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Enrollment Patterns in Advanced Middle School Mathematics Classes

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Paul Gray

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Walden University
2016

Abstract

Enrollment Patterns in Advanced Middle School Mathematics Classes

by

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MEd, Arkansas Tech University, 1998

BA, Arkansas Tech University, 1992

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Education

Walden University

August 2016

Abstract

The problem investigated in this study is that U.S. minority and low socioeconomic status (SES) student participation in advanced academic classes continues to lag behind that of Caucasian and economically advantaged students. The purpose of this project study was to investigate the participation gaps between minority and low SES students compared with non-minority and high SES students in advanced mathematics courses in the study district's middle school. The theoretical framework for the study was gap-analysis theory. A quantitative gap analysis of existing student test score data was conducted, utilizing a secondary analysis of existing Iowa Test of Basic Skills data from 347 middle school students, with 196 students classified as low SES and 129 as minority. Descriptive statistics and 2 one-sample chi square tests were used to examine differences by ethnicity and SES subgroups and to test whether the distributions of students who met the district's 70th-percentile cut-score were different than the hypothesized distribution of equal proportions. The results demonstrated significant enrollment gaps between minority and low SES students versus non-minority and high SES students. The study findings informed a policy recommendation project that offered suggestions for the current mathematics testing and enrollment program at the study site. Implications for social change include providing research-based findings to the administration at the local site on the enrollment gaps for minority and low SES students which may inform future decisions about enrollment policies for advanced mathematics courses.

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Section 1: The Problem

Introduction

The purpose of this project study was to quantify access and participation gaps between groups of students for entry into advanced pre-Advanced Placement® (AP) mathematics classes in the ABC School District (pseudonym)'s middle school. There have been laws passed, numerous research studies conducted, data examined, and policies shifted since 2001 to ensure that U.S. minority and low socioeconomic status (SES) students can achieve academically on the same level as their peers in school (Reback, Rockoff, & Schwartz, 2014; Park & Holloway, 2013; Corra, Carter, & Carter, 2011; Klopfenstein, 2004). In the ABC School District, there was preliminary evidence that many minority and low SES students did not have equal access to the same advanced academic coursework and opportunities as their peers (ABC School District, 2013). Specifically, there were gaps in the numbers of minority and low socioeconomic sixth grade students' enrollment in advanced mathematics classes and the majority student populations. This quantitative study was designed to determine access and participation gaps in advanced mathematics classes of ABC Middle School (pseudonym).

Definition of the Problem

The problem to be investigated was a lack of information on what gaps were present between minority and low SES students and majority and economically advantaged students to taking advanced mathematics classes in the ABC School District. Initial evidence from the sole high school in the ABC School District suggested that its

minority and low SES students were underrepresented or underserved in advanced mathematics classes (ABC School District, 2013).

The ABC School District used Iowa Test of Basic Skills (ITBS) mathematics score data to determine student eligibility for advanced mathematics. Any fifth, sixth, seventh and eighth grade student in the ABC School District who wanted to take an advanced mathematics class the next year and had not already met the ITBS requirements, had to take a diagnostic exam for placement into pre-AP math classes (C. Cochran, personal communication, November 11, 2013). According to the ABC District gifted and talented coordinator, any student could have taken the mathematics entrance exam for placement into the next year's pre-AP mathematics class. Further, once a student passed the ITBS or mathematics entrance exam, the student qualified for all pre-AP classes for perpetuity. Additionally, the only way a student would exit the pre-AP mathematics class was on a teacher recommendation based on poor performance by the student. Teachers and parents could have also agreed the student might be better served by returning to a regular math class. If a student did leave the pre-AP mathematics class and sought to return the following year, he or she would have had to retest to qualify for re-entry into the program (L. Burns, personal communication, November 1, 2013).

Rationale

The rationale for this study was to discover what gaps were present between minority and low SES students and other groups of students who entered into the sixth grade advanced mathematics classes at the ABC Middle School. This need was identified using district demographic data from the ABC High School (pseudonym), which

indicated that minority students took advanced classes at significantly lower rates than would have been statistically expected (ABC School District, 2013). The low numbers of minority students in ABC High School advanced placement classes suggested the likelihood of prior gaps of access and equity at the middle school levels. Evidence of lower participation in AP classes at the high school provided the catalyst to investigate where the gaps in participation began.

Evidence of the Problem at the Local Level

There were several ways students had been included or excluded from advanced classes over the years within the ABC School District. Tracking was one method which had been used to place students into a particular classroom or with a particular teacher. The traditional tracking placement method categorizes students into specific classes based on their past academic abilities and performance, and has been widely used to place students in advanced academic classes (Education Portal, 2014; Hanushek & Wößmann, 2006). A significant body of literature was written about tracking in regular classes in the 1990s through the mid-2000s, and most of that research was on regular academic classes or racial compositions in schools (National Education Association, 1990). Another problem identified in these practices was that most students in lower-track classes were minority students who were taught primarily by novice teachers (Clotfelter, Ladd, & Vigdor, 2005).

U.S. public schools have historically used standardized tests and test scores to determine inclusion or exclusion of students into advanced classes (Klopfenstein, 2004). School personnel created and used policies including prior student grades to determine

eligibility for advanced classes (Posthuma, 2010). This is problematic because students from indigenous, minority, or low SES backgrounds sometimes have experiences and cultural norms that are not understood by school personnel (Luke, Woods, & Dooley, 2011). Tomlinson and Jarvis (2014) suggested school personnel perceived minority and low SES students from a deficit paradigm perspective, which is now considered outdated.

Deficit paradigm theory suggests that minorities and low SES students achieve at lower levels and these performances that are solely the responsibility of the student and their families (Tomlinson & Jarvis, 2014). Essentially, the deficit paradigm places blame for poor performance on a student's culture, background, and family situation (Tomlinson & Jarvis, 2014). Deficit paradigm theory explained why the ABC School District's policies appeared to exclude some students from advanced mathematics courses. Minority and low SES students' attributes and experiences, either real or perceived by school personnel, create situations of academic exclusion, both intentional and unintentional. While half of all high schools in the United States offered calculus, less than one-third of high schools with high numbers of Hispanic and African-American students offered calculus classes (Achieve, 2013).

A different view on sorting practices is provided by the discontinuity paradigm, another framework used to explain minority and low SES students' performance deficits. The discontinuity paradigm suggests that internal school systems and school personnel created academic problems for minority students (Tomlinson & Jarvis, 2014). Discontinuity paradigm attributed underachievement by minority students as a failure of

school personnel to be responsive to the cultural needs and requirements of minority and low SES students (Tomlinson & Jarvis, 2014).

There is additional evidence that minority and low SES students are generally less prepared for science, technology, engineering, and mathematics (STEM) courses as they enter college (Crisp, Nora, & Taggart, 2009). Evidence existed of some indirect (yet cumulatively direct) effects on the lack of access for minority and low SES students to advanced coursework. It has been noted minorities and low SES students graduate college at lower rates than other students. Flores and Shepherd (2014) found that minority and low SES students are less likely to get into top-tier universities in Texas. This is problematic for these students because top-tier universities have higher graduation rates, which demonstrates the importance of high levels of high school preparation for these students (Flores & Shepherd, 2014). This is further evidence of the importance of access to advanced level classes in high school.

Preliminary evidence suggested there were fewer minority and low SES students in advanced classes in the school district under study. Minority students were generally underrepresented in most types of advanced courses (Corra et al., 2011; Klopfenstein, 2004). The issues of access and enrollment equity to advanced academic classes had come to the forefront in the last two decades (College Board, 2013a). Also evident was many students still did not have access to or were not achieving in the advanced academic classes that typically resulted in college attendance and graduation (Bernhardt, 2013; Engle, Yeado, Brusi, & Cruz, 2012). For example, Reardon and Galindo (2009) indicated that Hispanic students had major gaps in mathematics and reading scores

compared to Caucasian students. Adelman's (1999) seminal work suggested minority students' access to a high-intensity academic curriculum is much more important college entrance and success indicator than it is for Caucasian students. Further, Adelman (1999) indicated a high school student's academic resources for college success were 41%, 30%, and 29% one's individual high school curriculum taken, test score results, such as the American College Testing (ACT) program or Scholastic Assessments Test (SAT), and academic rank respectively.

These prior research findings collectively suggested that the curriculum, skills, opportunities, and academic advancement received by students are dependent on the types of classes to which they have access. More specifically, test scores are significantly affected by the student's level of classes taken and academic rank achieved. This suggested that the level of academic access for which a student is eligible is determinative of the opportunities available to them after high school. Ultimately, the research suggested success in college specifically, and in all career pursuits in general, were heavily dependent on the type, level, and rigor of high school opportunities and work.

This study was designed to identify restricted participation for some cohorts of students in advanced mathematics courses beginning at the sixth-grade level. Near the end of the spring term each year at the study site, all fifth-grade students were tested for placement into advanced mathematics classes, if they had not already become eligible via gifted and talented testing. All rising sixth-grade students in the ABC School District were not allowed to enroll in pre-AP mathematics courses without first passing an

entrance exam or meeting the ITBS cut-score (L. Burns, personal communication, November 1, 2013). The practice of restricting access to advanced mathematics extended into the eighth and ninth grade levels in the ABC junior high. The district gifted and talented coordinator indicated cut scores on fifth graders' ITBS were used as the primary metric for inclusion into the advanced mathematics class (L. Burns, personal communication, November 13, 2013).

The local problem was preliminarily identified using data from the one high school in the ABC School District. The demographic breakdown of the ABC School District's 1,145 Grade 10–Grade 12 high school students was 69% Caucasian, 18% Hispanic, 9% African-American, 2% Asian, 1% Native American, and 1% Hawaiian/Pacific Island (ABC School District, 2013).

Table 1

2013 ABC High School Census

Student Group	<i>n</i>	%
Caucasian	790	69
Hispanic	206	18
African American	103	9
Asian	23	2
Native American	12	1
Hawaiian/Pacific Island	11	1

Using the high school demographic numbers as a baseline for individual class enrollments, it was reasonable to expect all academic classes, advanced or otherwise, to have had a similar demographic distribution. At the high school level, enrollment of minority and low SES students in AP classes at ABC High School were significantly lower than might have been expected statistically.

At the time of this study, ABC High School's AP classes were overwhelmingly Caucasian, with few minority students enrolled. According to an ABC High School administrator, there were also disproportionately small numbers of low SES students in these advanced classes as well (S. Smith, personal communication, November 26, 2013). Fifty-seven percent of the district's students were from low socioeconomic families as determined by participation in the free and reduced lunch program (ABC School District, 2013).

In 2013, of the 1,145 students at ABC High School, 31% of the students overall at the high school were minority students, but only 6% of the students in AP classes were minorities. This gap of 25 percentage points between minority student enrollment overall and the 6% of minorities enrolled in advanced classes was notable.

Table 2

2013 ABC High School Advanced Placement Classes

Minority Students	<i>n</i>
Hispanic	48
African American	11
Asian	5
Native American	4
Hawaiian/Pacific Island	1

In the same census, ABC High School had 48 Hispanic, 11 African American, five Asian, four Native American, and one Hawaiian/Pacific Islander students enrolled in the 16 Advanced Placement courses offered in the school (S. Smith, personal communication, November 26, 2013). Of significant note, 69 minority students enrolled in AP classes at the high school, 69.5% of the students were Hispanic.

At the time of this study, ABC High School had AP mathematics classes for statistics and calculus. AP Statistics had a surprisingly high number of minority students in the class: Of the 42 students overall, 17 minority students were in the 2013 AP statistics class. Nine, or 13% of the minority students, were Hispanic. Five were African American and three were Asian. The ABC High School was approximately 18% Hispanic, which was fairly close to the school demographic breakdown. Likewise the African American and Asian student breakdown for the whole school was very close as well. Overall school census numbers and percentages of minority students were more

closely matched for the AP statistics class. The teacher of AP statistics had a general open enrollment policy, which encouraged all students to take the class. The numbers of minority students in the AP statistics class seemed to mirror the open enrollment policy of the teacher.

Table 3

2013 ABC High School AP Statistics Classes

Minority Group	<i>n</i>	% of minorities in AP statistics	% of school minority population
Hispanic	9	13	18
African American	5	7	9
Asian	3	3	2

On the other hand, the AP Calculus class had fewer numbers of minorities present. Of 34 total students in AP Calculus, 32 were Caucasian, one was Hispanic and one was Asian. Calculus has always been touted as one of the most difficult classes at the ABC High School. The AP Calculus teacher had in place a strict, written prerequisite policy, as well as an unwritten policy, which indicated only the best and brightest mathematics students should attempt AP Calculus.

Table 4

2013 Students in ABC High School AP Calculus Classes

Student Group	<i>n</i>	%
Caucasian	32	94
Hispanic	1	3
Asian	1	3

Background History

As rigorous coursework for all students became the focus of the 1990s and 2000s, college and career ready skills became the standard by 2009 (Common Core State Standards Initiative, 2014). Forty-five states originally adopted the Common Core State Standards (CCSS). These standards focused on college and career ready goals for all students. The focus of CCSS were mathematics and literacy skills attainment for all students (Common Core State Standards Initiative, 2013). CCSS were built in such a way that all students were expected to achieve at high levels and allow for schools to offer courses such as AP, pre-AP, or other advanced classes. The ABC School District's state adopted the CCSS standards.

For many years, the AP enrollment policies within the ABC School District were implemented based on teacher attitudes and building-level policy. For example, 15 years ago, teachers determined what students could take AP classes. In fact, the academic department chair made the enrollment policy for all AP courses in that department. The decisions about admittance into AP classes at ABC High School were based on criteria such as standardized test reading scores, sophomore or junior high teacher recommendations, and previous grades in specific academic subjects. A student grade of B or less in ninth-grade English was considered a disqualification factor for entry into the high school AP language course. For example, a grade of B or less in eighth grade United States history would have disqualified a student for the junior-level AP United States history course at ABC High School.

Limited data and a brief historical narrative from the ABC High School shed some light on the participation gaps in advanced mathematics courses in the middle grades of ABC School District. While no direct causation was claimed, the data and policies from the ABC schools warranted a look at participation in advanced mathematics classes between the majority and minority populations. The study attempted to collate all of these factors together.

Some exclusionary practices based on student academic status came into question at the high school in the ABC School District. By the late 1990s, some AP teachers at ABC High School became uncertain about the school's AP selection policies. Two of the social sciences teachers had attended workshops and learned shifts in College Board (CB) policies had occurred about who should participate in AP courses. In 2001, the social sciences department at ABC High School became the first to drop the application process for the three AP courses offered in their department. Due to interdepartmental collaborations with the language arts department, open enrollment practices began to spread within the high school. Approximately two years later, the mathematics and science departments started open enrollment. By 2007, all AP courses at ABC High School had open enrollment policies except for two. AP Calculus and AP Chemistry maintained prerequisites for both classes. By 2011, all selective enrollment processes were abandoned in the ABC School District except for mathematics testing in the fifth through eighth grades. The last vestige of these enrollment policies were for placement in mathematics courses in Grades 6 through 8 via exams which are administered in the fifth through seventh grades (L. Burns, personal communication, November 13, 2013).

Evidence of the Problem From the Professional Literature

Minority students in the United States are generally underrepresented in most types of advanced courses (Corra et al., 2011; Klopfenstein, 2004). Low SES students are also underrepresented in advanced courses (Argys, Rees, & Brewer, 1996; Lee, 2012). This problem is exacerbated by low SES and minority students are taught by teachers who are teaching out of their field of certification at much higher rates than Caucasian and middle/upper income students (Almy & Theokas, 2010). Low socioeconomic status of students has a greater negative impact than race, ethnicity, or gender characteristics (Reardon, 2013).

Minority and SES students' access to advanced academic courses continues to be an issue despite national, state, and local initiatives geared to make academic opportunity and access more equitable and open. School policies, state and national policies, use of test scores, and teacher and administrator attitudes are just a few examples of how access to advanced courses were negatively affected (Klopfenstein, 2004; Reback et al., 2013). Friend and Degen (2007) indicated teacher attitudes were paramount to increasing the numbers of minority and low SES students into advanced classes. Understanding the influence of teacher and administrator attitudes about access to advanced courses were best captured by the practices of open enrollment and gatekeeping. More important, schools were urged to respect all students regardless of background; the British Psychological Society's (2009) Code of Ethics, for example, urged that schools should respect all student differences including cultural, ethnicity, and socioeconomic status.

Open enrollment has been used to increase student participation in pre-AP and AP classes, whereas gatekeeping has been used to determine which students may or may not enroll in particular classes. Open enrollment was a process where students could enroll in advanced classes regardless of past academic grades, test scores, or other qualifying metrics (Klopfenstein, 2004). Gatekeeping was a practice where students may be excluded from a class based on grades, test scores, other past academic performance, or behavior issues. Klopfenstein's (2004) ground-breaking study on access to AP classes indicated gatekeeping was an exclusionary act that affected minority and low SES students at significantly higher rates than other students.

Of all the academic subjects, mathematics may have had more issues surrounding access and equity than any other. Attitudes about student performance in mathematics are ancient: Stinson (2004) traced the use of advanced mathematics as a gatekeeper course since the time of Plato, stating that Plato said advanced mathematics should be reserved for those who were naturally skilled in calculation. Attitudes about mathematics and who should take particular courses were still present among some school officials (Stinson, 2004). It is not uncommon for teachers and administrators to hear students and parents talk about their anxiety and lack of expertise in mathematics, or state that they and their family members had never had any acumen in mathematics skills or classes (Finlayson, 2014). Vukovic, Roberts, and Wright (2013) indicated mathematics performance anxiety has been shown to be distinct from general and test anxiety, which caused many students to avoid taking higher-level mathematics courses. The CB had similar policies early in its

existence. At the time, it was standard practice that only the ablest students should be taught AP classes as special groups (McAlister, 2013).

According to Houser and An (2014), student access to advanced coursework, attitudes, and individual performance had been shown to affect a student's college readiness and performance. McDonald and Farrell (2012) asserted attitudes about readiness for college coursework by disadvantaged students was very important. Crisp, Nora, and Taggart (2009) indicated there Hispanic students in particular, and other students in general have significant readiness gaps in science, technology, engineering, and mathematics (STEM) courses. Readiness gaps between majority students and minorities and low SES students included standardized test scores and participation in advanced or gifted classes (Tomlinson & Jarvis, 2014). For example, Mattern, Xiong, and Shaw (2009) reported students who enrolled in AP courses entered college and graduated college at higher rates than students who took no AP courses in high school.

Another commonly used gatekeeping practice is prerequisite classes. Posthuma (2010) suggested prerequisite classes of any kind posed one of the greatest barriers for minority and low SES students in gaining access to AP classes. Vukovic, Roberts, and Wright (2013) and Atanda (1999) asserted that gatekeeper courses such as algebra taught in the eighth grade, were predictive to students' applying to four-year colleges. Atanda's (1999) found that 72% of students who took advanced algebra in the eighth grade enrolled in college four years later, while only 42% of students who did not take advanced algebra enrolled in college four years later. This gap of 30% indicates that advanced algebra likely functions as a gatekeeper course in many schools (Atanda, 1999).

Simply offering open enrollment does not result in increased enrollment of minority and low SES students to advanced courses. Enrolling the targeted students into advanced classes with open enrollment practices requires efforts extended far beyond an invitation to join (Friend & Degen, 2007). Offering open enrollment policies and practices has to be augmented by school support systems to help the targeted students succeed (Posthuma (2010). Without the necessary support for students from minority and low SES backgrounds, it was unlikely underrepresented students would enroll in advanced courses.

Underrepresentation is not an issue only affects minority students. Argys et al. (1996) and Lee (2012) found there were fewer low SES students in advanced academic courses as well. Compounding these issues, Almy and Theokas (2010) asserted low SES and minority students were many times taught by teachers who were teaching out of their field of certification. Further, Reardon (2013) found low SES may have a greater impact than race, ethnicity, or gender characteristics in the enrollment process for advanced courses. Reardon (2013) indicated enrolling in an advanced class was a complicated process usually requiring assistance from advocates such as parents, counselors and teachers to assist in the admission process. Atanda (1999) found many low SES and minority students did not have high levels of support or advocacy.

Minority students' participation and general achievement have been lower in AP courses specifically, due to tracking in earlier grades using PSAT and SAT scores as enrollment tools (Klopfenstein, 2004; Richardson, 2010). Corra, Carter, and Carter (2011) found much higher concentrations of African American students placed in lower

track classes, as opposed to higher-level college-track classes. Corra et al. (2011) also confirmed AP classes tended to function as gatekeeper classes that limit minority students' participation in advanced classes. Powers and Chapman (2007) found consistent connections between students' social backgrounds and the classes in which they were placed, citing African American students were much more likely to have been placed in a regular or general class than in AP or other advanced classes. Solorzano and Ornelas (2004) discovered lower numbers of Hispanic students in California schools were placed in AP classes than their Caucasian counterparts. At the time of their study, 38% of California's school population was Hispanic, while only 16% of AP classes were Hispanic students.

The CB recognized and acted upon issues surrounding access to and equity in advanced courses. The CB, which administers the AP courses, began as a program in 1900 to test students for admittance into colleges and universities. In 1955 the CB began a program offering advanced coursework (AP classes) to students seeking admission into highly competitive colleges and universities in the United States (College Board, 2013a). Similarly, the International Baccalaureate (IB) program was introduced in the late 1960s to attempt to do for students who were children of foreign-stationed US diplomats in international schools what AP was doing in the United States (Geiser & Santelices, 2004). By their very nature, AP and IB were designed for elite students to compete for seats at elite universities, and for the next 3 decades, the AP and IB programs functioned in schools as programs only for the best and most capable students.

Open enrollment and gatekeeping practices for admission into pre-AP and AP classes have had a long history in the United States. Until the early 1990s, most high school AP classes were made up of only the top students in each academic discipline and were selected by teachers and administrators. As early as the late 1980s, the CB began to rethink their philosophy about who should take AP courses, and in 1990 introduced the Equity 2000 initiative (College Board, 2013a). The purpose of Equity 2000 was to recruit disadvantaged students into AP mathematics courses (College Board, 2013a). Equity 2000 turned out to be a catalyst to systemic change, which would sweep through the CB and the schools offering AP courses. Specifically, Equity 2000 was the beginning of a shift of thinking and practice about what types of students could and should take AP courses (Klopfenstein, 2004). The CB later launched additional programs and initiatives in 2003, 2004, and 2005 all aimed at increasing the enrollment and success of low SES, minority, and other underserved students (College Board, 2013a). These practices, usually couched as open enrollment practices and policies, were aimed at increasing the numbers of all types of students who took AP classes.

Since the CB did not mandate how students were placed, students in AP courses have been enrolled or placed in different ways (College Board, 2013a). Some schools opened up enrollment criteria while others kept in place strict enrollment policies and practices, such as gatekeeping. No matter what kinds of enrollment policies were in place, access to AP classes by minorities and low SES students lagged for a variety of reasons. Klopfenstein's (2004) landmark study on minority student participation in AP courses indicated that even when the best of circumstances and intentions were in place,

minorities and other underserved cohorts of students have not been able to participate in AP classes due to a lack of academic preparation. Other measures, such as SAT scores, have also indicated that family income was tied to achievement (Klopfenstein, 2004). The College Board (2013b) revealed that student SAT scores steadily increased along with the income of the student's family. Therefore, it is critical to remove roadblocks of access to advanced coursework for minority and low SES students.

Tracking is another method used to limit, restrict, or regulate the placement of students into advanced classes. The intent of tracking is to place the student in the best and most appropriate educational setting that fit their individual needs (National Education Association, 2014). The intended positive outcomes from tracking may not have been what actually happened to students. According to Argys et al. (1996), tracking was actually used primarily to help organize high schools as they became larger and more diverse during the 20th century. Tracking students into particular classes primarily benefitted the school and school personnel and did not attend to the individual needs of the student (Argys et al., 1996). It was also likely academic tracking of mid-level and lower-level academic students had many unintended consequences. The most negative unintended consequence was once a student was placed into a lower track, it became difficult for the student to ever become upwardly mobile out of that academic track (Corra et al., 2011).

Lucas (2001) suggested tracking of students was based on a series of separate, yearly, subject-specific decisions, which placed a student into particular academic cohorts. Tracking decisions were true for high-achieving middle and upper income

students, as well as for low SES students. The multiple decision points each student encountered determined what academic classes the student could or could not take (Lucas, 2001). Klopfenstein (2004) stated once students were placed in the lower academic tracks, it was very difficult for them to move to higher-level academic tracks. The literature suggested academic systems created self-fulfilling prophecies for various minority, low SES students, and other underserved students in that once placed, the evidence indicated the students usually remained in the lower tracks for the rest of their academic career.

By the early 1990s, there were calls to end tracking as evidence indicated the practice was detrimental to students (Argys, et.al, 1996). Legislated ressure to end tracking was formalized as the No Child Left Behind Act (NCLB, 2001) demanded accountability for all students' achievement (Darling-Hammond, 2007). Subsequent international studies, which compared Programme for International Student Assessment and Progress in International Reading Literacy Study data strongly indicated tracking increased inequality in achievement (Hanushek & Wößmann, 2006). The NCLB requirements placed emphasis upon student performance and measured success by standardized test scores (Klopfenstein, 2004). Intended or not, the use of student test scores were used by schools and educators to further place students into groups (Milner, 2013). The case for whether tracking created positive results by identifying low-performing students and getting them the help needed to improve academic performance was a matter of opinion. Milner (2013) indicated data-driven achievement gaps created an inequitable system for minority and low SES students. Houser and An (2014)

indicated standardized test scores further marginalized low-performing students sending them to a system of remediation that hindered access to advanced classes and college readiness.

As NCLB and other such initiatives were put into practice, the use of test scores to make decisions about schools, teachers and systems increased. An unintended consequence of interlocking test scores and student placement hinged on how standardized test scores are used. Specifically, many schools began to use test score data to sort students into groups, or de facto tracking cohorts. Some schools used student test scores as the primary inclusion or exclusion factor to access to advanced coursework. This practice led to students being placed into academic plans, which excluded them from advanced academic coursework. Kallemeyn (2009) and McQuillan et al. (2009) indicated the use of test scores alone to evaluate student achievement and potential was myopic at best and harmful at worst. In this study, test scores were the only benchmark used in the ABC School District to determine student placement into sixth grade advanced mathematics course.

Definitions

Advanced Placement: The collaborative community of AP teachers and students, states, districts, schools, colleges, and universities committed to the daily work of developing college-level knowledge and skills for college placement or credit (College Board, 2014a).

College Board: A mission-driven not-for-profit organization that connects students to college success and opportunity (College Board, 2014b).

Gatekeeping: A quasi-admission practice or process in which educators determine which applicants will gain access to a class, program, or profession. Multiple combinations of indicators including academic potential, grade point averages, reading scores, past academic grades and student behavior may be utilized to make these decisions (Koerin & Miller, 1995).

International Baccalaureate (IB) Diploma: An academically challenging and balanced program of education with final examinations that prepares students aged 16 to 19 for success at university and life beyond. It has been designed to address the intellectual, social, emotional and physical well-being of students (International Baccalaureate Organization, 2014).

Open Enrollment: In the context of this study, the practice of allowing any student who has the desire to enroll in an AP course. Under an open enrollment philosophy, there are no prerequisite classes required in order to enroll in an AP course (McAlister, 2013).

Prerequisite: A course that a student must successfully complete before enrolling in a more advanced course (Santa Barbara Community College, 2014).

Standardized Tests: A test made up of items appropriate in level of difficulty and discriminating power for the intended examinees (McGraw-Hill Education, 2014).

Tracking: The practice of grouping students into smaller groups based on their talents (National Education Association, 2014) or academic performance levels (Education Portal, 2014). Also referred to as ability grouping.

Underrepresented Students: Racial and ethnic populations that are disproportionately lower in number relative to their number in a general population.

Historically underrepresented student categories have generally been underrepresented for >10 year. In this study, underrepresentation was determined by comparing the number of students in different groups in particular classes relative to the general school population (Sierra College, 2015).

Underserved Students: In the context of this study, students with academic, discipline, or attendance problems, or students living in economically disadvantaged households, or students who are racial or ethnic minorities, or students speaking English as a second language (Zuliani & Ellis, 2011).

Significance

The significance of the problem were the lower numbers of minority and low SES students taking advanced mathematics courses in the ABC School District than did majority groups of students. The ABC School District's practices for admission into advanced academic classes at the middle grades created the lower numbers of minority and low SES students enrolled in these courses. Further, test cut-scores were virtually the sole tool used for entrance into an advanced mathematics course at the ABC Middle School. For example, fifth-grade students were not explicitly tested for entrance into the sixth-grade advanced mathematics classes. Instead, fifth-grade ITBS math scores were used. The 70th percentile was utilized as the cut-score for entrance into the ABC Middle School pre-AP mathematics classes. The sixth-grade test criterion was a suggested score of 80% on the Iowa Algebra Aptitude Test (IAAT). For the seventh grade, a test criterion of 80% on the IAAT was suggested (L. Burns, personal communication, February 20, 2014). There was no evidence found from the study to demonstrate why the 70th or 80th

percentiles were chosen. Inclusion or exclusion from the advanced mathematics courses were derived from the ITBS and IAAT cut-scores. A probable reason the ITBS and IAAT cut-scores were associated with practices of student placement into the ABC School District gifted and talented programs.

Table 5

Cut-Scores Set for ABC Middle School Students

Test	Fifth-Grade %	Sixth-Grade %	Seventh Grade %
Iowa Test of Basic Skills	70	N/A	N/A
Iowa Algebra Aptitude Test	N/A	80	80

If a student did not reach the cut-score for entry into the pre-AP mathematics class, parents could petition for their child to be admitted via a review process (Cochran, personal communication, November 11, 2013). However, there were several layers of forms and repeated meetings, which had to be completed for the student to gain entry into the class. If a parent demanded a review, the first step was the mathematics committee called a meeting. The mathematics committee was made up of the middle school principal, the junior high principal, middle school counselor, a middle school mathematics teacher and a junior high mathematics teacher. The second step was the mathematics committee met to formulate suggestions for the parents. Included in the second step, the middle school counselor would obtain data specific to the student whose parents were petitioning for enrollment into the advanced mathematics course. The counselor would also survey current and past mathematics teachers of the student. The

format, collection, structure, or nature of the teacher surveys were not explained during the interview. The assumption was the counselor tried to get an estimate or judgment from teachers on how this student might perform in advanced mathematics. In the third step, the mathematics committee would meet with the parents to make a further suggestion (Cochran, C., personal communication, November 11, 2013). The implied suggestion of the third step was one of an additional tactic of cautioning the parents not to enroll their child in the advanced mathematics course. If after all of the meetings, the parents insisted on their child's enrollment in the advanced mathematics class, the student would be enrolled. However, the parents had to sign a form, which indicated their understanding of the rigor of the advanced mathematics course and the likelihood of their student making a poor grade in advanced mathematics (C. Cochran, personal communication, November 11, 2013).

Regardless of the intent, the practice of testing students for access to the advanced mathematics course amounted to de facto tracking. For students who did not meet the cut-score, it was highly unlikely access to advanced mathematics occurred. The result was only the most supportive, aware, persistent, and able parents had the ability to get a student below the ITBS cut-score into the advanced mathematics class. High rates of underrepresentation and exclusion of minority and low SES students in advanced coursework were shown to be a national problem as well (Klopfenstein, 2004). Minority students, in particular, were underrepresented in advanced classes (Corra et al., 2011). The significance of this study was to identify and quantify gaps in service and practice to affected middle school students.

Guiding/Research Question

The process for participating in advanced mathematics classes at ABC Middle School in the sixth grade began with a test score. Most students did not purposely sit for the exam with the intent to qualify for an advanced mathematics class. Students simply took the ITBS exam, which was already scheduled for everyone. The results of the ITBS were used to determine the sixth grade students who could take pre-AP mathematics. Fifth-grade students who scored 70th percentile or higher on the mathematics portion of the ITBS qualified for pre-AP mathematics. One score criterion seemed limited at best, and unfair at worst.

The potentially unfair elements of the testing system provided opportunities to enact positive social change on the behalf of many students. The following guiding questions were asked:

RQ1: What enrollment gaps are present in the advanced mathematics classes at ABC Middle School?

RQ2: Do the mathematics exam cut-scores currently used in the fifth grade in ABC School District deny some students opportunities for advanced mathematics coursework?

The professional literature was clear on the underrepresentation of minority and low SES students. Minority and low SES were underrepresented in nearly every type of advanced course in high schools, including AP, IB, and honors (Klopfenstein, 2004). Klopfenstein (2004) also indicated academic tracking, gatekeeping, and other advanced course entry criteria were the basis of the low enrollments of minority and low SES

students. The perceived efficiency and pressure of school improvement initiatives to use test scores to measure everything in schools since NCLB had likely increased the exclusion of minority and low SES students (Reback et al., 2014). The increased use of test scores and other data had possibly created a self-fulfilling prophecy for many minority and low SES students.

Review of the Literature

A review of the literature on the links between student participation in advanced academic classes and overall student academic success were clear. Searches of multiple databases, included SAGE, ERIC, Google Scholar, and others. Search queries for the literature review on the databases included *minority and low SES enrollment in advanced classes, gap analysis, deficit paradigm, open enrollment, tracking, AP, IB, prerequisite classes, teacher and administrator attitudes, cultural resources*, and many others.

The completion of AP coursework has been linked to higher rates of college/university enrollment, attendance, and grades, as well as finishing a degree (Chajewski, Mattern, & Shaw, 2011). The study indicated race and SES were the most important factors when comparing AP students and non-AP students in college enrollment and finishing a degree. In fact, Chajewski et al. (2011) declared participation in just one AP course increased the odds of a student enrolling in college by 171%. Of further note, the previous study was commissioned and conducted by the College Board, which administers the AP program.

As shown so far, there were lower numbers of minority and low SES students in advanced academic classes. The broader problem was once minority or low SES students

were excluded in early opportunities for advanced coursework, it was rare for them to later take advanced mathematics courses. Intervention was needed to solve the issue of the affected students not enrolling in advanced courses. Students needed to be targeted for recruitment into advanced coursework and supported once there (AVID, 2015a). There were no intervention or support programs targeted at minority and low SES students in the ABC School District. The study revealed the need for some kind of support program. Advancement Via Individual Determination (AVID) is a program, which provided support to historically underrepresented students, including minorities and low SES, to gain access to college and careers (AVID, 2015a). AVID targeted support within the school to the middle students who had the abilities to perform academically, but may not have had opportunities for college-preparatory work (AVID, 2015a). AVID students were those from families where the adults had not graduated from college (Posthuma, 2010). Additionally, the AVID program provided targeted students with the support structures needed to take honors and AP courses (AVID, 2014).

Watt, Powell, and Mendiola (2004) found that AVID students increased enrollments in AP classes in Texas, and they subsequently scored higher on standardized tests than non-AVID students. The AVID students went on to college at higher rates than their non-AVID counterparts. The historically underrepresented students were successful due to a great deal of AVID advocacy and support. One issue which had to be understood was not to confuse the success of student support systems with simple access to AP or other advanced courses. Simple access did not automatically translate into academic success (College Board, 2015c).

Support and advocacy of minority and low SES students were shown in the research to be critical for success in advanced mathematics classes. The Students Training for Academic Readiness (STAR) program in Texas had similar goals to AVID in increasing the number of underserved students enrolled in more rigorous courses. Students in the STAR program were given significant training in study and academic methods skills to prepare them for AP mathematics (Maloney & Lopez, 2012).

Another factor which played a role in minority and low socioeconomic access to advanced coursework was school culture (Posthuma, 2010). In many cases, the deciding factor as to how students were placed in a pre-AP or AP class rested solely with school personnel. Posthuma (2010) found individual teachers sought to enroll minority and low SES students into their AP classes but were either not allowed to, or were discouraged from doing so by school decision makers. The teachers understood the many of the non-AP students did not possess the traditional academic qualifications, such as high test scores, grades, and teacher recommendations for AP classes. However, the teacher saw a talent or capacity in the student, which could be developed for success in the AP or advanced academic classroom (Posthuma, 2010).

Many of the decisions about what coursework students took were determined by school counselors, as they were the primary contact students had regarding course offerings and requirements (Posthuma, 2010). Counselor attitudes and views about advanced courses were critical. Counselors in the ABC Middle School seemed to act on mathematics teachers' views about student access to advanced classes. Counselor attitudes about the selection of students went beyond teacher input. Counselors believed

the students who were to be placed in the advanced mathematics course were what school administrators wanted (C. Cochran, personal communication, November 11, 2013).

Teacher attitudes were another critical factor in recruiting minority and low SES students to enroll in advanced coursework. Corra et al. (2011) suggested many minority students only took advanced courses, which were taught by teachers they considered role models and advocates, and who had established an element of trust. Minority and low SES students needed to trust the prospective teacher before taking an advanced course. The teacher who nurtured good relationships with minority students was more likely to recruit them into their classes (Riley & Ungerleider, 2012).

There had been successes in recruiting minority and low SES students into AP classes at the ABC High School. Over the past 10 years, the social sciences and humanities department teachers at ABC High School actively recruited minority and low SES students into AP classes. The most effective method to cause minority and low SES students to take AP classes was via one-on-one recruitment. The teacher directly asked the student to take the course and offered personalized academic support to those students who agreed to take the course. For example, the teacher designed individualized plans for the recruited student, or they offered extra help or attention on an as-needed basis. All support for minority and low SES students in the ABC High School social sciences and humanities department occurred on a teacher-to-teacher basis and was not programmatic in nature (J. Jones, personal communication, September 17, 2013).

The literature review demonstrated that having a culture, norm, or policy of recruiting minority and low SES students into advanced classes was necessary to achieve

access and equity for all students. Nevertheless, inclusive and positive attitudes by a few teachers was shown to not be enough to ensure access to advanced coursework (Klopfenstein, 2004). The ABC School District had an informal policy that was not codified in school policy or practice. Instead, the informal policy functioned as a practice, which became institutionalized by the inclusion or exclusion of students from advanced mathematics courses (ABC School District, 2014). Conger, Long, and Iatarola (2009) and Long, Iatarola, and Conger (2009) asserted that the pre-high school academic experiences of minority and low SES students were paramount to success in high school and beyond. Simply put, access, equity, and achievement gaps at the ABC Middle School had little chance of being closed under the testing system in place (Fong, Perry, Reade, Klarin, & Jaquet, 2016).

There was disagreement on the effectiveness of offering AP or other advanced classes to all students, regardless of their background. AP courses worked most effectively for students who were already highly-prepared academically (National Center for Educational Achievement, 2010). The National Center for Educational Achievement (NCEA) study stated there was no relationship between simply taking AP classes and graduating from college. The NCEA (2010) study indicated the true benefit of taking an AP course was passing the AP exam. The NCEA (2010) policy paper was produced by an organization, which wrote, administered, and scored the American College Testing program, or ACT exams. ACT was a direct competitor to the CB and its SAT (Scholastic Aptitude Test, 2015).

Dougherty, Mellor, and Jian (2006) countered there were measurable differences in college graduation rates of students who took at least one AP course in high school. For example, Dougherty et al. (2006) indicated 37% of African American students who took only one AP course and did not pass the associated exam, graduated college within 5 years. Conversely, only 10% of African American students who did not take at least one AP course graduated college within 5 years (Dougherty et al., 2006). Dougherty et al. found that 29% of Hispanic students who took an AP class graduated in 5 years or less, compared to 8% who did not take an AP class. Dougherty et al. (2006) also found Caucasian students graduated college within five years at a rate of 47%, compared to only 21% who did not take an AP course. Dougherty et al. (2006) found low SES to be negatively impactful as well. Only 7% of low SES students who graduated college within five years took an AP course. 27% of low SES students who took at least one AP course graduated college in five years or less. The numbers were significant and clear with regard to AP courses. Students, regardless of their background, who were enrolled in AP courses had greater success in college. This study demonstrated the critical determining factor for minority and low SES students' success was *access* to AP courses.

Table 6

College Graduation Rates and Taking AP Classes in High School

Students graduated college in 5 years or less	Students who took at least one AP class	Students who did not take an AP class
African-American	37%	10%
Hispanic	29%	8%
Caucasian	47%	21%
Low SES	27%	7%

Note. Adapted from “The relationship between Advanced Placement and college graduation,” by C. Dougherty, L. Mellor, and S. Jian, 2006, *2005 AP Study Series, Report I*, p. 8. Copyright 2005 by the National Center for Educational Accountability.

Implications

The study found many implications of the testing system for entry into the ABC Middle School pre-AP course. In 2014, only 16% of minority and 19% of low SES students were eligible to be enrolled in sixth-grade advanced mathematics. The most surprising implication was the high overall numbers of students, both majority and minority, who failed to qualify for access into the advanced mathematics courses in the ABC Middle School.

The ITBS and IAAT tests were intended to be diagnostic to provide school personnel with data to help make decisions about student needs. The reality was the tests were used in determinative, and not diagnostic ways. Essentially, if a student scored well on the ITBS and IAAT tests, the student was placed in an advanced mathematics class. If a student did not score well, the student would not be placed in the advanced mathematics class. Therefore, the result was the testing practices served as a placement tool. Given the

test worked like a placement tool, the practice was de facto tracking and gatekeeping. The research indicated tracking and gatekeeping were countervailing practices to the egalitarian nature of a public school education.

The study found major gaps of participation between the majority student population and minority and low SES students. Therefore, the testing procedures needed to be investigated and modified. As was the practice at the time, the students' standardized test scores were the only measure used to determine enrollment eligibility. Ideally, the existing standardized exam scores should have been retooled and used as one of many diagnostic tools to assess readiness for advanced work. Another suggested change was to include the establishment of a recruiting program for the advanced mathematics course aimed at and designed for minority and low SES students. The study proposed an AVID or AVID-style support program, which aimed to assist minority and low SES students who may not have possessed the personal, family, and academic support systems needed to be successful in advanced coursework. Another possible approach to the problem would have involved starting a locally-designed program for students with limited advanced academic backgrounds. A locally-designed program involved gathering existing resources, including teachers, tutors, facilities, computers, and other technology. The existing resources needed to be coupled with outside resources, such as community mentors, business leaders, and business resources. Other needed resources and connections included outreach programs into minority communities and parent communications specific to this program who could have helped students and

their families understand the resources and benefits of taking these advanced courses (Reynolds, Crea, Medina, Degnan, & McRoy, 2014).

The use of geographic data was another important tool used to augment the project. Geographic data on where minority and low SES students lived were easily collected in the school district computer databases. Geographic data indicated significant nesting or other patterns on how close students lived to an elementary school. The use of elementary schools in the various neighborhoods were intended as headquarters for the support programs. A geographical approach to the support program provided a critical element many support programs typically did not provide. Providing academic support and assistance to students, which was as geographically near as possible, served to mitigate transportation issues common to minority and low SES students (Li & Zhao, 2015).

The testing practices at the middle school likely created effects on the psyche of many minority and low SES students. The low numbers minority and low SES students in the ABC High School AP courses demonstrated something happened to these students. As previously discussed, only about one-fifth of minority students took AP courses the ABC High School. The study found enough evidence, which demonstrated correlation of low minority and low SES student participation in advanced classes to the ABC School District's testing practices (Curry & Holter, 2015). Finally, while this study did not directly investigate the implications the mathematics testing program had on participation in all advanced coursework throughout the ABC School District, it was hoped the

research spurred further study of all practices related to advanced coursework access, equity, recruiting, and support of underserved student populations (AVID, 2014).

Summary

The professional literature was clear that testing practices could disproportionately award or deny entry into advanced coursework to minority and low SES students. As indicated in the preceding narrative, the research revealed entry tests, tracking, gatekeeping, and other practices excluded minority and low SES students at higher rates from advanced classes and programs than other groups of students (Klopfenstein, 2004). The use of prerequisites also likely prevented some students from taking a course in which the student had an interest and acumen in a particular subject (Posthuma, 2010). Likewise, the testing practices were likely unfavorable to students who did not do well on standardized tests and recognized many capable students with an excellent work ethic, still may not have performed well on standardized assessments (Houser & An, 2014).

In the age of educational accountability, educators and schools were expected to deploy data-driven decisions, implement enhanced academic standards, and apply differentiated instruction for and to their students. With greater accountability for schools and school personnel, tests as a diagnostic tool became the norm in determining where students were academically. The testing program for entry into the sixth-grade advanced mathematics courses in the ABC School District, however, was likely not equitable to minority and low SES students. The data have shown these practices were not fair to other students outside these two groups who fell below the cut-scores of the ITBS and

IAAT tests. Ironically, the increased use of test score data to diagnose and assess students created both intended and unintended consequences. The test was intended to sort students into the advanced mathematics class based on the ability to do well on the exam. The high numbers of students, both minority and majority who did not qualify were certainly unintended consequences.

Section 2: The Methodology

Introduction

The primary research questions guiding this project study were:

RQ1: What enrollment gaps are present in the advanced mathematics classes at ABC Middle School?

RQ2: Do the mathematics exam cut-scores currently used in the fifth grade in ABC School District deny some students opportunities for advanced mathematics coursework?

I used quantitative gap analysis to identify possible gaps between the numbers of rising sixth-grade minority and low SES students to the majority populations of students at ABC Middle School (pseudonym) as a result of the parent district's testing program for entry into the advanced mathematics classes. As expected, the data indicated that Caucasian students were the majority population of the school. African American, Hispanic, Asian, Native American, and Hawaiian/Pacific Island students were identified as minority students. Free/reduced lunch status was used to classify low SES students. Lower numbers of minority and low SES students were eligible to take advanced mathematics courses than the overall demographic breakdown of the students generally predicted. The identification of gaps was used to categorize and define specific problems and suggest actions to change policies and practices, as well as propose solutions to these problems.

Access and equity issues for all students were certainly identified as worthy of study. Denying students access to advanced mathematics classes was counter to

professional best practices, and demonstrated the need for the study. The results of the study showed that the problem of lower access to advanced mathematics courses affected minority and low SES students at higher rates than other students. The study also found many majority population students were affected negatively as well.

For at least the past 20 years, denial of access to advanced coursework to minority students based on the results of one test score was found to have been a general practice (Klopfenstein, 2004). Atanda (1999) found gatekeeping to be one of the primary methods used to deny access to particular students. At the time of this study, the primary gatekeeping practice in ABC School District was to use one test score to qualify or disqualify a student from the advanced mathematics course. Stinson (2004) indicated mathematics was the primary course used in the denial of access. Conger, Long, and Iatarola (2009) found that access to advanced courses was particularly important for minority and low SES students' success after high school.

At least four scenarios could have been quantified using a gap analysis in the study. First, the quantitative gap analysis facilitated the identification and comparison of gaps, which were present between groups of students in the advanced mathematics courses. Second, a quantitative gap analysis allowed for the understanding of how large or small those gaps were. Third, a quantitative gap analysis collated existing data to identify the types of gaps present between groups. Finally, a quantitative gap analysis allowed for the comparison of what was actually occurring in the advanced mathematics program to what could have been happening compared to best practices and research.

The goal was for the study's results to provide the ABC School District professionals with information about the gaps between minority and low SES students and majority populations to ameliorate problems. The results of this study suggested changes in current practices must be implemented to create opportunities for the groups of students who did not have access to the advanced mathematics courses.

Methodology Framework and Justification

The project study utilized a quantitative gap analysis based on the theoretical framework of J. Michael Scott who initiated this approach in the field of biology (University of Idaho, 2014). Gap analysis, also known as gap studies, is a largely quantitative approach used predominantly in business, management, marketing, and biology (Davis, Misra, & Van Auken, 2002; United States Geological Survey, 2013). Gap analysis has also been used to gauge success in business projects and project quality (El-Sheikh & Pryke, 2010). Another facet of gap analysis research was its focus on assessing and comparing what was actually occurring to the ideal or desired outcome (Van Auken, Chrysler, Wells, & Simkin, 2011).

Business and marketing primarily used the gap analysis approach to identify voids in systems (Van Auken, Chrysler, Wells, & Simkin, 2011) and to demonstrate *reasonable* goals for business and marketing (Chevalier, 2010). Specifically, quantitative gap analyses indicated and quantified voids compared to what was present. Gap analysis was commonly used in project goals. Chevalier (2010) indicated gap analysis could not only help establish or quantify intermediate or final goals but could identify the intent of the goals and encourage stakeholders to more readily pursue the desired goal.

Sarmiento (2011) indicated methods such as gap analyses identify potential trade-off situations between the levels or situations that are being analyzed. The goal was to be able to identify and classify the extent and depth of the distinguishable gaps (Sarimento, 2011). The usefulness of the gap analysis approach is its application of indicators to gaps in access to advanced mathematics courses between minority, low SES, and majority students. Gaps to advanced mathematics courses include low access levels for minority and low SES students and higher levels of access for majority students. Further study was needed because the data revealed large numbers of majority students also did not meet the access requirements for the advanced mathematics course. The results of this quantitative gap analysis provided data for decision-makers and stakeholders in the ABC School District to determine changes in access practices to the advanced mathematics course.

Gap analyses have been utilized to identify and compare what was actually occurring to what one would want or expect to occur. LaBay and Comm (2003) described gap analysis in marketing approaches by defining expectations of service as what the customer might have hoped to receive, and was an important point for the study. In this study, the customers were the students and the data indicated significant gaps between groups of students.

Additional professional literature from business provided a more focused understanding of how quantitative gap analysis could be applied. Winch, Usmani, and Edkins (1998) asserted most gaps in understanding occur between what was expected and what actually occurred. Winch et al. (1998) further indicated building construction was a

service industry where clients purchase a capacity to produce and not a product. Applying the concept of capacity production in education seemed appropriate. Via the schooling process, students and parents were purchasing the capacity to produce in the future. A quantitative gap analysis provided a method to search for and identify gaps in educational processes and capacities. Gap analysis offered a data platform to conduct further research or be a catalyst to create programs to fill the gaps identified by the data.

The research data in this study were utilized in very narrow ways, in alignment with Ratnatunga's (2012) suggestion that gap analysis is a practical research approach for investigating very narrow problems. A secondary analysis of existing data was applied and found gaps of access between groups of students who can enroll in the advanced mathematics courses in the ABC Middle School. The goal of this secondary was to quantify potential gaps about access to advanced mathematics coursework among various groups of students. Chevalier (2010) indicated one of the primary purposes of any reasonable goal was the processes should be controlled by those who must do the work. This aspect of quantitative gap analysis methodology allowed the goals to become a motivator for improvement to close gaps, and not necessarily find all of the possible solutions to the problem. The reasonable goals established from a quantitative gap analysis were developed to encourage stakeholders to try to reach the objectives without defining success only as the best-case scenario. Gaps between the minority and majority populations were present and the study's methods would hopefully foster changes in practice and eventually student outcomes in the ABC School District.

Justification

The justification for using a quantitative gap analysis approach was that it provided an unbiased view of data and allowed for data to be captured and examined in smaller compartments instead of large datasets analyzed and assessed through months or years of longitudinal studies. El-Sheikh and Pryke (2010) indicated gap analysis was often used as a way to take a snapshot of data. In their approach, the data were a snapshot of client satisfaction in business. For the purposes of this study, the students were viewed as the clients. Existing ABC School District data were collated and analyzed, and provided opportunities for snapshots for investigating gaps in access and equity to the advanced mathematics classes. El-Sheikh and Pryke (2010) also stated gap analysis did not account for the organic nature of information exchange between groups, which was also very important point for this doctoral study.

In this study, there was no direct interaction between me and those being studied. No data were collected directly from students or teachers. All data were collected via school databases of existing information. I went to great lengths to make sure data analysis was the focus of study and only had contact with four school personnel during data collection. Four total phone conversations occurred between me and a middle school counselor and the gifted and talented director. A high school assistant principal gave me access to high school demographic and AP class data. A central office director gave me student test score data with research numbers inserted for student names. MY goal was simply to collect the data, analyze it, and determine what gaps existed.

Tsai, Hsu, and Chou (2011) indicated the effective use of gap analysis hinged on choosing the right attributes to measure for gaps. The choice of attributes to measure was an important distinction in this study, as there were large amounts of available data to examine. Narrowing the data to only the essentials needed to identify potential gaps was paramount. Further analysis of other information could be done after identifying and quantifying what was actually occurring.

Minority students were more likely not to meet the 70th percentile cut-score than the majority Caucasian student population. Sixty-eight of 218 Caucasian students (31%) met the cut-score, while just under 14% of minority students met or exceeded the 70th percentile cut-score. Tsai et al. (2011) stated that gap analysis was used to identify and evaluate gaps in customer perceptions and expectations in services they anticipated receiving. It was likely most of the rising sixth-grade students had no expectations about taking or not taking an advanced mathematics course. Many of the students were likely unaware the scores they made on the ITBS determined eligibility for advanced mathematics classes. Parents likely did not know how their student's test score affected their course options. The data demonstrated the ABC School District needed to change the testing policy on access to the advanced mathematics classes.

Another justification for the use of a quantitative gap analysis methodology was the data were used to quantify the practices and policies of the ABC Middle School's advanced mathematics testing program. The gaps identified from the secondary analysis of existing data were diagnostic, and provided the numbers of minority and low SES students who did not qualify for the advanced mathematics courses compared to the

majority population. Again, the strength of the gap analysis approach was the lower chance for bias using a secondary analysis of existing data to measure the gaps between groups of students. The data were simply collated, analyzed, and presented.

Quantitative gap analysis was further justified because it allowed the researcher to enumerate quantities of a policy, program or system, make an analysis of the data, and identify what gaps may be present. According to Chevalier (2010), a gap analyses were used to determine existing levels of performance with what was desired. Essentially, a quantitative gap analysis approach does not solve problems. Quantitative gap analyses were used to identify problems, or gaps, in an institutional setting. In this study, the gaps in enrollment between minority and low SES students and the rest of the school population indicated issues of access and equity. Additionally, the enrollment gaps for minority and low SES students likely translated into a lack of access to advanced coursework in later grades as well. Ramifications for longer term issues for minority and low SES students were significant due to AP course prerequisites and the fact that students who do not start out in advanced classes may be less likely to pursue advanced coursework as they go through school.

The quantitative gap analysis of ABC School District testing program also offered unexpected results. A significant majority of the students who did not meet the ITBS cut-score were from the majority population. Almost 68% of students who were not low SES students scored below the 70th percentile cut-score. Just over 80% of the low SES students missed the cut-score. An advantage of gap analysis was the ability to reveal unexpected results. LaBay and Comm (2003) found gap analyses offered the unexpected

in research by showing trends or results which were counter to any of the expectations before the study.

Table 7

2013 ABC High School AP Statistics Class Enrollment

Minority Group	<i>n</i>	% of minorities in AP statistics	% of school minority population
Hispanic	9	13	18
African American	5	7	9
Asian	3	3	2

Table 8

ITBS Cut-Score Results and Student Socioeconomic Status

Student Groups	<i>n</i> Scores 69% or Below	<i>n</i> Scores 70% or Above	<i>n</i> / % Below 70%
Noneconomically Disadvantaged	99	47	146 / 67.8%
Low SES	158	38	196 / 80.6%
Totals	257	85	342 / 75.1%

Quantitative gap analysis was the right approach for this study over other methods for several reasons. First, the data were collected, analyzed, and presented by an employee of the district. Since a quantitative gap analysis methods simply organized existing data about what was occurring, this method had no real opportunities for individual judgment or inferences than other potential approaches. Existing data were utilized to investigate an existing system of testing. Second, very little clarification of the findings was needed using quantitative gap analysis, as only quantitative numbers were

reported. Gap analysis methods allowed for simply reporting numerical data about what occurred with testing and placement in the advanced mathematics program. Third, there was less opportunity for bias in the study using quantitative gap analysis. The only data examined were existing demographic and test score statistics which have already been compiled by the ABC School District. This minimized possible negative perceptions about the district employee who collected and analyzed the data as having personal agendas about the results. Simply put, the quantitative gap analysis results created a set of data, which were examined only for what they were.

On the surface, this study might have called for a program evaluation. A study of the ABC School District testing program was not a good candidate for a program evaluation for three primary reasons. First, there was no evidence the advanced mathematics testing program was ever written into district policy. The testing program apparently became a practice, which was never actually codified. Second, the implementation of the advanced mathematics entry testing program occurred primarily in the sixth and seventh-grade building; however, the testing actually occurred in the fifth-grade elementary building. The testing series for the advanced mathematics courses ended in the eighth and ninth grade junior high building. With no codified district policy, there were simply too many variables and practices in three different school buildings with three sets of administrators, teachers, and counselors to perform an effective program evaluation. Third, entry testing for mathematics or other types of advanced courses in the high school did not exist by either policy or practice. In the ABC Junior High School, students took the courses they chose, except for mathematics. For example,

the ABC Junior High School had students in advanced mathematics courses because most of the students in those courses were there because of a fifth-grade test score. Therefore, a program evaluation simply did not seem suitable. After the identification and scope of gaps in access to advanced mathematics courses were identified, a program evaluation could have been an option.

An action research design for this study might have seemed appropriate as well. Action research was primarily designed to solve very specific educational problems (Creswell, 2012). The purpose of this study was to investigate a potential problem to determine whether there was a problem, and if so, determine the depth and scope of the problem. The action research approach was one based on validating or rejecting what was going on in an educational setting (Altrichter, Feldman, Posch, & Somekh, 2013). Action research was not suited to identify the nature and scope of the problem. Once the problem had been identified by the study, any actions to mitigate the discovered problems occurred in later actions and outcomes as a result of the study. Action research would have also required a great deal of interaction between the researcher and teachers, students, administrators, and others to collect and analyze data. Large levels of interaction could have driven up issues of bias, controversy, and other negative outcomes.

Finally, a quantitative gap analysis simply provided the best approach to identifying and quantifying a problem. An ABC School District employee performed the research, which could have placed the results under additional scrutiny, preconceived notions, and other negative perceptions from the school's administrators, teachers, or counselors. A research study on student access and equity to advanced coursework,

which required lengthy interviews and high levels of interaction could have caused conflict. The employee who did the research was from another school building in the district, and could have been viewed as interfering or causing problems in the academic practices of the ABC Middle School. Quantitative gap analysis provided some protection against this kind of perceived bias or negative scrutiny. The quantitative gap analysis used in this study simply organized, analyzed, and collated existing district data. The data indicated significant gaps in access to advanced mathematics courses for minority and low SES students. The identification of gaps in access for particular groups of students was only based on the data. Again, the researcher did not perform any formal interviews of school personnel, students, or other stakeholders. Methods such as interviews could have introduced potential bias from the employee doing the research or from those who were interviewed. The secondary analysis of existing data using a quantitative gap analysis reduced the possibility of bias or potential controversy caused by a district employee performing the research.

Setting and Sample

A secondary analysis of existing school data was performed, and no participants were needed. Written permission was obtained from ABC School District central office and building-level administrators to examine existing data via a Letter of Cooperation and Data Collection Coordination Request from the ABC School Superintendent's office. No survey or interview data were collected during data collection to prevent bias in educators. Interviews of faculty, counselors, and administrators conducted during the study could have led to defensiveness, withholding of information, or other possible

consequences. The goal of this study sought only to identify what gaps in student access existed.

The ABC Middle School principal was consulted about the overall nature of the study. An ABC School District Assistant Superintendent arranged for the data to be turned over for use in the study by the ABC Director of Elementary Instruction, who manages all of the ABC School District data. Two brief phone conversations were held by the researcher with the Gifted and Talented Coordinator and a middle school counselor. These conversations were very general about what tests students took for mathematics placement. The Director of Elementary Education shared handed the data via a large, single spreadsheet and gave a tutorial on each facet of all the data categories.

Protection of Subjects

All student data in this study were assigned a random number by the ABC School District Director of Elementary Instruction. All student names, addresses, or any other potentially identifying characteristics were not provided in the data. An extra layer of the protection of student data existed as all school personnel associated to the collection, delivery, and analysis of the data are active, licensed educators subject to the state educator Code of Ethics on confidentiality of student information and records (XYZ Department of Education, 2014). Further, all of the original, raw data was stored on a district desktop and laptop computer, which were both password-protected.

Data Collection

Data were collected to address the research questions of the study. What enrollment gaps are present in the advanced mathematics classes at ABC Middle School? Data collected for the study addressed the following research questions:

RQ1: What enrollment gaps are present in the advanced mathematics classes at ABC Middle School?

RQ2: Do the mathematics exam cut-scores currently used in the fifth grade in ABC School District deny some students opportunities for advanced mathematics coursework?

The data collection process included collecting information from existing school databases. The spreadsheet contained the following information for fifth-, sixth-, and seventh-grade students for the years 2012, 2013, and 2014: grade, gender, federal race identification, low socioeconomic status, special education status, English language learner (ELL) status, testing year, reading score, and ITBS mathematics score. A secondary analysis approach was used to examine existing data, which had already been collected for other purposes. Secondary data were valuable because the data may be used to investigate problems in new ways (VanderStoep & Johnson, 2008). These data gave the requisite information to ascertain how many students tested, what minority groups were present, the number of minority students, the number of low SES students, and quantified the number of students above and below the 70% cut-score.

For the purposes of this study, all sixth- and seventh-grade data were eliminated, as were all fifth-grade data from 2012 and 2013. The sixth and seventh sets of data were

removed because the fifth-grade ITBS cut-scores were determinative for entry into the advanced mathematics course in the sixth grade. Only the fifth grade class of 2014 demographic and test score data were utilized. The 2014 fifth grade data was the most recent and provided the most current information about the problem being investigated. Demographic information was collected and aggregated into several cohorts based on race/nationality/ethnic and SES background cohorts. For the purposes of this study, free/reduced lunch status served as the definition of low SES students.

The hypothesis of this study stated gaps were present between minority and low SES and majority and economically advantaged students who took advanced mathematics classes in the ABC Middle School. All data were collected using confidential methods. The data were provided by an ABC School District central office director. The administrator removed student names and assigned research numbers to each student's information. All information to be utilized for the study were pulled from the original spreadsheet of raw data and stored on district, password-protected laptop and on a district password-protected desktop computer drive. Further, researcher bias was not an issue as the data collection involved quantitative, secondary analysis methods of existing data. Secondary analysis methods provided an extra layer of protection against researcher bias, as existing data were utilized to answer the research questions. No interviews or other interactions with students or school personnel occurred.

Permission to collect data was granted from the ABC School District superintendent's office. The data were delivered to the researcher via a spreadsheet by the ABC School District Director of Elementary Education. The data contained no

identifying information which could identify a student or their family. All student names were replaced with random research numbers assigned by a Director of Elementary Education.

After the data were examined, substantial gaps in the ITBS mathematics cut-scores between groups of students were present. Descriptive statistics using quantitative variables provided the best route to collate and examine the data. The original database containing nine qualitative variables were truncated to four cohorts, as these data were the only ones needed to address the research questions: gender, race/ethnicity, low SES, and ITBS mathematics scores. Gender was split into males and females. Low SES status was used to identify the rest of the students as not coming from low SES status families.

Overall, 63.6% of the total fifth-grade population was Caucasian, while 37.4% of the students were minorities. Analysis of the data indicated significant gaps were found between minority and majority groups, as well as between low SES and non-low SES students. One finding not expected was the overall low numbers of students who met the 70% mathematics cut-score on the ITBS. Only 24% (82/342) of all 2014 fifth grade student made the 70% or above on the ITBS mathematics battery. Only 6.1% of the students scoring above the cut-score were minorities.

The data provided answers to the research questions:

RQ1: What enrollment gaps are present in the advanced mathematics classes at ABC Middle School?

RQ2: Do the mathematics exam cut-scores currently used in the fifth grade in ABC School District deny some students opportunities for advanced mathematics coursework?

The first hypothesis was there were enrollment gaps present in the advanced mathematics classes. The null hypothesis was there were no enrollment gaps present in the advanced mathematics classes. The second hypothesis was the ITBS exam cut-scores denied some students opportunities for advanced mathematics coursework. The null hypothesis was no students were denied opportunities for advanced mathematics coursework.

There were distinct gaps present between the groups of students; however, the gaps were different than expected. For example, less than one-quarter of all 2014 fifth graders equaled or surpassed the 70th percentile of the ITBS. A 24% overall rate of students scoring above the 70% cut-score may not be exceedingly low when compared to national ITBS mathematics averages. The key was that the cut-score was used to include or exclude students from advanced mathematics coursework. Consideration to the numbers of students who met or exceeded the cut-score was important. The larger issue was about how the cut-score was being utilized to make placement decisions.

A comparison of national ITBS mathematics score averages to the ABC School District might have seemed appropriate; however, the comparison of one year's set of students with another year of students with regard to national percentile rank was not considered best practice (University of Iowa, 2011). To gain an understanding of how ITBS data were used, the national average on math scores was usually at or around the

50th percentile (University of Iowa, 2011). According to the ABC School District's Gifted and Talented (GT) coordinator, the use of a 70th percentile cut-score to grant access to the advanced mathematics course was essentially the GT student cut-score range (L. Burns, personal communication, November 13, 2013). In other words, students were identified for placement in GT programs, in part, by the utilization of a 70th percentile cut-score on the mathematics portion of the ITBS.

The use of a cut-score on an achievement test was the standard practice of the district to grant or deny entrance to an advanced mathematics course. The 70th percentile cut-score was a very high standard as it reduced the eligible population to only the top three stanines, which were primarily identified as above average and very above average students (Data Recognition Corporation, 2015). Additionally, the ITBS was an achievement test. Achievement tests were utilized to determine what a student had learned from the curriculum, and not the student's academic ability (Excel Program, 2015).

An achievement test, such as the ITBS, was a useful tool to help identify students who might do well in advanced mathematics; however, the ITBS was not an ability test (Excel Program, 2015). The ITBS was used by ABC Schools as an ability test. Also very important to remember, the 70% cut-score was a one-day testing event. A one-day event did not account for situations in the students' lives that day or for other extenuating circumstances, which may have occurred in the hours, or days before the exam (Gaddis & Lauen, 2014). The use of a one-day test event should not have been the one and only

determinant of a student's ability to perform advanced mathematics. There was no evidence found that students had opportunities to re-test on the ITBS. Data Analysis

The demographic composition of the enrollment of students in advanced mathematics courses at the middle school level did not seem to be remotely close to the general demographic composition of the student body. Demographic and test score data for this study were collected from an existing school district database. Data analysis was needed to identify and quantify the possible gaps in participation in the advanced mathematics course between and among demographic groups within the middle school. A secondary analysis using descriptive statistics was utilized, and data were collated to include only the most recent year of demographic and test score data. Further, the most recent year of data were pared to only students from the 5th grade. A secondary analysis allowed the existing school data to be examined without bias or subjectivity, as no other type of data were collected. The descriptive statistics approach allowed a pathway to see the data in very simple table form for what they were or were not.

Data Analysis Results

There were 347 fifth grade students who took the Iowa Test of Basic Skills in the ABC School District in 2014. Five general cohorts of data were collected, collated, and analyzed: gender, minority, low SES, non-low SES, and majority students. Gender was separated into males and females. Minority student data were first aggregated as a whole group. Minority student data were then disaggregated into the ABC School District's federal categories of race/nationality/ethnic backgrounds of Asian, African American, Hispanic, Native American, and Two or More Races. Low SES students were identified

using free and reduced lunch status. Non-low SES students were those who did not receive free and reduced lunch status. Majority students were those who could not be placed in any of the preceding categories. Generally, any student in the majority cohort was assumed to be Caucasian.

All data cohorts were analyzed via the 70th percentile mathematics cut-score on the ITBS. Students scoring 69% or below were considered to have not passed the ITBS in mathematics and were not eligible for the advanced mathematics course. Students who scored 70% or above on the ITBS were considered to have passed and were eligible for the advanced mathematics course.

There were 129 students identified as minorities who took the ITBS exam in 2014. The data of 78 Hispanic and 32 African American students were analyzed as separate cohorts. Since there were only 19 minority students combined from the smallest groups of Asian, Native American, and Two or More Races, these groups were placed into one category called Small Minorities. The numerical breakdown for the Small Minorities group were Two or More Races (12), Asian (5), and Native American (2).

Out of 129 total minority students, 66 of 78 Hispanics, or 84.6% failed to meet the ITBS cut-score. Twenty-nine of 32 African American students, or 90.6% did not reach the 70th percentile cut-score. Of the Small Minority cohort, 13 of 19, or 68.4% of these students were not successful in reaching the 70th percentile mark on the ITBS mathematics exam.

Table 9

Minority Student ITBS Mathematics Exam Results

Minority Group	<i>n</i> of Students	Scores 69% or Below	Scores 70% or Above	% at or below 69%
Hispanic	78	66	12	84.6
African American	32	29	3	90.6
Small Minority Cohort	19	13	6	68.4

The proportion of students in the four minority groups of students were examined using a chi square analysis. Of the 129 minority students who took the 2014 ITBS exam, 108, or 83.7% failed to meet the 70th percentile cut-score on the ITBS, which represented a *p* value of 0.0006 and a chi-square value of 12.617. Both the *p* and chi-square values indicated the chance of economic status and meeting or exceeding the ITBS cut-score were associated and demonstrated there was a potential issue with equitable enrollment eligibility. Because the *p* value was 0.006, at the 0.01 significance level, the null was rejected. There was sufficient statistical evidence that economic status and passing status are associated. There was only a 0.007 chance of observing the chi-square value of 7.345 or higher by chance if the two variables were independent. The expected values were the amounts that would have been expected to see in each category if there were no special or unusual relationship between the variables. For example, the expected value of African American students who scored 70% or higher was how many that would be in that

category if the proportion of students that scored 70% or higher who were African American was the same as the proportion of African American students in the fifth grade.

Table 10

Minority Fifth-Grade Student Statistics

Factor	Value
<i>N</i> of Minority Students	129
<i>n</i> of Low SES students 69% or below	108
χ^2	12.617
<i>p</i>	0.006
<i>df</i>	3

The data represented in Tables 10 and 11 indicated there was little likelihood that mere chance was involved in the numbers of students who met or did not meet the ITBS cut score. Expected values were examined as they were the amounts expected in each category if there were no special or unusual relationship between the variables. For example, the expected value of black students who scored 70 or higher was how many would be in that category if the proportion of students who scored 70 or higher and were black, was the same as the proportion of black students in the fifth grade. Degrees of freedom were measured as this number described how many values are free to vary in the calculations of the chi-squared value and *p* value.

Table 11

Expected Values for Student Groups

Minority Group	Expected Value	Expected Value
Small Minorities Combined	14.127	4.873
Black	23.793	8.208
Hispanic	57.994	20.006
White	162.09	55.914

The assumption was made that the 2014 ITBS scores were representative of fifth-grade level performance in the ABC School District. The expected values were all greater than or equal to five, after rounding. Because the p value was 0.006, at the 0.01 significance level, the null was rejected. There was sufficient statistical evidence that economic status and passing status were dependent. There was only a 0.006 chance of observing the chi-square value of 12.617 or higher by chance, if the two variables were independent. There were 196 low SES students who took the ITBS exam in 2014. Of the 196 low SES students, 158, or just under 81%, failed to meet the 70th percentile cut-score on the ITBS, which represented a p value of 0.007 and a chi-square value of 7.345. Like the results with minority students, both the p and chi-square values indicated the chance of economic status and meeting or exceeding the ITBS cut-score were dependent and demonstrated there was a significant problem. Because the p value is 0.007, at the 0.01 significance level, the null was rejected. There was sufficient statistical evidence that economic status and passing status were dependent. There was only a 0.007 chance of

observing the chi-square value of 7.345 or higher by chance, if the two variables were independent.

Table 12

Low SES Fifth-Grade Students

Indicator	Result
<i>n</i> of Low SES Students	196
<i>n</i> of Low SES students 69% or below	158
χ^2	7.345
<i>p</i>	0.007
<i>df</i>	1

There were 146 students who were not in the low SES student group. Of the 146 students who were not from low SES backgrounds, 99, or just under 68%, scored at the 69th percentile or below on the ITBS. The students in the non-low SES group had higher rates of scores at or above the 70th percentile. However, the fact that over three-quarters of the non-low SES students did not meet the cut-score was not expected.

Table 13

Expected Values Based on SES

<i>Student Group</i>	<i>Expected Value Column 1</i>	<i>Expected Value Column 2</i>
Non-Low SES	109.71	36.287
Low SES	147.29	48.713

Because the p value is 0.007, at the 0.01 significance level, the null was rejected. There was sufficient statistical evidence that economic status and passing status were dependent. There was only a 0.007 chance of observing the chi-square value of 7.345 or higher by chance, if the two variables were independent.

Data Results Summary

The data indicated a system, which likely limited access to the advanced mathematics course to large numbers of ABC Middle School students. Overall, minority students had about a 16% chance of eligibility for access to the advanced mathematics course. At approximately 19%, low SES students were only slightly more likely to have access to the advanced mathematics class. Caucasian students met or exceeded the 70th percentile ITBS cut-score at a rate of 31%.

Assumptions, Limitations, Scope, and Delimitations

One of the assumptions of the study was minority and low SES students were admitted into advanced mathematics courses at lower rates. Another assumption was lower standardized test scores were the reason minority and low SES did not qualify to take the advanced mathematics course. The data found both of these assumptions to be generally accurate. 84.6% of minority and 80.6% of low SES students did not meet or exceed the 70% ITBS cut-score. An additional assumption was the databases would have all of the necessary information needed to determine if gaps in participation do exist. The database was sufficient in providing the needed information. In fact, the data contained more information than was needed for the study and was pared down to only the essential data to address the research questions.

A potential limitation of the study was the relatively small scale of what was examined. Only the 2014 data from the 347 fifth grade students were analyzed. Further, the problem examined was highly localized and any possible connections to other similar situations were likely not appropriate or useful. While the data from the study provided general reliability, it was likely not comparable to other situations or locations with the same problem.

The study did not include the use of any experiments, which might could have shown causation. The data provided strong evidence of correlation between the lower numbers of minority and low SES students and eligibility for entry into the advanced mathematics classes based on ITBS scores. Though the data demonstrated correlation, due to the type, size, and scale of the study, no further claims beyond these could be made. Additionally, the testing program at the ABC Middle School for entry into an advanced course existed only for the mathematics classes. Comparisons in social sciences, language arts, sciences, or other classes were nonexistent or exceedingly limited. There were also no similar testing programs for entry into advanced courses in the other schools of the ABC School District. Therefore, further comparisons to other schools and similar situations were inappropriate.

The scope of the study involved collecting data for a secondary analysis from only the fifth-grade students in the ABC School District. The data analysis examined fifth-grade student scores which were used to determine entry into the sixth-grade pre-AP mathematics courses at ABC Middle School. No formal interviews of teachers,

counselors, or administrators were conducted, and no students were contacted by any method.

Conclusion

The quantitative gap analysis methodology and secondary analysis of existing data answered the research questions:

RQ1: What enrollment gaps are present in the advanced mathematics classes at ABC Middle School?

RQ2: Do the mathematics exam cut-scores currently used in the fifth grade in ABC School District deny some students opportunities for advanced mathematics coursework?

The existence of gaps in opportunity between minority and low SES students and the majority student populations was confirmed. The data revealed significant gaps between the minority and low SES fifth-grade students and the majority population for eligibility to take advanced mathematics courses at the ABC Middle School. What was not expected was a large gap in opportunity among fifth-grade Caucasian and non-low SES student populations of the ABC Middle School. The gaps of access for majority populations were smaller than their minority and low SES counterparts but nonetheless more significant than expected. The fact that all student groups had significant gaps in opportunity and were denied access to the advanced mathematics course was the most surprising element of the study. The unexpected and large gaps for all groups of students confirmed a need for change to the whole testing and selection system into the advanced mathematics course.

The theoretical framework was useful in quantifying, analyzing, and utilizing the outcomes of the study. The gap analysis approach was useful in quantifying what actually happened with regard to the mathematics testing program compared to possible desired outcomes. Specifically, the gaps between minority and majority students were much larger than should be expected from general demographic composition of students. The gap analysis approach was also used to group the gaps in access to the advanced mathematics course by ethnicity, gender, and SES, which allowed for an effective display of the data. Gap analysis was also particularly useful to determine the depth of gaps in service between and among minority and majority groups of students. The gap analysis approach was effective in finding gaps in service to students, which before the study, were not expected at all. For example, the gaps in service to majority students was one such gap not expected to be found. The most effective and powerful use of gap analysis was the ability to utilize existing school data to report the results. The gap analysis approach facilitated the production of data results, which were presented with minimal bias. In particular, the data already existed and the researcher simply collated those data into a useful product, which examined the problem. Finally, the gap analyses results have been shown to help lead stakeholders to pursue the goals, which were derived from the data (Chevalier, 2010). The desired outcome of the study was the stakeholders examined the data from the study and took action based on those results.

The literature review demonstrated the scope of the problem in the study was appropriate, relevant and significant, and was integrated into the state of knowledge associated with the problem. The literature review indicated the problem studied was

appropriate in that many examples of similar problems were catalogued in the research. Specifically, the body of literature demonstrated problems of access to and equity in advanced coursework have existed and continued to be a problem. For example, underserved and underrepresented students were adversely affected by testing practices, gatekeeping, and prerequisites for placement into advanced coursework and should be replaced with less exclusionary methods, such as open enrollment (Klopfenstein, 2004). The professional literature revealed minority and low SES students were less likely to be enrolled in advanced coursework than other students. Recommendations for the use of standardized testing indicated the scores should have been used as indicators of student ability, and not as an exclusionary metric. The literature also recommended underserved and underrepresented students in advanced courses should have been actively recruited and supported by school personnel to ensure both opportunity and success.

A limitation of what was found in the literature revealed research on access to pre-AP and AP courses seemed to have peaked in the mid-2000s. One assumption for the preceding was the problems of access and equity were mitigated as open enrollment become more of a standard practice. The findings in this study underscored there was still work to be done on the problem. For example, if a problem of access and equity was found in one school district in this study, it is likely other such problems existed. A major limitation in the literature was that the inner workings of placement of students into advanced coursework in many school districts likely had not caught up with the suggested practices in the body of professional literature. Further, school district practices with regard to access to advanced coursework were not able to be known at all times. The

practices of the ABC School District were one such example of student exclusion from advanced mathematics coursework that was not known to anyone other than school personnel at the fifth-grade and middle schools.

Positive social change for all students of the ABC School District was the focus of the study. The data and research from the study bolstered the claim that students should not have been denied access to advanced academic classes by single-criterion metrics. The testing practices and processes limited access and opportunity where it should have expanded opportunity for students. There were considerable efforts in the ABC High School to provide more access to advanced classes, regardless of student ability or the academic level of the class. The efforts at ABC High School provided focus for the project study.

As the policy recommendations suggested, the first recommendation for social change was to suspend the current method of how students were selected into advanced mathematics courses. Social change was furthered by the recommendation of a program for recruiting minority and low SES students into the advanced mathematics courses. The most authentic social change suggested was for the ABC School District to create support systems focused on helping underserved students transition into classes for which they were not eligible in the past. The final, and most important test of social change would be the ABC School District recruiting, encouraging, and supporting all types of students in such ways that every single classroom looked generally like a demographic cross-section of the entire district.

Section 3: The Project

Introduction

Section 1 introduced the problem of gaps in opportunity between the numbers of minority and low SES students taking the advanced mathematics course compared to the rest of the student population in the ABC Middle School (pseudonym). Based on low participation rates of minority and low SES students in AP and honors courses at ABC High School (pseudonym), this study was designed to identify and quantify gaps in participation of minority and low SES students and the majority groups of students in the advanced mathematics course at ABC Middle School. The findings of this study indicated students were granted or denied entry to the advanced mathematics course based on the use of cut-scores from the mathematics portion of the ITBS test. The exclusion of students into advanced coursework based on a single measurement has been widely rejected in recent professional literature. The professional literature also rejected other school policies and practices, which limited or denied access and equity to advanced coursework.

I conducted a quantitative gap analysis of the study data that is reported in full detail in Section 2. Data were collected from an ABC School District database of student demographic and educational information. A secondary analysis was performed on selected portions of the data to identify potential gaps in access to the sixth-grade advanced mathematics course between minority and low SES students from the rest of the student populations. Significant gaps were discovered between the various groups of students. A policy recommendation to the ABC School District was constructed that proposed solutions to close these gaps in opportunity and service to the affected students.

I identified several programs, interventions, and policies suggested by the professional literature that fit the local problem discussed. The professional literature suggested it was a common practice in schools to exclude particular groups from advanced coursework by testing, gatekeeping, course prerequisites, and other methods (Klopfenstein, 2014). The policy recommendation of this project offered comprehensive suggestions for changes in policy, practice, and professional attitudes on how students gain access to advanced coursework. If the suggested changes are implemented, all students at the study site will have the opportunity for access to advanced coursework and the needed support for success in those classes.

Description and Goals of the Project

The policy recommendation to the ABC School District School Board consists of suggested changes to the existing fifth-grade testing program for entry into the advanced mathematics coursework in the sixth grade. The goals of the project's policy recommendations are to:

- eliminate the use of the 70% cut-score on the ITBS for entry into advanced mathematics for sixth grade;
- introduce a recruitment program for students to enroll in advanced courses in the ABC Middle School;
- institute staff development to assist teachers, counselors, and administrators in identifying students and student potential for advanced coursework; and
- create support systems for students who might not have had the academic backgrounds needed for success in advanced coursework.

I did not identify any evidence that the ABC School District had ever identified the potential inequities of access between and among groups of students in the advanced mathematics testing program. A secondary analysis of existing data identified a problem in that large numbers of students were denied access to the advanced mathematics classes. The data collected and processed for the study revealed the scope of the problem exceeded what was anticipated. The data showed that minority and low SES students were prevented from taking the advanced mathematics courses at high rates. The data, also, unexpectedly revealed many students in the district's majority populations were also excluded at very high rates as well. The project addressed the problem via a policy recommendation identified minority students as most affected.

The goal of the project is to make policy recommendations, which eliminates gaps of access and creates equity of opportunity for all students. The data results provide an avenue to investigate the entire advanced mathematic course entry testing and selection program to understand how the the program got started, why the ITBS was used, as well as to raise awareness such a system was being utilized. A further goal is to eliminate the existing testing program and replace it with a more inclusive, student-centered system of recruitment and support. To have any chance at success, a student recruitment program needs significant professional adoption and development for all teachers, administrators, and counselors. A substantial outreach program of stakeholders who did not work in the school buildings daily is needed as well. Stakeholders include, but are not limited to parents, business leaders, religious leaders, minority group leaders, and other civic leaders.

Another goal is to formally address the ABC School Board and central office leadership about how the testing and placement procedures have transpired over the years. Suggested changes for implementation of new systems are to be presented through the policy recommendations. The ultimate goal is to help the central office and school board leaders make decisions, which open up student access and equity to all advanced courses. Finally, all policy recommendations are focused on increasing access to advanced courses for all students and on the necessary supports needed for success for all kinds of students in advanced courses.

A policy recommendation creates the best opportunity to guide the study to take action and effectively change the current system. Additionally, the policy recommendation methodology provides an effective pathway for the ABC School District to take action on a policy, which was unknown to most decision-makers in the district. Ultimately, the project was chosen to address the problem because it offers the support structures needed to help the affected students gain access to the advanced mathematics course, and provides the best pathway to make changes to the entire advanced coursework entry policies and systems.

This project fits with data collected and analyzed used a secondary analysis in Section 2. ABC School District student demographic and testing data from 2012 to 2014 were examined. The database contained categories including gender, race, SES, special education status, ELL levels, and test data. Reading and mathematics test data divided into several categories were also included in the database. The secondary analysis approach offered an avenue to answer new questions using existing data, as

recommended by UK Data Service (2016). For the purpose of this study, only the fifth-grade data were used because the primary entry to the advanced mathematics class was regulated by the fifth-grade test score. The 2014 fifth-grade information were chosen for use because these data were the most recent. Finally, only gender, race, SES, and mathematics score data were used in this study.

Twenty-one of 128 (16.4%) of minority fifth-grade students in 2014 made a score at or above the 70th percentile on the ITBS. Further, 38 of 196 (19.4%) of low SES students scored at or above the 70th percentile on the ITBS. However, as low as the minority and low SES student scores were, the data revealed discovered that test scores among all groups of students were lower than expected. The eligibility rate for entry into the advanced mathematics class at the ABC Middle School for all students was only 25.6%, or 89 out of 347 total students.

During the study, no school board policy or directive concerning access rules to the advanced mathematics course was found. The establishment of the 70th percentile cut-score practice likely began as a screening process for the identification of GT students. According to the ABC School District GT coordinator, the use of a 70th percentile ITBS cut-score for entry to the sixth-grade advanced mathematics course seems to have been set many years ago. The coordinator also indicated the cut-score practice likely dated to their predecessor, or the one before, which meant the testing practices went back at least 15-20 years (L. Burns, personal communication, January 5, 2014).

The findings of this study suggested a complete dismantling of the testing and access practices for the sixth-grade advanced mathematics course. As reported in Section

2, the data suggested the testing program created a system of exclusion of underserved and underrepresented students, which has effects beyond the initial ITBS administration. One example of this is the low proportion of minority students who took AP courses at ABC High School. The practice of excluding a student on one fifth-grade test score is essentially permanent: Any student excluded by an ITBS mathematics score below the 70th percentile has very little recourse to ever take an advanced class again in this school system.

The project's policy recommendations include proposed solutions that allowed for more opportunities and support for underserved and underrepresented students to gain access to advanced coursework. Existing school data were used to determine the existence of the problem by measuring numbers and categories of students who did not qualify for the advanced coursework. Gap analysis theory and a secondary analysis of existing data were utilized to quantify the problem. The existing school district data were collated and demonstrated minority and low SES students had a much higher probability of exclusion from advanced mathematics coursework than other students. Gap analysis and secondary analysis were effective approaches because all human elements were taken out of the data production and analysis. No interviews of students or educators were conducted. Gap analysis and secondary analysis methods were effective because there were no subjective elements involved. Gap analysis and secondary analysis methods were effective because existing data were simply quantified and arranged in ways to reveal what was known or not known. Also, gap analysis was effective in determining what was occurring, so it could be compared with what was desired.

Gap analysis was an effective method for revealing information, which was previously unknown before the study. An assumption before the study would have been that some groups of students were qualifying for the advanced mathematics course at much higher levels. One might have assumed non-low SES students met the ITBS cut-score at levels near their percentage of population in the school. Gap analysis indicated there were also significant gaps in qualification for the non-low SES group as well. In fact, gap analyses demonstrated there were significant numbers of students in all minority and majority groups who did not qualify for the advanced mathematics course. Essentially, gap analysis and secondary analysis were able to identify the scope, depth, degree of the qualification problems between and among several groups of students.

The project was a solution to the problem in the sense it identified and highlighted a problem, which, according to the sixth-grade middle school counselor, was generally unknown to most educators in the ABC School District because the student selection process happened automatically each year (C. Cochran, personal communication, November 11, 2013). The policy recommendations provided the next steps in offering solutions to the problem. To fully solve the problem was a process that would take many years to initiate and implement. The study ascertained students were being selected for access to the advanced mathematics course by a single test score. The first solution was the elimination of the testing system, which was only the beginning step of other solutions.

Based on the findings, the following recommendations were made for a new way of recruiting students into the advanced mathematics course. Next, the affected students

needed academic and social support programs to offer the best opportunities for success. Another need to solve the problem was parent and community support. Teachers, counselors, and administrators needed to devise all of the recruiting, support, and outreach programs for students, staff, and the community. The project offered solutions to the problem as it addressed both student denial of access to the advanced mathematics course, as well as a proposal of recruitment and support programs for all types of students to gain access to the advanced mathematics course and other advanced courses.

The project was an effective method to solve the problem; however, the proposed solutions were long-term, multifaceted, and complex. The study found the practices used by the district negatively affected several groups of students. The supports needed for each group of students were similar. All proposed student support structures were complex and geared to long-term commitment by the district. Therefore, the solution to the problem was a longitudinal process that required years of commitment to accomplish.

Review of the Literature

Most of the searches for the study were done via online, academic libraries. Key words used in the searches included *underserved, underrepresented, economically disadvantaged, low socioeconomic status, minority, African-American, Hispanic, Caucasian, access, equity, advanced mathematics, mathematics anxiety, opportunity, gap analysis, opportunity gaps, gatekeeping, open enrollment, tracking, Advanced Placement, pre-Advanced Placement, testing, test scores, standardized tests, counselors, community schools, and gifted and talented identification*. One effort to find related research was the use of reference lists of each cited source. Another successful attempt to find related

research was communication with colleagues who have worked with these types of programs and students denoted in this research. Websites of professional organizations whose missions were to service underrepresented students were also consulted for research outlets and resources.

The basic issue of equity for all students was foundational to the research and outcomes in this study. McDermott, Mahanty, and Schreckenber (2013) indicated the issue of equity for every student and school had become synonymous with economic opportunity. Taken even further, equity for all students, at all times was an issue of individual health, life expectancy, economic productivity, citizen participation, and the overall societal good (McDermott et al., 2013). Savage, Sellar, and Gorur (2013) argued schools had sometimes not fostered true equity among its students because issues of social justice many times seemed oppositional to the ideas of capitalism and free markets. This study did not suggest the ABC School District intentionally limited some students' opportunities. However, the mathematics testing system in the ABC Middle School certainly seemed lacking with regard to issues of equity for all students.

Fifth-grade students in the ABC School District took the ITBS each year, which was used to measure student progress primarily in the areas of reading and mathematics. However, the ITBS mathematics scores were also used to designate whether a student was eligible for entry into the advanced mathematics course in the sixth grade. The practice of using one specific score out of the ITBS as a sole metric for a student to prove academic eligibility for the advanced mathematics course seemed peculiar at best. The use of one test score to demonstrate student aptitudes for mathematics work did not seem

fair or justifiable. Perhaps the best assertion that all students deserve every chance to demonstrate their capacities and talents came from the ancients. Stinson (2004) indicated Plato said mathematics should be reserved for those who have particular talents in that field. Rice and Smilie (2014) suggested what Plato was really saying was education should not be based on a student's background, but orchestrated around student abilities and interests. Further, Hatt (2012) asserted intelligence tests were largely grounded in culture. Schools may project intelligence, and even ability levels on students through testing and social controls, largely along lines of class and race (Hatt, 2012). The implication was schools, school culture, teacher expectations, and the cultural background of students had great influence and power on students that may be very negative. For example, Hatt (2012) indicated teachers tended to identify students as intelligent based on cultural understandings, as well as how the students' parents had trained their children to learn like the teacher expected.

The practices of teachers and administrators were not the only factors determining student attitudes about intelligence, learning and ability. Sternberg (2007) concluded students believed tracking into particular classes was indicative of their intelligence level. Once a student was placed repeatedly in a lower track class, the student believed the class level they were in was, in fact, indicative of their intelligence level (Sternberg, 2007). Van Houtte, Demanet, and Stevens (2012) found that in a school tracking system, the highest-track courses were considered to be the normal, or highest intelligence track. Of further note, the more tracking there was in a school, achievement levels of the lowest ability groups were the lowest (Van Houtte, Demanet, & Stevens, 2012).

The research was unequivocal about the remaining gaps in achievement with regard to race and SES. Chen (2015) reported only 11% of African American students and 15% of Hispanic students were advanced in mathematics, compared to 42% of their Caucasian counterparts. Knaggs, Sondergeld, and Schardt (2015) asserted a 30% college enrollment gap existed between low- and high-income students in the United States. Further, high-achieving, low-income minority students were five times less likely to attend college than students from high-income backgrounds (Knaggs, Sondergeld, & Schardt, 2015).

Gaps in eligibility for the ABC Middle School advanced mathematics courses between minority and low SES was not only a local problem. Haskins and Kemple (2014) reported approximately one-third of all students from families in the bottom fifth of family income averages in the United States went to college and only 11% graduate. In comparison, about 80% of students from families in top fifth of family income went to college with a greater than 50% graduation rate (Haskins & Kemple, 2014). Stephan and Rosenbaum (2013) indicated the social stratification structures in society connected directly to preparation for entry to college. Specifically, the educational background and income of a student's family were correlated to preparation for college while in high school and successful entry into college (Stephan & Rosenbaum, 2012).

The level of access to advanced courses was a significant indicator of how students began to prepare for college work (Klopfenstein, 2004). In the ABC School District, students who gained access to the advanced mathematics course in the sixth grade were essentially assured of seats in subsequent advanced mathematics courses.

Students who were denied access in the sixth grade likely did not get into subsequent advanced mathematics classes. While no causation or correlation was claimed in the study, it was reasonable to assume from the ABC High School AP mathematics courses participation rates that most students who did not initially qualify for the sixth-grade advanced mathematics course took fewer or no advanced courses in junior or high school.

Even if a student who did not qualify for the advanced mathematics course via the ITBS cut-score could have gained access to advanced coursework was highly unlikely to take an advanced course later on. Students who did not qualify for middle school advanced courses, and perhaps decided an AP class in subsequent high school years, likely needed extra academic support. The literature has shown support programs gave particular groups of students the skills and knowledge needed for success in advanced coursework. Contreras (2011) asserted academic intervention programs were essential to minority, low SES, and other underrepresented students for guidance toward, and later success in, higher education opportunities. Further, Contreras (2011) indicated support programs were critical to underrepresented students in recognizing needed skills and aptitudes, as well as the ability to develop the skills and aptitudes they already possessed.

The immediate dissolution of the advanced mathematics course testing program at ABC Middle School would not have solved the problem. Students who did not qualify for the advanced mathematics course gained no advantage by automatic placement into these classes. The affected students still needed development and support in preparation to succeed in advanced coursework. Therefore support systems were needed for

assistance in recruitment, placement, and support for students. A concurrent support system was needed for teachers, counselors, and administrators as well.

First, the research indicated the use of only one measurement for entrance into a program was not only ineffective, but socially and educationally not appropriate (Olszewski-Kubilius & Clarenbach, 2012). While the use of test scores might have helped identify student strengths, weaknesses, readiness, and needs, the ITBS scores were used only to sort, add, and delete students from a particular class. Olszewski-Kubilius and Clarenbach (2012) indicated minority and low SES students were more likely to have been admitted or not admitted to gifted education programs or classes based on the one-shot entry approach. The ABC School District's cut-score practices using the ITBS looked like a program originally set up to identify gifted and talented students; however, no school personnel verified such a practice existed.

Second, in addition to student support, a student recruitment element was needed. Students from minority and low socioeconomic families had lower levels of parent involvement in school (Park & Holloway, 2013). Many students from minority and low SES backgrounds came from family and economic situations which lacked the financial means, knowledge of school systems, skills or structures to advise and coach their student, ways to encourage and support their student to sign up for, and be successful in advanced coursework (Palmer, Davis, and Maramba, 2011). More important was the importance of outreach by schools to minority and low SES families to incorporate and show parents how they could help their students (Park & Holloway, 2013). The many

moving parts of class, ethnicity, and culture of affected students' families demonstrated the school district did not understand how to approach this problem.

Third, the research indicated the exclusion of minority and low SES students from advanced coursework began early in a student's education. Swanson and Nagy (2014) indicated minority students were nearly always underrepresented in elementary and middle school gifted programs, and therefore had many fewer opportunities to subsequently enroll in high school honors, AP, and IB courses. Lack of opportunity in the elementary and middle school years played a significant role in the determination of opportunity for underserved and underrepresented groups of students. Again, exclusion of minority and low SES students in the early grades seemed to have long-term effects on eligibility and participation in advanced coursework later on.

Fourth, to recruit underserved and underrepresented students into a support program, the district needed programmatic structures, skills, and training. The study proposed the adoption of the AVID or an AVID-style program which targeted the recruitment of minority and low SES students for support in preparing for and taking advanced academic classes. AVID (2015a) was designed to recruit, prepare, and support students from backgrounds including minority, low SES, and no family history of college attendance. Stephens, Hamedani, and Destin (2014) found first-generation college students from minority backgrounds needed avenues and guidance to understand the significance and importance of their cultural differences in their education process. Many underserved and underrepresented students came from families where neither parent had graduated from college (AVID, 2015a). Underserved and underrepresented students

needed more assistance in getting ready for college, including psychological resources, such as support and encouragement from those of similar backgrounds who acted as role models or mentors (Harackiewicz et al., 2013). Stephens, Martkus, and Fryberg (2012) indicated minority students who came from families where there had been little or no academic success needed both structural and social supports. Structural supports were those offered by systems such as school, while social supports included personal behaviors and expectations from self and family. Stephens et al. (2012) further indicated most school settings and systems focused primarily on student social behaviors instead of structural systems. Essentially, the ABC middle school practices were focused only behaviors, and any changes or responsibilities in student achievement fell mostly on the students.

Fifth, it was important to understand how parent and community involvement could address the gaps in representation of minority and low SES students. The research indicated authentic involvement must include equitable involvement of all parents and the community members. Parent and community involvement with schools over the last few decades has focused on approaches based on so-called traditional middle-class values (Baquedano-López, Alexander, & Hernández, 2013). The middle-class approach to helping their children in school has been one of parental supervision and activism on behalf of their child, whereas minority or low SES parents may have believed they helped most by allowing educators to educate their child (Curry & Holter, 2015).

Finally, changing the rules for entry into advanced mathematics should have extended to other academic class offerings. Students should have been encouraged and

supported to take an advanced course based on their personal interest. Students with interests or aptitudes in language arts, history, geography, science, music, art, business, career, technical, or other disciplines should have been encouraged to pursue advanced academic coursework, which fit their particular interests and aptitudes (Aliaga, Kotamraju, & Stone, 2014).

The Project

The project was a policy recommendation to the ABC School District, which proposed the suspension of the current testing program, an assessment of testing in the future, and the creation and implementation of a recruitment and support system aimed at underserved and underrepresented student populations. The timeline in the recommendation was for presentation to the ABC School District School Board and Central Office administrators in the winter of 2016. The first timeline recommendation was to advise the immediate suspension of the use of the ITBS mathematics 70th percentile cut-score as the only means of access to the advanced mathematics course. The next step was a preliminary study of the existing program and practices in the spring of 2017. All findings and recommendations from the study were processed by the end of the 2016-17 school year. Design and scope of the recruitment and support program was completed in the summer of 2017 for implementation for the 2017-18 school year.

The professional literature supported the findings and recommendations made in the proposed policy changes. The history of the inclusion of minority students was traced back to a study conducted on admitting minority students to gifted classes over 80 years ago (Jenkins, 1936). Programs of systemic recruitment efforts to advanced courses went

back as early as the AP Equity 2000 program released in 1990, which encouraged schools to open advanced mathematics courses to minority and low SES students (College Board, 2013a). Ford (1998) indicated minority and low SES students were not included in gifted and talented programs, and that teacher training in identifying these groups of students was minimal. The history of this problem was bolstered in that Burton et al. (2002) found schools made minimal attempts in recruiting minority and low SES students to AP courses. The inclusion of minority and low SES students into advanced coursework alone was not enough. Bernhardt (2013) suggested many minority and low SES students needed academic and social supports from the school, in order to maximize academic success and college readiness. The proposed policy recommendations could mitigate these problems suggested by the literature.

Shifrer, Callahan, and Muller (2013) indicated minority and low SES students were disproportionately academically stratified, meaning students were primarily placed only in classes, which counted for graduation credit. The result of academic stratification was that minority and low SES students tended to be excluded from advanced coursework at very high rates. Practices such as academic stratification ensured minority and low socioeconomic students lacked the opportunities provided in advanced coursework. Palardy (2013) called the limited enrollment of minority and low SES students to advanced courses, and similar practices, socioeconomic segregation, and indicated these practices were damaging to the rates of student achievement, high school graduation, college attendance, and college graduation. Again, the ABC School District

could use the recommendations to restructure and modernize the student selection system for advanced mathematics classes.

Given the professional literature were clear that exclusionary academic practices were detrimental to student performance and success, the project focused on changing school and teacher/administrator practices. Professional development was the key to changing attitudes of school personnel about admitting and supporting minority and low SES students in advanced coursework. Any changes in school practices and staff attitudes needed to flow through professional development. The ABC School District could find many solutions from the policy recommendations in this study.

Given the practices and conditions outlined in this study, the current program of testing and admission practices to the advanced mathematics classes had to change. For any of the recommendations of the project to be successful, teachers, counselors, and administrators had to be committed to changes in attitudes and practices. Specifically, attitudes about student access, equity, and success had to be addressed. There was a low likelihood that professional development alone could have changed the testing and placement system in place, without a commitment of the professional staff to change practices. Therefore, teachers, counselors, and administrators needed to commit to professional development, which focused on including and supporting the students to be recruited into the advanced mathematics classes.

Success in professional development endeavors had been shown to be limited by attitudes of teachers, counselors, and administrators, as well as lack of sustained commitment to the professional development activities and programs. In particular, many

professional development activities in the ABC School District were one-time events with no follow-up. In a seminal study on professional development, Darling-Hammond et al., (2009) indicated professional development must be on-going and sustained to be effective for teachers and for student learning. Darling-Hammond et al., (2009) further specified professional development must be directly connected to the content the teacher was teaching, as well as school priorities and goals. The report also indicated teachers needed to work collegially to solve problems and improve instruction through professional development (Darling-Hammond et al., 2009).

Desimone, Smith, and Phillips (2013) found that teachers were more likely to institute changes, and had better student results in mathematics instruction, if the professional development provided focused on mathematics content, which needed to be taught to students. Essentially, the content relevance of the professional development was the greatest indicator of teacher implementation, and therefore, student success (Desimone, Smith, & Phillips. 2013). Van Driel and Berry (2012) suggested professional development needed to focus on academic content, which was then applied situationally. Specifically, teachers needed to learn the academic content, as well as ways to apply that content to fit the needs of different classes and students. The ability to fit content to the needs of students was particularly important to this project, given many of the targeted students likely possessed deficits in mathematics content needed for an advanced course. Therefore, the attitudes and approaches that teachers and administrators had about the students and their presence in an advanced mathematics course could not be overemphasized.

Further, Antoniou and Kyriakides (2013) emphasized the importance of the need for differentiation in content and practice in professional development. Each teacher needed different sets of content knowledge to be more successful in their classroom. By the same measure, teachers required different types of professional development to understand how to present the content knowledge to their specific sets of students (Antoniou & Kyriakides, 2013). Consequently, no matter the professional development approach, teachers needed to understand how to balance the needs of their students with the appropriate approach.

The likely major key to success for this project was professional development. Any professional development program had to be focused, relevant, and targeted to student outcomes. Teachers had to see access and equity opportunities for minority and low SES students to advanced mathematics was essential. Masuda, Ebersole, & Barrett (2012).indicated that teachers must regard the perceived benefits of professional development as more important than the costs of the professional development. Teacher commitment to the proposed outcomes of this project were no small matter. If teachers and administrators committed to the goals of the policy recommendations, then success was likely. If teachers and administrators perceived the goals of the policy recommendations as prescribed, then success was less plausible. The student's role in the project was multi-faceted. First, I asked to be placed on the agenda for a school board meeting to present the findings and recommendations of my research on the existing testing program in the ABC School District. My request was granted and the presentation was placed on the agenda. Second, as part of the presentation, I outlined

the current practices and overviewed the findings of the data. Third, I volunteered to spearhead the committee work to research existing programs or design a support program appropriate for students to gain access to and succeed in advanced coursework. I volunteered for any role needed to help get the recommendations from the proposal to action stages.

There were many available resources and solutions needed for implementation of the project, as well as several potential barriers to implementation. Given the overall financial health of the ABC School District, the resources needed for operating the suggested programs existed (ABC School District, 2016). There were available administrative frameworks and expertise to be used in areas such as gifted and talented, AP, ELL, and several social services areas to implement the program successfully. Other resources available in the district were the offices of elementary instruction and secondary instruction. The directors of testing, homeless services, and federal programs were also available resources.

Resources, Needs, Stakeholders, Barriers, Roles, and Responsibilities

The project program was named Advanced Coursework for Any Student (ACFAS) and its purpose was to identify, recruit, and support students from minority, low SES, underserved, or underrepresented backgrounds for advanced academic coursework. The program was appropriate for the problem in that it offered academic and other support focused on enrolling in, and successfully completing, advanced coursework. The primary goal was to give targeted students the support, skills, and knowledge needed to be prepared for advanced academic classes in the ABC Middle

School, as well as AP, honors, and Project Lead the Way at the ABC Junior High and High Schools. Further, ACFAS was designed and geared to encourage parents, guardians, and other family members of the targeted students to become involved in these processes via a community school approach.

The community schools approach provided guidance on to how to positively impact traditionally underserved and underrepresented students (Jacobson, Hodges, & Blank, 2011). Though a full community schools approach was not the focus of this project, there were key components to be gleaned. Community schools sought to combine the core instructional program, expanded learning opportunities for both the student and their families, as well as offer a range of health and social services, which were designed to further the learning of the student (Lubell, 2011). The ACFAS approach focused on the delivery of instructional and learning opportunities immediately. Health and social services programs were targeted objectives to be added in subsequent years.

The identified students at ABC Middle School needed recruitment and support systems designed to help them enter the advanced mathematics course. There were three primary pillars of support needed by the ABC Middle School students who did not currently qualify for the advanced mathematics course:

1. School administrators, teachers, and counselors who were committed to the principle that all students should be recruited and have access to advanced coursework;

2. Adult mentors, tutors, and volunteers from the community who wanted to help students realize their potential by identifying academic strengths and weaknesses to build upon and/or remediate for academic success;
3. Available resources focused on student needs for success, which included appropriate curriculum, after-school help centers, food for students during non-school hours, after-school hours transportation, and stipend pay for educators who managed the education of students at the help centers.

Transportation has been identified as one of the key needs for many minority and low SES students, as large percentages of these students do not have transportation resources (Young, 2015). The students in ACFAS would be able to stay after school in help center settings to receive extra work on individual academic or social needs. Since many of the targeted students likely did not have private transportation to and from school, the district had to provide this service. Without transportation services, there was no hope ACFAS could ever succeed.

Another possibility was to place targeted students in an academic advisory period. Advisory periods already existed in the ABC Middle School schedule. Designated students were paired with teachers and volunteer mentors and tutors such as business or civic leaders and retired educators who committed to the ACFAS program. The focus of the advisory period centered on a curriculum similar to the AVID program. The first goal of ACFAS were opportunities for students to engage in relationship-building with the mentor adults. The second goal was targeted academic skills and knowledge attainment. A third goal was for students to gain the social skills aimed at academic success.

Academic skills and knowledge were pursued simultaneously with social skills development as the two could not develop effectively if done separately (Corra et al., 2011). Some research has been done on the academic and life skill of persistence. The teaching of persistence by adult mentors has been shown to be critical to academic success for minority and low SES students, including higher grade point averages and personal expectations to attend college (Maxwell & Connell, 2013). Additionally, mentorship of low income students has been shown to have very positive results. Ashtiani and Felciciano (2012) indicated over 74% of low income students who had significant mentor relationships in secondary school enrolled in college, while only 39% of low income students who did not have mentor relationships enrolled in college.

A surprising and significant finding from the data of the study was the high numbers of non-minority and non-low SES students who did not earn qualifying ITBS entry scores to the advanced mathematics classes. As stated in Section 2 of the project, 67.8% (99 of 146) of fifth grade students who were not from low SES families failed to meet the 70th percentile cut-score. It was clear the problem of low levels of access and equity extended far beyond just minority and low SES students in the ABD School District. Based on the findings of the data, solutions to low qualification rates for the advanced mathematics course needed to be geared to all students in the school.

Project Evaluation Plan

No formal evaluation was possible at the time of the project as the district would have had to adopt or reject all or part of the recommendations in order to begin evaluation. The project was a policy recommendation (see Appendix A) to the ABC

School District with recommendations to address the problems found in the data. The policy recommendation presented many goals, beginning with the cessation of the testing program. Additionally, recommendations to actively recruit and academically support underserved and underrepresented students were included. Any evaluation of the project and policy recommendations were welcomed.

Implications

The project had plenty of social change opportunities. The project provided opportunities for success for students who had been marginalized previously. The expected social change outcomes of the project were that all students would have equal opportunities regardless of their social class, ethnic background, or zip code location. As the proposals and changes in the policy recommendation were implemented, the lives of many fifth-grade students began to change immediately. Students who had never had a chance to take advanced coursework were now eligible to take the courses. The affected students had the opportunity to be exposed to many of the most highly-trained teachers in the ABC School District. Minority, low SES, and other students previously not allowed to take the advanced coursework had access to new coursework and opportunities, which led to potential career choices never considered before. The most important and far-reaching social change opportunities were from the support programs the students received. The students who were enrolled in the program received advanced academic training, which was oriented to college preparation and career-readiness. The opportunities in the advanced class coursework created potential pathways previously not available to many of the affected students.

Another promising social change was the supplemental supports offered to the targeted students who had never taken an advanced course before. The project offered support systems, which augmented and complemented the students' new and existing academic classes. The ACFAS support program created a system where students had teachers and adult mentors who provided additional support in their academic work, both within and after school hours. Additionally, many of the students got to go to facilities after school, which were in the neighborhoods in which they lived.

The project promoted social change by creating a community schools approach through the expansion of what the school provided to its stakeholders. The community schools approach opened some of the district's elementary schools after hours, which gave students' families increased access to support from the school, school personnel, trained community volunteers, as well as avenues for parents to help their student succeed. Parent stakeholders were an important focus of the project as well. The opportunities for more parent involvement gave school stakeholders increased chances for research into improved student success through interaction with parents and their families (Curry & Holter, 2015). Increased parent involvement in schools, particularly at the secondary level provided the greatest opportunity to increase student participation and achievement in all courses, regardless of level. One of the project's goals was to increase participation of the parents of minority and low SES students. Increased parent and community involvement with schools was shown to be of particular importance to minority and low SES students (Baquedano-López, Alexander, & Hernández, 2013).

Positive social change outcomes for the school personnel stakeholders were a byproduct of the project as well. The project demonstrated to school personnel the importance of access and equity for all students. District personnel realized how to consider and evaluate avenues to change practices and policies, which were not in the best interest of students. Using the ACFAS program, district administrators, counselors, and teachers were able to evaluate the mathematics testing program and make changes, which had prevented students from achieving at their highest levels and potential. Through the changes implemented from the project, administrators, counselors, and teachers now possessed the tools, vision, and attitudes to examine other programs or practices in their classrooms, buildings, or across the district for modification or elimination.

The ABC School District had worked well with the community on traditional partnerships such as athletics, band, sponsorships, parent-teacher organizations, GT volunteers, and other effective undertakings. The ACFAS project provided the ABC School District with an expanded and organized group of community stakeholders focused on supporting groups of traditionally underserved and underrepresented students. The ability to harness more human resources from the community directly benefitted the targeted students, district personnel, the school district, and the entire community at large by creating more opportunities for students and a more holistic sense of community.

Another major social change opportunity was the prospect of increased parent involvement in all grade levels. Like many schools, the ABC School District had experienced low levels of involvement by parents of minority and low SES students (S.

Smith, personal communication, November 26, 2013). Stacer and Perrucci (2013) reported parents of minority and low SES students were generally less involved in their children's education for a myriad of possible reasons, which included work schedules and parental interpretations of their role at school. ACFAS allowed for a more targeted and practical opportunity to increase involvement of parents of minority and low SES students. The support program involved reaching out to parents and enlisted their direct support and help of their student with specific avenues parents could be involved. Park and Holloway (2013) indicated many parental supports for minority and low SES students are home-based. The most important factor suggested to enlist minority and low SES parents in schools was to engage in direct outreach efforts (Park & Holloway, 2013). A primary component of ACFAS was a support program targeted at the parents of minority and low SES students.

Implementation

Full implementation of the project could not have occurred until after approval of the policy recommendations by the ABC School Board. Next steps in implementation were articulated in the policy recommendation. The resources outlined in the policy recommendation and needed for implementation would have had to be supplied by the ABC School Board. Recommendations were for implementation to begin immediately upon passage by the ABC School Board. The next steps after implementation are also articulated in the policy recommendation.

Potential Resources and Existing Supports

There were several potential resources and existing supports in the ABC Middle, Junior High and High Schools, which facilitated the recruitment and support programs. The ABC Middle School had a structured advisory period, which was used as a launching pad for the project. ABC Junior High expanded its Project Lead the Way course offerings, as well as other advanced classes. Open enrollment was standard practice for 17 of the 18 AP classes at ABC High School. Additionally, the ABC Junior and High schools also had advisory periods, which were used to facilitate the recruitment and support programs.

The ABC School District was in excellent overall financial shape. Therefore, funding the recruitment and support programs was plausible should decision makers do so. The ABC School District was by far the largest and most ethnically diverse school system in the region. Further, it had a close relationship with one of the state's largest universities in the city. The resources available via the university's teacher education and administrator leadership programs were invaluable assets.

Potential Barriers

The goal of the project was to break potential barriers through leadership, change of mind, and change of heart among the stakeholders in the schools. Barriers to the project existed primarily in the educational systems and in the attitudes of personnel of the ABC School District. The testing system which was in place was likely driven by expectations and attitudes of student performance in advanced classes. For example, counselors at the middle-level schools indicated the testing cut-score helped some

students avoid failure in the advanced mathematics class (Cochran C., personal communication, November 11, 2013). Another possible barrier to success in the project was changed attitudes from administrators, counselors, and teachers about what students should and should not be eligible to take an advanced mathematics course. No suggestion of intentional malice by school personnel was ever intended towards students who did not meet the ITBS mathematics cut-score. Again, counselors indicated they thought the cut-scores actually protected students because they did not want to place students into a situation which might have caused failure. Whatever the intentions, the fact remained the cut-score was used ways, which denied many students opportunities of access and equity to the advanced mathematics course. Finally, whatever the circumstances that created the testing program, the methods became an ABC School District standard practice.

Breaking the many barriers were difficult and multi-layered. Of all of the conversations I had over several years with middle and junior high mathematics teachers, counselors, administrators, pre-AP teachers, and AP teachers about qualifications for the advanced coursework, a central theme emerged. Many administrators, teachers and counselors believed the ITBS cut-score provided an effective way to vet students for entry into the advanced math course. Administrators cited parent concerns and complaints of difficult coursework. Counselors indicated some students struggled with advanced courses and were destined to fail in the class (Cochran, C., personal communication, November 11, 2013). Teacher conversations centered on the difficulty of teaching differentiated students in advanced classes. On the surface, all of the school stakeholders indicated the students who could not meet the ITBS 70th percentile simply

should not have been in advanced courses. Teachers and counselors both suggested students who did not meet the ITBS cut-score should not have been subjected to rigorous work in which they likely could not succeed (Cochran C., personal communication, November 11, 2013). The attitudes of exclusion by some school personnel were highly entrenched and generally static.

Additionally, there were barriers for resources. All school resources were valuable and budgeted to many parties and programs. Adding another program created pushback among teachers, administrators, and the school board. Even with ABC School District on solid financial footing, there were barriers to commitment to the resources needed for a program to actively recruit and engage more students to do advanced academic work. As one example, about ten year ago, a much smaller-scale program very similar to this project was proposed for the ABC High School. The district central office administrators approved resources for teacher stipends, materials, and classroom space for a summer tutoring program for below-level high school students. The central office administration decided not to fund transportation and food service costs for the proposed summer program. Given most of the targeted students from were low SES backgrounds, had no transportation, and needed breakfast and lunch served, there was a low likelihood the targeted students would have even gotten to the school each day. The ABC High School administrators and teachers had to cancel the program.

Proposal for Implementation and Timetable

The proposed implementation was to initiate the project immediately upon approval by the school board and administration. As detailed in the policy paper

proposals, many facets had to be addressed before implementation with students could begin. Analyses of how the testing program started, needs assessments, educator training, school board approval, as well as many other steps had to be accomplished before any program with students could begin. It was proposed administrators and teachers begin conversations about the testing program in the fall semester of 2017. The next step was to involve existing personnel who believed the system needed to have more access and equity for underrepresented and underserved students. The next step in the timetable was the elimination of the 70th percentile ITBS cut-score as the entry criterion to advanced mathematics classes for the Spring 2017. The study for the design and implementation of the recruitment and support program continued in the spring of 2017. Finalization and adoption of the program would be completed by May of 2017 in order to start teacher-training by summer of 2017. Implementation of the program was targeted for the fall of 2017. The first phase of the program was to begin with the recruitment of a cohort of targeted sixth-grade students into the academic support program and at least one advanced academic class. The highly-trained and supportive teachers worked to implement the academic support program with the assistance of trained tutors and volunteers. The program was monitored throughout the first year via meetings of teachers and administrators to assess effectiveness and make adjustments as needed. At the end of the 2017-18 school year, the program was evaluated for the desired outcomes, to assess needs, and to cut segments that did not work as intended.

Roles and Responsibilities of Student and Others

The student's role in this support program was to present the policy recommendation to the ABC School Board and central office administrators. Additionally, my role was to provide data and research to District decision makers, which demonstrated the need to change the existing fifth-grade testing system for entry into the advanced mathematics classes. Further, my role was to make recommendations to administrators and board members to explain how these changes could create opportunity, access, and equity for all students. I had to explain how the denial of access to advanced coursework on the basis of one test score simply could not be a district practice. All issues of access and equity for all students were highlighted to the decision makers.

I made all preparations to place the policy recommendation on the agenda for a school board meeting or special session. My long service as a teacher in the ABC School District was an asset. Even though many of the recommendations I made involved shedding light on an imperfect system, all decision makers understood I had the best interest of the district and its students in mind.

Project Evaluation

Policy recommendations were presented to ABC School District decision makers. Implementation of the recommendations was a long and reiterative process, which could, and should, last for years. Should the District accept and take action on all of the policy recommendations, follow up procedures, program implementation, and other efforts had to occur on an open-ended timeline. The program was designed to begin in the fifth and

sixth grades and grow in each direction annually, adding the junior and high schools, as well as the elementary grades.

There were short- and long-term goals of the project to provide access and equal opportunities to advanced coursework to all students. Since there were intended goals and outcomes, the evaluation of this project contained both goal- and outcomes-based evaluations. For example, the first goal was to eliminate the current cut-score requirement for entry into advanced mathematics courses. An outcome goal was to implement recruitment and support programs for the affected students. The support program was designed to build and strengthen academic skills for students who previously were ineligible for the advanced courses.

The goal of the project was to eliminate the testing program at ABC Middle School, with the desired outcome of ultimately increased student participation in advanced coursework by all students. The first outcome of the project was the elimination of the cut-scores and entry exam. The second goal was the needs to be the recruitment and inclusion of minority and low SES students into advanced courses. The third goal was the recruitment and enrollment of targeted students into the academic support program.

The evaluation justification was the elimination of the entry testing as primary and immediate short-term goals. The rest of the recommendations involved meeting outcomes for students, teachers, counselors, administrators, parents, and the community. The goal of implementing student recruitment and support programs within a year was lofty and difficult and took longer to attain. The ultimate expected outcomes were to

eventually have increased numbers of minority and low SES students take advanced classes in all academic disciplines. The best evaluation of the ACFAS program was increased numbers of students with needed supports in advanced classes, meant more of the targeted students were better prepared for college and careers.

The project needed many years of evaluation to determine if all goals were met or accomplished. Within the first 3 years of the program, a program evaluation needed to be executed to indicate successes on which to build, areas of failure to eliminate or correct, and suggestions for improvement. Evaluation of the outcomes were assessed at each stage of implementation and completion. Evaluation of the ACFAS program was essentially in perpetuity. The program essentially needed to be evaluated and changed in perpetuity.

The key stakeholders for the project included district students, teachers, counselors, administrators, parents, and community members such as business and civic leaders. The school stakeholders created and provided the vision and resolve to implement the recommendations for all students in the district. Stakeholders from outside the school were provided with all of the information and support needed to understand and support the vision of the student academic recruitment and support program. Recruitment of stakeholders outside the daily operations of the district was a key component to the success or failure of the program. Outside stakeholders led to more community support, increased parent involvement, and opportunities for understanding of the district's functions and vision.

Implications Including Social Change

Local Community Implications

The implications for social change for this project were profound. The data and research from the study were very clear the testing program for the advanced mathematics course did not serve as a reliable way to identify students. The testing system was replaced with a system of student recruitment, support, and empowerment, which provided access and equity to advanced courses to all students. To be clear, the ACFAS did not suggest that every student be enrolled into an advanced academic course. Specifically, ACFAS provided an opportunity for full equity of access for recruitment and support into advanced academic courses for every student in the district.

Once all recommendations were approved and in place, ACFAS provided an avenue where ALL students were eligible to take advanced academic courses when they entered middle school. Most important, ACFAS created a system where school personnel actively recruited, encouraged and supported all kinds of students to take advanced courses. Specifically, ACFAS actively recruited minority, low SES, and other previously underrepresented or underserved students to gain access to advanced coursework. ACFAS provided support to students who did not possess needed skills at the time of entry to be successful in the advanced course. ACFAS also supported students' families, which had the effect of changing the fabric of entire school, in that parents felt welcome and needed in the school and their child's education. ACFAS created a system where all students were recruited to an equal opportunity system with the needed supports to realize their academic and social potential.

Far-Reaching Implications

Kozol (2012) indicated that the American education system had become bifurcated by class, wealth, and race by the early 1990s. Some schools were packed with financial resources, excellent teaching resources, strong parent and community support, highly-trained and motivated teachers, and other assets teaching mostly Caucasian students (Kozol, 2012). The other schools had large numbers of minority and low SES students, which were generally financially poor, had few teaching resources, possessed overwhelmed staffs, and had little community support. On a smaller scale, the results of this study and project found some of the issues Kozol addressed in his 1991 seminal book were going on the ABC School District. Many minorities, low-SES, and other groups of students in the ABC School District were marginalized based on the use of one mathematics test score for entry into an advanced mathematics course.

The far-reaching implications of this project was to create systems in the school district, which were truly inclusive and equitable for all students. The study demonstrated participation in advanced classes by minority and low SES students was significantly lower than other student populations in the school. Unexpectedly, the data also indicated large numbers of students from majority populations also did not meet the mathematics cut-score. Therefore, efforts to increase opportunity for the affected students required sustained and prolonged student recruitment and support efforts in order to pay long-range dividends. The ultimate dividend was for more of the targeted students to attend and complete college or career readiness training from the opportunities provided from these programs.

Another far-reaching goal was to create policies and practices aimed at producing students who generally had the same opportunities for success in all types of courses, regardless of their ethnic, racial, or income background. The ultimate goal of ACFAS was to create an environment and system of access and equity throughout the district. All of the resources, capabilities, and the will of the District was harnessed for the betterment of all students, at all times, and in all of the classes in the ABC School District. ACFAS provided a portal for the district to make sure no student was ever marginalized, exempted, or compartmentalized due to a practice, which excluded anyone from opportunities at which they may excel.

The study examined a very specific problem in a very specific context. The study provided solutions, which were very specific to a single school district. Therefore any expectations of far-reaching effects outside the District were limited at best. The future of ACFAS was for extension and adoption into every grade of the ABC School District. Again, no claim was made that ACFAS would work in another school. However, there the mechanisms and proposals in ACFAS hopefully provided templates that other schools or districts could use for their own students and situations. Any efforts, successes, failures, and lessons learned from the ABC School District could have been emulated by other schools.

Conclusion

The policy recommendation provided a framework to address the problem of gaps in access and equity to the advanced mathematics course between and among particular groups of students in the ABC School District. The recommendations were focused on

eliminating the gaps in service between groups of students. The recommendations suggested widespread changes in testing practices, which disqualified students from advanced mathematics coursework. The recommendations further focused on recruitment and support systems needed to create a level system of opportunity. The project also focused on changing attitudes of administrators, counselors, and teachers with regard to what students should be in advanced courses, as well as how those students were chosen.

A significant and important change was the recommendation to actively and insistently recruit previously underrepresented and underserved students into advanced courses. Additionally, the project recommendations included the creation of a student support program aimed at giving students the tools they needed to be successful in advanced coursework. Another important recommendation was the student support program included the recruitment of parents into the schools for assistance in helping their students be successful in advanced classes. The recommendations included the recruitment of community stakeholders, which brought their civic, cultural, business, and other fields of expertise into the schools to serve as tutors, mentors, and resources for the students and school personnel.

The mathematics testing program was likely a practice, which led many affected students away from taking advanced course of any kind. The policy recommendations were intended to correct the testing practices many personnel and parents in the ABC School District likely did not know existed before the project. The recommendations were also designed as a tool of social change to help every student reach his or her potential. The project and policy recommendations created a pathway for all students,

parents, teachers, counselors, and administrators to work together to focus on equity and access for all students. The recommendations also provided a platform to pose new questions as to what other problems might exist or be created by the changes from the project.

Section 4: Reflections and Conclusions

Introduction

There are many items on which to reflect on what was achieved and what still needs to be accomplished regarding the work of this project. The strengths of this project lie in its commitment to fairness, access, equity, and social justice for all students. The focus of the study was to identify and quantify issues of access to advanced mathematics classes for different groups of students. The findings revealed there were issues of access and equity that might be prejudicial to minority and low SES students.

The study had many limitations. The study was purposely small in size and scale. The study focused on a single year of data of fifth-grade students from a one-school district. Remediation to the study's findings was suggested via a policy recommendation to the school district in which the study was conducted. Specific suggestions were articulated through a recruitment and support program designed to target students who were not previously eligible to take advanced mathematics courses due to a testing cut-score.

The development of the project was a result of an attempt to capture and combine the latest scholarly research on these issues with existing programs, which address problems like the one in this study. The policy recommendation focuses on mitigating the current testing system through project development, student support, and leadership. The recommendations target school leaders and their ability to make changes in the current system for students.

The study has significant potential impact because it proposes sweeping changes in how students are selected for advanced mathematics courses. The study offers possible solutions to the problem via a policy recommendation. Applications of this study to situations in other places and directions for further research are discussed below.

Project Strengths

The primary strength of this project was its focus on the identification of equity and access gaps, which were found to exist and limit access by certain student groups to advanced mathematics courses in ABC School District (pseudonym). In particular, the study quantified a problem of access to advanced mathematics for minority and low SES middle school students. Further, this study demonstrated that this problem exists for many students in the majority population as well.

Another strength was the project shed light on a problem most school employees, parents, or community members never knew existed. The mathematics testing program was entrenched and it was difficult to find information on how the program came to be. If school personnel who are implementing the program each year did not know when or how the program started, there is likely many others who do not know how or why students are tested. Therefore, the testing program went on each year as a normal process without seemingly any question from school personnel.

An additional strength of the project was the proposed solution to a complex problem. Simply pointing out a problem existed and dissolving the testing program would likely not have helped a single student. Inviting every middle school student into advanced mathematics would not have solved the problem either. The real strength of the

project suggested the creation and implementation of a recruitment program targeted at traditionally underserved and underrepresented students for entry into the advanced mathematics classes. Additionally, the study proposed the recruited students would receive appropriate academic and social supports needed for success in any advanced course.

Perhaps the most important strength of the project was one of simple social justice. Every student should be afforded equity of access to any course offered by the district. True practices of equity by the school district would empower every student and their parents to make the choices, which could meet with each student's abilities and interests. This study provided a pathway to change school district policies and practices to make these suggested changes, and other currently unknown modifications as might be needed.

Recommendations for Remediation of Limitations

One of the project's major limitations was the small scale of the study. The study focused on the testing practices at two grade levels in one school district. Therefore, any generalizations to other districts, schools, or their students would not be appropriate. Still, there were lessons or opportunities for other districts and schools to take from this research.

If similar practices which resulted in limiting opportunities for students existed in similar situations, there were many solutions offered in this study. The identification, recruitment, and support of underserved or underrepresented students into programs to assist them in advanced coursework were one of many suggestions in the study. Programs

to recruit and support underserved or underrepresented students would be valuable to any school's students regardless of the size or situation.

Another limitation of the study was the lack of the student input and perspectives on the problem. The perspective of the student was not heard at all, because the study focused on identifying and quantifying the problem. The data from the study were clear as to how the current program denied access to advanced mathematics classes to some groups students. Hearing what students had to say would have been valuable information. Though not part of this study, student perspectives on access and equity issues on advanced coursework should form part of the basis for further research on this topic.

Another possible remediation of the limitations of the study would have been a longitudinal analysis of data to provide a baseline for exactly how low or high student test scores were. For example, a school might have looked at their existing data from the past to see how many minority and low SES students passed or failed based on test scores. Further, those data could have been updated each year to indicate progress of students and the elementary curriculum. This study was simply not designed in a way that allowed the collection of longitudinal data.

One recommendation for remediating this study's limitations is to increase the size and scope of the study. The inclusion of as many stakeholders as possible in the study would have increased the types and scale of data available. Interviews of school personnel, including principals, mathematics teachers, parents, students, and community members would have produced more data, increasing the overall view and scope of the

study. The inclusion of all stakeholders could reveal more data as to both causes and solutions to the problem of access and equity.

Another recommendation for remediation is to expand the data collection from one year of data to multiple years of data. This study used only the most recent year of test score data to identify gaps in opportunity for groups of students. The use of several years of data could have potentially demonstrated more clearly the depth and scope of the gaps in student eligibility for the advanced mathematics course.

There might have been other options to address this particular problem; however the approach which was used seemed the most appropriate. The data indicated major gaps in participation rates in advanced mathematics between and among groups of middle school students. The problem in this study was one, which was not known or recognized as a problem before the data were collected. Specifically, most educators, parents, and students in the ABC School District did not know anything about these testing and access practices. Further, based on informal interviews with middle school counselors, the parents, or other community members, did not seem to know how student mathematics test scores were used in advanced mathematics course admission. The purpose of this study was to identify there was a problem and to determine the scope of the problem. The design of the study was to find the best path to identifying where the problem was centered, and then confirm if a problem existed. Any other approaches to mitigation and remediation would have had to come after the problem was identified.

The problem was largely not known to most school personnel, students, or the community, or even seen as a problem before the study. Any alternative approaches to

the study would likely have needed to identify the problem first. The identification of the problem through quantitative data had to be the first step to address this type of problem. Once the problem was identified, actions to solve the problem could be devised. Therefore, no alternative proposals to identifying and addressing the problem of access and equity to the advanced mathematics course were deemed feasible for any initial study.

Scholarship

I learned a great deal about scholarship throughout this project. Before this experience, I thought I knew a lot about both general and academic writing. I have taught at the high school level for almost 25 years. I have taught as a university adjunct for over 17 years. Throughout my professional career, I have researched and written extensively in various academic realms. I have been published in a major academic journal, authored two textbooks, written national curriculum standards, and created multiple academic and teaching resources for use on websites, institutes, workshops, and academic alliances. All of the work I have written before paled in comparison to what I have done and learned about scholarship through this project.

Specifically, I have learned to substantiate every single sentence I write. I have learned every statement must be confirmed with appropriate sources. I have learned that research is complicated and multifaceted. I have learned that no matter what one piece of research indicates, there is other research which indicates something completely different. I learned my job as a scholar is to sift through all of the countervailing research and

process all of the evidence into a useful product. Many times, I learned this process meant showing both sides of an issue, which is truly not even settled in the literature yet.

I also learned that scholarship is a never ending process. No matter how much I wrote or read research, the process is continuous. Each journal article led me to another set of sources. I learned I should read all research with a critical eye. Every sentence I wrote was later edited, expanded, or deleted by my own maturation as a writer, or on the advice of scholars with more knowledge and experience than I have. I learned the scholarship process will always be ongoing and ever-changing, as knowledge is not a static product.

I have never been satisfied that any of my professional work was the best it could be. The doctoral process has taken me to another level of expectations and performance. I now have an even more comprehensive understanding of what to do as I continue my work, and how to prepare others to do their professional, scholarly work. I now have the skills and understand how I can look for ways to identify and solve problems in more holistic terms.

Project Development and Evaluation

Through my experiences as a soldier, teacher, department chair, consultant, teacher leader, and president of professional organizations, I had developed and run various types of projects. Looking back now, I wish I had my doctoral experiences before I embarked on many of those projects. I could have made them all much better with the knowledge and skills I know have.

Through the design of this project study, I have learned to identify a complex problem, formulate a plan to address the problem, and to collect and analyze data. After data analysis, I learned to figure out how to solve the problems, which presented themselves via the data analysis. I learned to be flexible as the data did not always demonstrate exactly what I anticipated. I also learned to adapt a project's response to a problem by building the solutions around the problem as it presented itself. Further, I learned to see the complexities and ever-changing nature of problems. I learned projects must be seen at the macro level in order to see all parts of the problem and how they fit or do not fit together. Conversely, I learned investigation of a problem at the micro level is equally important. I learned via project development to always keep the focus on how people are going to be affected by the proposed solutions. The micro level is where people are most affected. The decisions of any project affect what can and will happen to people. Therefore, I learned no matter what the data from project might reveal, the focus must remain on the outcomes and their effects on all stakeholders.

Leadership and Change

I learned a great deal about leadership during the project study. I have been a leader at many levels in almost 25 years as an educator. The one constant in my professional career has been change. Change in leadership, change in focus of what is important, change in curriculum, change in technology, change in pedagogy, and change in educational law are just a few of the shifts and transformations I have seen during my career. Given change has been constant and ongoing, I still learned new ideas via the project study process.

The simplest form of change I learned was to continue to adapt personally to ongoing changes in the degree-seeking process. For example, there were many changes within the university and the degree I sought over my time in the program. Every now and then, the rubric for the prospectus would change. The Blackboard shell and navigation details would change. My academic chairs for my prospectus and proposal changed more than once. All of these changes, and many more, made me adapt and be more flexible. Upon reflection, these changes helped me keep my focus and persistence on finishing my project and my degree.

I also learned more about leadership and change from a macro perspective. I learned leaders not only have to adapt to change. I learned leaders have to see the overall components of an issue or issues, and design the change needed for a given situation. For the purposes of this study, I acted on a problem I had seen from afar for a number of years. My doctoral work provided me a pathway to seek change to a system which seemed inequitable. The knowledge and tools I learned allowed me to identify the nature of a problem and propose the changes needed to solve that problem. Through the knowledge, skills, and tools I know possess, I can be a leader who can identify, propose, and implement needed changes. I am now armed with the research and data skills to address the issues concerning school processes. I also have the skills needed to lead others through the process of changing a program or system.

Analysis of Self as Scholar

I learned that a scholar is someone who always sees problems, solutions, and opportunities through the connective lens of evidence and research. Throughout my

career, I have tried to identify and solve problems for in my classroom and in my school, which were always aimed at helping students. Now, I have enhanced skills and knowledge, which I can use to better myself, my classes, my students, my school, and my district.

I have also learned how to be a scholar in larger contexts. Before I began the doctoral process, I tended to think in terms of reacting to problems. The scholarly skills I have learned have made me think about how problems fit into larger systems. Instead of seeing a problem and wondering how to address that problem, I now have the skills to label a problem and try to solve it. I learned that scholarship is a collegial process and that I should seek out others in the research process. I learned any scholarly work I do should be scrutinized by others.

Further, I have excellent research, data collection, data processing, and writing skills to identify and solve problems. My writing skills were above-average when I came to this program. But the doctoral experience taught me to become much better at the process of editing and review. I used to do all of my own editing and review. The doctoral process taught me to open up my work to others and seek other perspectives and allow criticism of my work. Now, when I look back at papers I wrote a few years ago, I am stunned at how much better I write now than then.

I have also learned that my skills at being a scholar can and should be shared. I look forward to working with colleagues on enhancing instruction, identifying problems, proposing solutions, conducting research, or gathering data to process and analyze. The doctoral process has also given me credibility as a scholar now. However, whatever

credibility my degree has given me must be balanced by further preparation. I must be a leader and be prepared to take the initiative as a scholar, or be prepared to be called upon to help identify and solve problems. All of the skills I have learned as a scholar can now be put to work each day as a teacher leader.

Finally, I have learned no one can become a scholar and do quality scholarly work without the help of others. I learned I needed good mentors to help me identify my weaknesses and develop the skills needed to correct them. My mentors helped me utilize my strengths in my scholarly work. My mentors revealed my weaknesses and gave me the tools to develop me into an apprentice scholar. My mentors made me understand I now know how to do scholarly work and that I must become a mentor to others.

Analysis of Self as Practitioner

I am a teacher who is a practitioner in a classroom. Classroom practitioners tend to stay focused on the matters within their classroom and their students. My doctoral project experiences have taught me to further expand my role beyond just my classroom. The skills I have now will enable me to better understand the connections between and among issues and design possible solutions. In the future, I intend to be a practitioner who functions beyond just the systems of my classroom.

I learned to be a practitioner who can now utilize the skills of a scholar to better identify and solve problems. I can now be a practitioner who has the skills to identify problems before they occur, not just react to them after the fact. The doctoral project has given me the skills to see the overall view of my job and the jobs of those around me. I have a better understanding of the processes at work in my department, school, and

district, which enable me to better anticipate problems and develop pathways to solutions. I also know have the credibility of a practitioner and scholar. I expect my colleagues to view me as a potential expert on performing research or analyzing data. Therefore, I have to be prepared for the responsibility to act as a teacher leader ready to assist as needed.

Analysis of Self as Project Developer

I have learned only the basics about being a project developer. My understanding of project development is similar to finishing an apprenticeship. As in finishing a traditional apprenticeship, I now have the basic skill sets to develop a project. I possess the basic knowledge, skills, and resources to seek out and undertake projects when needed. I hope to use the scholarship skills I have learned to work collaboratively in my school setting, or others, to create projects as opportunities are presented.

What I need now is to develop and hone my skills as a project developer. I would like to develop mini-projects for the department in which I teach. I also would like to work in the district to help develop larger, more comprehensive projects. I hope I will be able to evaluate projects within my school district, as well as those in other school districts. Further, I hope to use my project development and evaluation skills in community settings such as nonprofit, civic, government, and other groups.

The Project's Potential Impact on Social Change

Before the collection of any data, I believed there was a problem in the way students qualified to take advanced coursework in mathematics in the ABC School District. I also believed the testing system was not intended to be inequitable to students but nonetheless had become so. The research I had performed for this study, as well as

my own classroom experience in my years as an AP teacher and department chair, indicated minority and low SES students took advanced coursework at much lower rates than other students. The importance of the work of this study became obvious after the first data were collected. The data indicated minority and low SES students were far more likely to not meet the ITBS cut-score. Surprisingly, the data indicated a higher-than-expected number of non-minority students also did not meet the cut-score. Therefore, the study indicated there was a significant problem to be addressed., and the possible impacts on social were important and significant.

Social change has been something I have practiced throughout my career in teaching. I have led efforts to be inclusive of all types of students in my classroom and in my department, regardless of student ability or the academic level of the class. My first effort in this area was to implement open enrollment for AP classes in my department when I became the chair. Exclusion from advanced academic classes by single-criterion metrics should not be palatable in any school. The project's intended impact was to create positive social change through changing the testing process, which would lead to expanded opportunity for all students.

Should the project be fully implemented and successful, many students will have academic opportunities never available to them before. Whether intended or not, the students who are currently locked out of the advanced mathematics class are steered to general, academic coursework. In no way am I suggesting general academic coursework is not appropriate for any student. I am suggesting that all students should be afforded the opportunity take whatever classes in which they may be interested or for which they have

a particular disposition. As important, parents and other stakeholders should have the information needed to help place their student where most appropriate. Structural changes in access to advanced mathematics classes should create increased opportunities of access to other advanced courses to currently affected students. What is being suggested is students who, if identified and supported properly, could succeed in advanced courses.

Another significant social change implication is the project provided an avenue for recruitment and support. The project did not endorse the prospect of simply placing minority, low SES, or any other students into advanced courses. The sweeping social change was to actively and systematically target and recruit students for admission. Once in the advanced mathematics course, students would be given the tools and support needed to succeed.

Another positive social change outcome of the study would be for currently affected students to gain access to advanced courses other than mathematics. The testing system in its current form creates a type of self-fulfilling prophecy. It is reasonable to expect that if a student is denied access to an advanced mathematics course in the fifth grade, it is likely the student might expect all advanced courses are not available to them, or that they are not capable of doing advanced work. As indicated in this study, there were statistically significant low numbers of minority and low SES students in AP classes at the ABC High School. The recruitment and support programs recommended in the study would provide the basis of the needed social changes. The final and true test of positive social change outcome would be all advanced course classrooms in all of the schools would look generally like a demographic cross-section of the entire district.

Implications, Applications, and Directions for Future Research

What was learned from this work was there is still much work to be done. The study indicated and quantified that there was a problem of access and equity for admission into the sixth-grade advanced mathematics course. Perhaps the most important item learned from the study was the basic machinations of how test scores were being used to sort students into advanced and regular mathematics classes. The origins of the testing program were essentially unknown and it had become largely unquestioned and, therefore, entrenched in practice.

I learned all educators should think about all of the systems in schools, both macro and micro. The classroom educator spends a great deal of time focused on the micro sector of our jobs. Teachers make lesson plans, teach classes, go to meetings, and work with students in settings such as clubs, coaching, and others. However, an equally important task for teachers is reflect on how all of the tasks we perform fit into the larger educational and institutional processes. The testing practices made me reflect on the fact that all educators must study and operate on more than our daily and weekly practices. We must think about how classroom, school, and district practices and policies affect students collectively. Thinking in terms of macro systems in our school and district is not only the purview of administrators. Because we are the closest to how policies and practices are carried out, teachers and teacher leaders must examine these systems to ensure what is occurring for students matches what is intended. The use of a one-time test to sort students into an advanced mathematics class was one such example where more questions and reflection could help change practices.

I also learned how complicated all of the interconnecting school practices and policies are. As I did the work on this study, I learned thinking and acting only at the macro level led me to big ideas and vision. Thinking at the macro level created opportunities for programs and vision on what the outcomes might be. However, when I only focused on large outcomes, it was easy to forget the details on who would do the work, how would it get done, and how would it really affect students. Though it is not possible to ever know for sure, the testing program in this study likely started by thinking at the macro level. Decision makers probably wanted to create a system to put kids in an appropriate mathematics class in line with their abilities. The problem is the testing system created a one-size-fits-all system filled with unintended consequences, which were clearly not good for all students.

I have also reflected that the recruitment and support systems proposed in this study can fall victim to the same issues. Most of the solutions proposed in this study were created at the macro level. The micro-level details of recruiting and supporting the affected students will require huge human and capital inputs. The daily machinations of teaching and learning will be very complicated. At the micro, or daily level of implementation of the recruiting and support program, school personnel who are in opposition can do great harm. There is no doubt some students will not be identified or placed properly into the support program. The stresses placed on teachers and administrators will be significant. Some educators will certainly push back against any such program. Therefore, the work for the next level of planning for this project should be at the micro level.

Future research on this topic should focus on the limitations and what was not examined in this study. One issue of particular interest would be to determine if exclusion from advanced coursework in the sixth grade causes a student to not take other advanced courses in subsequent grades. This study was not designed to answer this issue. A student who was told they were not eligible or did not score high enough on a test to be in an advanced academic course might assume they were not smart enough or did not possess the proper skills to take these kinds of courses. Further research could be constructed to answer such issues.

Student attitudes on learning mathematics would be a good possibility for further research as a result of this study. Research was presented in this study, which indicated students may have negative perceptions about mathematics classes in general, as well as advanced mathematics classes. The quantitative gap analysis utilized for this study was not an appropriate method to ascertain or indicate negative student attitudes or perceptions. A gap analysis was only able to identify and quantify gaps between and among student groups and eligibility for the advanced mathematics course. The study and its methods could not determine how student attitudes were affected about learning mathematics after they were denied access to the advanced course, or if there was even a connection at all.

The scale of this study was also very small. Any conclusions which might be drawn from the study should be limited and examined carefully. Data from only one year of mathematics test scores, from one grade level, in one school district were utilized. No generalizability of this study's findings should be drawn to other situations, schools, or

districts. The study was simply too small and limited in its scope to compare to other schools or situations. This study's findings could be used as a way to identify similar problems in other schools or settings. For example, further research might focus on identifying a similar problem outside of mathematics. There are implications for future, similar research similar research on the topics of this study by others; however, most of these implications may be very limited.

Any consumer of this research attempting to make comparisons and connections to situations in their own settings or research should do so with great caution. The transferability of this study is likely very limited in both scope and scale. As stated before, the scale of the study was very small. Additionally, the testing program used to determine entry into the advanced mathematics course was specific only to the ABC School District. Further, only data from students in one grade from one school were examined. Finally, the purpose of this study was only to identify and quantify what gaps were present.

Future research on the topics of this study should focus on how to identify existing problems. Future research from this study might focus on similar student barriers of access and equity to classes, programs, organizations, or other educational settings. Any attempt to take down barriers of access and to create situations of equity in schools should be invited. Perhaps the most significant problem is not recognizing a problem of access or equity in a school. Long-held practices and policies may be seen by school personnel as acceptable because of the longevity and perceived acceptance of the practice or policy.

The strength of this study which might be expanded upon in future research is to look for problems, which seem to be routine or pedestrian in nature. Many policies and practices are rarely questioned or quantified, much less evaluated. Therefore, any future research from this study would employ the methodology, not the topic of the study. Identifying potential problems in existing systems can be complicated work. Long-held practices are usually guarded and protected by stakeholders. Questions about or attempts to reform long-held practices many times meet with opposition and resistance. The methods of this study might be a good platform of approach to mitigate stakeholder push-back.

This study used existing school data to identify and quantify a problem in a particular program. Any future work similar to this study should try to employ approaches, which involve secondary analyses of local data. Utilizing existing data that come from the program or system being studied are difficult to reject or question. The researcher and the findings from the data only reveals what is already occurring. No value judgments or bias by the researcher or the data can be accused of unfairness or having an agenda for the findings.

Conclusion

Research in this study was done from the inside of an organization. Completing the work which has been suggested will be challenging and difficult. Being an employee in and doing research about a program from within the school district was a challenge. When doing work on the inside of one's own organization, it was important to be cognizant of potential bias and being seen by coworkers as meddling in the affairs of a

school building in which I did not work. I was able to work with existing data collected by the school district. The use of existing data made it much easier to demonstrate there were fewer opportunities for bias by the researcher.

The social change possibilities of this study are limitless. Should the suggested policy recommendations be accepted and implemented, all students will have equal opportunities at all of the advanced coursework offered. Further, previously underserved and underrepresented students will be targeted for recruitment to a program, which will support them to be successful. Additionally, the policy recommendations could lead to looking at other programs in the district, which also might be prejudicial to particular students or groups of students.

Looking beyond the purview of this study, there are likely many other such programs in schools, which limit opportunities for students. This study provides a template to look for and investigate problems of access and equity and to provide social justice. In particular, once a problem is identified, a researcher should try to use the data within the district to examine the scale and scope of the problem. The use of internal data offers an opportunity for the organization to consider the practices and policies to limit claims of bias and personal agendas.

The most satisfying part of this study was to identify, confirm, and quantify a suspected problem with an existing district practice. I first became aware of the fifth-grade testing practices several years ago. The professional literature I had read on AP and other advanced academic coursework did not match what was occurring in the middle school pre-AP mathematics program. Now that the problem was confirmed as prejudicial

to many groups of students, the most important steps of remediating the problem could begin.

The most exciting part of the research is in the future. Should the policy recommendations be implemented and successful, the students of the ABC School District will benefit by gaining access to coursework and opportunities not open to them before. The opportunities provided by the recruiting and support program are the embodiment of positive social change. All students will have the opportunity to enroll in and investigate whatever kinds of courses interest them. The support program will give the students all of the tools they need to not only be successful but to realize all of their talents and interests. When all students' talents are realized and maximized, not only does the school do better, the entire community wins.

Finally, the results of the study should only be a beginning. There are certainly other programs, policies, and practices in schools, which should be examined for potential dissolution and or change. Issues of equal access, equity, and opportunity for all students should be the minimal goal in all schools at all times. The methods of this study should provide another way for teacher leaders, administrators, and researchers to find situations where inequity may be occurring.

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Appendix: Executive Summary

Background

The policy recommendation has been prepared for the ABC School District superintendent, central office administrators, school board, and Grades 5-12 building principals and counselors. The results and recommendations of *Enrollment Patterns in Advanced Middle School Mathematics Classes* are proffered for recognition of a problem most of the educators in the ABC School District may not realize exists. The aforementioned project study was undertaken by Paul T. Gray, Jr. as part of the requirements of his doctoral degree from Walden University between August 2013 and June of 2016.

The purpose of the study was to determine and quantify gaps of participation in advanced mathematics courses between minority and low socioeconomic (SES) students and the rest of the student population. A quantitative gap analysis of the data, which was conducted, indicated significant gaps, between the numbers of minority and low SES students eligible for the sixth grade, advanced mathematics course compared to the rest of the student populations. This type of opportunity gap between underserved students and other school populations is an important access and equity issue within the district and in other school districts elsewhere. According to Shapiro, Meschede, and Osoro (2013), different types of educational opportunities continue to bifurcate American society since minority students generally come from families with higher rates of poverty, lower incomes, and have less accumulated wealth. Condrón, Tope, Steidl, and Freeman (2013) used the concept of dissimilarity to contextualize the differences in the types of schools

Caucasians and minority students get to attend. Essentially Caucasian schools had more resources and minority schools had fewer resources. The work on dissimilarity of Condrón et al. (2013) was useful for the ABC School District's advanced mathematics class testing practices. Though the district's funds and capital assets for students might come from a common origin, these resources might be used in different ways. More specifically, the ABC School District's potential resources for students are the same; however, opportunities and implementation of resources to sets of students may not be the equal. For example, the data indicated minority and low SES students had limited access to programs, courses, and teachers involving advanced coursework.

Summary of Analysis and Findings

Under the current system, any student who does not meet the 70th percentile cut-score on the mathematics section of the Iowa Test of Basic Skills (ITBS) does not qualify for the pre-Advanced Placement (AP) mathematics courses at ABC Middle School. The data have indicated minority and low SES students in the District are disproportionately denied access to the advanced mathematics courses due to the cut-score. It is fair to assume these students are also denied access to some of the District's most well-trained teachers. Per state law, district pre-AP teachers are required to attend training every three years (XYZ Department of Education, 2015). Pre-AP and AP training sessions are nationally-sanctioned by the College Board and led by national teacher experts and leaders in pre-AP and AP skills, curriculum, and content (College Board, 2015b).

Data collection for this study revealed significant access gaps between ethnic minority and majority student populations. The data also revealed gaps in access between

students from low SES families and those students whose families are not low SES.

Perhaps the most surprising finding from the data analysis was a significant percentage of students from the majority populations did not meet the 70% ITBS cut-score either.

Therefore, the problem goes beyond the issues of access and equity for minority and low SES students.

The data analysis provided insights into how the ITBS is being used in the District. The ITBS battery is an achievement test (Milner, 2013), which measures a student's level of understanding and use of the curriculum presented to them. The manner in which the ITBS is being used to sort students for access to the advanced mathematics courses causes many questions and concerns. First, the use of a one-time testing system as a singular metric for eligibility and access to an advanced course is a cause for concern. Second, for a student who fails to meet the 70th percentile cut-score, there is apparently little or no expectation for an opportunity to take the test again for placement. The practice of taking an exam one time with no subsequent attempts is unlike what high school students do with the ACT or SAT exams. Third, because the ITBS is measuring a student's grasp of mathematics skills and concepts, it is assumed all students have received exactly the same curriculum presented to them in reasonably similar ways. There is no suggestion here that teachers did not teach the curriculum. The suggestion is the ITBS score is being used in a less than optimal manner. The data analysis suggested the ITBS battery was being used more like an ability test, instead of an achievement test. Again, it is not likely district administrators and other decision makers intended for the ITBS to be used as an ability test. However, the fact remains the test cut-score excluded

some students from advanced mathematics coursework who likely could do advanced coursework. Therefore, the way the District uses the ITBS makes it a de facto ability test. A score below 70% declares a student does not likely have the ability to do the work or will be generally unable to be successful in advanced mathematics at the next level. To clarify with an example, under the current testing system, a student who makes a percentile score of 69, 68, or 65 on the ITBS is excluded from the advanced mathematics course, while a student who made 70 is eligible. Fourth, one of the most significant problems between minority students and other students is the gap in skills attainment. Heckman (2011) indicates most of the gaps between minority and low SES students and other students are based on skills attainment. Students who do not take the advanced mathematics class and subsequently advanced coursework will likely not ascertain skills needed to succeed throughout their K-12 school years, much less in college or for high-paying jobs in the workplace.

The use of the ITBS math score for use in a one-time scenario seems to work more like a placement test rather than a diagnostic indicator of student achievement. One such possibility is the current testing program for advanced mathematics course entry is being used as a placement system for gifted and talented (GT) students. Similar to the placement of students in special education classes, GT programs must have metrics to identify, test, and place students into appropriate programs per state law (XYZ Department of Education, 2015). According to McClain and Pfeiffer (2012), GT students are defined as those who are statistically uncommon and possess high intelligence and creativity. Again, the ITBS cut-score might be an appropriate basis for GT eligibility for

the pre-AP course; however, any further use of a 70th percentile cut-score is not only inappropriate but likely excludes many capable students. The California Mathematics Placement Act (2015) set standards for measurement of student preparedness for mathematics classes to be based on an aggregate of many objective measures and not on the student's race, ethnicity, gender, or socioeconomic background.

For another comparison, the use of the ITBS mathematics scores alone seems to mirror the approach used in athletics or other ability-level try out programs. For example, in athletics, if a student is fast enough, can jump high enough, or possesses other desired skills, he or she will qualify for the team. If a student does not have the required skills, he or she will be cut from consideration to make the team. Though unintentional, the District testing program for entry into advanced mathematics essentially works much the same.

Finally, the use of the ITBS mathematics cut-score gives students only one opportunity to pass the test. Placement into an advanced mathematics course based on one day of testing does not seem educationally sound. Students may try out repeatedly for an athletics or academic team in hopes of making the team. Junior high and high school students may take the ACT or SAT multiple times in hope of raising their scores to gain admittance into a particular college program. The use of a single opportunity test for entry into a program of courses does not seem educationally appropriate for a student who is 10 or 11 years old.

Perhaps the most important factor to remember is if a student fails to make a cut-score in the fifth grade, it is reasonable to assume he or she may simply not seek to take other future advanced course opportunities. The last thing the District wants to do is to

cause a student to believe he or she does not possess the necessary intelligence and skills to succeed based, at least in part, on a test score. Therefore, the current testing program has to be changed.

History of the Testing Program

An analysis of the origins of the current testing program started is warranted. Some essential questions for analysis might include (a) When did the program begin? (b) What precipitated the need for the testing program? (c) What were the goals of the testing program? (d) Who were the stakeholders in establishing the initial program? (e) What research was consulted in setting up the program? (f) How often has the testing program been reviewed over the years? If the program is many years old, it is likely the answers to many of the preceding questions will not be attainable. If any of these questions cannot be ascertained, this provides further evidence the program should be reviewed.

Administrator, Counselor, and Teacher Attitudes about the Testing Program

An inventory of administrator, counselor, and teacher attitudes about the testing program and admission into advanced mathematics courses at the ABC Middle School is needed. Quantifying the professional attitudes, beliefs, and opinions professional staff have about what students should be in advanced coursework will help direct efforts to make the system work better for students. If the current program has not been assessed in many years, there are professional staff members who are carrying out a program of which they know very little. For example, mathematics teachers who teach the advanced course may know little about how the students in their classes are selected. Or, if the

teachers know how the students are selected, it is likely they may not know of the gaps in access and equity between groups of students.

Testing Program Assessment

The entire mathematics testing program should be assessed. All stakeholders should be consulted as to what defines the current system, how it works, and be able to propose changes. Proposed changes to the testing program should be open-ended and include everything from minor changes to a full deconstruction of the program. All current and potential stakeholders should be identified and consulted. Stakeholders should include administrators, counselors, teachers, school board members, parents, and community members. Students at all levels in the district should be consulted as well. The primary administrator, counselor, and teacher stakeholders to assess the program should come primarily from the ABC Fifth Grade and Middle Schools. However, it is also important to bring in administrator, counselor, and teacher representatives from other schools in the district. Mathematics teachers from all grade levels in the district must be consulted. Teachers from other subject and content areas should also be on the assessment team. The widest possible range of perspectives and viewpoints is needed to fully assess the program and make suggestions for changes.

Open Enrollment and Gatekeeping

The advanced mathematics courses at ABC Middle School are designated as pre-AP courses. Pre-AP and AP programs, curriculum, and skills are designed at the macro-level by the College Board (2014b). While schools have choices on how to select students and implement pre-AP and AP programs, the College Board's (CB)

recommendations about access and equity are clear. In 1990, the CB introduced the Equity 2000 program, the particular aim of which, was to encourage the recruitment of minority students into AP mathematics classes (College Board, 2013a). More CB inclusion programs were launched between 2003 and 2005, which offered further guidance to schools on recruiting traditionally, underserved students (College Board, 2014a). The primary goal with access is clear from the policy statement regarding AP courses, “The College Board strongly encourages educators to make equitable access a guiding principle for their AP programs by giving all willing and academically prepared students the opportunity to participate in AP (College Board, 2015a, p. 1).

Recruitment of traditionally underrepresented and underserved students into pre-AP and AP classes is critical. Many minority and low SES students have been discouraged or denied from taking advanced courses via gatekeeping (Klopfenstein, 2004). Gatekeeping is an admission practice or process where educators determine which applicants will gain access to a class using indicators including academic potential, grade point averages, reading scores, past academic grades, and student behavior to make these decisions (Koerin & Miller, 1995). The ITBS mathematics cut-score used in the district is primary gatekeeping practice that shuts the door on advanced coursework for many students. The parent of a student who misses the cut-score may file an appeal for entry into the advanced mathematics course; however, the appeal process seemed to be used to generally discourage the parents to seek access to the course for their student (Cochran, C., personal communication, November 11, 2013). The previous practice has been couched by middle school counselors as simply doing what is best for the student. No

matter the intention, the practice still has the effect of denying students access to the advanced course.

Preparation for Advanced Coursework

Once again the CB policies on preparation for advanced coursework is to encourage schools to prepare their students for AP classes long before high school stating, “Provide all students with access to academically challenging coursework before they enroll in AP classes (College Board, 2015a, p. 1).” A landmark study on AP courses indicated schools with the best of intentions and situations have high numbers of underserved cohorts, primarily comprised of minority and low socioeconomic students who do not participate in advanced coursework (Klopfenstein, 2004). The data gathered for this study combined with the access and equity policies above, indicate there is significant evidence the district needs to improve the preparation of minority and low SES students for advanced coursework. The current system does not provide a coordinated effort from school to school within the district to prepare underserved and underrepresented students for advanced coursework.

Recruiting Students to Advanced Courses

The current system of recruitment seems only to hinge on student interest and parent involvement. Students who are interested in and seek advanced coursework do so. Parents who understand school programs and practices tend to be very involved in the academic affairs of their children and make sure they get into the most challenging classes. Currently, there is little evidence underserved and underrepresented students are being recruited into the advanced mathematics or any other advanced classes. There is

also no evidence of recruiting or encouraging traditionally underserved students to take advanced coursework at the middle school level.

Recruitment of students into advanced programs such as science, technology, engineering and math (STEM) is very important. The same is likely true for existing district programs such as Project Lead the Way (PLTW), pre-AP, AP programs, and others. There is little evidence in the district of any such outreach or recruiting systems for underserved students from minority and low socioeconomic backgrounds. Kelly and Schneider (2011) suggested outreach was the first step of recruitment of students into STEM (and other such programs), but cautioned outreach was only designed to gain the attention and interest of students to possibly investigate a program of study. The next step was to actively recruit targeted students into a program. Packard (2012) indicated authentic recruitment was about the preparation of students to enter into a program of advanced studies such as STEM, PLTW, AP, or other similar programs. Targeted recruitment programs were intended to create opportunities for underserved populations (Packard, 2012). There is no evidence the district engages in active recruitment of underserved or underrepresented students into advanced mathematics coursework. The data suggests meeting test cut-scores, student interest, parent interest, and perhaps persistent parent sign-up are the only avenues to gain access to the advanced mathematics course.

Support Programs for Underserved Students

There are no systemic support systems for underserved or underrepresented students to in the district. There are currently no support structures in place in the district to assist a student who has marginal past grades, a cut-score below 70%, or other traditional gatekeeping indicators such as behavior records, academic potential, use of reading or other standardized test scores. This is true of all students in the district regardless of social, ethnic, or economic background.

The data indicated significant numbers of underserved and underrepresented students did not meet the ITBS mathematics cut-score. The data also revealed significant numbers of majority population students also did not meet the ITBS cut-score. The absence of support for all types of students is not surprising given how the current system works. A full review of the testing program should help identify some avenues to provide support to the affected students. Nationally recognized and successful programs designed to support traditionally underserved students are available to adopt. Many of these national programs are designed to specifically to address the needs of, and provide support to, underserved student populations taking advanced coursework. And, most of these programs are designed to ensure success in college readiness and entry. Or, the district may want to use one of these programs as a model to create a localized support system. However, creating a customized program for the district will be time-consuming and require many resources.

Support Programs for Teachers

The implementation and success of any recruitment and support program for students to advanced coursework could never succeed without first getting teachers the support they need. Teacher training and support are critical to student success in advanced coursework, as evidenced by State law mandating CB-sanctioned training for all pre-AP and AP teachers (XYZ Department of Education, 2015). Additionally, the College Board (2015b) mandates all teachers who teach AP courses be trained through sanctioned institutes and workshops, have approved textbooks and materials, and follow course curriculum specific to each discipline. Other programs such as PLTW have similar teacher training requirements (Project Lead the Way, 2015). The district currently meets the teacher training requirements for teaching pre-AP, AP, and PLTW; however, additional training and support will be needed to assist in teaching and meeting the needs students from an underserved and underrepresented student population, which is recruited into these existing programs.

Recommendations

The ABC School District (2015) mission statement, is posted in all buildings and highlights, “Educates, Equips, and Empowers all students” p. 1). To fully realize this mission statement, changes in how students are selected for advanced coursework must be examined. A comprehensive analysis of the system of student placement into advanced mathematics courses at ABC Middle School is recommended. An analysis would include the District analyzing all eligibility and placement decisions for all advanced coursework in all of the schools. Recommended actions are focused on the

structure of the student placement program into the advanced mathematics course at the middle school level. Further, the following recommendations are centered on issues of student access and equity to advanced mathematics courses. Most important, recommendations are geared to expand access to all advanced courses for underserved minority and low socioeconomic student populations. A final overarching recommendation is to analyze the systems of entry for all students into advanced coursework district-wide.

The specific recommendations are (a) identify and obtain input from all stakeholders; (b) review the entire testing program with a focus on eliminating the use of the 70% cut-score on the ITBS as the only method for entry into advanced mathematics for sixth-grade students; (c) overhaul of the advanced coursework testing program; (d) introduction of a recruitment program of underserved and underrepresented students to take advanced courses in the ABC Middle School; (e) staff development to assist teachers, counselors, and administrators in identifying students through multiple methods for advanced coursework; (f) create a recruitment program, which targets underserved students, specifically minorities and those from low socioeconomic backgrounds; and, (g) create support systems for students who might not possess the academic backgrounds and/or past opportunities for success in advanced coursework. Finally, it is important to note that any other student who does not qualify for the advanced mathematics program and was not mentioned in item f should also be included in any of the programs of support suggested here.

Stakeholders

The identification of stakeholders and potential partners could be the most important of all the recommendations. The district must identify, cultivate relationships, and utilize the expertise and needs of the various stakeholders in the issues surrounding all advanced coursework. These stakeholders need a receptive attitude in the process of including traditionally underserved and underrepresented students with a wide variety of needs into advanced classes.

Selection of students for advanced mathematics courses should be the first focus of the proposed changes. Selection processes for all other courses should follow as soon as possible. Stakeholders would include, but are not limited to, district administrators, school-level administrators, counselors, teachers, coordinators, and potential community partners. Although students are the vehicle through which all of this work will be accomplished, they, too, should be regarded as stakeholders. Student input will be valuable and should make all final products and programs more viable, authentic, and utilitarian.

The school personnel stakeholders are obvious; however, the selection of these stakeholders to do the work of examining the current system should be done with great care. The current research outlined in this document underscored the importance of attitudes of school personnel regarding access and equity issues for students were critical. It is essential to have teachers, counselors, and administrators who have an inclusive and supportive vision for recruiting all kinds of students into advanced coursework (Ashtiani & Feliciano, 2012). All students who are currently served, as well as the students this

recommendation seeks to serve, need teachers, counselors, and administrators with positive and inclusive attitudes.

Community partners could be very valuable in this process as well. Community and business leaders are needed who possess the vision and expertise of how the inclusion of all students into advanced academic programs can help the students and the community. They can also provide expertise on job markets, career readiness, and specific skills needed in the workplace. Additionally, the business community could provide needed financial, in-kind support, and manpower, as well as act as tutors and mentors, which are central to proposed programs. Perhaps the most important community stakeholder task could be identifying and involving leaders from minority communities. The input and suggestions from leaders in the minority community could be the lynchpin to creating success in any of these efforts.

Testing Program

A testing recommendation is that the district should use the ITBS mathematics score as only one of many potential measures of a student's readiness for entry into the advanced mathematics course. The recommendation of the discontinuing use of the single mathematics test cut-score alone is not enough to help the affected students. The ITBS mathematics scores could be one indicator of student academic deficits. The goal is not to completely eliminate the use of the ITBS math cut-score as an indicator as this would not improve or eliminate the potential student deficits. The ITBS should be used as one indicator of student readiness. The recommendation is the district should use multiple methods for entry into advanced mathematics courses. Another recommendation is the

district revisit the 70th percentile as the cut-score. For example, there is currently no method for working with or encouraging a student who scores a 65 on the ITBS to take the advanced mathematics course.

It is further recommended the district investigate other evaluation methods for mathematics readiness. Teacher input and advocacy for the affected student populations could be essential to these efforts. Teachers should be trained and encouraged to identify and support underserved and underrepresented students to enter advanced coursework. An approach of seeking out all types of students will require a shift in thinking by all staff members about how to think about student potential and support.

Student Recruitment

As previously stated, a support system where all students are eligible for advanced coursework is recommended. The recommendation is not to suggest a system where all students are placed in advanced coursework but one where all students are eligible. Recruitment of students would be accomplished through existing school personnel such as counselors and teachers. For this recommendation to be accomplished, an active recruitment system or program for traditionally underserved students must be initiated. One part of such a recruitment program seeks to empower all students to take the types of courses in which they are interested. Active and supportive recruitment of underserved and underrepresented students by teachers, counselors, and administrators is essential. The College Board (2015d) recommends that schools identify and motivate traditionally underrepresented students to take the challenge of enrolling in an AP course.

As previously discussed, gatekeeping methods have kept many underserved students out of advanced courses. Therefore, recruitment programs must be organized, systemic, and supported by all district stakeholders. Recruitment efforts should be broadened to create opportunities for underserved and underrepresented populations by reducing or eliminating standard requirements to advanced coursework, such as past grades (Packard, 2012). Further, it is recommended the use of gatekeeping measures such as grade point averages and test scores be deemphasized and replaced with recruitment methods, which is followed with student support programs. Finally, the CB strongly encourages equity of access to all pre-AP and AP courses; however, they also indicate equity of access alone is not enough (College Board, 2015c). All access efforts must be followed up with support to help ensure the success of underserved and underrepresented students.

Student Support Program

All of the preceding recommendations lead to two final recommendations: student support and teacher/staff support programs. Two options are recommended for student and teacher/staff support programs. The first recommendation option is for the district to invest in an existing, nationally-recognized student support program. A second recommendation option is for the district to create a locally-designed support program modeled from one of the many successful national programs.

Advancement Via Individual Determination

A program recommended for adoption by the district is the Advancement Via Individual Determination (AVID) program. AVID is a nationally recognized program

aimed at preparing traditionally underrepresented students, including minority, low socioeconomic, and/or first generation college attenders, for entrance into college (AVID, 2014). More specifically, AVID is designed to support traditionally underrepresented or underserved students gain access to higher education by teaching skills and behaviors for academic success, providing personal support, establishing positive teacher-student relationships, and creating positive peer groups for students (AVID, 2015a). Although AVID has K-12 programs available, it is recommended the district first adopt and target the program to Grades 5-8 middle school students and grow the program year-by-year to Grades 9-12. Extending supports to the elementary level is also recommended as a future goal. AVID offers each school district a full training and support system, including a summer institute and continued support, training, and materials for teachers, counselors, and administrators (AVID, 2015a). Costs for the AVID program are through an annually-renewed contract with the district (AVID, 2015b).

District Program

A second recommendation option would be the establishment of an AVID-style program, which is designed and supported by the district. The advantage of this option is it gives the ABC School District more flexibility to design a program that meets the needs of the district and its students. The disadvantage of this option is the district must first analyze, collate, and create a full needs assessment. The district would also have to design and implement all staff training and support systems, as well as all student support programs. Obviously, a needs assessment should be done no matter the route taken; however, a program such as AVID can provide basic needs assessment and guidance for

the existing situation in the district. Although adopting a program like AVID will have fiscal costs, creating an authentic and suitable district program will incur significant costs as well.

College Board Recommendations

For additional guidance in the recruitment and support of underserved students in pre-AP and AP classes, the CB has recommendations for outreach, policies, and programs. The College Board's policies focus on diversity of the school's student population, the elimination of barriers to entry of pre-AP and AP courses, and provide the prior preparation to students needed to be successful in advanced coursework (2015a). Although the CB does not mandate compliance, there are strongly encouraged recruiting and support suggestions for underrepresented and underserved students. The ABC High School currently follows CB guidelines regarding open enrollment practices. All secondary schools in the district should, at minimum, follow open enrollment practices suggested by the CB.

Recruitment and outreach programs highlighted by the CB as successful in this area include AP shadow week, AP teacher panels, "Pack the House" athletic events which focus halftime events on AP, and other such programs coordinated and geared to seek out and encourage underserved students to take AP courses (College Board, 2015c). It is recommended all recruitment/outreach efforts be followed up with support programs, which provide the targeted students with materials, guidance, and skills attainment to ensure success. An essential requirement is that substantial teacher, counselor, and administrator training and support be provided to ensure success.

Staff Development and Support Program

Davis, Davis, and Mobley (2013) assert minority and low SES students are three times more likely to earn a bachelor's degree by only attempting AP courses in high school. Therefore, the importance of recruiting and supporting these students cannot be overstated. Due to the needs of the targeted students, more teacher training will be required as there will be more underserved and underrepresented students in advanced classes. Many of these students will come to the classes with significant deficits in knowledge and skills needed for advanced coursework. Gaps and deficits in knowledge and skills will need immediate attention by the advanced class teachers. Administrators and counselors will need training in how to support teachers and students in the support and teaching processes. Further, it is recommended all training for teachers, counselors, and administrators have a heavy emphasis on educator attitudes toward recruiting and supporting underserved students in advanced coursework.

CB recommendations provide a clear pathway for the District to follow with regard to teacher, counselor, and administrator training, support, and attitudes for and about underserved students. The CB (2015d) emphasizes teachers must be committed to teaching AP to all students, not just those who are academically prepared. The CB (2015d) also suggests equity of student outcomes in pre-AP and AP to be the standard, not simply one of an equity of access. The equity outcomes are of particular importance to the student support recommendations. Without the proper support of underserved students in advanced courses, all recruiting efforts will mean very little. The students will likely not do well, the teachers will be frustrated with struggling and failing students,

counselors may not want to place these students in advanced courses, and administrators will not be able to effectively support and manage these efforts.

Most of the staff development and support recommendations hinge on how to implement the suggested policy shift. Teacher, counselor, and administrator attitudes about teaching and supporting underserved students in advanced courses must be explicitly addressed. With regard to pre-AP and AP students, the CB (2015d) indicates, “Teachers must be committed to serving all students, not just those who are academically ready to enroll in an AP course. These teachers need to see themselves as academic coaches for students.” Counselors are encouraged to create student-centered pathways to persuade underserved students to take pre-AP and AP classes (College Board, 2015b). Administrators should implement support systems for students such as partner and mentor programs, after-school help sessions, and summer programs to build foundations and facilitate the transition for underserved students into advanced coursework (College Board, 2015d).

Community Schools

The community school is an approach which actively invites, engages, and connects students, their families, and local communities to the school (Jacobson, Hodges, & Blank, 2011). The idea behind the community school approach is to identify student needs and create a school environment, which serves the student better and creates connections between families and the school. A full community school system is not part of this recommendation; however, the basic approach of community schools should be a utilized to create successful systems for students.

An additional recommendation would be to investigate geographically-based student support in the district. Transportation was usually the most significant barrier to getting the needed support to minority and low SES students (Young, 2015). Due to time constraints of the normal school day, much of the targeted student support is likely needed in after school settings. An after school program for junior high and high school students could be developed for students to be able to stay after school. Such a program would allow students to get the academic and social support needed.

Another possible approach would involve the use of elementary schools as bases of operation for support programs. Students from the various district schools are bussed back to their neighborhoods each day. One of the seven district elementary schools is generally within walking distance from each neighborhood in the city. While not perfectly situated, each elementary school is within walking distance to the homes of many of the targeted students. The elementary schools could be utilized to implement a geographically-based community school approach. Targeted students from the middle, junior high and high schools would take buses to the elementary school closest to where the student lives. A combination of teachers, tutors, and other adults would be stationed at each of the designated elementary schools to assist the students in their particular program of study. The use of elementary schools is recommended as it gets the kids to a safe, physical learning environment, which is geographically nearest their homes.

A natural byproduct of the community school support approach would be the inclusion of parents and guardians joining their student at the school after or before work. Parents and guardians would be able to come to the school before or after work to

participate with their student. Other services could be offered to parent and guardians including classes or assistance with computers, parenting, literacy, English as a second language or others as needs are determined.

Other Stakeholders

It is recommended the District find ways to involve parents, community members, and business leaders in this process. The district must demonstrate the scope of the problem to potential partners and articulate the need for support programs. The potential partners could be consulted and invited to solve problems, provide support, and ensure success for these students. Parent, community, and business resources can be beneficial in multiple ways including manpower for volunteer tutors, aides, and mentors. Partners can offer the district vision through their experiences and ideas from outside education, school-work partnerships, and increased diversity. Partners could also offer resources such as human capital, sponsorship of programs, in-kind resources, job skills training, job shadowing, as well as on-the-job training opportunities.

Increased parent involvement is usually a major component of the annual goals for each school in the District. The stakeholders recommendation could increase the participation of minority and low socioeconomic parents. The adoption and implementation of the community school approach in the district elementary schools provides an excellent opportunity to increase parent participation. The parents of the students targeted for the academic support programs should feel much more comfortable coming to an elementary school in their neighborhood, as opposed to the larger middle, junior, and high school buildings.