics in 2018, math courses taught at too shallow a level. By creating a curriculum that is leaner, but more in-depth, students may fully understand the concepts taught and then, be able to implement the concepts with greater understanding, rather than absorbing a more comprehensive array of concepts superficially, and not truly understanding or even recalling (Learning-Liftoff, 2019).

International Comparison

The Programme for International Student Assessment (PISA) evaluates student knowledge in three subject areas: reading, mathematics, and science worldwide. It is an extraordinarily comprehensive and intensive international assessment for academic achievement in these subject areas. The report consists of six volumes and is administered every three years. The most recent testing session was administered in 78 countries around the world in 2018. According to mathematics results gathered from 78 countries who participated in the report, the

United States scored 37th (score = 478), categorized as Level two achievement. When comparing the United States progress achieved from the previous 2015 test results, our nation improved nominally from a ranking of 39th, which shows a slight improvement over the previous three years from which the US slipped by three rankings: 36th for 2012. For comparison purposes, therefore, the United States score was slightly below its ranking in 2012 (PISA, 2018).

Figure 35. PISA 2018: Insights and Interpretation.



Adapted from PISA Schleicher, 2018

The three top countries in 2018 were Beijing-Shanghai-Jiangsu-Zhejiang (B-S-J-Z) China, Singapore, and China. The three lowest-scoring countries in 2018 were Panama, Philippines, and the Dominican Republic, which differs slightly from the previous PISA results in 2015: Dominican Republic, Algeria, and Kosovo.

One of the comparative analyses that the PISA report provides is how disadvantaged students across the world perform by Country. It is noted that the most disadvantaged students in B-S-J-Z, Macao, and Estonia are ranked first, third and fifth top-level one performance status and scored as well as or higher than the average student in the United States. PISA reports state that disadvantaged students in B-S-J-Z specifically have a higher growth mindset than those students considered to be privileged, based on questionnaire results. This type of educational mindset is not existent for the same category of a student in the United States. The success does not depend, therefore, on the socioeconomic success of the family, but rather on the can do mindset of academic resilience (Clavel, 2019). According to the report analysis, the growth mindset is supported by parents and teachers who maintain a disciplinary climate in the schools by working together.

Teacher behaviors such as meeting the individual needs of students, are of paramount importance while maintaining a controlled classroom environment for optimum learning. If teachers are not well prepared for class or are too strict with students, such behaviors would hinder learning outcomes. When comparing US rankings on PISA with Japan and China concerning a cooperative learning environment. The US has demonstrated a more competitive learning environment, which makes it difficult for disadvantaged students who trail behind academically. If the United States is to maintain the highest standards possible for our high school graduates so that they may continue their education and enter the workforce as productive citizens in a global economy, it appears as if we have some catching up to do, especially in the area of mathematics (Clavel, 2019).

According to the publication, National Opportunity to Learn Campaign, data reveals that students attending different schools and districts do not have equal access to a quality education,

defined by rigorous coursework, experienced teachers, and other indicators of quality education. Approximately ten years ago, which indicates a systemic problem in our Nation, the Civil Rights Data Collection presented data from more than 72,000 schools, representing 7,000 different districts. The outcome revealed that 3,000 of those schools offered no Algebra 2 classes, translating to approximately 500,000 students devoid of an opportunity for a higher-level math course. Furthermore, more than two million students had no access to calculus classes (Civil Rights Data Collection, 2014).

A more recent Civil Rights Data Collection (CRDC) study indicated that in some states across our Nation, over 40 percent of high schools do not have a functioning guidance counselor who guide students into courses during master scheduling enrollment. This represents a total of 700,000 high school students who are deprived from the basic support system we expect all students to have; this would naturally be equitable. States such as Massachusetts, Maine, Montana, North Dakota, and New Hampshire, however, provide counselors to students in more than 95% of high schools. These discrepancies represent real-world impact in a very negative way to minority students (Civil Rights Data Collection, 2014).

A Look at Race and Critical Race Theory. Advanced placement courses are an early predictor for student success on the collegiate level. As cited by the Theodore Cross Family Charitable Foundations group, there are more AP program participants in the traditionally affluent, predominantly White suburbs. Even within these types of school districts, students of color are not realizing the benefits of this program. It was noted in the study that AP courses are offered in over 100 nations, with 600 Universities around the world that consider AP credits for admission criteria. Clearly all students should therefore have equal access. Ledesma & Calderon (2015) suggest that author Richard Delgado defines Critical Race Theory, or CRT, as a

collection of activists and scholars interested in studying and transforming the relationship among race, racism and power in the book titled Critical Race Theory: An Introduction (Ledesma & Calderon, 2015).

According to legal scholar Kimberlé Crenshaw, the term Critical Race Theory or CRT emerged in the 1980s as a notion that the United States is a color-blind society where racial identities do not have an effect on a person's socioeconomic status. CRT asserts that Racism is normal, not aberrant in American society, and that Racism appears as normal behavior. This is because it is enmeshed in the fabric of the United States social order. Education is an extension, which is used to maintain racial inequalities. This essentially says that if a person does not partake in the deconstructionist of racism, they are contributing to its impact. For an example, if a human resource manager is not actively seeking diversity and equity in hiring practices, then they are contributing to and increasing the gap (Ledesma & Calderon, 2015).

There are connections to the Civil Rights movement and Critical Race Theory, and many researchers feel that relationship is very complex. Rebecca Bodenheimer makes the argument in her article What is Critical Race Theory, that Derrick Bell is the forefather of the theory. That he believed many of the early desegregation efforts were in the self-interests of Whites as opposed to Blacks. Also that many institutions claiming to be promoting civil rights failed themselves to sincerely promote equality. This encapsulates some of the clear differences between the civil rights movement and critical race theory, most of which relates to belief and trust in our systems. Critical race theory essentially questions our entire foundation and core belief system. CRT has no interest in waiting patiently for slow and steady progress either (Ledesma & Calderon, 2015).

CRT also asserts that Racism advances both working class Whites and elite wealthy Whites, and that this interest convergence removes the incentive for its removal. Teachers of Advanced Placement courses can easily fall into this classification when given autonomy to select students into elite level courses. The argument can be made that there is no initial benefit to the teacher, in fact there may be initial upfront effort to scaffold children that may not be as prepared for these types of courses. Without the appropriate level of cultural competence, a teacher may view such an effort as a burden. A belief such as this leads to the status quo of inequity that we see in school districts across the country (Ledesma & Calderon, 2015).

Overall climate and organizational culture must also be considered, as the purpose of CRT is to examine exactly how patterns of exclusion develop in aspects of our society. (Parker & Villalpando, 2007). According to CRT, race should be considered a factor when implementing systems for organizational improvement. If opportunity gaps exist in an organization, for minorities for example, CRT can play an important role when attempting to become more diverse and inclusive. Its tenants state that although working towards balancing numbers is a good step in the right direction, institutional change should be the priority. That a ubiquitous, systemic change is more impactful than a mathematical equality that may or may not last over time. CRT also states that building a culturally competent and diverse group of individuals working and leading the institution builds long term, sustainable equity. Additionally, CRT poses a social construct theory, that states race behavior is much more a product of our social interactions than our biological makeup (Delgado et al., 2012). This aspect of the theory is powerful for the workforce, not just in schools. Recently, CRT researchers made a connection to economics, and assert that treatment of races is interdependent with the job labor market (Parker & Villalpando, 2007).

Looking at race in Education specifically, African-American populated schools are twice as likely to have less qualified teachers in the same district (CRDC 2014), a data fact still true in today's world. Additionally, in 2016 only seven percent of the country's teachers were Black. When schools have a diverse teaching force, they may also be able to limit the effects of implicit bias. White teachers have lower expectations than Black teachers have for the African-American students. It seems logical, therefore, that good role models for young adults would be to have teachers who have reasonable expectations for all students, reasonable and equitable, creating an atmosphere of learning that demands rigorous coursework such as advanced mathematics (Deruy, 2016).

What are the results of the opportunity gap on minority students that has been a systemic issue throughout the years? Unfortunately, research will support the achievement gap. The term often substituted for opportunity gap between White and minority students that has made very little progress with regard to the narrowing of student academic success, which a landmark education report calls a national embarrassment. The Equality of Education Opportunity 50th anniversary known as the Coleman Report, which was mandated by the Civil Rights Act of 1964. This report examined the status for elementary and secondary educational equal opportunities with the specific purpose of studying the difference among schools attended primarily by White and Black students. The comparisons are startlingly similar to today's ever-present opportunity gap within the American school system (Camera, 2016).

Coleman (1966) was tasked with studying the competency of the Nation's public school system, touted as how mental skills and subject knowledge was imparted to the children and was preparing all students an equal and equitable opportunity regardless of their background/minority identification. One of its primary questions that gathered information regarding the extent of

racial and ethnic groups were segregated, and whether a quality education was being provided to both groups. The study is still relevant today and is cited as being extraordinarily comprehensive in its scope and analysis. The 1966 published report included a national sampling of close to 650,000 students and teachers in over 3,000 schools. The Civil Rights Act of 1964 called for the study, and it was one of the first social science studies commissioned by Congress to provide information to the US Government. The results shaped school desegregation policy for many years following the publication of the report. Although initially, the report received a wide variety of interpretations, Coleman's study identified how specific characteristics of schools impacted students and their communities. Interpretation arguments claim that the report identified families as the key drivers for students to achieve academic success. In the heat of the Civil Rights movement, it found substantial benefits of integrated schools for Black and White students alike (Coleman Report, 1966).

Moreover, it included some prescient findings of how students' mindset and motivation contribute to their learning. It appears that for the past 50 years, at least, society has been addressing issues about the opportunity gap among students attending our Nation's public schools. Consequences of the opportunity gap that existed in the past, which will continue to exist, can exist in a variety of forms. This was expressed by the Glossary of Educational Reform in an attempt to inform stakeholders such as journalists, parents, and the community about educational reform issues. The following factors regarding opportunity gaps were offered as a representation of problems that are facing minority children across our Nation (Partnership, 2013).

Lower-income household children are disadvantaged due to many systemic issues such as poor nutrition, health problems, lack of proper healthcare, lack of financial resources to enter

preschool education or paying for tutoring and test-preparation services, and an inability to pay for college tuition. These factors can have a detrimental effect on scoring high on mandatory standardized tests as well as aspiring to attend college and leads to a lower educational achievement and attainment goal.

Minority students may be subject to prejudice or bias that denies them equal and equitable access to learning opportunities. There is a disproportionate number of higher-level achieving students enrolled in college-level and Advanced Placement courses on the high school level. African-American students, for example, have lower graduation rates and are enrolled disproportionately in special-education programs. Additionally, college attendance after high school is usually lower. Besides, minority students are often raised in homes where parents and guardians have not earned a college degree. Thus the encouragement to enroll into college-preparatory courses is lacking and the complexities of navigating the college-admissions and financial-aid process becomes a nightmare because of a lack of resources available to the parent and guardian as well as to the student because disadvantaged local public schools do not have the resources to hire career and college counselors dedicated to providing support for this purpose (Partnership, 2013).

ESOL students who acquire English proficiency later in their public education are at a disadvantage because of the struggle with English fluency, thus causing delays in academic achievement as well as lower GPA stats. Extra-curricular and co-curricular activities such as science fairs, debate, clubs, drama, and theatrical performances might suffer in smaller, geographically isolated schools that are typically part of the curriculum in a broader, more urban public school environment.

Lower-income students will have less advantage for connectivity online, which provides learning opportunities utilizing technological skills. According to Roland Fryer, Harvard University Professor in Economics, the position of US Black students is truly alarming. Since our Nation continues to be a capitalistic society that necessitates a competitive educational edge for graduating college students, providing an equal and equitable education is critical, and it must start early. There is nothing more important we can do. The OECD rankings for minority students, comparing the ranking of this group just below Mexico, which is in the last place. Geography has immense power in determining educational opportunity in America. The opportunity gap clearly links a student's zip code with academic success (Ireland, 2019).

The opportunity gap may be considered a solid wall of obstacles that block the minority student's educational success. The compilation of multiple factors including socioeconomic status, race, English proficiency, ethnicity, and familial conditions might contribute to or perpetuate lower educational aspirations, achievement, and attainment for particular groups of students (Markowitz, 2017). Not only are the above variables out of the student's control, but they must also have the self-confidence to overcome in order to attain academic success. Social problems among minorities manifested in inappropriate behavior at school lead to our current problem of disproportionate suspensions categorized by race. Many African-American students fall behind in their classes as a result of poor behavior resulting in suspension (Wong, 2016).

Wong (2016) continues to report that repeated suspensions will disengage the student from the learning environment and their teachers, ultimately weakening the school bonding experience. While Morris and Perry's latest study cannot prove that there is a causal relationship between suspension and achievement, it does use longitudinal data to show a strong connection between the unequal suspension rates and the persistence of the race-based achievement gap.

Edward Morris from the University of Kentucky and Brea Perry from Indiana University concluded that unequal suspension rate is one of the most critical factors for the ongoing racial achievement gap in our school systems. There is a hidden inequality embedded within routine educational practices, which contributes to the students' disengagement from the learning process. At the time of this study, Black students are suspended nearly three times more than the White counterparts, which in their opinion, represented approximately one-fifth of the White and Black achievement gap at the time of the study (Wong, 2016).

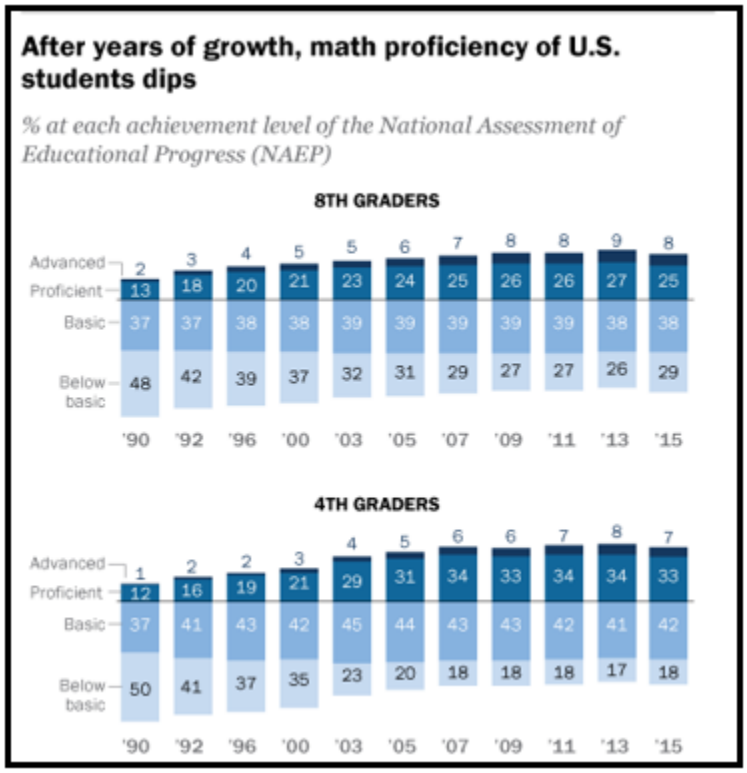
The Punishment Gap: School Suspension and Racial Disparities in Achievement study, analyzed suspension and student performance specifically for math and reading. The study's findings included the following outcomes. Predominantly Black schools had a higher rate of suspension overall. Black and Latino students received the highest rate of suspensions. Suspended students scored significantly lower on end-of-year math and reading exams. During years in which they received suspensions, the same students scored worse on exams when compared to years they improved their suspension rates. Students who receive free or reduced-price lunches were more likely to be suspended. Students enrolled in special education programs were more likely to be suspended. Students with two parents were less likely to be suspended. Black students were predicted to be suspended three times as much as their White counterparts because of a lower level of socioeconomic status (Ordway, 2016).

International, National, State, and Local Factors Affecting Math Achievement

Desilva (2017) states that it is highly unlikely that any individual is tested in the fourth and eighth grades. Thus, the 2017 NAEP scores are largely unchanged from the 2015 scores. This flat lining for math scores remain an important issue. Highlighting data from the NAEP, for 1996-2015, average scores for fourth graders increased by two points and eighth graders, by

three points. On an achievement scale of 0-500, fourth graders averaged 240 and eighth graders a score of 282. For 12th-grade, on a scale of 0-300, the average scores in the same period were 152 (The Public Health and Safety Organization, 2018). This raises the question of whether state and local testing might be more effective than national or world comparisons. Another question is raised that perhaps testing within one county or even one school site might be more relevant, comparing achievement in specific grades such as fourth and eighth grade. The fact that students in the United States are not performing to their counterparts' standards in other countries. This is a concern that school systems cannot ignore if we are to compete in the global economy. According to the Pew Research Center scores fell for the first time for both age groups fourth and eighth grades since 1990. The NAEP is attempting to analyze these reasons. (Desilva, 2017*).*

Figure 36. Math proficiency of U.S. students' dips.



Adapted from U.S. Achievement Lags Desilva, February 15, 2017

Curriculum Rigor in Math in the U.S. The Elementary and Secondary Mathematics and Science Education Act (ESSA) for science, technology, engineering, and math (STEM) are designed to provide for a rigorous curriculum in kindergarten through 12th grades. Advanced courses are offered as soon as middle school, depending upon each state's requirements. The Act provided for a variety of STEM priorities, such as encouraging specialized training for math and science teachers as well as the consideration for including the at-risk student populations. Thus, let us assume that states have developed a K-12 rigorous curriculum for math and science standards. According to the National Science Board report, the National Research Council (NRC) stated in 2011, that there was successful K-12 STEM Education, identifying effective approaches in science, technology, engineering, and mathematics (The Public Health and Safety Organization, 2018). The report goes on to state that successful methods of tracking and evaluating were available and that strategies for success were being implemented, thereby establishing a partnership of student ability plus student tracking for purposes of recording student success in STEM subjects. Why then are we stagnated within our own country, and why are proficiency levels falling on the worldwide scale?

China Comparison. Reviewing the PISA (2018) test results, the following three countries perform consistently high: Singapore, Hong Kong, and China. When considering the level of rigor not only in the STEM subjects, indeed, the entire structure of their educational systems differs significantly to the United States (The National Academies of Sciences, Engineering, & Medicine, 2010). Figure 37, illustrates a brief comparison between China and the United States. A competitive exam is administered after the mandatory nine years of elementary plus middle school education. Approximately 50% of all students enter the general education

curriculum in high school, and the remaining 50% enter a vocational educational curriculum (PISA, 2018).

Additionally, one school per city in China provides special education for students with disabilities. Few extracurricular activities that are offered other than test review after school, which stretches from 8:00 a.m. to 5:15 p.m. each school day. One single test, taken only once, will determine whether the student enters college.

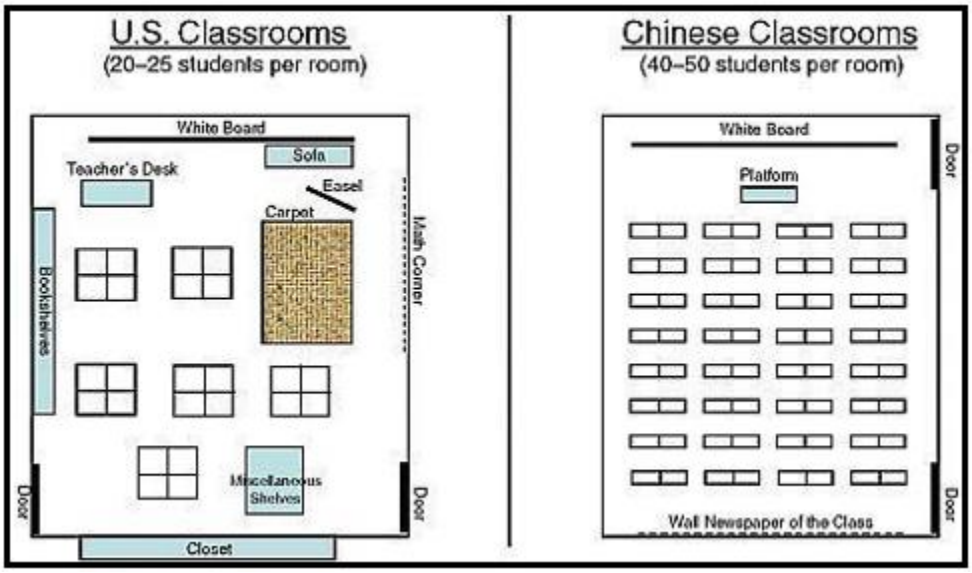
Figure 37. BOX 1-1: China-U.S. K–12 Educational Levels Comparison.

China	**United States**
Primary education and elementary school start at the age of 6 and last six years. Secondary education consists of three years of middle school and three years of high School. Mandatory education requires nine years of education, starting at the age of 6.	Primary education and elementary school consist of five–six years. Secondary education consists of two–three years for middle school and four years for high school. Mandatory education starting age and length varies by state.

Adapted from Summary of a Workshop at NAP.edu, May 10, 2020.

It is evident that the structure of the educational system in the top three achieving nations is quite different from the United States structure. According to this report, math specialists are common in the China classroom. Teachers, in general, have fewer classes to teach, perhaps two or three per day. Even classrooms, as well as teacher workrooms, are structured differently, maximizing teacher control; thus, all desks face the front rather than having a group/cooperative learning design popular in the United States, especially on the elementary level.

Figure 38. U.S. classrooms compared to Chinese classrooms.



Adapted from Summary of a Workshop at NAP.edu, May 10, 2020.

Classrooms consist of approximately 60 students. Teachers expect to grade homework each night as well as collaborate and coordinate curriculum and lessons with their departments. Chinese students are taught to respect their teachers. Performance is mandatory, and achievement is demanded. It is interesting to compare the top three achieving nations with our system of presenting curriculum because we have failed to improve our math achievement scores in over fifteen years significantly. Perhaps the different educational structure of China schools could be applied to our state public schools with excellent results. The argument arises whether a qualitative review of a program is superior to a quantitative statistical evaluation. It seems that we are well informed about the stagnated proficiency levels for math in fourth and eighth-grade classrooms within the US as measured via statistical analysis. We are also well informed via statistical evaluations of the dropping levels of proficiency when compared to other countries worldwide. Perhaps the teaching strategies, program structure, classroom structure, and teacher personality becomes the qualitative components for success. It seems, as described previously, that the Algebra Nation program provides for many of these components. Other components,

however, remain the responsibility of the district as well as the individual school sites in which Algebra Nation is implemented.

U.S. National Strategies. The National Survey on High School Strategies (HSS) to help at-risk students studied thirteen strategies, written as informational briefs, for 2,142 high schools across our nation in 2017 (Academic Tutoring, 2017). The following list of topics is available at the National Survey on High School Strategies Designed to Help At-Risk Students Graduate. The topics are academic support, academic tutoring, career-themed curriculum, case management, college-level coursework, competency-based advancement, early-warning system, high school transition activities, mentoring, personalized learning plan, social services, and student support teams. Academic tutoring, topic three, offers advice on how to implement programs into a high school for at-risk students but does not measure the effectiveness of any programs that are implemented. The study offered a conclusion that supports the introduction of academic tutoring programs as a requirement for high-poverty schools, primarily urban as opposed to suburban or rural. It continues to state that the factors for population selection within those schools were student academic performance, staff referral, and attendance issues.

Among the high schools that applied academic tutoring strategies, 95% utilized an in-person approach, 14% combined a facilitator and online software program, and only six percentages had students go online. Additionally, 75% of the schools organized small groups consisting of ten or fewer students, 14% provided one-on-one tutoring, and 11% organized students into a larger group of ten plus. Finally, the study reported that licensed subject teachers were offered supplemental pay from the school budget to accomplish the academic tutoring objectives (Academic Tutoring, 2017).

Edwin Dickey recently conducted a study of Algebra Nation, on December 28, 2018 at the South Carolina Education Oversight Committee. The study measured student achievement, teacher use and opinions, teacher method gathered via observation, and student learning gains for one year in the state of South Carolina. Created by a professional organization named Study Edge, which worked in cooperation with the University of Florida, Algebra Nation, later called Math Nation was launched in Florida for the 2013 school year. The program offered students online access via Facebook or iOS and Android apps (EdSurge Research, 2013). The need for a program such as this was identified and designed to enable students, teachers and parents to access hundreds of video lessons that deliver instruction for present math concepts and reviews past data accumulated and evaluated proved that Florida proficiency rates in Algebra hovered around 50%, except in schools with students categorized as higher at-risk populations, sometimes falling as low as 20% proficiency.

Over 8.4 million logins have been recorded for Algebra 1, Geometry, and Algebra 2 materials. The successful launch of Algebra 1 was expanded to include additional courses mentioned above as well as the addition and improvement to provide for a variety of lessons and activities. The instructional design of Algebra Nation is multi-tiered, allowing for individualized instruction that appeals to individual student needs while taking teacher preferences into account. Teachers can assign videos to students based on their learning needs, making it possible for students to progress asynchronously through Algebra 1. One of the components of the program that makes it so unique is that the program employs different instructors from which students can choose. This exceptionally nice feature because the students feel they can make a connection to an instructor or teaching style with which they feel comfortable. A student may also select

different speeds of review depending upon their learning style, need, or preference (Algebra Nation, 2019).

Algebra Nation provides a comprehensive toolkit for teachers and students, including a consumable workbook for students, quizzes, exam prep, and diagnostic unit checks. It also provides personalized feedback to each student, so they move forward through the material instead of stagnating. The program is designed to move through the curriculum, not go back through the same material already reviewed, thus avoiding needless time on already mastered material. One of the most positive features of Algebra Nation is that teachers have an opportunity to engage in a collaborative discussion with other teachers in the state, gaining insight and exchanging input from other professionals. Algebra Nation components empower teachers to be true instructional leaders (Algebra Nation, 2019).

Overall, test scores for the End of Course Examination Program (EOCEP) Algebra 1 test declined, as illustrated in the figure below. However, 80% of the teachers surveyed felt positive that Algebra Nation was a valuable partner as a teaching tool and that it also encouraged new knowledge skills for all teachers who participated. Ninety percent expressed that the program was a high or moderate priority to continue into the next school year. Dickey noted that although state results dropped slightly, those schools utilizing the program did not drop as much as the state average. The decision is made to continue the use of Algebra Nation for another year. Figure 39, illustrates the EOCEP Algebra 1 Examination Summary Statistics posted in Dickey's article for a breakdown of results based on categories for two years (Algebra Nation, 2019).

Figure 39. EOCEP Algebra 1 Examination Summary Statistics.

South Carolina EOCEP Algebra 1 Results	2017-2018			2016-2017		
	Mean	SD	N	Mean	SD	N
ALL STUDENTS	68.4	14.9	60489	69.4	13.4	62655
Male	67.3	15.1	31115	68.5	13.5	31962
Female	69.7	14.5	29251	70.4	13.1	30484
Hispanic or Latino	66.4	13.8	5376	67.7	12.5	5088
Amer Indian or Alaska Native	65.8	14.8	195	66.4	12.5	171
Asian	81.7	15.1	979	80.6	14.0	1001
Black or African American	61.6	12.3	19344	63.5	10.8	20638
Pacific Islander or Hawaiian	68.6	13.2	81	72.3	13.3	76
White	72.6	14.7	32115	73.0	13.5	33438
Two or more races	68.8	14.3	2108	69.9	13.3	2002
Limited English Proficient (LEP)	65.8	14.2	4305	66.8	12.5	4008
Non-LEP	68.6	14.9	56184	69.6	13.4	58647
Algebra 1 (4114)	70.9	14.8	48906	71.7	13.4	49603
Intermediate Algebra (4117)	58.6	9.5	10974	61.6	8.6	12281

Adapted from The Nation's Report Card: NAEP, 2017

Educational Technology Strategies. One of the strategies noted as successful in South Carolina's study was the method of presenting the material utilized via the Algebra Nation program. It notes that improving student readiness is of paramount importance and that algebra education is viewed as a gateway to higher-level mathematics and science courses (The Rand Organization, 2013*).* As described in this article, blended learning provides access to high-quality instruction outside of normal school time. It also provides an individualized approach that efficiently utilizes teaching resources. Immediate feedback is given for students to absorb and proceed to a higher-level concept (Algebra Nation, 2019).

The other Algebra Nation states include Michigan, Mississippi, Alabama, New York City, and of course and Florida. Studies indicate that for the 2014 and 2015 school year, a ten percentages increase in the passing rates on the Florida Algebra 1, End-of-Course exam. This data was noted when compared to non-program using students. It is noted that these results did not differ when considering the following factors when considered: economic status, level of English proficiency, race, or previous math performance. According to the research, this dramatically improved results. Florida continues to utilize the program because of its flexibility

and potential as well as serving as an example for other states listed on the Algebra Nation website (Algebra Nation, 2019).

Figure 40. States Points of Interest.

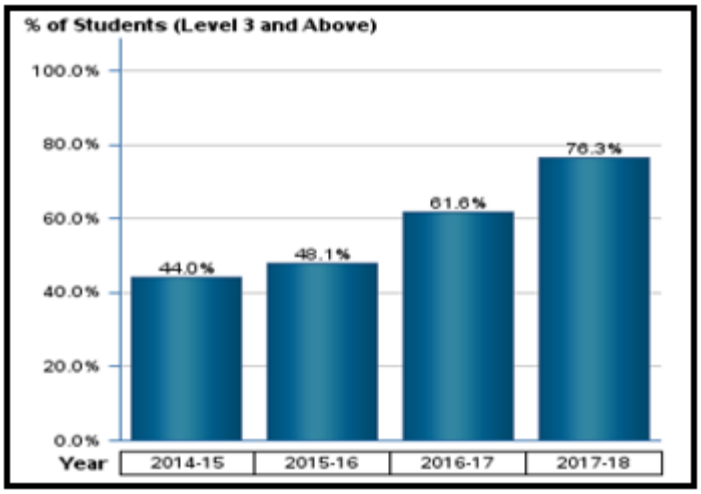
STATES	POINTS OF INTEREST
Michigan	The Michigan Department of Education (MDE) just recently adopted Algebra Nation because of the State's "persistently low math scores." In the Spring of 2016, 67% of 8th graders failed to earn a proficient score on the M-STEP test. In that same year, 63% of 11th graders did not score proficient on the MME exam, the test which determines readiness for college or careers. MDE now supports Algebra Nation, funding it 100% for Michigan school districts, teachers, students, and parents to use as a support tool.
Mississippi	Adopted Algebra Nation as a pilot program in 2018 in 30 Districts in the last two years. According to studies, the program provided a 7.2% increase for students scoring at the proficient or advanced levels on the MAAP test (Mississippi Academic Assessment Program). Non-users only scored a 4.8% increase. Mississippi is offering teachers in ten regions training on Algebra Nation this coming summer 2019. A total of $500,000 in legislative funding is provided for the continuation of this program.
Alabama	Newly adopted this school year. The program has a smartphone app that is accessible anywhere for easy access by teachers, parents, and students. Because of the success noted in the FL schools, Alabama began a pilot program in Mobile County.
New York	The newly adopted program was launched in the Dixie Hollins High School. The website did not provide data for analysis because of the recent adoption.

Adapted from Algebra Nation, 2019

Urban High School 1 Algebra 1 EOC Results. Southeast urban high school implemented a cram course approach for levels one, two and lower level three students approximately three months before the state Florida Comprehensive Assessment Test (FCAT) exam. Algebra Nation is an online software program that was implemented in the regular classroom environment block scheduling provided an excellent opportunity to provide additional tutoring support as well as small group pull-out sessions with qualified, certified teachers who

were given supplemental pay. Urban high school 1 experienced a significant increase in math proficiency as measured by the Algebra 1 EOC, as seen in the figure below. In the 2014-2015 school year, 44% of all students that took the Algebra 1 EOC earned a Level three or higher. As the Algebra Nation program was implemented during the 2016-2017 and 2017-2018 school year, results increased to 76%, representing an improvement of over 30%.

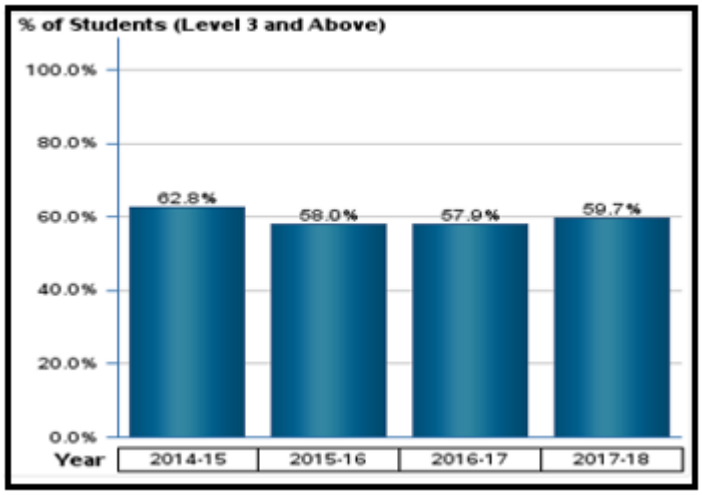
Figure 41. Algebra 1 Student Performance Level 3 and Above by Year.



Adapted from Florida Department of Education, 2019

Overall Urban District County Algebra 1 EOC Results. The results for the students taking the Algebra 1 EOC in the large urban district in the southeastern United States is illustrated in figure 42. Scores have decreased by three percentages over the same period, from 2014-2015 to 2017-2018.

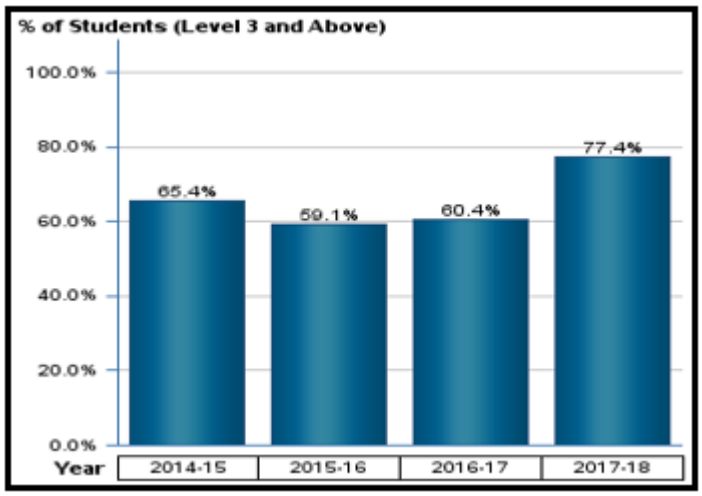
Figure 42. Algebra 1- District Student Performance Level 3 and Above by Year.



Adapted from Florida Department of Education, 2019

Geometry EOC Results. Urban high school 1 has experienced a significant increase in proficiency as measured by the Geometry EOC, as seen in the figure below. In the 2014-2015 school year, 65% students that took the Geometry EOC earned a Level three or higher. As the Algebra Nation program is implemented during the 2016-2017 and 2017-2018 school year, results increased to 77%, representing an increase of over 12%.

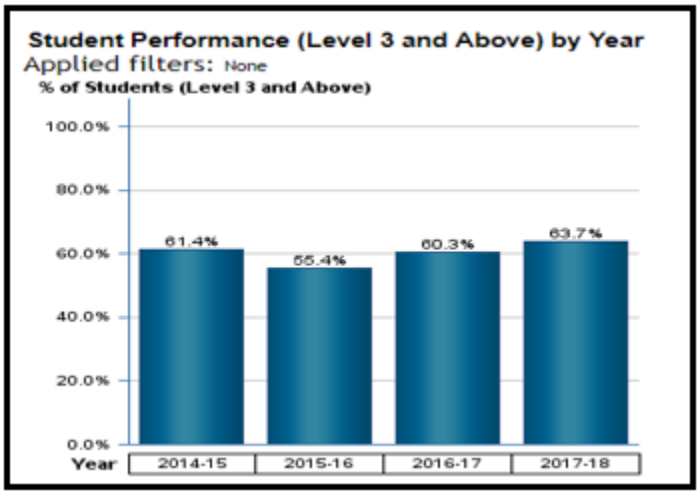
Figure 43. Geometry Student Performance Level 3 and Above by Year.



Adapted from Florida Department of Education, 2019

Overall Urban District County Geometry EOC Results. The results for the students taking the Geometry EOC in the large urban district in the southeastern United States is illustrated in figure 44. Scores increased by two percentages from 2014-2015 to 2017-2018.

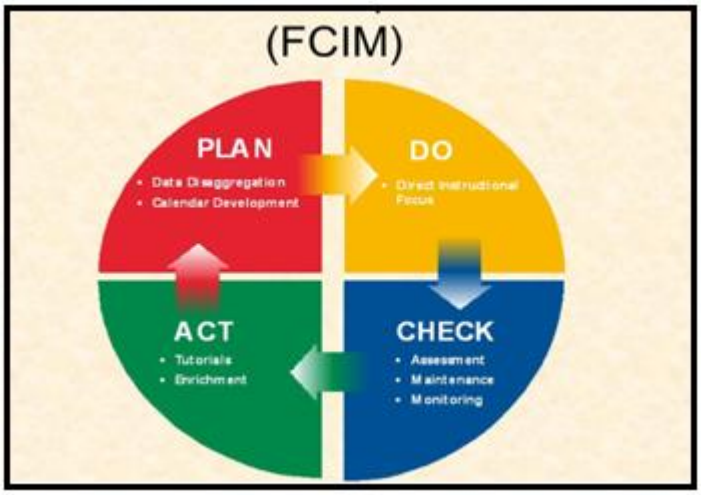
Figure 44. Geometry – District Student Performance Level 3 and Above by Year.



Adapted from Florida Department of Education, 2019

The large urban district in the southeastern United States was the first to adopt the Math Nation curriculum. The challenge is that many teachers only utilize videos during instruction, creating a scenario where many schools have not implemented the program with fidelity. However, urban high school 1 has implemented the program with fidelity, but several interventions have been put in place to increase math scores, and in many ways, mirror some of the instructional models found in modern-day China. This includes stand and deliver instruction, small group pull-out tutorial, strategic placement and scheduling, implementation of professional learning communities, remedial math blocks, and new staffing assignments.

Figure 45. Florida Continuous Improvement Model (FCIM).



Adapted from Florida Department of Education, 2019

The Continuous Improvement Model. Florida Continuous Improvement Model (FCIM) identifies five characteristics or correlates common to all effective schools:

1. Strong instructional leadership by the principal that frames the school's vision and turns it into reality.
2. High expectations of student achievement by students and staff members.
3. A broadly understood instructional focus that centers on reading, writing, mathematics, and science.
4. A safe and orderly school climate conducive to teaching and learning.
5. Frequent measures of pupil achievement as a basis for program evaluation and improvement.

The Eight Step Process ensures that quality instruction and learning takes place in every classroom.

1. Disaggregation of Test Scores – Each spring, results are disaggregated by student group to identify objectives that require improvement. The district's goal is to show continuous

improvement year to year. The data are prepared for each teacher over the summer break and delivered to teachers by the beginning of the school year. Providing teachers with the data in a timely and efficient manner is a critical part of the process.

2. Development of Instructional Time Line – Florida identifies essential standards and benchmarks for all students. Using this as a base, teachers develop a time line for teaching each of these skill areas. Time allocations are based on the needs of the student groups and the weight of the objective. Effective instruction begins by knowing what students need to learn, what teachers need to teach, and how long instruction will take.
3. Delivery of Instructional Focus – Using the time line, an instructional focus sheet stating the objective, target areas, instructional dates, and assessment dates is disseminated and followed by each teacher. By looking on the calendar, everyone knows the objectives teachers are focusing on and the time period when they will be taught. The district sets the expectation while the teachers determine how to fulfill it.
4. Assessment – After the instructional focus has been taught, teachers administer a commercially prepared assessment. Eighty percent of students must master an objective before teachers move on to another target area. Shorter, more frequent assessments allow teachers to detect and correct problems early. If students do poorly on a particular objective, additional teacher resources are provided, such as bringing in an instructional specialist. School Improvement
5. Tutorials – Students who fail an assessment attend small tutorial groups devoted to the re-teaching of non-mastered target areas. Teachers in all grade levels and areas of certification provide tutorial or remediation activities both during and after school and on Saturdays. Computer lab time is offered. Additionally, vertical and horizontal teams of

teachers and other staff members ensure seamless transitions for students moving between grade levels and schools.

6. Enrichment – Mastery students attend enrichment classes during tutorial time. At the intermediate and high school levels, mastering the basics is a requirement for taking electives. This practice (which parents highly support) has served to motivate students to take their studies seriously and focus on passing the tests.
7. Maintenance – Materials are provided for ongoing maintenance and re-teaching of objectives. This ensures students retain what they have learned. It also helps teachers to quickly spot students' needs for additional instruction. Economically disadvantaged students who need a lot of structure and reinforcement have especially benefited from this practice.
8. Monitoring – Principals visit classes daily during the instructional focus to monitor progress and drive home the message that learning is the primary purpose of the school (Florida Department of Education, 2019).

Master Schedule Process Review and Design

The urban district system's protocol for developing school-based high school master schedules appears outwardly simple. Select the courses offered for each school; develop a course selection sheet; distribute this sheet to all students; collect and tally the sheet; assign classes to the students by need; want; and availability. The majority of high schools in the county, begin the schedule selection process as early as January of the preceding year. One of the essential steps in designing an effective master schedule is to collect the student data early in the process to ensure this is considered the most critical component in the scheduling process (Butterfoss, 2018).

Each high school administrator designs a flexible master schedule that provides for changes when needed. It must also provide students with ample opportunities to progress to higher levels of learning that involves increased rigor as well as the ability to enroll in elective credits for academic and elective exploration. Additionally, innovative scheduling can be utilized to overcome limitations that the school might face, such as physical classroom space as well as school climate issues (The Power of Innovative Scheduling, 2019). The master schedule will define the school's approach for creating achievement-oriented opportunities for teachers to meet with students with ample time to teach required subjects successfully and effectively. Setting explicit priorities, and expressing their relative importance, is, therefore, one of the most critical steps of developing a strategic schedule. According to Daigneau (2017), administrators have numerous strategic pathways that will accomplish the school's mission statement goals. However, they also must understand that there will be trade-offs concerning fitting the best teacher for the job into the most appropriate classes to produce a sufficient learning experience for students (Daigneau, 2017).

Considerations such as the school and district mission, graduation goals, and juggling the number of teachers based on student count are combined with the type of schedule design of the school block or traditional, student complexity ratios, and the curriculum offered by College and Career Academy Support Network. Additionally, the master schedule should provide opportunities for students to major in elective pathways such as vocational certification programs or higher-level STEM courses. Existing courses might be shelved and new courses offered each year when a count matrix is performed.

Advanced Placement and AICE courses in the state of Florida have been infused into the master schedules of high schools, promoting rigor and college preparation. Unfortunately,

Florida educational stakeholders tend to define high-quality schools based on their school grades. Although this view can prove to be exceptionally narrow, many students become trapped the moment they walk on campus into remedial math and language arts classes because of eighth grade test results. When developing master schedules, one philosophy to follow is to encourage all achievement levels to enroll in advanced studies, including AICE, AP, Honors, IB, and advanced STEM classes such as physics or calculus during the four-year high school experience. Schools that offer extra support for students such as in-class tutors and extra help tutoring after school via homework centers serve as a support challenge to students who never would have considered this type of course (LaCour, 2017).

Preventing the disproportionately low-income and minority students from enrolling in Advanced courses because of teacher or guidance recommendation is a common practice known as tracking. In a study performed by the NAEP in 2009, 75% of all states tracked math students. Four years later, in 2013, the states that tracked students achieved the highest math scores on the AP exams. Barshay reports that schools that do not track by levels of achievement tend to produce a watered-down curriculum. However, by adopting the tracking master schedule approach, only higher-level students would be enrolled in the advanced and honors science, technology, engineering and mathematics (STEM) classes (Barshay, 2016).

African American and Hispanic students comprise the majority of lower socioeconomic students in our Nation's schools. While SAT scores have continued to improve, the gap for these students when compared to others has increased. Cross notes that in 2017, only seven percentages of all AP classes' enrolled African American students, and only five percentages are enrolled in STEM classes. Cross points out that college admissions officers are impressed with students who enroll in higher-level Advanced Placement classes, looking for a rigorous program

of study. He notes that most participants in the AP program have been affluent high school students, predominantly living in the White suburbs of major cities. High school administrators must decide whether achieving competitive achievement scores within their district or state overrides, providing a fair opportunity to all students regardless of social or heritage factors (Cross, 2008).

One negative factor surrounding the inclusion of lower-academic students into advanced placement and advanced coursework is the cost-effectiveness versus the pass rate ratio (Davis et al., 2015). College Board Data covering 16 years (1997-2012) revealed that African American students in Texas, New York, and Florida's ratio of passing score costs to failing score costs were negative for every year. Davis and another study noted that because of the limited education budgets in many states, dollars have to be spent wisely. In the urban district in the southeastern United States, several schools endorse open enrollment for all high school students, endorsing the philosophy of open enrollment. It is noted, however, that once an open master schedule enrollment is followed for some time, overall passing averages decline (Cross, 2008).

After school programs that provide positive role models, mentoring and tutoring, and provide shelter from home neighborhoods can provide students with the social and personal skills needed to succeed in the regular classroom environment during the day (Cross et al., 2010). Opportunities to enhance what is taught in the classroom can help at-risk students reach the next level of college readiness. The introduction of a tutoring program creates the extra support needed to bring socioeconomically disadvantaged, at-risk students into a higher level of performance, thus raising the expectations of success the moment the student walks on the high school campus (LaCour et al., 2017).

Additionally, mentoring is associated with a positive outcome for students and has been used as a program to help students who have demonstrated risky youth behavior (Eckholm, 2006). The implementation of this type of program after school has been utilized frequently, producing excellent results. Coupling a mentoring concept with a math tutorial approach when students are in attendance, is designed to raise the level of academic performance expectations for the at-risk students. Research suggests that the lower socioeconomic background African American males are not ready to enroll in upper-level AP classes, especially in the mathematics subject area. This may lead to a declining cascade of events that causes students to drop out of school, thus limiting their future job opportunities (Eby et al., 2008). The objective of an in-house master schedule academic tutoring program for all at-risk students would embrace the academic achievement learning gains in the field of mathematics, encouraging more students to enroll in highly rigorous classes before their senior year in high school (Cross et al., 2010).

Master Schedule Programs. To aid in the development of master schedules, professionally developed software packages are currently on the market for the purchase and can be used to assist educational administrators. The implementation of such packages may be useful in analyzing various factors such as teacher availability, student needs, and class length (Strategies for Mastering School Schedules, 2019). Merenbloom Seminar Consulting, for example, offers a variety of services to both administrators and teachers who might need help designing effective master schedules for grades PK-12 (Admin, 2019). They offer help with developing a block or another flexible design versus traditional. Providing room for a double math or language arts period within the schedule's confines, designing academies, and strategies to connect the schedule with the mission/vision of the school are other features of their services.

However, these packages are expensive, especially when considering the number of schools in urban county in the southeastern United States that would utilize such a product.

In a school that provides a cohort/team or academy approach to topic area scheduling, administrators must provide for factors such as the number of periods in the day, the number of students in the cohort/team or academy and the number of dedicated teachers assigned to teach the relevant courses in the Master Scheduling Guide. Providing for the cohesive scheduling of academies can be challenging, especially if the schools have several functions at the same time. A team of approximately 40 teachers, administrators and other educational stakeholders can help develop a list of factors that should be considered (CASN); common prep planning for teachers; number of classes teachers will teach in and out of the academy; number of students taking classes in and out of the academy; and time of day issues for students participating in internships and field trips. The structure of the schedule will also have to provide for flexibility in the length of the period for courses that demand hands-on performance/achievement (Master Scheduling Guide, n.d.).

Schedule changes. Although this process is started half-way through the current year for the upcoming year in order to gather student selections and provide for ample time to complete the process, there are negative factors for completing early registration, such as students forgetting or redirecting choices. Each year, students change classes well into the first quarter, missing class time, which leads to a loss of learning opportunity. According to a study performed by Kubitschek. the results surprisingly indicated that there was no significant difference in the achievement for students who entered the class late, missing many days of instruction. It is interesting to note that schools most often rely upon the individual teacher to create the criteria for missed work. It might be easier to welcome the student into the class even

if entry is in the middle of the semester. Competency will be proven on the mid-term examination regardless of the entry date. This liberal policy allows students to change classes with greater frequency, disrupting class counts, and teacher instruction in some cases. Principals understand, however, that administrators and teachers must deal with the concerned parents/guardians who are in support of the schedule change regardless of the date (Kubitschek, 2005).

Classroom climate has always been an important factor for student achievement and satisfaction levels, thus reducing behavioral issues for the teacher. When a teacher creates an atmosphere that is a formal, subservient climate and reveals a level of animosity toward the students, the achievement is affected adversely. Even today, personality traits make a difference in classroom management and can make the teacher's role more difficult. Linsin offers six personality traits that make a negative impact on the climate of the classroom: impatience, quick to anger, pessimism, irritability, overly sensitive, and easily frustrated. Students will review their schedules over the summer break and communicate with others about the teachers' reputations. Schedule changes are requested before students even enter the physical classroom at the beginning of the year. Additionally, students will decide to change classes after experiencing some of the above negative personality traits without attempting to push through with the learning process in the originally scheduled class (Linsin, 2011).

The size of the school, as well as the number of students in the classroom, has been linked with severe discipline infractions, which will interfere with student achievement. The impact of scheduling on student discipline from a macro sense affects the administration of a school. We can infer that this might eventually affect the school grade achieved in the state of Florida. Educators often consider only the micro sense, within the classroom, as a separate

functioning entity. Administrators attempt to even out the class counts, assign competent teachers to each class taught, and maintain supervision of discipline issues as they occur. The master schedule should provide state-mandated, appropriate-sized classrooms with competent teachers in charge for optimum student achievement and a positive campus climate (Walberg, 1968).

Master Schedule Design. As a presenter for the Association of California School Administrators' master schedule Training Seminar, Murakawa-Leopard, states there are four significant phases of master board design: planning, course selection, building and analyzing, and fine-tuning on building a master schedule with setting a realistic timeline. He emphasizes that one of the most significant challenges administrators still face is making the most of the limited educational time we have. Staff turnover, he continues, affects the consistent flow for scheduling from one year to the next, and keeping to an accurate timeline can be a significant challenge. Every high school will go through the process of developing a master schedule utilizing available resources in the best possible manner to enhance student placement in appropriate classes. The design must be agreed upon and shared with administrators, staff, department chairs, and teachers to ensure success (Halberg, 1998). Since master schedules impact all stakeholders, a process for governing communication, feedback, and joint decision-making enhances the ability to create a technically correct master schedule.

The ongoing controversy noted since the 1980s regarding the length of the school year when compared to the length of classroom instructional time, seems to have an impact on the level of student engagement, student achievement, and quality of instruction. The reinvention around learning as being the primary concern and that the length of the year, as well as the class, creates a boundary marking limit in which a teacher must present the required, relevant material

while engaging his/her students. Nichols was referring to the difference between traditional versus block scheduling with respect to the number of days in the school year (Nichols, 2000).

Most high school schedules include approximately 180 days with breaks for holidays that could represent as many as four plus weeks. Schools in other countries that have year-round calendars outperform American Schools. Japan requires high school students to attend an additional 60 days beyond American students. He noted that in past studies, 60% of the school day per year was devoted to actual classroom instruction. Interruptions of any kind, identified as an organizational distraction from learning, totaled approximately 16%, a sizable amount of time (Pedersen, 2012).

According to Nichols (2000), varying the design of the schedule can have a positive effect on student achievement. He cites an example, such as varying the number of periods in a day six through nine periods as well as varying the length for those periods 50-60 minutes. It is of paramount importance that students are engaged in classroom activities with the ultimate goal of learning, but when periods are crowded into the day, demanding students take seven or eight credits per year are coupled with the current teaching schedule demands (Nichols, 2000).

When comparing the statistics between the United States and Japanese scheduling, researchers comment on how the latter improves the quality of their teaching approaches through a collaborative design process with colleagues. The Teaching Gap Best Ideas from the World's Teachers for Improving Education in the Classroom referring to this process as lesson study. This design process has allowed Japanese teachers to relentlessly improve its teaching and thus raise student achievement levels above our own in the U.S. In our Nation, how teachers use their planning time may very often remain an unexamined issue, one that is rarely addressed for master scheduling design (Snyder et al., 2018).

A study conducted by the Stanford Center for Opportunity Policy in Education in 2018, examined how collaboration among teachers was a factor for successfully achieving schools. The following characteristics are noted as being relevant themes. Teacher collaboration, focus on student learning and development, coherent, shared governance, continual learning, professional capacity, multiple roles for teachers, district support, and participation in networks. Merritt reports that teachers from Wisconsin reported on a survey that the most significant impact on their ability to support student learning was planning time. Several additional studies are cited in Merritt's article that confirmed these results (Rentner et al., 2016).

Secondary teachers in the United States and Chile spend significantly more time instructing students than the average of 20 hours weekly in other countries. However, students in Chile and the United States score below other countries where teachers spend less time with their students. Teachers have noted the increasingly complicated accountability duties of everyday teaching taking place in our Nation's schools as being time-consuming, preventing collaborative efforts of a team approach for planning (Rentner et al., 2016).

Block Scheduling. One method of providing for more teacher planning time has been branching away from the traditional schedule design, which consists of all year classes, six to eight per day, lasting 40-60 minutes. Collaborative teaching time now increases from 50 minutes to 90 minutes, as does student learning time (Daigneau, 2017). Block scheduling has been lauded as providing teachers with the opportunity to collaborate if a common planning period is introduced into the master schedule for this purpose. Block schedules are varied and can flexibly fit the needs of high schools. The traditional block schedule is an accelerated schedule, which is a two, 90-day semester design. Students can complete eight courses a year, or have an opportunity to retake a failed course. Alternative A/B block schedule design creates a two-day

or some variation of this theme, consisting of a four-class day with 90 minutes' class. Still popular in today's schools, these block designs are based on the 180-school day calendar (Williams, 2011).

Japanese Scheduling. Japanese students achieve consistently higher scores on both mathematics and Language Arts each year on international tests, we have to analyze the reasons. Not only do they provide for collaborative planning, which encourages consistency among departmental teachers, but the school climate is also completely different. Although the school day begins at 8:45 a.m. and ends at 3:15 p.m. for Japanese students, they attend club activities and cram school for the rest of the day. Attending school for 60 days longer than American students, as mentioned previously, they begin in April as opposed to September and end the school year in March. Interestingly, Japanese students cannot be sent out of class for any reason leaving teachers to deal with any problems that arise. Additionally, students do not move from the classroom; the teachers rotate into the classroom (Gardner 2016).

Japan's success is centered around a two-part approach to the method of teaching, and the quality of teaching. The context of the lesson is essential, not merely getting the correct answer on a worksheet. Japanese teachers practice hatsumon, which is a technique designed to question the student about the concept behind the math so that they are gaining critical thinking skills, not merely rote memorization of math principles. Additionally, teachers engage in jugyokenkyu, which consists of preparing the lesson, teaching the lesson in front of students, other teachers, and also a university professor. In this process, improvement for the instruction of the material is ensured. After the lesson is taught, a consultation meeting is held, offering feedback (Gardner 2016).

Describing the behavioral attitude instilled in Japanese students from the moment they walk on campus such as eating the same lunch meal that is provided for them in the classroom with their teacher, and student responsibility for cleaning the school. Since our U.S. schools are not designed with such rigid behavioral structure for students, providing for the optimum amount of continuous classroom time comes in the form of adopting block scheduling designs that suit the school's student population (Williams, 2011).

Block Scheduling versus Traditional Schedule. A significant amount of research shows that block scheduling has led to an increased number of school districts adopting this scheduling format. In the urban county in the southeastern United States there are essentially an even split of schools offering block scheduling versus the traditional schedule. Studies cite that the majority of students believe that block scheduling makes a difference in school. When teachers introduce new concepts, the new schedule allows more time to cover new information. Numerous students found that with the additional time in class, they were able to spend more time understanding lessons, providing time to collaborate with peers. Students also felt less pressured to get assignments done (Marchant, 2001). In their experimental study, Zepeda & Mayers (2006), block scheduling appeared to increase student grade point averages and improve school climate. The results of the study found that block scheduling reflected positively on student grades and climate but was inconsistent regarding standardized test scores and student attendance (Zepeda & Mayers, 2006).

When looking at the typical high school day, totaling thirty periods per week, the block schedule is seen as a way to increase the depth of coverage by extending class periods. While at the same time reducing student's moving from one class to the next, resulting in less supervision and disruption possibilities on campus (Cawelti, 1994). Thousands of students are released into

hallways six, seven, or eight times a day, which poses a supervision problem for administrators. When schools continue to run on a fixed clock, the traditional schedule, then the promotion of educational inequalities for students may produce a negative result. Teachers of hands-on courses in the field of science, physical education, art, and technology understand the difficulty of organizing lessons within a time limitation of 40 – 50 minutes (Canady & Rettig, 1995).

According to Evans et al., (2002), when reviewing the traditional block schedule, teachers reported they were able to spend more time on student-centered activities rather than teacher-oriented lectures. Students were also able to participate in more independent projects during class time because of the varied and creative assessments that were developed. Time to focus and concentrate on assignments and homework are clearly designated as benefits. Teachers not only reported that the block scheduling reduced inappropriate student behavior and decreased detentions by 50% but also noted there were fewer difficulties when providing a substitute teacher with enough material for the extended time coverage. There are concerns about students who were absent and felt they would have more difficulty catching up to the rest of the class was a limitation of this type of schedule (Evans et al., 2002).

Parents believe that block scheduling would isolate children, offering fewer opportunities to interact with other students, limiting socializing between classes. Overall, the majority of teachers, students, and parents were satisfied with the implementation of the four by four block scheduling. Teachers changed their instructional practices and found that with the additional time, they were able to implement a variety of activities that benefited their creativity. There was a considerable improvement in student achievement, standardized test scores, a higher percentage of the honor roll, and a decrease in student failure rates (Evans et al., 2002).

When a school is considering a scheduling design change from traditional to block, it must have buy-in from its stakeholders. The school administration must provide teachers with staff development to ease the transition from one design to the next. Additionally, the school should conduct an extensive communications campaign among all stakeholders. Communication should contain the purpose of the change and the design structure description so that the morale of teachers, students, and parents/guardians remain positive when looking forward to more extended class periods. School administrators must provide teachers training and professional development (Zapeda, & Mayers, 2006)

In comparison, Gruber & Onwuegbuzie (2001), conducted a similar study comparing 115 block design schedule students, with 146 traditional schedule design students revealing no significant difference in grade point averages or scores on the state exam's writing portion. Other subjects did reflect a significant difference in Language Arts, math, social studies, and science favoring the traditional design. The same study offered various qualitative benefits for the block design such as the reduction of discipline issues, the feelings of the student regarding the overwhelming stress in the traditional design because of academic requirements, numerous classroom rules, homework assignments, and the feeling of a confusing curriculum Gruber & Onwuegbuzie (2001.

Schools not only have to redesign space to provide for increased student enrollment demands, implementing innovative scheduling that supports a flexible approach to student learning strategies becomes a vital factor. Expanding a flexible approach within an existing master schedule provides more targeted learning opportunities for students. Personalizing the learning opportunities with qualified staff members is a benefit to the school that provides a more extended block of time each period. Providing additional targeted learning opportunities

for students within the confines of the existing master schedule is easier when the time frame for each period is optimized (Jacobson, 2018).

Time of Day. A study conducted was examined test scores for nearly two million Los Angeles area students in grades six through eleven. Morning math class achievement scores were higher for assessment tests five points on average than scores for students in the same classes scheduled during the last two periods of the day. English, however, had different results. There was no significant difference between the test scores for those in the morning versus afternoon classes. It is noted that students taking English in the morning earned better class grades. It is important to keep in mind that high school schedules are created with core subjects and elective credits, most often in a balancing attempt to equalize class counts for each teacher and that state mandates require a limitation on class counts for core subjects. Understanding that a basal arousal level, which is an indicator of mental alertness, rises as the day progresses and eventually peaks around 8 p.m. For optimum learning during the day, teenage biorhythms and hormone levels will also affect mental abilities (Learning-Liftoff, 2017).

Goldstein et al., (2007) described the synchrony effect as being a self-expressed identification of either morning or evening type of an energy function. In other words, teenagers, when asked, will identify themselves as being most alert in the morning hours or the evening hours. He continues to report that evening-type adolescents will more often have maladaptive behavior problems and that schools can recognize this red flag as a potential at-risk student. Evening-types also were seen to have increased problems with family, peers, and teachers. Additionally, as students change from morning-types to evening-types, early start times create sleep deficits. He emphasizes that this shift in type could be due to environmental, social, or biological factors and seems to be a global problem (Goldstein et al., 2007).

There is evidence that Chrono-typing, the identification of morning versus evening-type, may be related to adolescent behaviors such as academic achievement, risk-taking, mental health, and general health issues. The U.S. Department of Education published statistics stating that the average start time for a sample of over 18,000 high schools in the U.S. was 7:59 a.m. Developing master schedules conducive to the morning-type students alone ignores the importance of the sleep-wake cycle teenagers experience (Karan, 2017).

Teacher Bias and Efficacy: How it affects Master Scheduling

Some studies have determined a correlation between a teacher's sense of efficacy in the classroom and successful student academic performance. When a teacher is open to a flexible protocol of teaching methods, student needs are met with greater efficiency. These types of teachers are more resilient when changes are needed, and more experimental with new techniques and applications to serve the individuals in their classrooms. Additionally, the type of teacher who is more apt to understand the imperfections of learning styles, as well as their differences, based on the previous educational experiences ESOL, ESE, and Disadvantaged, are less inclined to give up on students who are behaviorally or academically unable to achieve in their classroom. (Protheroe, 2008).

There appears to be a high correlation between collective teacher efficacy and the structure within a high performing school, which is determined by the principal. Three school structures are identified as the creation of teaching teams, the transparent and timely communication with teachers, and the combined collaborative decision-making processes among staff members. The exploration of the effectiveness of professional learning communities (PLC) and how this strategy can predict a greater collective efficacy, teacher efficacy is predictive of teachers working together. Encouraging collective efficacy through a PLC approach was highly

effective with 16 schools participating in a study, which in turn contributed to improved student achievement. Although socioeconomic status may affect achievement, a better predictor of student achievement is the level of collective teacher efficacy (CTE) (Chrispeels, 2018).

Through common work, indicating a collaborative teamwork effort endorsing the activities via collective efficacy, student achievement is effective in a positive manner. Teachers must emphasize the specific teaching behaviors which are conducive to developing CTE by developing greater effort and persistence as well as a research-based new teaching approach which will promote learning. Common work encourages PLC to move teachers from an if only stance to a can-do educational culture, especially towards struggling students (Protheroe, 2008).

Urban county schools in the southeastern United States have incorporated the professional learning communities approach to collaborative teacher planning twice a month, changing those scheduled days for students into half-day attendance. District structured lesson plans that many schools chose to present topics to faculty which were pertinent to each locality. In conjunction with Marzano staff evaluation methods and classroom preparation techniques, collaborative teacher planning was encouraged on these professional development days to raise student performance on the elementary, middle, and high school levels. The foundation upon which Marzano (2011) was chosen was deemed as a good fit for urban district schools' quest to introduce the CTE approach to raise teacher efficacy and was based upon four principles stated on the Marzano website:

- Rigorous, standards-based system in every classroom
- Relentless focus on student results with leading indicators
- Responsive instructional framework with a pathway to scaffold instruction
- Renewed and revitalized teachers with access to resources for growing their practice

Marzano (2011) supported practices that would help all teachers improve upon their skills in the classroom by developing a systemic protocol for teaching, which was a research-based, five-part framework approach. Practicing strategies in the classroom was emphasized, and feedback was essential for growth. Teachers would share best practices in planning sessions and share best practices that would encourage professional growth. Marzano's emphasis was on the development of a collegial atmosphere of sharing strategies. It was not only multi-tiered in its approach and scope, and it seemed to incorporate the concept of collective efficacy discussed previously. Administrators would circulate during professional development days, requiring department members to meet, plan, and share common course materials, thus ensuring an open communication line between administration and teachers (Marzano, 2011)

However, in recent years, Marzano and professional development days have been eliminated in some urban districts in the southeastern United States due to budgetary cuts. It remains to be seen whether or not the improvements in student achievement will be affected adversely in an urban county, especially in light of the most recent year, 2020, when all schools in our nation converted to online instruction and eliminated standardized tests and other essential methods of collecting data for statistical comparisons to previous or future years.

Chapter III

METHODS

Introduction

A real and measurable opportunity gap exists in our country, and our educational system has served to increase this gap. Our system has failed to provide equitable access to advanced coursework for Black and Hispanic students. Implementing a deliberate and strategic system for scheduling high school students will provide historically underrepresented student groups equitable access to college credit and college-level courses. Quantitative research will determine how such an approach can impact high school students at an urban district when principals, and principal supervisors, create systems to schedule students equitably.

The research may determine the scope, cause(s), and impacts this gap has on high school students as measured by their academic success. The study will drill down to specific actions that schools, through their administrative processes, take when designing and implementing their master schedules on an annual basis. This research will examine how principals and principals' supervisors play a crucial role in shrinking the opportunity gap and aligning school and district resources to strive for and achieve equity.

Philosophical Lens

There is a direct correlation between the success of students and the efficacy of their teachers, and studies Protheroe (2008) have been conducted to support this relationship. Teachers become reflective and open to questioning and improving their effectiveness, they begin the process of improving their instructional effectiveness, which leads to enhanced student learning. Additionally, this mentality towards adapting to students creates a type of teacher who is more willing and capable of adjusting to a diverse group of students and creating a much more

welcoming and diverse learning environment. It also accomplishes what the researchers hold as a core belief that there is no excellence without equity (Protheroe, 2008).

Conversely, when efficacy is not present in the hearts and minds of educators, the opposite occurs. The teacher fails to modify the instruction to suit the student's needs, and then the quality and effectiveness of the learning begin to diminish. The teacher, many times, begins to blame the students and/or previous teachers. Administrators must step in at this point, and put in place strategic systems to break this negative cycle. Otherwise, students lacking requisite skills, either from a lack of schooling or from being assigned to an ineffective teacher, will continue to fall behind their counterparts on what can be considered a slippery slope.

The researchers' lens in this research study is that student learning will improve when provided with adequate instruction, at the appropriate level of rigor, from teachers with cultural competency that lack bias. This belief applies to all students and staff, of all race, color, and creed. This belief does not preclude institutional racism from being a factor present in Education, nor does it preclude poverty from impacting schools. The researchers' lens considers both Critical Race Theory (2015) and the Coleman Report (1966) strongly as the basis for understanding how to implement systemic change in Education. Specifically, the belief that change in these institutions must begin with the following steps:

1. Establishing a vision and belief system that all students can learn.
2. Examining the appropriate student subgroup data to identify strengths and weaknesses.
3. Collaborating with teachers, administrators, and stakeholders.
4. Developing specific and measurable goals for improvement.
5. Implementing the change.
6. Monitoring the process and gathering feedback for follow up needed.

This process mirrors Florida's Continuous Improvement Model, or FCIM, as a process for improvement. This process will also form the basis of the researcher's actionable, incremental, and pragmatic study for enhancing equity in high school master schedules.

Philosophical Perspectives

In order to consider the educational system successful, the potential of all children must be maximized. To accomplish this, all adult employees in the system must work towards this goal as a priority. The reality is that adult employees are themselves, individuals, that each brings their perspectives and imperfections to work daily. Many times employees, over time and through the years, begin to ask, what is in it for me? This leads to cracks in the system, which grow the point of large gaping holes. Unfortunately, it often leads to our most needy students becoming underserved as they continue to fall further and further behind in all aspects of their education. Those gaps become ordinary, commonplace, and accepted, as described by Critical Race Theory. This theory can be, and ideally should be, used to change situations, relationships, and practices to benefit individuals. More specifically, in this study, the past of least resistance will be deconstructed by a focused and target system of master scheduling designed to benefit those students that have been historically left behind (Critical Theory, 2015).

The researchers are also taking a pragmatic approach to this study because education is a continually changing industry. Regardless of which school year in which this study is completed, unexpected outside influences, ranging from political to social to environmental changes could potentially affect the study. This can include anything from the social-political revolution to a global pandemic to a hurricane or other natural disaster. Leaders must adapt to each other and their environment. The study is pragmatic because real and measurable steps must come first when working towards a long term visionary goal as idealistic as racial equity in education.

However, practically or pragmatically speaking, equitable access to advanced coursework on the high school level is a real and measurable step towards that goal. This philosophical perspective is at the heart of this dissertation in practice, as the goal serves two-fold. The first being to complete a data-based quantitative analysis that can be used to measure a school's progress during this study objectively. The second is very practical, or pragmatic, to get leaders of the school to adapt their school's master scheduling system to benefit the students of the school they serve. This dissertation is a real-world, practically applied study of work completed by schools and applied to real students in the urban district chosen.

This study also has a perspective of idealism, albeit less influential than the pragmatic view. It is critical to consider this perspective due to educational aspirations' very nature, believing that all children can learn and be successful. While this research study will focus on data to measure improvement, each participant will receive essential professional development that will lead to their own personal growth. The participants, including school-based administrators, will be working together in professional learning communication to maximize their collaboration and synergy. The researchers must use this perspective, as this is a personal mission towards making real and measurable change and maximizing the success of students underserved continuously throughout our system's recorded history (Oregon State, n.d.).

Proposed Research

This study will use a program logic model program evaluation with quasi-experimental design analysis (Creswell & Creswell, 2018). This design's rationale will permit an evaluation of different outcome predictor variables and measures independent variables of underrepresented high school students participating in Advanced Placement, IB, and AICE courses.

Variables Types. For this research study, the researchers will examine five types of variables:

1. Grade point average (Cumulative – Quarter 1)
2. Attendance (Quarter 1)
3. Discipline (Quarter 1)
4. Ethnicity (All demographics)
5. Access to advanced coursework (AP/AICE/IB)

The concept map illustrates whether students exposed to rigorous coursework affect if they will be successful in other rigorous courses. Student learning and equity and the achievement gap is the variable that will be affected. The variables that instructional time and quality, coursework rigor and difficulty, bias, and enhanced cultural competence are called the independent variables. To understand each independent variable as a predictor of achievement, the researchers analyzed several factors associated with;

1. Instructional time and quality
2. Coursework
3. Bias
4. Enhanced cultural competence

Controlled Variables

The research study's controlled variable is the historical data of each of the schools to which the researchers will be applying the scheduling process intervention. Each school will primarily be compared to their data, broken down by student subgroups, with the goal for each being improvement compared to the prior year. For example, at one of our schools in the urban district, only TBD% of Black students, or “X” students total, were provided access to college

level coursework 2019-20. That number increased to TBD%, or "X" students total, in the school year 2020-21. In the research, there may be many possible factors that could be influencing outcomes. For example, instructional capacity, budget constraints and technology limitations. All of the possible interfering variables are controlled, so the researchers can analyze the exact effect of the independent variable on the dependent variable.

Collection of Data

This study will primarily focus on collecting quantitative data collected from both the Florida Department of Education and the urban district. More specifically, the best data to be collected will be the college-level coursework enrollment data when comparing the school year 2019-2020 to the school year 2020-2021. The researchers will also examine the graduation success rate data for school years 2019-2020 and 2020-2021, advanced coursework completion results or school years 2019-2020 and 2020-2021, and consider Florida Standards Assessment and End of Course exam state data for the school year 2016-2017 to the school year 2020-2021. Success and failures of the master schedule initiatives can be determined by examining the increase in the number of students scheduled into advanced coursework to the prior school year before the interventions were put in place.

To collect data from the state of Florida Department of Education, the website www.fldoe.org can be utilized as well as the Student Information System (SIS), the Educational Data Warehouse (EDW) can be utilized from the urban district system similar to EDW. The program Performance Matters or Unify can also be used to download all student data in the spreadsheet format. Both data sources allow multiple years of data to be accessed, sorted, and produced.

Both programs contain data that is publicly shared data. Either researcher, making the data collection a relatively straightforward process, can access them. Additionally, there will be no need to obtain consent to access the data, so there are no concerns regarding how long the data will be stored and when the data will need to be destroyed. There are no specific risks and or benefits to the participants. Teachers can collect secondary data to assign grades. There are additional options when collecting qualitative data for teachers and students regarding the quality of their mathematics instruction and the overall happiness with the course. However, the researchers' plan is to look specifically at quantitative data.

Research Questions

1. How does access to advanced coursework impact student outcomes in underrepresented groups?
2. What impact does equitable master scheduling have on closing the achievement gap?

Target Population and Setting

The target population is the enrolled students in the purposeful and convenient sample of high schools that offer advanced courses and have large numbers of the diverse student population in the urban south region high schools of the urban county schools. The data will be disaggregated by race and other factors and will include duplicated and unduplicated participation. The sampling method will most closely resemble Stratified Sampling. The sizes of each of the schools chosen for the study will vary; however, it will ensure the data is considered proportionately once the data is aggregated.

Instrumentation and Procedures

The researchers will use the high school master schedule data examining enrollment in AP courses, GPA, attendance, college credit earned for FY16-17 to FY20-21. The researchers will use high school master schedule data by analyzing school data by demographics, race and other factors. The general sample will be composed of eight urban high schools with students in grades 9 -12.

Sampling Plan and Procedures

The plan for collecting the data will comprise of student enrollment data from FY17 and school year 2016-2017 to FY21 in advanced coursework. Advanced Coursework participation is represented by student participation in either Advanced Placement (AP), Cambridge (AICE), and/or International Baccalaureate (IB). Races to be disaggregated will include those that the vast majority of students in the county, which are White, Black, and Hispanic. Sample groups will include the school population as a whole and the population of the advanced coursework student sample. The advanced coursework sample will always be a percentage of the overall school population, as typically not all students will be enrolled in advanced coursework.

Analysis

The researchers will first conduct frequencies for any missing or incomplete data; then, crosstabs will be computed to measure central tendencies. Box Plots will be performed to determine if there are any outliers in the distribution. The researchers will conduct descriptive mean, mode, median, and standard deviation and inferential statistics on the dependent variables of college credit, attendance, grade point average, enrollment numbers in AP classes. Multiple multivariate analysis of variances MANOVAs will be chosen as the inferential command. The MANOVAs will be run as the researchers assume that the dependent variables are related to each

other and that the variables will be normally distributed. The researchers will be looking for similarities and differences within and between groups for school years 2016-17 to 2020-21. Scores from the MANOVAs will be judged to be significant at $p<.05$. Pillai's Trace will be performed to measure error variance. Pillai's Trace was chosen as the preferred test to measure error variance because it is the most robust under violations of the assumption of equal covariance. Statistical analyses program SPSS 27.0 will be used to run the data analyses (SPSS, 2020).

Ethical Considerations

The researchers will seek permission from the Lynn University Institutional Review Board and, once receiving approval, will request permission from the large urban district to use the large data sets from the eight different high schools. All school names will be confidential and only known to the researchers. Pseudonyms will be used that do not relate to the schools' real names. The data will be kept on the researchers' password-protected computer and will be destroyed once the study is completed.

Study Design, Methods and Procedures

The researchers will design and facilitate a series of professional development workshops in Improving Equity through master scheduling at a large urban county in the southeastern United States. All professional development workshops in Master Scheduling are based on current research. Each professional development workshop in Equity Master Scheduling will be quarterly. Each professional development workshop should not exceed two hours and consist of four modules, highlighting equity. The four modules will be:

1. Review of prior year performance to identify strengths and areas for improvement

   AP/AICE/IB Program review and analysis.

The Principal Supervisor facilitates the training session—a comprehensive data analysis of the previous school year's exam results from college-level coursework. The teacher, subject, and exam type disaggregate exam results. Compared to similar schools, inside and outside of the urban district, the results are compared to prior-year self. Also examined are enrollment trends by subject, teacher, and school. Participants included the school principal, the administrative team, including academic support faculty, and the principal supervisor. Members of the team break into three or four groups and conduct classroom walkthroughs visiting AP/AICE/IB courses. Each group visits between five and eight classes, and there is a debrief process to discuss instructional practices witnessed. Members of the group share strengths and weaknesses, as facilitated by the principal supervisor, as they analyze the classroom teacher's actions and discussion, the materials used, and the work assigned.

2. Developing an action plan for implementation - developing course offerings, course selection and budget planning.

The team analyzes their current course offerings and decides which courses to add, drop, expand, or decrease from the course selection sheet for the coming school year. Teachers are recruited for the training, and professional development is scheduled as needed. Principals begin to work with teacher leaders to create recommended pathways for student course progression. Also very important at this stage is to examine potential opportunity gaps based on race. The team works through prior year data to examine both participation and passing rate data to create written equity and acceleration plan. School leadership and counselor teams are included in the process.

3. Finalizing the action plan for implementation - finalizing course offerings, course selection and budget planning.

The team finalizes and implements a focused and strategic course selection process. Stakeholders receive updates and offerings in the School Advisory Council (SAC) meetings, parent nights, and School Counselor visits to classrooms. School department chairs and teachers are educated on new course offerings. Demographic reports are run to ensure the equity and acceleration goals are met in real-time.

4. Preparing and finalizing the master schedule for implementation.

The team conducts a detailed data analysis of student course selection before finalizing the master board teacher sections and class period. Data is compared to prior years and is analyzed on a course by course basis to ensure original goals of acceleration are met. Final considerations for teaching assignments are made, along with any necessary professional development or training. Equity data is examined closely, and individual student schedules are reviewed to ensure that all students have selected courses that ensure they are challenged to their maximum potential.

The equity master scheduling professional development workshops will challenge principals in a large urban county in the southeastern United States. Principals will examine how to create an equitable master schedule that may impact student learning and achievement by ultimately narrow or closing the achievement gap between Black, White, and Hispanic students.

Summary

The research study will examine eight high schools in the urban district and how their scheduling practices can be improved to reverse the trend of contributing to the opportunity gap that exists. Simply stated, these practices have failed to provide equitable access to advanced coursework for Black and Hispanic students. The research study will drill down to specific actions that schools, through their administrative processes, taken when designing and implementing their master schedules on an annual basis, and how principals and principals' supervisors play a crucial role in shrinking the opportunity gap and aligning school and district resources to strive for and achieve equity.

The research issues are alarming despite all the money and resources available for all students. Betsy DeVos, sincerely believes there is a student achievement crisis Our nation's 2019 report card, written by the National Center for Education Statistics (NAEP), summarizes results for over 600,000 students in every state and Washington DC, representing 27 large, urban districts. A national assessment test is administered to students attending public and Catholic schools across the U.S.; the most recent publication reveals a drop for math proficiency by one point for eighth graders from the last test date in 2017. The outlook appears to be even more catastrophic for our historically underperforming student groups (Green & Goldstein, 2019).

Having an equitable master scheduling system creates academic opportunities in advanced coursework for ALL students. This equitable system will expose all students to college-level coursework that provides students exposure to academic content that is grade levels above the Florida Standards Assessments assessment. As students receive instruction in these courses, they receive the requisite skills needed for mastery. It is also worth mentioning that students earn more than just proficiency scores. They become eligible for scholarships, earn

college credit and readiness, and are considered college-ready while in high school. The benefits of advanced coursework are so plentiful that mentioning them all would be beyond the scope of this study.

Chapter III focuses on the methodology of the research study. It is imperative that changing the educational practices or policies that directly affect Black and Hispanic students create equity gaps and create a systemic epidemic that hurts society as a whole. Implementing a deliberate and strategic system for scheduling high school students will provide historically underrepresented student groups equitable access to college credit and college-level courses. Quantitative research will determine how such an approach can impact high school students at an urban district when principals, and principal supervisors, create systems to schedule students equitably.

There is a direct correlation between students' success and the efficacy of their teachers, and studies have been conducted to support this. According to Protheroe (2008), as teachers become reflective and open to questioning and improving their effectiveness, they begin the process of improving their instructional effectiveness, which leads to enhanced student learning. In this research study, the researchers' lens is that student learning will improve when provided with adequate instruction, at the appropriate level of rigor, from teachers with cultural competency that lack bias. In order to consider the educational system successful, the potential of all children must be maximized. To accomplish this, all adult employees in the system must work towards this goal as a priority. This belief does not preclude institutional racism from being a factor present in Education, nor does it preclude poverty from impacting schools (Protheroe, 2008).

The researchers' lens considers both Critical Race Theory (2015) and the Coleman Report (1966) strongly as the basis for understanding how to implement systemic change in Education. Precisely, the belief that change in these institutions must begin with establishing a vision and belief system that all students can learn, examining the appropriate student subgroup data to identify strengths and weaknesses, collaborating with teachers, administrators, and stakeholders, developing specific and measurable goals for improvement, implementing the change and, monitoring the process and gathering feedback for follow up needed.

The concept map illustrates whether students' exposure to rigorous coursework affect if they will be successful in other rigorous courses. Student learning and equity and the achievement gap is the variable that will be affected. The variables that instructional time and quality, coursework rigor and difficulty, bias, and enhanced cultural competence are called the independent variables. To understand each independent variable as a predictor of achievement, the researchers analyzed several factors associated with; instructional time and quality, coursework, bias, and enhanced cultural competence.

In the research, there may be many possible factors that could be influencing outcomes. All of the possible interfering variables are controlled, so the researchers can analyze the independent variable's exact effect on the dependent variable. The researchers will also examine graduation success rate data, advanced coursework assessment results, consider Florida Standards Assessments, and End of Course exam state data, collected from both the Florida Department of Education and the urban district. Additionally, there will be no need to obtain consent to access the data, so there are no concerns regarding how long the data will be stored and when the data will need to be destroyed. There are no specific risks and or benefits to the participants.

The target population is the enrolled students in the purposeful and convenient sample of high schools that offer Advanced courses and have large numbers of the diverse student population in the urban south region high schools of the urban county schools. The sampling method will most closely resemble Stratified Sampling. Each school's student population for the study will vary; however, once the data is aggregated, it will ensure the data is considered proportionately.

The researchers will use the high school master schedule data for FY16-17 to FY20-21, analyzing the data by race and other factors. The general sample will be composed of eight urban high schools with students in grades 9 -12. Each sample group will include the school population as a whole and the advanced coursework student sample population. The advanced coursework sample will always be a percentage of the overall school population, as typically not all students at a given will be enrolled in an advanced course.

Chapter IV

FINDINGS

Introduction

This research study is designed to improve equity through the master scheduling process. The researchers' goal was to determine the scope, cause(s), and impacts the opportunity gap has on student groups as measured by their academic success and the extent to which an intervention can impact shrinking this gap. This study's research questions provided the basis and framework for the researchers to apply a quantitative response to these questions.

This study used historical data from eight comprehensive high schools in the urban district. There are more than seventy-six thousand data points over four school years, FY18 through FY21. Student outcomes are used from quarter one of each school year for each dependent variable, grade point average, attendance, and discipline.

Research Question 1

How does access to Advanced Coursework impact student outcomes in underrepresented groups?

Independent Variable - 1	Independent Variable - 2	Dependent Variable - 1	Dependent Variable - 2	Dependent Variable - 3
Access to Advanced Coursework	Ethnicity	Grade Point Average (GPA)	Attendance (Absences)	Discipline (ODR)
Yes/No	Asian, Black, Hispanic, Indian, Multiracial and White			

Quantitative Data Analysis - Two-way MANOVA

A two-way MANOVA was run with two independent variables – ethnicity and access to advanced coursework – and three dependent variables – grade point average, attendance and discipline. The combined grade point average, attendance and discipline were used to assess academic performance. There was a statistically significant interaction effect between ethnicity

and type of intervention advanced coursework access on the combined dependent variables GPA $F(5,76814) = 8.537$, p = .000, absences $F(5, 76814) = 5.507$, p = .000 and discipline $F(5, 76814) = 9.539$, p = .000, Pillai's Trace.

Follow up univariate two-way ANOVAs were run. These showed a statistically interaction effect between ethnicity and type of intervention for access to advanced coursework, GPA $F(5,76814) = 8.537$, p = .000, absences $F(5, 76814) = 5.507$, p = .000 and discipline $F(5, 76814) = 9.539$, p = .000. As such, a simple main effects analysis was conducted for GPA, attendance and discipline. There was a significant difference between interventions for Black and Hispanic students, but not for White, Indian and Asian students.

As such, simple comparisons were run for the difference in mean access to advanced coursework between inventions for Black and Hispanic students. The mean for GPA scores for Black students were 3.12 (*SD* = .716) for access to advanced coursework intervention and 2.57 (*SD* = .924) for non-intervention, a significant mean difference of 0.55% CI [-.572, -.523], p = <.001. The mean for GPA scores for Hispanic students were 3.22 (*SD* =. 726) for access to advanced coursework intervention and 2.62 (*SD* = .956) for non-intervention, a significant mean difference of 0.6% CI [-.621, -.579], p = <.001.

The mean for absences for Black students were .677 (*SD* =. 1.62) for access to advanced coursework intervention and 1.19 (*SD* = 2.65) for non-intervention, a significant mean difference of -0.54% CI [-.449, -.583], p =. <001. The mean for absences for Hispanic students were .839 (*SD* =1.74) for access to advanced coursework intervention and 1.46 (*SD* = 2.71) for non-intervention, a significant mean difference of -0.62% CI [-.566, -.682], p =. <001.

The mean for discipline for Black students were .026 (*SD* = .205) for access to advanced coursework intervention and .127 (*SD* = .487) for non-intervention, a significant mean difference

of -0.10% CI [.090, -.113], p =. <001. The mean for discipline for Hispanic students were .023 (*SD* =.210) for access to advanced coursework intervention and .097 (*SD* = .462) for non-intervention, a significant mean difference of -0.9% CI [.064, .084], p =. <001.

Figure 46. Between-Subjects Factors.

Between-Subjects Factors

		Value Label	N
Advanced Coursework	No	No	37148
	Yes	Yes	39678
Ethnicity	A	Asian	2874
	B	Black	18928
	H	Hispanic	21802
	I	Indian/ Nat Am.	383
	M	M	2008
	W	White	30831

Figure 46 illustrates the interaction between students having access to advanced coursework and ethnicity. Advanced Coursework is split into two-level: Yes, or no. Ethnicity is split into six levels: Black, Hispanic, Indian/Nat. Am., Mixed and White.

Figure 47. Multivariate Tests.

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.698	59054.682[b]	3.000	76812.000	.000
	Wilks' Lambda	.302	59054.682[b]	3.000	76812.000	.000
	Hotelling's Trace	2.306	59054.682[b]	3.000	76812.000	.000
	Roy's Largest Root	2.306	59054.682[b]	3.000	76812.000	.000
AdvCoursework	Pillai's Trace	.016	408.450[b]	3.000	76812.000	<.001
	Wilks' Lambda	.984	408.450[b]	3.000	76812.000	<.001
	Hotelling's Trace	.016	408.450[b]	3.000	76812.000	<.001
	Roy's Largest Root	.016	408.450[b]	3.000	76812.000	<.001
Ethnicity	Pillai's Trace	.025	131.347	15.000	230442.000	.000
	Wilks' Lambda	.975	132.186	15.000	212044.510	.000
	Hotelling's Trace	.026	132.932	15.000	230432.000	.000
	Roy's Largest Root	.023	355.340[c]	5.000	76814.000	.000
AdvCoursework * Ethnicity	Pillai's Trace	.001	6.816	15.000	230442.000	<.001
	Wilks' Lambda	.999	6.816	15.000	212044.510	<.001
	Hotelling's Trace	.001	6.817	15.000	230432.000	<.001
	Roy's Largest Root	.001	10.375[c]	5.000	76814.000	<.001

a. Design: Intercept + AdvCoursework + Ethnicity + AdvCoursework * Ethnicity

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Figure 47 illustrates the statistically significant interaction between advanced coursework and ethnicity and type of intervention on the combined dependent variables, $F(15.00) = 6.816$, p <.001, Pillai's Trace Λ <.001, partial η^2 <001. There was a statistically significant intervention effect on the combined GPA, absences and discipline variables. The main effect of ethnicity on the combined dependent variable was statistically significant, $F(131.347) = 15.00$, p = .025, Pillai's Trace Λ <.001, partial η^2 <.001.

Figure 48. Tests of Between-Subjects Effects.

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	GPA	8553.443[a]	11	777.586	1211.746	.000
	Absences	6632.337[b]	11	602.940	126.554	<.001
	Discipline	174.569[c]	11	15.870	117.507	<.001
Intercept	GPA	88711.235	1	88711.235	138242.663	.000
	Absences	9906.993	1	9906.993	2079.429	.000
	Discipline	40.200	1	40.200	297.657	<.001
AdvCoursework	GPA	761.511	1	761.511	1186.697	<.001
	Absences	517.542	1	517.542	108.630	<.001
	Discipline	19.668	1	19.668	145.628	<.001
Ethnicity	GPA	991.794	5	198.359	309.111	.000
	Absences	816.356	5	163.271	34.270	<.001
	Discipline	9.003	5	1.801	13.332	<.001
AdvCoursework * Ethnicity	GPA	27.390	5	5.478	8.537	<.001
	Absences	131.185	5	26.237	5.507	<.001
	Discipline	6.441	5	1.288	9.539	<.001
Error	GPA	49292.054	76814	.642		
	Absences	365963.760	76814	4.764		
	Discipline	10374.100	76814	.135		
Total	GPA	751261.515	76826			
	Absences	456264.000	76826			
	Discipline	10872.000	76826			
Corrected Total	GPA	57845.497	76825			
	Absences	372596.098	76825			
	Discipline	10548.669	76825			

a. R Squared = .148 (Adjusted R Squared = .148)

b. R Squared = .018 (Adjusted R Squared = .018)

c. R Squared = .017 (Adjusted R Squared = .016)

Figure 48 illustrates the statistically significant interaction effect between advanced coursework and ethnicity for GPA, absences and discipline variables. GPA $F(5,76814) = 8.537$, $p < .001$, absences $F(5, 76814) = 5.507$, $p = .000$ and discipline $F(5, 76814) = 9.539$, $p < .001$.

Figure 49. Univariate Tests.

Univariate Tests

Dependent Variable	Adv Coursework		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
GPA	No	Contrast	542.024	5	108.405	168.932	<.001	.011
		Error	49292.054	76814	.642			
	Yes	Contrast	459.129	5	91.826	143.096	<.001	.009
		Error	49292.054	76814	.642			
Absences	No	Contrast	745.316	5	149.063	31.288	<.001	.002
		Error	365963.760	76814	4.764			
	Yes	Contrast	187.376	5	37.475	7.866	<.001	.001
		Error	365963.760	76814	4.764			
Discipline	No	Contrast	13.787	5	2.757	20.417	<.001	.001
		Error	10374.100	76814	.135			
	Yes	Contrast	.598	5	.120	.886	.490	.000
		Error	10374.100	76814	.135			

Each F tests the simple effects of Ethnicity within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Figure 49 illustrates the statistically significant difference between GPA, absences and discipline for access to advanced coursework intervention and for non-intervention. GPA, $F(5, 76814) = 143.096$, $p < .001$, partial $\eta^2 = .009$. Absences, $F(5, 76814) = 7.866$, $p < .001$, partial $\eta^2 = .002$. Discipline, absences, $F(5, 76814) = .120$, $p = .490$, partial $\eta^2 = .001$.

Figure 50. Pairwise Comparisons.

Dependent Variable	Ethnicity	(I) Adv Coursework	(J) Adv Coursework	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
							Lower Bound	Upper Bound
GPA	Asian	No	Yes	-.389*	.033	<.001	-.454	-.324
		Yes	No	.389*	.033	<.001	.324	.454
	Black	No	Yes	-.547*	.013	.000	-.572	-.523
		Yes	No	.547*	.013	.000	.523	.572
	Hispanic	No	Yes	-.600*	.011	.000	-.621	-.579
		Yes	No	.600*	.011	.000	.579	.621
	Indian/ Nat Am.	No	Yes	-.686*	.082	<.001	-.846	-.525
		Yes	No	.686*	.082	<.001	.525	.846
	M	No	Yes	-.565*	.036	<.001	-.636	-.494
		Yes	No	.565*	.036	<.001	.494	.636
	White	No	Yes	-.566*	.010	.000	-.585	-.548
		Yes	No	.566*	.010	.000	.548	.585
Absences	Asian	No	Yes	.166	.090	.066	-.011	.342
		Yes	No	-.166	.090	.066	-.342	.011
	Black	No	Yes	.516*	.034	<.001	.449	.583
		Yes	No	-.516*	.034	<.001	-.583	-.449
	Hispanic	No	Yes	.624*	.030	<.001	.566	.682
		Yes	No	-.624*	.030	<.001	-.682	-.566
	Indian/ Nat Am.	No	Yes	.308	.223	.168	-.130	.745
		Yes	No	-.308	.223	.168	-.745	.130
	M	No	Yes	.566*	.099	<.001	.373	.759
		Yes	No	-.566*	.099	<.001	-.759	-.373
	White	No	Yes	.585*	.026	<.001	.534	.636
		Yes	No	-.585*	.026	<.001	-.636	-.534
Discipline	Asian	No	Yes	.022	.015	.148	-.008	.052
		Yes	No	-.022	.015	.148	-.052	.008
	Black	No	Yes	.101*	.006	<.001	.090	.113
		Yes	No	-.101*	.006	<.001	-.113	-.090
	Hispanic	No	Yes	.074*	.005	<.001	.064	.084
		Yes	No	-.074*	.005	<.001	-.084	-.064
	Indian/ Nat Am.	No	Yes	.099*	.038	.008	.025	.172
		Yes	No	-.099*	.038	.008	-.172	-.025
	M	No	Yes	.152*	.017	<.001	.119	.184
		Yes	No	-.152*	.017	<.001	-.184	-.119
	White	No	Yes	.091*	.004	<.001	.083	.100
		Yes	No	-.091*	.004	<.001	-.100	-.083

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Figure 50 illustrates the mean for GPA scores for Black students were 3.12 (*SD* = .716) for access to advanced coursework intervention and 2.57 (*SD* = .924) for non-intervention, a significant mean difference of 0.55% CI [-.572, -.523], p = .000. The mean for GPA scores for Hispanic students were 3.22 (*SD* =. 726) for access to advanced coursework intervention and

2.62 (*SD* = .956) for non-intervention, a significant mean difference of 0.6% CI [-.621, -.579], p = .000, but this difference was not statistically significant for Asian and Indian students.

The mean for absences for Black students were .676 (*SD* =. 1.62) for access to advanced coursework intervention and 1.19 (*SD* = 2.65) for non-intervention, a significant mean difference of -0.54% CI [-.449, -.583], p <001. The mean for absences for Hispanic students were .839 (*SD* =1.74) for access to advanced coursework intervention and 1.46 (*SD* = 2.71) for non-intervention, a significant mean difference of -0.62% CI [-.566, -.682], p <001.

The mean for discipline for Black students were .026 (*SD* = .205) for access to advanced coursework intervention and .127 (*SD* = .487) for non-intervention, a significant mean difference of -0.10% CI [.090, -.113], p <001. The mean for discipline for Hispanic students were .023 (*SD* =.210) for access to advanced coursework intervention and .097 (*SD* = .462) for non-intervention, a significant mean difference of -0.9% CI [.064, .084], p <001, but this difference was not statistically significant for Asian and Indian students.

Figure 51. Descriptive Statistics GPA.

Descriptive Statistics

	Adv Coursework	Ethnicity	Mean	Std. Deviation	N
GPA	No	Asian	3.0868	.78043	821
		Black	2.5745	.92408	13018
		Hispanic	2.6291	.95636	11159
		Indian/ Nat Am.	2.5660	.94107	192
		M	2.7383	.92804	845
		White	2.8230	.91544	11113
		Total	2.6803	.93638	37148
	Yes	Asian	3.4758	.56371	2053
		Black	3.1219	.71670	5910
		Hispanic	3.2290	.72595	10643
		Indian/ Nat Am.	3.2518	.76652	191
		M	3.3031	.66080	1163
		White	3.3891	.61051	19718
		Total	3.3077	.66834	39678
	Total	Asian	3.3647	.65703	2874
		Black	2.7455	.90111	18928
		Hispanic	2.9220	.90293	21802
		Indian/ Nat Am.	2.9080	.92353	383
		M	3.0654	.83233	2008
		White	3.1850	.78378	30831
		Total	3.0043	.86773	76826

Figure 51 illustrates the mean for GPA scores for Black students were 3.12 (*SD* = .716) for access to advanced coursework intervention and 2.57 (*SD* = .924) for non-intervention, a significant mean difference of 0.55% CI [-.572, -.523], p = .000. The mean for GPA scores for Hispanic students were 3.22 (*SD* =. 726) for access to advanced coursework intervention and 2.62 (*SD* = .956) for non-intervention, a significant mean difference of 0.6% CI [-.621, -.579], p = .000, but this difference was not statistically significant for Asian and Indian students.

Figure 51.1. Descriptive Statistics Absences.

Descriptive Statistics

	Adv Coursework	Ethnicity	Mean	Std. Deviation	N
Absences	No	Asian	.753959	1.4297790	821
		Black	1.193040	2.6558785	13018
		Hispanic	1.462765	2.7120300	11159
		Indian/ Nat Am.	1.239583	2.6966910	192
		M	1.400000	2.6539785	845
		White	1.379465	2.6993385	11113
		Total	1.325078	2.6689467	37148
	Yes	Asian	.588407	1.5055460	2053
		Black	.676819	1.6231906	5910
		Hispanic	.839143	1.7402941	10643
		Indian/ Nat Am.	.931937	1.7742533	191
		M	.834050	1.6726440	1163
		White	.794350	1.5241141	19718
		Total	.780029	1.6056213	39678
	Total	Asian	.635699	1.4859333	2874
		Black	1.031858	2.3939414	18928
		Hispanic	1.158334	2.3108449	21802
		Indian/ Nat Am.	1.086162	2.2859442	383
		M	1.072211	2.1586929	2008
		White	1.005254	2.0471347	30831
		Total	1.043579	2.2022563	76826

Figure 51.1 illustrates the mean for absences for Black students were .676 (*SD* =. 1.62) for access to advanced coursework intervention and 1.19 (*SD* = 2.65) for non-intervention, a significant mean difference of -0.54% CI [-.449, -.583], p =. <001. The mean for absences for Hispanic students were .839 (*SD* =1.74) for access to advanced coursework intervention and 1.46 (*SD* = 2.71) for non-intervention, a significant mean difference of -0.62% CI [-.566, -.682], p =. <001.

Figure 51.2. Descriptive Statistics Discipline.

Descriptive Statistics

	Adv Coursework	Ethnicity	Mean	Std. Deviation	N
Discipline	No	Asian	.031669	.2240879	821
		Black	.127900	.4873799	13018
		Hispanic	.097052	.4622216	11159
		Indian/ Nat Am.	.119792	.5522197	192
		M	.168047	.7270479	845
		White	.110141	.5250379	11113
		Total	.112065	.4949056	37148
	Yes	Asian	.009742	.1205194	2053
		Black	.026565	.2052077	5910
		Hispanic	.023208	.2104370	10643
		Indian/ Nat Am.	.020942	.1435679	191
		M	.016337	.1457652	1163
		White	.018967	.1609719	19718
		Total	.020692	.1803132	39678

Figure 51.2 illustrates the mean for discipline for Black students were .026 (*SD* = .205) for access to advanced coursework intervention and .127 (*SD* = .487) for non-intervention, a significant mean difference of -0.10% CI [.090, -.113], p =. <001. The mean for discipline for Hispanic students were .023 (*SD* =.210) for access to advanced coursework intervention and .097 (*SD* = .462) for non-intervention, a significant mean difference of -0.9% CI [.064, .084], p =. <001, but this difference was not statistically significant for Asian and Indian students.

Figure 52. Estimated Marginal Mean Advanced Coursework.

Advanced Coursework

Dependent Variable	Adv Coursework	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
GPA	No	2.736	.012	2.713	2.760
	Yes	3.295	.011	3.273	3.317
Absences	No	1.238	.032	1.175	1.301
	Yes	.777	.030	.718	.837
Discipline	No	.109	.005	.098	.120
	Yes	.019	.005	.009	.029

Figure 52, the marginal means for advanced coursework were GPA 3.295 (SE = .011) for intervention and 2.736 (SE = .012) non-intervention, mean difference of 0.56. The marginal means for advanced coursework were absences .7775 (SE = .030) for intervention and 1.238 (SE = .032) non-intervention, a mean difference of -0.461. The marginal means for advanced coursework were discipline .019 (SE = .055) for intervention and .109 (SE = .005) non-intervention, a mean difference of -0.09.

Kokemuller (2019) suggests that students who have access to advanced coursework impact underrepresented groups' outcomes. Allowing students to access specific college credit classes while still in high school creates college efficiency, money savings, and develops mental stimulation. College efficiency occurs when students can earn high school and college credit. Money savings happens when students take college classes while in high school, including financial benefits for students and families. The college pays its instructor to teach the course, and in most cases, the high school usually provides the funding for the students' courses. By starting college with college credits, students and their families will pay for fewer course credits. Mental stimulation happens when a high school student takes college classes. They will experience the standards of learning required of college-level students. A college-level class can

provide a more significant challenge. Students who participate in advanced coursework show that they have the intelligence and study habits to do well in college (Kokemuller, 2019).

Research Question 2

What impact does equitable master scheduling have on closing the Achievement Gap?

Independent Variable	Dependent Variable - 1	Dependent Variable - 2	Dependent Variable - 3	Dependent Variable - 4
Professional Development	Access to Advanced Coursework	Grade Point Average (GPA)	Attendance (Absences)	Discipline (ODR)
Pre/Post				

Quantitative Data Analysis - One-way Repeated Measures MANOVA

A one-way repeated measures MANOVA was conducted to determine whether there was a statistically significant difference in the dependent variables pre and post intervention.

Figure. 53 Within – Subjects Factors.

Within-Subjects Factors

Measure	Intervention	Dependent Variable
Access	1	@20Access
	2	@21Access
GPA	1	@20GPA
	2	@21GPA
Absences	1	@20Absencs
	2	@21Absences
Discipline	1	@20Discipline
	2	@21Discipline

Figure. 54 Multivariate Tests.

Multivariate Tests[a]

Effect			Value	F	Hypothesis df	Error df	Sig.
Between Subjects	Intercept	Pillai's Trace	1.000	3027.433[b]	4.000	2.000	<.001
		Wilks' Lambda	.000	3027.433[b]	4.000	2.000	<.001
		Hotelling's Trace	6054.866	3027.433[b]	4.000	2.000	<.001
		Roy's Largest Root	6054.866	3027.433[b]	4.000	2.000	<.001
Within Subjects	Intervention	Pillai's Trace	.990	49.580[b]	4.000	2.000	.020
		Wilks' Lambda	.010	49.580[b]	4.000	2.000	.020
		Hotelling's Trace	99.160	49.580[b]	4.000	2.000	.020
		Roy's Largest Root	99.160	49.580[b]	4.000	2.000	.020

a. Design: Intercept
Within Subjects Design: Intervention

b. Exact statistic

Figure 54 illustrates the professional development intervention did elicit statistically significant changes in access to coursework, GPA, absences and discipline. The figure illustrates the interaction within subjects on the combined dependent variables, $F(4) = 49.580$, $p = 0.020$, Pillai's Trace $\Lambda = 0.20$, Hotelling's Trace = 0.20 and Roy's Largest Root = 0.20

Follow up univariate two-way ANOVAs were run. These showed a statistically interaction effect pre and post intervention on each variable; access, grade point average, absences and discipline.

Figure. 55 Univariate Tests Intervention.

Univariate Tests

Source	Measure		Type III Sum of Squares	df	Mean Square	F	Sig.
Intervention	Access	Sphericity Assumed	.005	1	.005	18.434	.008
		Greenhouse-Geisser	.005	1.000	.005	18.434	.008
		Huynh-Feldt	.005	1.000	.005	18.434	.008
		Lower-bound	.005	1.000	.005	18.434	.008
	GPA	Sphericity Assumed	.050	1	.050	10.010	.025
		Greenhouse-Geisser	.050	1.000	.050	10.010	.025
		Huynh-Feldt	.050	1.000	.050	10.010	.025
		Lower-bound	.050	1.000	.050	10.010	.025
	Absences	Sphericity Assumed	.915	1	.915	28.159	.003
		Greenhouse-Geisser	.915	1.000	.915	28.159	.003
		Huynh-Feldt	.915	1.000	.915	28.159	.003
		Lower-bound	.915	1.000	.915	28.159	.003
	Discipline	Sphericity Assumed	.013	1	.013	25.149	.004
		Greenhouse-Geisser	.013	1.000	.013	25.149	.004
		Huynh-Feldt	.013	1.000	.013	25.149	.004
		Lower-bound	.013	1.000	.013	25.149	.004
Error(Intervention)	Access	Sphericity Assumed	.001	5	.000		
		Greenhouse-Geisser	.001	5.000	.000		
		Huynh-Feldt	.001	5.000	.000		
		Lower-bound	.001	5.000	.000		
	GPA	Sphericity Assumed	.025	5	.005		
		Greenhouse-Geisser	.025	5.000	.005		
		Huynh-Feldt	.025	5.000	.005		
		Lower-bound	.025	5.000	.005		
	Absences	Sphericity Assumed	.162	5	.032		
		Greenhouse-Geisser	.162	5.000	.032		
		Huynh-Feldt	.162	5.000	.032		
		Lower-bound	.162	5.000	.032		
	Discipline	Sphericity Assumed	.002	5	.000		
		Greenhouse-Geisser	.002	5.000	.000		
		Huynh-Feldt	.002	5.000	.000		
		Lower-bound	.002	5.000	.000		

Figure 55 illustrates the statistically significant interaction on each dependent variable. The pre and post show a significant interaction to access $F(1) = 18.434$, Spherificity Assumed = 0.008, Greenhouse Geisser= 0.008, Hyunth-Feldt= 0.008, Lower-bound = 0.008. The pre and post show a significant interaction to GPA $F(1) = 10.010$, Spherificity Assumed = 0.025, Greenhouse Geisser= 0.025, Hyunth-Feldt = 0.025, Lower-bound = 0.025. The pre and post show a significant interaction to absences $F(1) = 28.159$, Spherificity Assumed = 0.003, Greenhouse Geisser= 0.003, Hyunth-Feldt= 0.003, Lower-bound = 0.003. The pre and post show

a significant interaction to discipline $F(1) = 25.149$, Spherificity Assumed = 0.004, Greenhouse Geisser= 0.004, Hyunth-Feldt= 0.004, Lower-bound = 0.004.

Figure. 56 Estimated Marginal Means Intervention.

Estimates

Measure	Intervention	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Access	1	.535	.057	.387	.682
	2	.574	.053	.437	.711
GPA	1	3.043	.085	2.825	3.262
	2	2.914	.121	2.602	3.226
Absences	1	1.189	.086	.968	1.411
	2	.637	.113	.347	.927
Discipline	1	.074	.013	.039	.108
	2	.009	.003	.002	.016

Figure 56 illustrates the marginal means for the pre and post intervention Access were 0.535 (SE = .057) for pre intervention and 0.574 (SE = .053) non-intervention, a mean difference of .039. The marginal means for the pre and post intervention GPA were 3.043 (SE = .085) for pre intervention and 2.914 (SE = .121) post-intervention, a mean difference of 0.129. The marginal means pre and post for absences 1.189 (SE = .0.086) for pre intervention and 0.637 (SE = .113) post intervention, a mean difference of -0.552. The marginal means for discipline .074 (SE = .013) for pre intervention and .009 (SE = .005) post-intervention, a mean difference of 0.065.

Figure. 57 Descriptive Statistics Ethnicity.

Descriptive Statistics

Group		N	Mean
Asian	20Access	1	.7081081081
	21Access	1	.7460770328
	20GPA	1	3.361108108
	21GPA	1	3.330998573
	20Absencs	1	.8156862745
	21Absences	1	.2478753541
	20Discipline	1	.0209150327
	21Discipline	1	.0014164306
	Valid N (listwise)	1	
Black	20Access	1	.3057148927
	21Access	1	.3667017914
	20GPA	1	2.798313151
	21GPA	1	2.489479452
	20Absencs	1	1.104895105
	21Absences	1	1.021050438
	20Discipline	1	.1217605923
	21Discipline	1	.0093789079
	Valid N (listwise)	1	
Hispanic	20Access	1	.4750045118
	21Access	1	.5407223796
	20GPA	1	2.938693377
	21GPA	1	2.764934490
	20Absencs	1	1.429483860
	21Absences	1	.8416203060
	20Discipline	1	.0844122216
	21Discipline	1	.0066063978
	Valid N (listwise)	1	
Indian/ Nat Am.	20Access	1	.5056179775
	21Access	1	.5161290323
	20GPA	1	2.895393258
	21GPA	1	2.792150538
	20Absencs	1	1.219780220
	21Absences	1	.7021276596
	20Discipline	1	.0659340659
	21Discipline	1	.0212765957
	Valid N (listwise)	1	
MultiRacial	20Access	1	.5785288270
	21Access	1	.6198019802
	20GPA	1	3.073081511
	21GPA	1	2.974415842
	20Absencs	1	1.291746641
	21Absences	1	.5332031250
	20Discipline	1	.0806142035
	21Discipline	1	.0078125000
	Valid N (listwise)	1	
White	20Access	1	.6351136965
	21Access	1	.6526595745
	20GPA	1	3.192429931
	21GPA	1	3.130489362
	20Absencs	1	1.274815004
	21Absences	1	.4771395076
	20Discipline	1	.0676192906
	21Discipline	1	.0072945161
	Valid N (listwise)	1	

Chapter V

Summary of Results and Product

Introduction

This study provided a quantitative study of the real and measurable gap that exists in our country and how our school system has failed to provide equitable access to advanced coursework for Black and Hispanic students. In a visual format, this summary also proves that the implementation of a deliberate and strategic system for scheduling high school students provided historically underrepresented student groups enhanced access to college credit and college-level courses.

Summary of Results

The study was focused on how to use the master scheduling process to increase equity by providing more students access to advanced coursework. This access positively impacts the academic performance of the historically underrepresented groups.

Research Question

1. How does access to advanced coursework impact student outcomes in underrepresented groups?

Findings:

- Access to advanced coursework has a statistically significant impact on student outcomes for all student demographic groups.
- Access has not been equitable across student demographic groups.

The graphs represent the relationship of the dependent variables to the independent variables and to their correlation to one another.

Figure. 58 Mean GPA/Advanced Coursework.

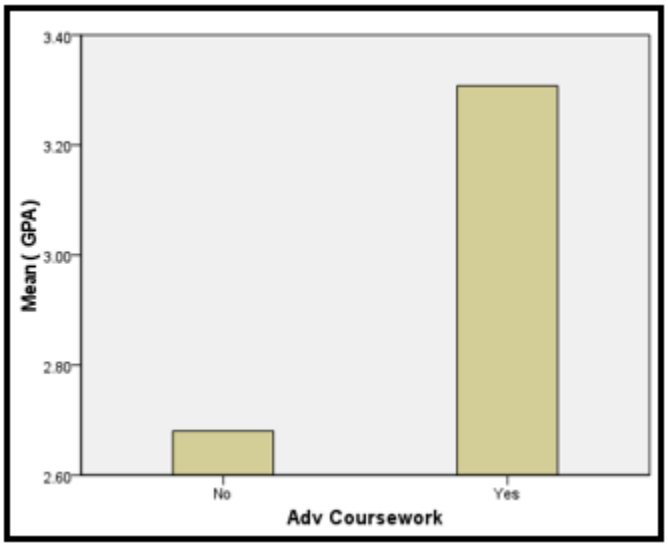


Figure 58 illustrates the Mean GPA based on access to advanced coursework.

Figure. 59. Mean Absences/Advanced Coursework.

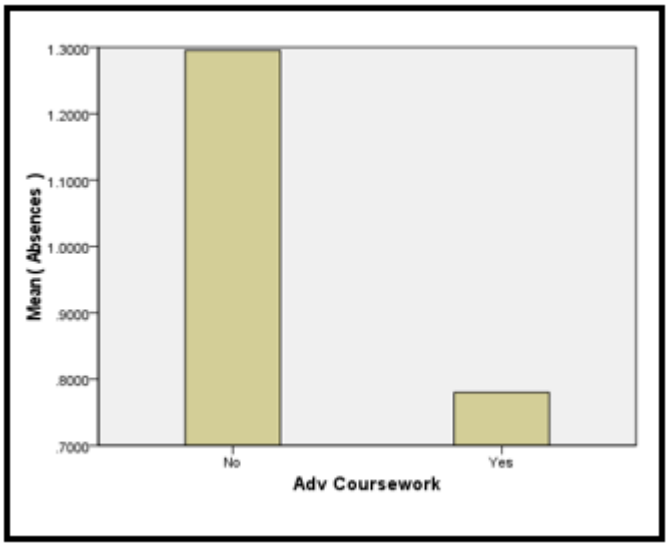


Figure 59 illustrates the mean absences based on access to advanced coursework.

Figure. 60 Mean Discipline/Advanced Coursework.

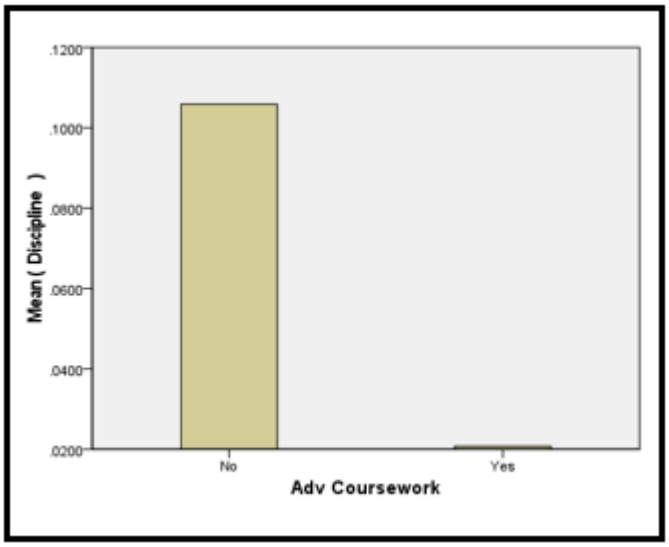


Figure 60 illustrates the mean discipline based on access to advanced coursework.

Figure. 61 Mean Absences/GPA.

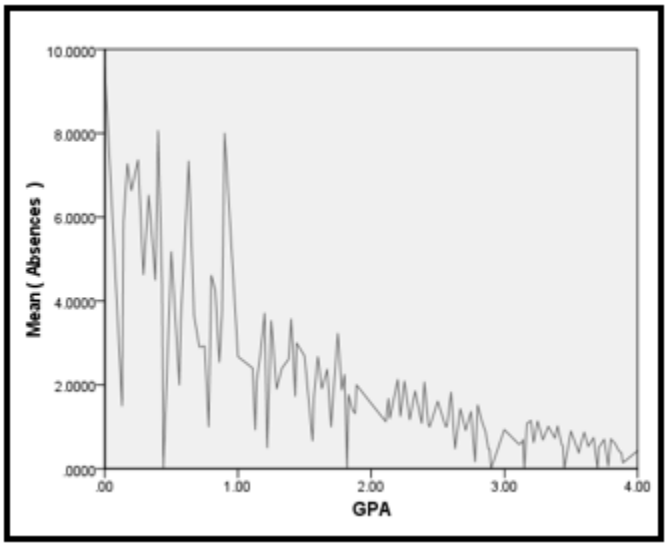


Figure 61 illustrates the negative correlation between the mean absences and GPA.

Figure. 62 Mean GPA/Discipline.

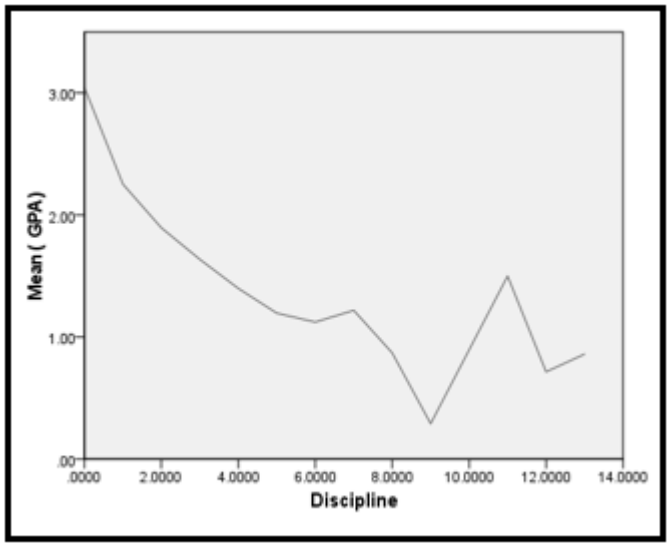


Figure 62 illustrates the negative correlation between mean GPA and discipline.

Figure. 63 GPA/Coursework.

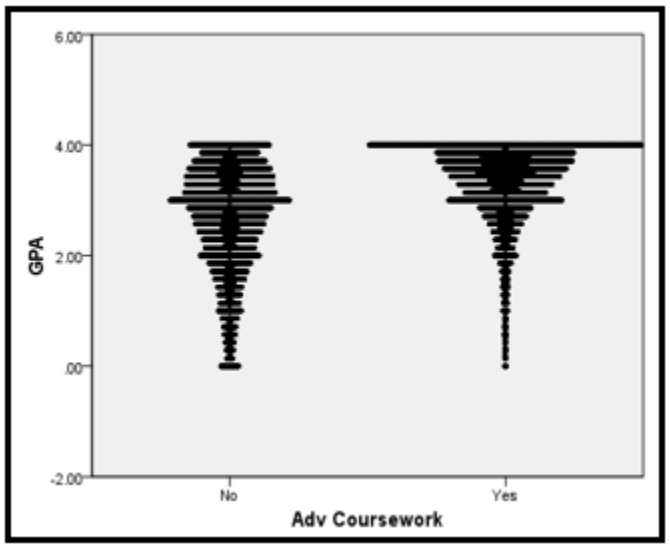


Figure 63 illustrates the GPA distribution based on access to advanced coursework.

Figure. 64 Ethnicity GPA.

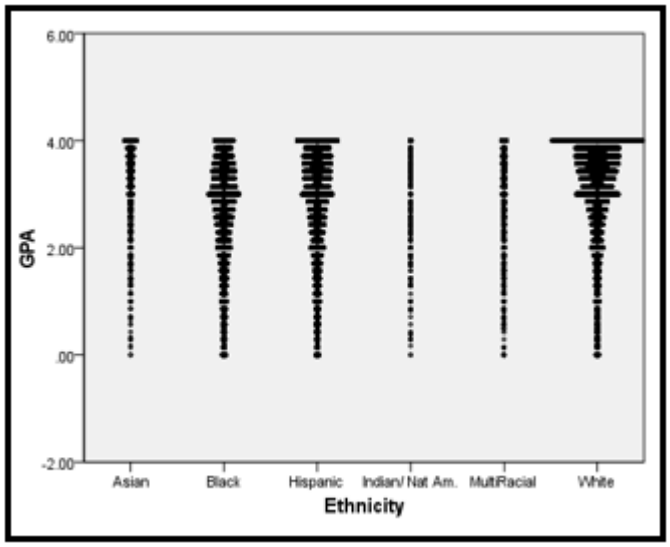


Figure 64 illustrates the GPA distribution based on ethnicity.

Figure. 65 Multiple Line Mean of GPA, Mean of Absences, Mean of Discipline by Advanced Coursework.

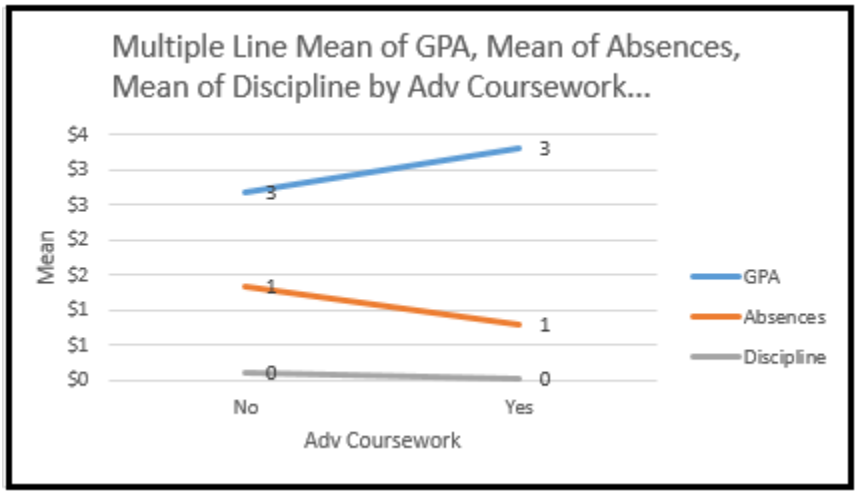


Figure 65 illustrates the mean GPA, mean absences and mean discipline based on access to advanced coursework.

Research Question 2

What impact does equitable master scheduling have on closing the achievement gap?

Findings:

- Advanced Coursework access increased for all student demographic groups post intervention.
- Black, Hispanic and Mixed race students experienced the largest percent increases in access to advanced coursework post intervention.
- The intervention increased both overall and equitable access to advanced coursework.

The graphs represent the dependent variable MEAN by ethnicity from school year 2019, 2020 and 2021.

Figure. 66 Advanced Coursework FY19-21.

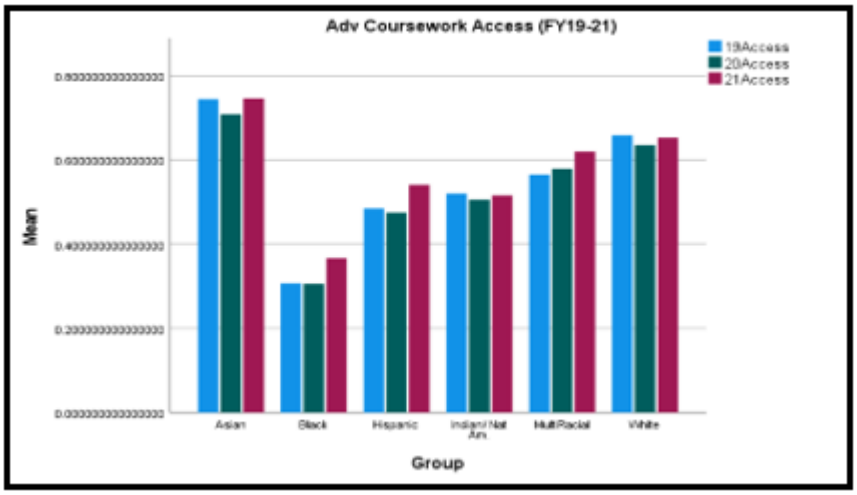


Figure 66 illustrates the change in percentage access to advanced coursework by ethnicity FY19 – FY 21.

Figure. 67 GPA (FY19-21).

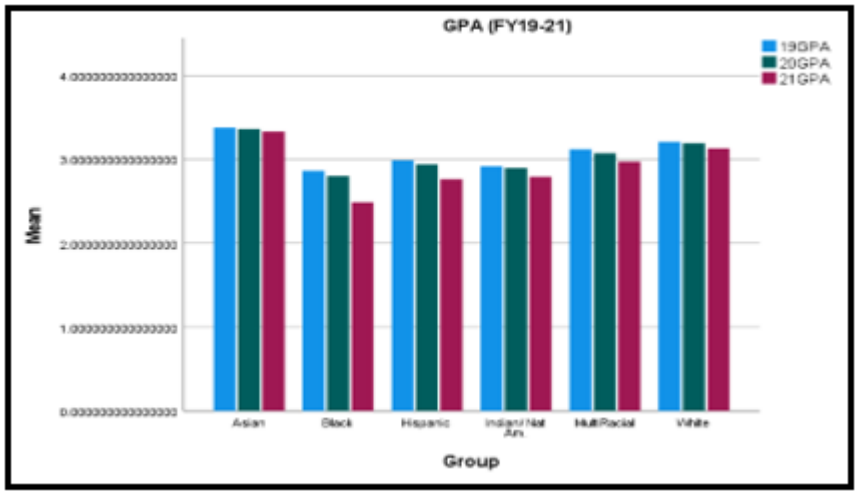


Figure 67 illustrates the change in Mean GPA by ethnicity FY19 – FY 21.

Figure. 68 Absences FY19-21.

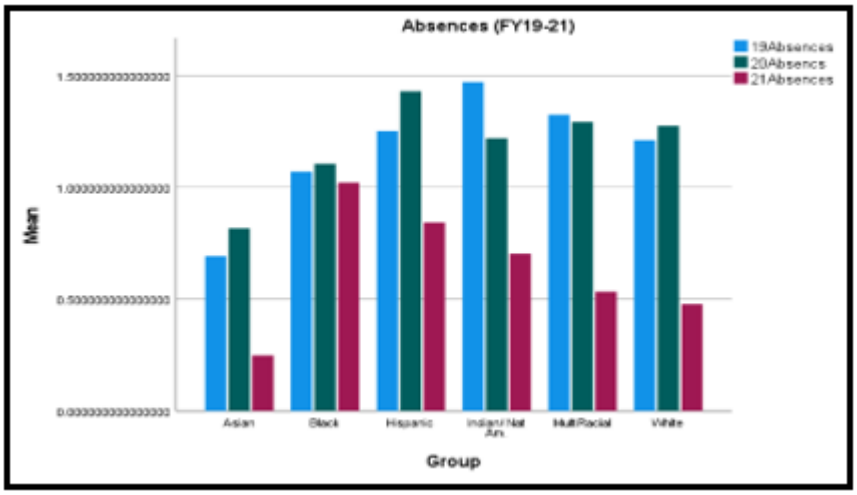


Figure 68 illustrates the change in Mean attendance absences by ethnicity FY19 – FY21.

Figure. 69 Discipline FY19-21.

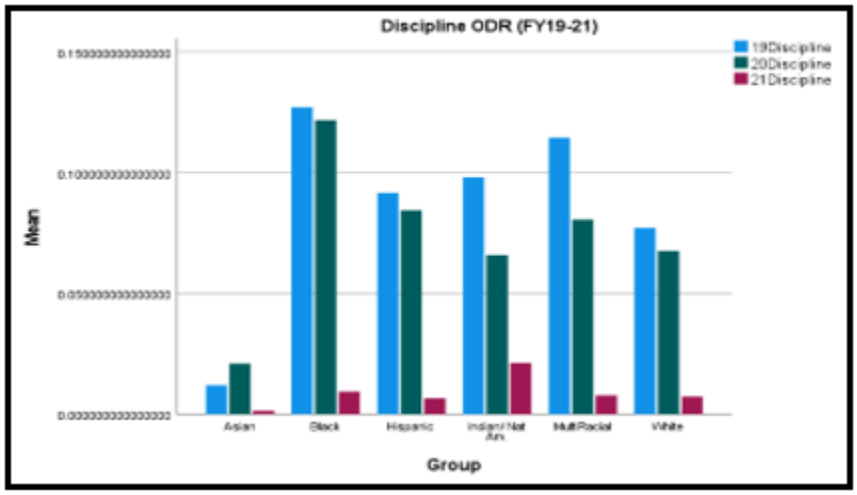


Figure 69 illustrates the change in Mean discipline (ODR) by ethnicity FY19 – FY21.

Limitations of the Study

- Student Population**:** When comparing ethnicity of the schools included in the research to the urban district, there exists a lower percentage of Black and Hispanic students. Additionally, there was a lower percentage of students on free/reduced lunch, and a lower percentage of schools classified as Title 1.
- Data: Quarter one academic data available as opposed to yearly academic data.
- Covid– 19: There is a strong likelihood that the dependent variables included in this study were impacted, specifically those from the 2021 school year. Learning options were provided to the student families that led to a significant number of students being switched to virtual learning. Additionally, state testing was halted dictating that standardized test scores be omitted from this study.

Recommendations

To continue this study methodology over the course of additional timelines/school years and include additional dependent variables and/or student outcome data. Additional outcome

data can include standardized test score performance, college level exams passed and weighted GPAs.

Product – Intervention

Description of Training/Professional Development. This researcher will design and facilitate a series of professional development workshops in Improving Equity through Master Scheduling at a large urban county in the southeastern United States. All professional development workshops in master scheduling will be based on current research. Each professional development workshop in Equity Master Scheduling will be quarterly. Each professional development workshop should not exceed two hours and consist of four modules, with each highlighting equity. The four modules will be:

1- Review of prior year performance to identify strengths and areas for improvement AP/AICE/IB Program review and analysis.
2- Developing an action plan for implementation developing course offerings, course selection and budget planning.
3- Finalizing the action plan for implementation finalizing course offerings, course selection and budget planning.
4- Preparing and finalizing master schedule for implementation.

The professional development workshops in Equity Master Scheduling will challenge principals in a large urban county in the southeastern United States to examine how creating an equitable master schedule may impact learning and student achievement to ultimately narrow or close the achievement gap between Black, White, and Hispanic students.

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