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The Effect Engagement and Positive Relationships have on African American Students' Math Success in a Large Suburban High School

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The Effect Engagement and Positive Relationships have on African American Student's Math Success in a Large Suburban High School

The Effect Engagement and Positive Relationships have on African American Student's Math Success in a Large Suburban High School

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in fulfillment of final requirements for the MAED

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The Effect Engagement and Positive Relationships have on African American Student's Math Success in a Large Suburban High School

Abstract

Nationwide, African American students have significantly lower advanced placement credits, standardized test scores, and grades (Musu-Gillette, Brey, McFarland, Hussar, Sonnenberg, 2017). The literature review will explore reasons why African American students are underperforming and emphasize the different methods that can lead to higher academic achievement in math. Data from multiple articles were investigated, and the similarities and differences between the influences and best practices for African American students were addressed. Once these best practices were identified, a case study was conducted and conclusions were drawn. This action research project will focus on how engagement and relationships can increase mathematical performance for African American students.

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Research shows that African American high school students are graduating with less AP credits and underperforming in standardized tests in comparison with other races. Figure 1 represents the percentage of fall 2009 ninth graders earning credit in Advanced Placement or International Baccalaureate courses by academic subject area and ethnicity (Musu-Gillette, Brey, McFarland, Hussar, Sonnenberg, 2017). African American students not only have the lowest percentage of earned AP or IB credits in math, but all other races have a percentage of twice as high or more.

Figure 13.1. Percentage of fall 2009 ninth-graders earning any credit in Advanced Placement (AP) or International Baccalaureate (IB) courses, by academic subject area and race/ethnicity: 2013

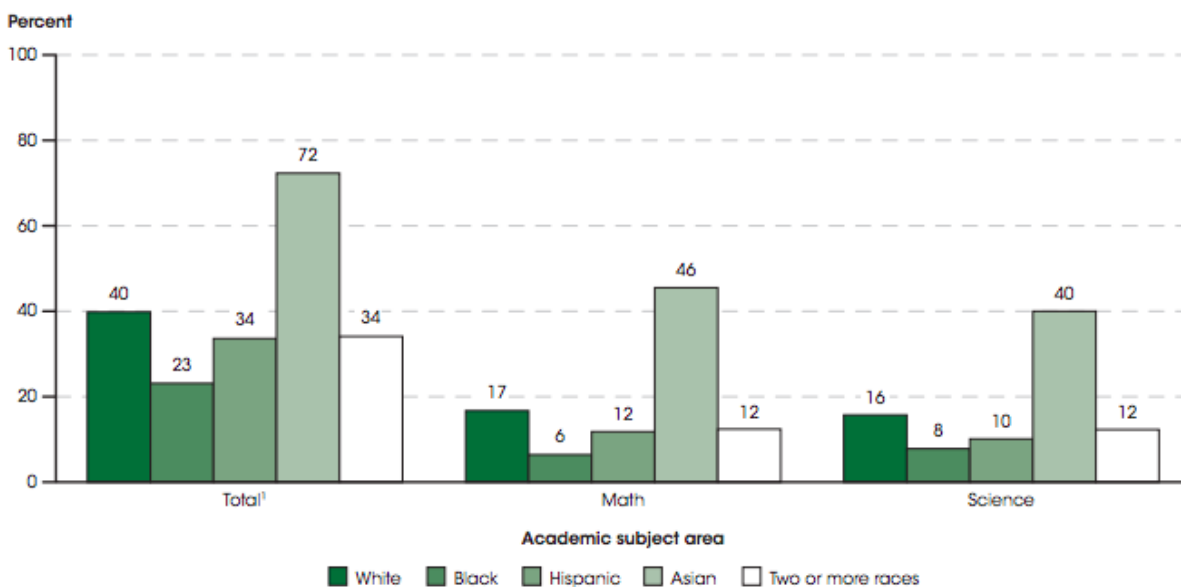


Figure 1. Percentage of fall 2009 ninth-graders earning any credit in AP or IB courses

Research within Minnesota highlights more concerning statistics. Figure 2 compares the Minnesota MCA math results for all 11th-grade students to 11th grade African American students. In 2018, 47.5% of 11th-grade students across all races either met or exceeded the expectations for the Math portion of the MCA. In the same year, only 17.8% of 11th grade African American students met or exceeded the expectations for the Math portion of the MCA.

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This suggests African American students are performing below average when compared to all students.

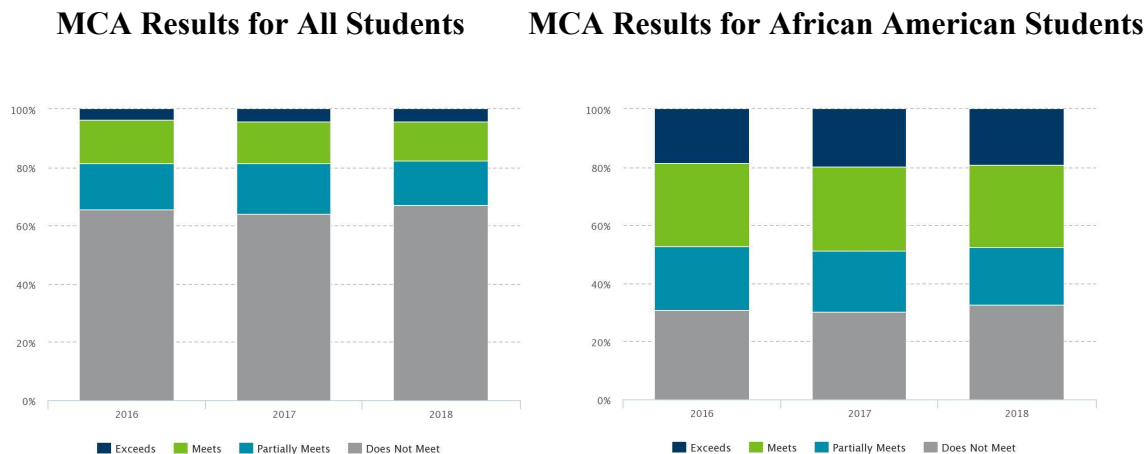


Figure 2. MCA Results for All Students and MCA Results for African American Students

Similar results are reflected in a large, suburban high school in Minnesota. During the 2017-18 school year 13.4% of all 9-12th grade students earned a D or F in math. When separated by race, figure 3 shows 9.4% of Caucasian students earned a D or F while 32% of African American students earned a D or F in these same math courses.

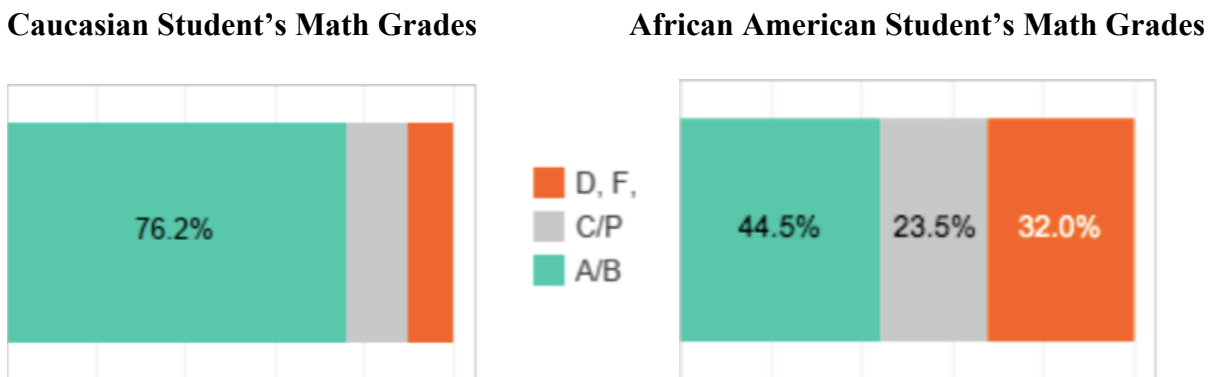


Figure 3. Comparison of the average Caucasian Students Math Grades and African American Students Math Grades

After comparing national data to Minnesota schools, it’s evident that African American students are underperforming in multiple areas, especially mathematics. Since this is an ongoing

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issue that has not seen much reliable improvements, there is a need to gather and present information about the different interventions that teachers can use to close this racial gap in math performance. The purpose of this action research study is to explore reasons why African American students are underperforming and emphasize the different methods that can lead to higher academic achievements. The literature review will focus on the effect single parenthood and self-efficacy has on African American students and how engagement and relationships can increase mathematical performance.

When exploring the research of African American student's success in high school, a few different theories came up consistently. Dweck's "Fixed vs. growth mindset" theory plays an important role in the triumph of these students. According to Dweck, people with a growth mindset have an underlying belief that their learning and intelligence can grow with time and experience. When a student has a fixed mindset, they believe that their basic abilities, intelligence, and talents are fixed traits (Dweck, 2006).

Another theory involved in the success of these African American students is Bandura's theory of "Self-efficacy". "Students with higher self-efficacy also lead to an approach rather than avoidance behavior when confronted with a problem" (Thompson, 2015). Students with low self-efficacy may depend ineffectively on others or become despondent, making minimal effort to better themselves or the problem (Thompson, 2015). My literature review was guided by these theories and other ideas that lead to better understand and improve the learning of these students.

Through my research, I learned that many African American students come to school with a fixed mindset or low self-efficacy. After learning more about each theory, I was able to discover strategies that lead students to a higher belief in themselves and better understanding of growth mindset. In the following section of this action research, I will identify other reasons that

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lead African American high school students to experience less success than others and what strategies teachers can use to help narrow this achievement gap.

Review of Literature

Influences: Single Parenthood

Although there is disagreement regarding what underlying causes contribute to African Americans underperforming in school, research suggests that single parenthood and underperformance in school are strongly correlated. According to the United States Department of Education, in 2017, 84% of Minnesota students graduated high school in four years. The percentage of students graduating high school dropped to 56% when raised by a single father or mother (Musu-Gillette, Brey, McFarland, Hussar, Sonnenberg, 2017). If children from single-parent families can progress to college, the completion rate is 26% lower than students with two-parent households (Strayhorn, 2015).

Studies show in 2015, over 65% of African American children were born to a single mother (Threlfall, 2015). This statistic does not seem to be improving as data from 1960 to 2013 shows the proportion of African American children living with a single parent has more than doubled (Threlfall, 2015). Figure 4 below compares single-parent to two-parent families, measuring the rate of school years completed and percentage of college completion. From the data, it's evident that growing up in a two-parent household can positively impact educational careers. Since a large portion of African American students have single parents, this puts these children at an academic disadvantage.

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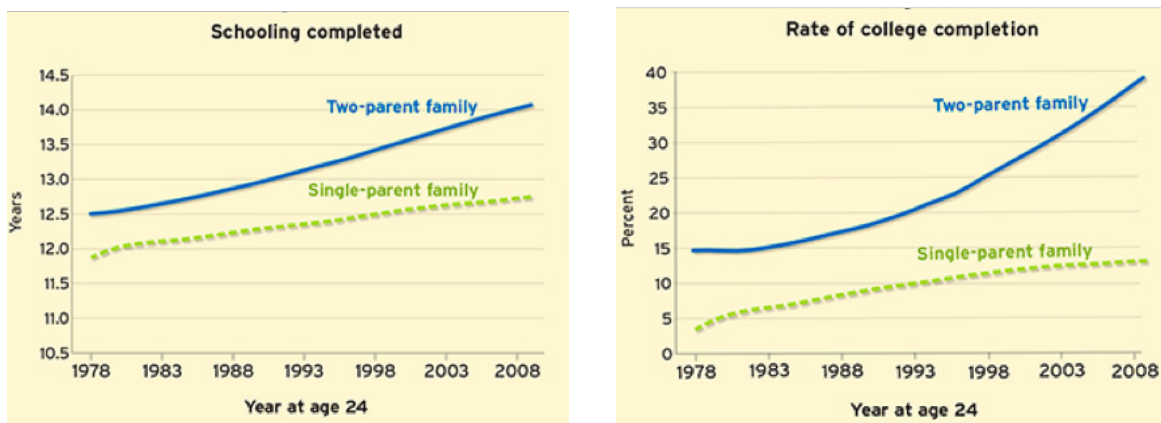


Figure 4. Schooling Completed and Rate of College Completion

Influences: Self-Efficacy

Academic self-efficacy refers to an individual's confidence in his or her ability to succeed in academic tasks and pursuits (Uwah, McMahon, Furlow, 2008). Research shows that self-efficacy contributes greatly to academic achievement and the racial achievement gap (Thompson, 2015). Students with higher self-efficacy work harder and develop better goal-setting and time-monitoring strategies than other students (Uwah, McMahon, Furlow, 2008). "Students with higher self-efficacy also lead to an approach rather than avoidance behavior when confronted with a problem" (Thompson, 2015). Students with low self-efficacy may depend ineffectively on others or become despondent, making minimal effort to better themselves or the problem (Thompson, 2015). Research suggests that teachers can strengthen struggling learners' self-efficacy "by linking new work to recent successes, teaching needed learning strategies, reinforcing effort and persistence, and helping them succeed on the very task they hope to fail" (Thompson, 2015 as cited by Margolis & McCabe, 2004).

Uwah, McMahon, and Furlow studied a predominately African American school in a large southeastern city where they surveyed forty African American students' educational career

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goals. Their research indicates that African American differ very little from Caucasian's educational aspirations. Uwah, McMahon, and Furlow research concluded that although African American students had high aspirations, research states they are unable to attain their educational goals.

Evidence-based practices: Meaningful Learning Experiences

Engaging students holistically (behaviorally, emotionally, and cognitively) can positively improve academic achievement for middle and high school students (Griffin, Cooper, Metzger, Golden, & White, 2010). In *Multiplication is for White People: Raising Expectations for Other People's Children*, Lisa Delpit talks about the importance of meaningful learning experiences and how these types of experiences increase engagement. "Teaching is situated in a context of real experiences, and students should have multiple opportunities to use the knowledge or skills they are acquiring" (Delpit, 2012). Instead of giving students fill in the blank worksheets with a word bank; give them an open-ended, applicable problem related to their interests and have them explain to each other the method they chose for solving (Delpit, 2012). When students are given relatable learning experiences and student choice with multiple opportunities to learn, academic achievement is increased (Delpit, 2012; Griffin, Cooper, Metzger, Golden, & White, 2010).

Educational research also shows that children learn best when their culture and language are reflected in the school's curriculum (Wormeli, 2003). "In today's schools, students of color are taught a test-driven, eurocentric curriculum that does not connect with their historical and sociocultural experiences" (Wormeli, 2003). Creating a culturally relevant environment with meaningful learning experiences can help bridge the academic disadvantages African Americans encounter.

Evidence-based practices: Role Models

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In 2015, the National Center for Educational Statistics showed nearly 4 million public school educators are primarily Caucasian. The 2015 to 2016 data collection of a nationally representative sample of elementary and secondary public school teachers and administrators, showed about 80% of all public school teachers are Caucasian, 9% Hispanic, 7% African American, and 2% are Asian. Meanwhile, public schools are becoming more and more diverse with 51% of students in 2016 being students of color (Musu-Gillette, Brey, McFarland, Hussar, Sonnenberg, 2017). The lack of diverse teachers in our education system is influencing students' learning when role models only come from one ethnicity (Lindsay & Hart, 2017). Students are more engaged in learning when the teacher is either the same race or explains the importance learning has for all races (Anderson, 2018). Dr. Anderson states that if teachers bring guest speakers or host skype conference calls with educators of different racial backgrounds, the importance and desire to learn increases for all students. Exposure to same-race teachers is also associated with reduced rates of exclusionary discipline for African American students (Lindsay & Hart, 2017). "This relationship holds for elementary, middle, and high school grade ranges for male and female students, and for students who do and do not use free and reduced-price lunch" (Lindsay & Hart, 2017). When students see someone similar to them regarding background or race being successful in the content being taught, they are more prone to motivation and engagement.

Evidence-based practices: Growth Mindset

As previously noted, self-efficacy is difficult to maintain for many of our African American students. To sustain self-efficacy, teachers must first show they believe in every student (Griffin, Cooper, Metzger, Golden, & White, 2010). When educators in high performing schools are convinced of their students' brilliance, humanity, and inherent intellectual capability,

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their instructional approaches are aligned with these beliefs (Deplit, 2012). Once students know their teachers believe in them, they must be taught how to believe in themselves. Having a growth mindset is the belief that intellectual ability may be developed and grown with factors such as effort (Kelberlau-Berks, 2015). "Teaching about these mindsets and the functioning of the brain can help students overcome the negative stereotypes that exist and gain a new motivation to persist and believe in the power of effort and the power within themselves" (Kelberlau-Berks, 2015). Dr. Boaler states "the implications of this mindset are profound; students with a growth mindset work and learn more effectively, displaying a desire for challenge and resilience in the face of failure." Studies show that around 40% of United States students display a growth mindset, another 40% has a fixed mindset, and the rest have a mix of the two. When students shift their mindsets from fixed to a growth mindset, they immediately start performing at higher levels in school (as cited by Dweck, 2006). Creating a growth mindset for African American students can potentially increase effort for academic achievement.

Evidence-based practices: Relationships

Studies including racially diverse samples show that students who are emotionally connected in secondary school are more likely to succeed in school than those who don't see the importance in school (Allain, 2011). Additional literature indicates that effective connections at school promote academic achievement (Kelberlau-Berks & Darla 2015). "Significant learning cannot take place until a significant relationship has been established. You cannot teach a child that you do not love, respect, and understand. Children know when you love and respect them and when you don't" (Kelberlau-Berks & Darla, 2015 as cited by in Kunjufu, 2002). Teachers need to truly care about and believe in their students, not just to make students feel good; but to improve learning and achievement (Kelberlau-Berks & Darla, 2015). The teacher must be

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emotionally connected with students because that is what makes it possible for the child to identify and internalize the teacher's disposition towards learning (Pitre, 2014 as cited by Comer, Joyner, & Ben-Aive, 2004). Without that emotional contact, students may reject school and become ambivalent or reluctant to get involved and therefore underperform (Pitre, 2014).

Conclusion

Research shows it is hard to ignore the academic achievement gap in place for African American high school students. The research shows this is an issue that will not improve until schools and the teachers intervene with evidence-based practices. Understanding the outside influences that African American students encounter is important in knowing how to improve academic achievement. With having this knowledge, teachers can begin improving engagement and building relationships that will help their students become lifelong learners. Once teachers understand influences on African American academic performance and focus on increasing diverse role models, fostering growth, and improving relationships, African Americans academic performance can improve. After identifying all these evidence based practices, the case study can begin.

Methodology

The purpose of this study was to measure the effect engagement and relationships have on African American high school student's success in mathematics. In order to do this, data was collected in a variety of different ways. This study consisted of two types of data. There was qualitative data involving attendance records, surveys, and participant observations and quantitative data consisting of pre- and post-summative assessments. With each of these data tools, results were collected to determine if there was an increase in student's engagement and

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relational capacity. This data then helped identify if that improved the mathematical performance for these high school African American students.

The population for this action research study was taken from 9th and 10th grade African American students enrolled at a large suburban high school in Minnesota. The sample size included 10 African American students enrolled between two Geometry B courses during 4th term in the 2018-19 school year. The sample included 6 males and 4 females. The two geometry courses studied were required classes and the sample was representative of the high school population. There were no students with IEP's or 504's in this study.

Many tools were used during the data collection portion of this study. Pre- and post-assessments were given in a traditional short answer and free-response test format. Google form surveys were given to students before and after intervention strategies were used (see Appendix A), attendance records were compared, and teacher observations were kept in a teacher journal to keep track of the intervention strategies being used and student observational data.

Each tool had a specific purpose in collecting data on whether these engagement and relationship building strategies were increasing mathematic success for these African American high school students. Although taking attendance is a normal everyday event, taking attendance during the Ch. 8 and Ch. 11 units was very important with the interest of comparing these records. By comparing attendance records before and during the intervention, the data identified whether the intervention strategies had increased student attendance. Research states that increased engagement and positive teacher-student relationships have a strong correlation with increased attendance and as a result, the data helped identify whether these intervention strategies increased attendance for the African American students. The google surveys were given to students on the last day of Ch. 8 and Ch. 11. While focusing on just the African

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American students results from these surveys, the feedback identified whether my intervention strategies had increased engagement/relationships.

The next data tool used in this study was a teacher journal. By keeping records of weekly observations and thoughts in a teacher journal, I was able to cross-reference the data from the African American student's feedback in these surveys and pinpoint what had most effectively increased the relationships, engagement, and success of these African American students. Data was recorded in the teacher journal at the end of each class period during each day within Ch. 8 and Ch. 11. The teacher journal was set up as a table with questions for quick and convenient observation notes. By recording summative assessment results (Ch. 8 and Ch. 11 tests) before and after the intervention, the data identified whether the intervention had increased the academic performance of these African American students in math. The summative assessments used were the original Ch. 8 and Ch. 11 assessments from the Kendal Hunt geometry curriculum and a part of all students required work to full fill the Geometry B essential learning targets. The two assessments chosen for this case study were similar in difficulty to avoid inconsistent results. Although all students were required to take these assessments, in the interest of this study I prioritized the data from the African American students to benefit this action research study. With all of the following data tools, results were compared and used to identify whether engagement and teacher-student relationships were increased and as a result, if mathematical success was increased for these 13 African American high school students.

Analysis of Data

As stated before, the data collected in this study was a mix of qualitative and quantitative data. The qualitative data was analyzed using a few different types of techniques. The attendance records were compared by percentages and used to identify if the African American students

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were more motivated to come to class after the intervention techniques were put in place. The google survey data was in the form of multiple choice, free-response, and 1-5 scaled questions that pertained to engagement and relationships. The feedback from these google surveys were compared to identify if African American students felt an increase in engagement and teacher-student relationships after the intervention strategies were used. The teacher journal data was in the form of short sentences and tables to keep track of when each intervention strategy was used and the immediate effect it had on these African American students. Lastly, the quantitative data consisted of pre- and post- summative assessments given at the end of each unit. Once these tests were graded, the data came in the form of percentages and was used to identify whether mathematical success had improved.

Report Findings

The purpose of this study was to measure the effect engagement and relationships have on African American high school student's success in mathematics. In order to do this, data needed to be collected. Through research, engaging and relationship building strategies were found to be the most successful intervention strategies for African American student's math success. The action research study design was a mix of qualitative and quantitative data that measured when the researcher used these strategies and the effect these had on the mathematical performance for these African American students.

The research question being analyzed is "What effect does engagement and positive student-teacher relationships have on African American student's math success in a large suburban high school?" The central focus of this research question is to test the intervention strategies found through research and identify if these strategies are improving the academic performance for African American students in math. This means the data that was collected from

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this action research study helped gain a better understanding on a few things. The results from each data tool helped identify when intervention strategies were being used, the student's perspective on whether these strategies were increasing engagement/relationships, and as a result if math success was improving.

Use of Intervention Strategies

To reach higher mathematical success for African American high school students, intervention strategies had to be used. These intervention strategies revolved around increasing engagement and building positive relationships. These strategies included giving students more choice, introducing role models of different nationalities, incorporating growth mindset, and building relationships positive relationships with students and parents. One data tool used in this study is a teacher journal. The teacher journal kept track of anytime an intervention strategy was used and any other observations worth noting from the African American students pertaining to engagement or relationships.

Feedback from Intervention strategies

Before and after the intervention strategies were being used, feedback was taken from the students using a google survey. The feedback involved the student's perspective on engagement level and the relationships with other students and the teacher. The survey questions ranged from "How often did you pay attention during each lesson?" to "Do you feel like your teacher knows you?" (See Appendix A). This results from this data tool helped compare if the intervention strategies increased student engagement and positive relationships.

Math Success

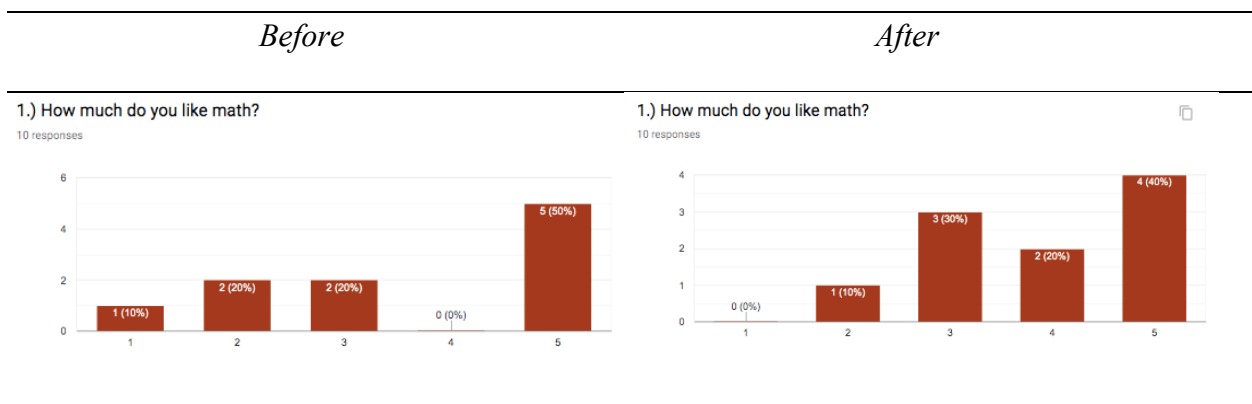
Once the researcher was able to identify if the intervention strategies were increasing engagement/relationships, academic success in mathematics was measured. Summative

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assessments were given before and after the intervention strategies were being used. By doing this, the researcher was able to compare the results and identify whether the improved relationships and engagement increased the success in mathematics. Since attendance is a major factor in academic success, attendance records were also taken before and after these intervention strategies and compared to identify an increase in attendance and as a result, success.

Survey Results

Figure 5 shows the results from a few of the Google Survey questions the researcher gave his students before and after the intervention strategies were used. The data above is only involving the ten African American students enrolled in Geometry B when this case study took place. By looking at the bar graphs, it's clear to see more students are liking math, paying attention in math, and feel the teacher knows them more in comparison to before the intervention strategies were used. This verifies that engagement and positive relationships are improving after the intervention strategies were used.



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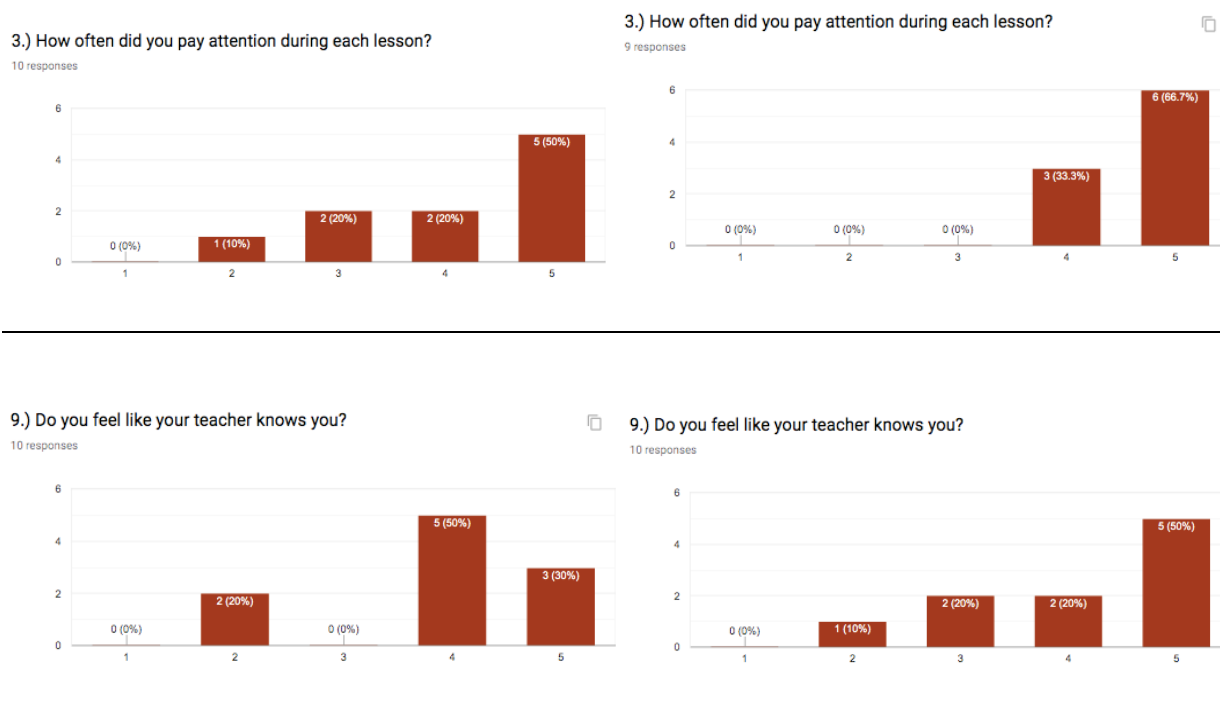


Figure 5. Pre and Post Student Responses on Engagement and Relationships Surveys

In figure 6 below, the results of each summative assessment are listed in a table. The table shows that 8 of the 10 African American students showed improvement after the intervention strategies were used. The overall average score for each test is listed at the bottom of the table, showing an 8% increase after the engaging and relationship building strategies are put into place.

Summative Assessment Results

African American Students	Ch. 8 Test (before)	Ch. 11 Test (after)
Student #1	14/35 – 40%	10/32 – 31%
Student #2	21.5/35 – 61%	25/32 – 78%
Student #3	28.5/35 – 81%	27.5/32 – 86%
Student #4	27.5/35 – 78%	23/32 – 72%

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Student #5	21.5/35 – 61%	24.5/32 – 77%
Student #6	26/35 – 74%	25/32 – 78%
Student #7	14.5/35 – 41%	18/32 – 56%
Student #8	22.5/35 – 64%	27/32 – 84%
Student #9	22.5/35 – 64%	24.5/32 – 77%
Student #10	33.5/35 – 96%	31/32 – 97%
Overall (average)	23.2/35 – 66%	23.6/32 – 74%

Figure 6. Pre and Post Intervention Summative Assessment Results

In figure 7, the attendance records for each African American student are displayed in a table. The results from this table show 9 out of 10 students had fewer unexcused absences or tardy after my intervention strategies have been used. The overall average unexcused absences or tardy per person also dropped from 2.2 to 1.8 after the intervention.

Attendance Records

African American Students	Number of Absences/Tardy (before)	Number of Absences/Tardy (after)
Student #1	4	6
Student #2	4	2
Student #3	0	0
Student #4	2	2
Student #5	3	1
Student #6	1	1
Student #7	4	3
Student #8	2	1

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Student #9	2	2
Student #10	0	0
Average per person	2.2	1.8

Figure 7. Pre and Post Intervention Attendance Records

Conclusion and Recommendations

Research shows it is hard to ignore the academic achievement gap for African American high school students in math. The research shows this is an issue that will not improve until schools and the teachers intervene with evidence-based practices. After the intervention strategies identified in this research were used, the following conclusions were drawn:

- Overall attendance records improved for African American students.
- According to the google surveys, engagement and relational capacity increased.
- Overall summative assessment scores improved for African American students.

Now that the results have been investigated, an action plan can be set in place. Since positive outcomes were made from these evidence based practices, this means these intervention strategies did positively increase the overall academic achievement for African American High School students. Based on the findings and conclusions of this study, the following actions were drawn to improve academic achievement for African American students in math:

- Giving students more choice and relating content to student interests.
- Introducing culturally diverse role models.
- Incorporating growth mindset.
- Increasing engagement and building positive student-teacher relationships.

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Before starting this action research project, the achievement gap between races was something that always caught my attention. Understanding the outside influences that African American students encounter is important in knowing how to improve academic achievement. To gain more insight on this issue, research was initiated and a literature review was created. To test the evidence-based practices identified through this research, a case study was conducted. After the results from the case study were analyzed, conclusions were drawn and intervention strategies that increased math performance for African American students were identified.

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Appendix A

Action Research Survey

Survey given to High School geometry students measuring engagement and the relationship with their instructor.

What is your gender?

- ...
- Male
- Female
- Prefer not to say
- Other...

What is your race?

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Hispanic or Latino
- Two or more races
- Prefer not to say

1.) How much do you like math?

1 2 3 4 5

Not at all A lot

2.) Did you look forward to math class during the Ch. 11 Unit?

1 2 3 4 5

Not at all Yes

Why? (Check all that apply)

- Because I like my teacher.
- Because I like math.
- Because my teacher makes math fun.
- Because I'm good at math.
- Other...

3.) How often did you pay attention during each lesson?

1 2 3 4 5

Never Always

4.) What was your favorite part of class each day?

- Beginning of class
- Lesson
- Work Time
- Activities (when we do them)
- Other...

5.) What was your favorite thing we did in Ch. 11?

Long answer text

6.) Rate your effort from the Ch. 11 unit:

1 2 3 4 5

Didn't try at all Tried as hard as I could

7.) Do you feel like your teacher cares about you?

- Yes
- Sometimes
- Not sure
- No

Why?

Short answer text

8.) Do you care about your teacher?

- Yes
- Sometimes
- No
- Other...

9.) Do you feel like your teacher knows you?

1 2 3 4 5

Not at all Very well

10.) Do you trust you teacher?

- Yes
- Sometimes
- No
- Other...