A QUANTITATIVE STUDY OF MATHEMATICS GRADUATION REQUIREMENTS AND THE IMPACT ON HIGH SCHOOL GRADUATION AND POSTSECONDARY ELIGIBILITY

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AUTHORIZATION TO SUBMIT

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This dissertation of Mollee O'Day, submitted for the degree of Doctor of Philosophy with a major in Educational Leadership and titled "A Quantitative Study of Mathematics Graduation Requirements and the Impact on High School Graduation and Postsecondary Eligibility," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies.

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ABSTRACT

California graduation requirements have been largely unchanged since 2003. Within the state of California, a public-school district has to meet state requirements to offer a high school diploma, but a district can implement additional requirements for students beyond the state minimum. Postsecondary educational eligibility is determined during a student's high school years, and, when school districts implement requirements beyond state minimums, there is a potential impact on postsecondary eligibility. The effect additional graduation requirements, specifically additional math requirements, have on students, and how changing requirements at the state or district level impacted students' graduation rates and postsecondary eligibility, is the focus of the study. The purpose of this study is to identify the impact requirements can have on a student's graduation status and options after high school in California. The top 76 school districts by enrollment were identified and statistical testing was completed to determine whether the math requirements set by the district had a relationship with graduation rates and A-G rates. Further analysis of the school districts with greater than 50% socioeconomically disadvantaged students was analyzed to see possible relationships between graduation rates and A-G rates. A statistical analysis using an independent samples t-test found that school districts with two years of math had a statistically significant increase in graduation rates versus school districts that required three or four years of math to graduate. A separate independent samples t-test reviewing years of math required and A-G rates was not statistically significant, and a further analysis using a one-way MANOVA including socioeconomic status was also found to not be statistically significant. The outcome of the study found that increasing math requirements for high school graduation could have unintended consequences in decreasing graduation rates with no discernable impact on A-G rates for college eligibility.

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Introduction

In 2018, 418,205 students in California received a regular high school diploma (California Department of Education, n.d.-c) and began the next steps in their postsecondary plans. The California Department of Education (2018) reported that of those students who graduated, 49.9% met the eligibility requirements to apply directly to a four-year university. Course requirements, referred to as A-G requirements, are a series of courses students must complete with a minimum grade to meet entrance requirements for public, four-year universities and many private universities in California. The A-G course requirements go beyond the minimum California state graduation requirements and require students to complete additional math, foreign language, English, lab sciences, and electives (California Department of Education, n.d.-b; UC Admissions, n.d.). Due to the disparity of students across California who meet A-G requirements, some districts are increasing graduation requirements beyond state minimums to more closely align with A-G requirements (Murray, 2012; Phillips et al., 2015).

For a students, having a defined path in high school that prepares them for college can have a long term impact on future earnings (Gitterman, Moulton, Bono-Lunn, & Chrisco, 2015; Lansing, Ahearn, Rosenbaum, Mohker, & Jacobson, 2017). Of the students who do not finish high school, 42% are neither enrolled in postsecondary education nor working (McFarland, Cui, Rathbun, & Holmes, 2018). For students who continue, postsecondary education has a direct influence on employment and future income (Carlson & McChesney, 2015; Gitterman et al., 2015). The potential earnings of young adults in the United States in 2016 increased by $9,500 annually for individuals with some college completed and increased by $29,400 annually for individuals with a bachelor's degree (McFarland et al., 2018). Employment rates and median

earnings of students are related to additional education and are compounded for an individual's earnings across a lifetime (Carlson & McChesney, 2015; Clark & Martorell, 2014; Gitterman et al., 2015).

Postsecondary achievement can also act as a signal for future employers. Economists use the Signaling Value of Education to analyze the impact that education can have on long term opportunities (Clark & Martorell, 2014; Heisig, 2018). Analysis of the effects of postsecondary education identifies that employers consider educational achievement as a way to sort potential candidates for interviews and job offers (Clark & Martorell, 2014; Heisig, 2018).

States are changing educational priorities to promote college readiness, which has led to changing graduation requirements for high school seniors in parts of the United States (Phillips et al., 2015; Plunk, Tate, Bierut, & Grucza, 2014). This often includes increasing requirements in math and science, which are considered predictors of college success (Gao, 2016; Garland & Rapaport, 2017; Wang, Wang, Sun, Chan, & Wickersham, 2017). States can set graduation requirements individually, with districts adding additional coursework; therefore, the variance in requirements across a state and the country can be significant (Booth, Shields, & Carle, 2017; Rodriguez, 2018).

School districts are challenged with continually increasing student achievement, which can have an impact on graduation rates (Fensterwald, 2018; Walston, Tucker, Ye, & Lee, 2017). To improve student outcomes, multiple programs are implemented in differing districts, based on what a single district considers an area of need or focus (Castellano, Richardson, Sundell, & Stone, 2017; Lile, Ottusch, Jones, & Richards, 2018). One district may focus on vocational programs, another may focus on increasing requirements in academics, while another district may invest in college preparatory programs (Castellano et al., 2017; Fina, Dunbar, & Welch,

2018; Plunk et al., 2014; Wooldridge, 2018). Lack of consistency across California school districts regarding how to approach increasing postsecondary preparedness can make achievement difficult for students who are socioeconomically disadvantaged, have a language barrier, or are highly mobile (Saw, 2016; Wooldridge, 2018). Beyond the implementation of programs, differing graduation requirements can lead to an informational disconnect with the school that impacts academic success (Dagley, Georgiopoulos, Reece, & Young, 2016; Scott, Miller & Morris, 2016).

Existing literature examines the impact of academic interventions and college support programs for students from disadvantaged backgrounds (Green, 2018; Kolbe , Kinsley, Feldman, & Goldrick-Rab, 2019; Wooldridge, 2018). The district or statewide impact of increasing graduation requirements on socioeconomically disadvantaged students, however, is not clearly defined (Howell, 2014; Plunk et al., 2014). Students who take additional years of math report having an increase in postsecondary educational achievement, but whether varying requirements act as a barrier to a student's college eligibility is not clear (Gaertner, Kim, Desjardins, & McClarty, 2014). Analyzing the impact an increase in math requirements has on graduation requirements and college entrance requirements can support student postsecondary accessibility (Drotos & Cilesiz, 2016). Factors such as parent involvement, student choices, counseling programs, and dual enrollment can influence postsecondary success, and while the analysis of specific interventions is addressed in the literature, how the increase of academic requirements for high school graduation impacts socioeconomically disadvantaged students in preparation for meeting college requirements is an identified gap (Bowman, Kim, Ingleby, Ford, & Sibaouih, 2018; Drotos & Cilesiz, 2016; Page & Scott-Clayton, 2016; Phillips et al., 2015)

Statement of the Problem

In California, 6.2 million students are enrolled in the education system, which is 9.1% of all students enrolled in the K-12 education system in the United States (National Center for Education Statistics, n.d.). Of the students in California, 61.5% are identified as socioeconomically disadvantaged, and, of those students, only 33.7% are considered prepared for college and/or a career (California Department of Education, n.d.-a). This equates to approximately 1.24 million socioeconomically disadvantaged students that are not considered prepared for postsecondary achievement by the State of California. In order to be considered college and career ready in California, a student needs to meet one or more of a variety of indicators (Bush, Hough, & Kirst, 2017). Indicators include completing A-G requirements, participating in dual enrollment, meeting minimum scores on AP or state assessments, participating in ROTC, earning of the state Seal of Biliteracy, or completing a career pathway (California Department of Education, n.d.-a). Student achievement in advanced coursework, state assessments, or meeting A-G coursework are all considered a path to be prepared; however, not all school districts require students to complete the additional requirements in order to graduate (California's New School Dashboard, 2017). The potential impact of lower expectations on student achievement, particularly in socioeconomically disadvantaged students, is an area in need of analysis since the ability to complete A-G requirements can have a long-term impact on postsecondary opportunities (Fensterwald, 2018; Murray, 2012).

The Department of Education in a state determines the requirements to receive a high school diploma. The state sets a minimum, and school districts can then further identify required courses for a high school diploma (Blankenberger, Franklin, & Lichtenberger, 2017). The variance in graduation requirements by a school district contributes to different student

expectations, depending on a student's district of attendance (Booth et al., 2017; Saw, 2016). The governing body of a school district, usually the school board, determines the requirements for that district (Phillips et al., 2015). When district requirements are not as rigorous as college enrollment requirements, students that are considered non-college bound are found to focus on graduation requirements and a less stringent schedule, versus students that are planning to go straight to a university (Fina et al., 2018; Murray, 2012). This leads to a multiple track system, where college-bound students move in one direction of coursework, while non-four-year-college students move in another direction (Dagley et al., 2016; Weikart, 2015). In addition to discrepancies for high school requirements, the California State University system, which consists of 23 campuses in California, has also begun to consider the importance of mathematics (Agrawal, 2019). In September 2019, the governing board of the California State University System announced a proposal to increase math requirements for college eligibility from three years to four, where the fourth year could include mathematics, computer science, or a quantitative reasoning course (Agrawal, 2019). The proposal is currently under review and may be adopted for the freshman class of 2027. Understanding the relationship between a district's graduation requirements, the graduation rate, and A-G completion rate can provide insight into the number of students who do not enroll in additional academic courses in high school and the subsequent impact on eligibility for post-secondary education (Curry, 2017; Jacob, Dynarski, Frank, & Schneider, 2017).

Unlike some states, such as New Mexico, North Caroline, and Illinois, California has lacked statewide initiatives to change high school graduation requirements (Booth et al., 2017; Muñoz, Harrington, Curs, & Ehlert, 2016; Walston et al., 2017). Increasing rigor and postsecondary opportunities have been factors in developing new requirements by other states, in

order for students to be prepared in the 21st century (Plunk et al., 2014; Rodriguez, 2018). Certain courses, such as science and math, are recognized as predictors for college success (Garland & Rapaport, 2017; Rodriguez, 2018). Given the increase in graduation requirements for students in states across the country, the varied expectations for the students in California is in need of analysis. The impact required courses have on socioeconomically disadvantaged students on completing high school and meeting college eligibility criteria needs to be analyzed in districts that have already increased math requirements in order to identify possible areas of focus for intervention.

Academic performance in high school can be impacted by multiple factors, one of which is a student's socioeconomic status (SES) (Agirdag, 2018; Berger & Archer, 2018). Students identified as being socioeconomically disadvantaged face challenges to academic success including, but not limited to, access to community, parent involvement, family mobility, transportation, and educational resources (Kotok, 2017; Sengul, Zhang, & Leroux, 2019; Von Stumm, 2017). Programs and methods of intervention that offset the challenges faced by socioeconomically disadvantaged students can have a large influence on academic performance (Bohanon, Castillo, & Afton, 2015; Faria et al., 2017; Page & Scott-Clayton, 2016). Recognizing barriers to success for socioeconomically disadvantaged students can lead to rethinking accessibility and support for student to meet their postsecondary goals (Lansing et al., 2017; Von Stumm, 2017).

Increasing course rigor can happen throughout a student's educational career, due to a new curriculum, assessments, or changing academic requirements (Blankenberger et al., 2017; Goodman, 2019). Students may also have increased levels of academic expectations as courses become progressively more challenging, and successful course completion can be required to

enroll in the next level (Gao, 2016; Rodriguez, 2018). Identifying the impact a school district's graduation requirements have on postsecondary eligibility can allow for increased interventions for students, parents, and educators. This intervention can occur before a student changes their academic courses to no longer meet A-G requirements or be considered prepared for college and career paths (Foote, Schulkind, & Shapiro, 2015; Knaggs, Sondergeld, & Schardt, 2015; Kotok, 2017).

Recognizing the different points of academic fallout during high school can lead to early focused interventions and increased postsecondary opportunities (Drotos & Cilesiz, 2016; Page & Scott-Clayton, 2016). If given the opportunity, students who struggle in high school can elect to take non-academic courses to meet minimum graduation requirements (Bowman et al., 2018; Buddin & Croft, 2014). This is the case for math requirements in California, which have a great variance across school districts in the minimum number of years required (Booth et al., 2017; Gaertner et al., 2014). Identifying the impact on specific populations of students who are not participating in college readiness coursework and, consequently, are on a non-college bound path, is necessary for a district to have successful postsecondary planning in the K-12 setting (Cha, 2015; Morgan, Zakhem, & Cooper, 2018). Policy changes to graduation requirements have a long reaching effect on student course taking, academic expectations, graduation rates, and, ultimately, postsecondary opportunity (Atkinson, 2017; Booth et al., 2017; Buddin & Croft, 2014; Howell, 2014; Plunk et al., 2014).

The impact of specific courses in high school on postsecondary enrollment has been an area of analysis in the United States (Goodman, 2019; Page & Scott-Clayton, 2016; Smith, 2016). The academic interventions reviewed in the literature include studies that specifically look at math scores (Ellison & Swanson, 2016) or foreign language (O'Rourke, Zhou, &

Rottman, 2016) rather than successful completion of a set number of years of study. Information on state graduation requirement analysis has been limited to states that are updating requirements, such as New Mexico and Illinois, and excludes California (Booth et al., 2017; Plunk et al., 2014). How graduation requirements are connected to college eligibility for students, including socioeconomically disadvantaged students, can shape educational policy (Cross, 2015; Page & Scott-Clayton, 2016). Understanding the impact additional math requirements have on California graduation rates and how the increased academic requirements in math affect socioeconomically disadvantaged students in their completion of high school can contribute to policies to support student access and achievement. Further analysis is needed to identify possible themes and to see how graduation requirements impact the completion of college entrance requirements.

The purpose of this quantitative study is to explore the impact increasing graduation requirements beyond the state minimum in California has both on graduation rates and meeting minimum college entrance requirements for socioeconomically disadvantaged students. A gap in the literature exists in exploring what effect additional graduation requirements, specifically additional math requirements, has on students and how changing the requirements at the state or district level can impact socioeconomically disadvantaged students' graduation rates and postsecondary eligibility. The literature identifies changes that have happened in states across the country, including North Carolina, New Mexico, Illinois, and Michigan (Blankenberger et al., 2017; Booth et al., 2017; Jacob et al., 2017; Weikart, 2015). Because there has been a shift over the last several years across numerous states as a result of educational policy (Stipanovic, Stringfield, & Witherell, 2017; Walston et al., 2017), and California has not made changes to graduation requirements since 2003 (California Department of Education, n.d.-d; Gao, 2016),

what impact minimal high school graduation requirements in California has on students who attempt to meet college entrance requirements is a needed area of analysis.

Background

For students across the United States, high school is the first step toward identifying postsecondary plans. The transition from middle school to high school can be difficult for students, and the academic and behavioral support of students in ninth grade has been identified to be correlated to overall high school achievement (Balfanz, Byrnes, & Fox, 2014; Wilkins & Bost, 2016). English and math courses are typical required courses for ninth grade students, and achievement in these subjects can be the first step toward moving on a college path (Cha, 2015; Wang et al., 2017). Math achievement was additionally recognized as important for socioeconomically disadvantaged students for whom interventions that could have a positive impact on education were not always available, resulting in struggles in higher level courses (Cha, 2015; Gaertner et al., 2014).

Analyzing ninth-grade students with high achieving math scores showed that the math achievement gap was prevalent for socioeconomically disadvantaged students unless a support network was in place (Green, 2018; Kotok, 2017). Support networks include peer-based support, access to after-school programs, or parental support (Kotok, 2017; Li, Deng, Wang, & Tang, 2018). Additional support is identified as needed through academic intervention. These interventions can be additional periods of math support, access to tutoring, evening academic programs within a community, as well as scaffolding math courses to meet the needs of the students (Ellison & Swanson, 2016; Huang, Snipes, & Finkelstein, 2016; Martinez, Bragelman & Stoelinga, 2016; Rodriguez, 2018). Academic interventions are considered necessary for future academic achievement in high school and can lead to additional educational opportunities for

students who struggle in math courses in middle school and upon entering high school (Green, 2018; Ulichnie, 2015).

Increasing math and science requirements can have multiple effects on student success in a postsecondary educational environment (Buddin & Croft, 2014; Gao, 2016; Goodman, 2019; Kist, 2020). Math achievement, however, has been studied as an academic area where students struggle (Ellison & Swanson, 2016; Huang et al., 2016; Kotok, 2017). In California, the graduation requirement for math is two years, part of which must include content in algebra. The algebra requirement to graduate high school was implemented in California in 2003. Prior to 2003, the requirements to graduate from a California high school were first applied to the Class of 1987 (California Department of Education, n.d.-d). School districts in California must at least follow the minimum requirements, but they may also increase math requirements to graduate high school to three or four years (Freedberg, 2017; Gao, Lopes, & Lee, 2017). To meet entrance requirements in California public four-year colleges, students must complete three years of math, including algebra, geometry, and algebra II (California Department of Education, n.d.-b). The specific course requirements for California high school and college requirements are outlined in Table 1.

Table 1

California Minimal High School Graduation Requirements and A-G College Eligibility

Subject	CA High School Minimum Requirements	CA Public University Minimum A-G Requirements
English	3 years	4 years
Mathematics	2 years (including Algebra I)	3 years
Social Studies	3 years	2 years
Science	2 years (biological and physical)	2 years (biological with lab and physical with lab)
Arts/CTE	1 year of visual/performing art, foreign language OR career technical education	1 year visual/ performing arts
Foreign Language	N/A	2 years – same language
Physical Education	2 years	N/A
Electives	N/A	1 year

(California Department of Education, n.d.-d)

The additional year of math required for A-G requirements is often a struggle for students who have not been successful in math courses (Kist, 2020; Royster, Gross, & Hochbein, 2015). When students are struggling in math and realize they are not required to take the course to graduate from high school, they may elect to stop taking math completely, which affects long term postsecondary options (Rodriguez, 2018; Wang et al., 2017).

Academic challenges happen throughout a student's educational career (Fye, Miller, & Rainey, 2017; Lansing et al., 2017). However, in elementary and middle school, when a student is struggling, they may still move on to the next grade level of courses. This process, known as social promotion, can occur as districts continue moving students forward, sometimes with few interventions to ensure the student is at or close to grade level when entering high school (Jing,

2015; McMahon, 2018). The effects of social promotion can be long ranging. Students who fail courses in middle school have an increased risk of failing courses in high school and, ultimately, not meeting graduation requirements (McMahon, 2018; Zaff et al., 2017). When students participate in interventions that increase coursework in areas where students struggle, such as mathematics, the support courses can allow for additional time learning foundational material or a slower pace, and still give students the opportunity to meet needed requirements for applying to colleges after high school (Abid & Akhtar, 2020; Jing, 2015; Wang, Kiuru, Degol, & Salmela-Aro, 2018). Without academic interventions that provide foundational support, many students are unable to keep up with other students in core subjects that are necessary to be successful in high school and college (Green, 2018; Phillips et al., 2015). The lack of academic foundational support contributes to students falling off the college track quickly once in high school, as students learn of the requirements to receive a diploma versus those to continue to a four-year college (Phillips et al., 2015; Ulichnie, 2015).

The shift from middle to high school is a period of adjustment, emotionally and academically (San Pedro, Baker, & Heffernan, 2017; Wilkins & Bost, 2016). During this time a student has to learn the relationship of course grades to future academic success (Hudson, 2017; San Pedro et al., 2017; Scott et al., 2016). Moving from middle to high school could be a smoother academic transition for students if they received support earlier and recognized when to reach out for additional intervention (San Pedro et al., 2017; Wilkins & Bost, 2016). Providing remediation information and implementation early on, through extra tutoring, summer school, or support courses, leads to further success for the students (Faria et al., 2017; Kolbe et al., 2019; McMahon, 2018). The earlier students engage in interventions, the higher level of success the intervention will have on later student achievement (San Pedro et al., 2017; Ulichnie, 2015).

Implementing continuous interventions for students is one way that districts can support student achievement in high school (Faria et al., 2017; Finning et al., 2018; San Pedro et al., 2017). It has been identified that interventions in math have a direct relationship to a student's ability to complete at least three years of math curriculum in high school (Green, 2018; Rodriguez, 2018). Students who would benefit from interventions can be identified from multiple measures, such as standardized scores, district assessments, and academic grading. Implementation can occur throughout the school year, allowing students who fall behind to be identified early, offered services, and have the chance to catch back up with the curriculum. These interventions can open doors for students to complete more challenging curricula in their later years of high school (Green, 2018; Ulichnie, 2015). Along with access to academic interventions, schools are responsible for ensuring the availability of rigorous and advanced courses to meet any graduation requirement. Schools with after-school academic support, such as additional math classes, can increase students' overall academic success (Ellison & Swanson, 2016; Rodriguez, 2018).

Academics are only one component needed for students to find success on a high school campus (Kolbe et al., 2019; Muñoz et al., 2016). Identifying supports for students beyond academics is the purpose of programs built into the school day that offer academic, college planning, and family support (Bowman et al., 2018; Knaggs et al., 2015). Recognizing that student success is related to academic achievement, as well as additional factors such as family influence, social interactions, and SES, is imperative if a high school is going to support all students in pursuing postsecondary education (Bowman et al., 2018; Cavendish, 2013; Curry, 2017; Knaggs et al., 2015). College preparatory programs develop workshops for parents and students as well as support continuous postsecondary planning and awareness (Deslonde &

Becerra, 2018; Page & Scott-Clayton, 2016). These programs recognize that meeting high school graduation and college entrance requirements is a process that starts as soon as a student enters a high school campus (Deslonde & Becerra, 2018). District implementation of multiple support systems ensures students who face additional challenges in meeting college entrance requirements can overcome them and succeed in their high school and postsecondary plans (Royster et al., 2015; Scott et al., 2016; Ulichnie, 2015).

High school is a transition for students, and the impact of academic success starting in ninth grade can influence long-term educational opportunities (Deslonde & Becerra, 2018; Royster et al., 2015). The implementation of interventions in content areas that students historically struggle with, such as math, is important in order to ensure that students have access to higher level courses that are needed for college entrance eligibility (Green, 2018; Kotok, 2017; Rodriguez, 2018). Additional programs that support student achievement along with family engagement and personal well-being can also contribute to student success (Bowman et al., 2018; Wooldridge, 2018). However, course requirements set by individual school districts can influence the courses the students are taking and the content that students are mastering before they complete high school (Booth et al., 2017; Garland & Rapaport, 2017; Plunk et al., 2014). Analyzing state and district math graduation requirements, which is an academic area with varying requirements, can provide additional insight into long-term student educational opportunities. This will build on previous literature that focuses on interventions, school programs, and the achievement gap in high school.

Research Questions

The purpose of this study is to explore the impact increasing high school graduation requirements in mathematics beyond California's state minimum has on postsecondary

opportunities, specifically focusing on the following research questions:

1. In the 76 largest school districts in California, what differences exist in high school graduation rates between districts that require only two years of math and those that require three or more years of math?
2. What differences exist in A-G completion rates among students in the 76 largest school districts in California, based on the number of years math is required?
3. In the 76 largest school districts in California, what impact do school district math requirements have on the graduation rates and A-G rates for school districts where greater than 50% of students are socioeconomically disadvantaged?

Description of Terms

The terminology in education includes multiple acronyms and explanations. The terms outlined below refer to high school and post-secondary educational terms in the public school system in California, overseen by the California Department of Education, as well as federal educational policies, overseen by the federal Department of Education.

A-G requirements. College preparatory courses required to meet minimum college application requirements for public, four-year universities in California. Requirements include two years of social studies, four years of English, three years of math, two years of lab sciences, two years of a foreign language, one-year of a fine art, and one year of a college prep elective. Courses must meet minimum grading requirements to be eligible (California Department of Education, n.d.-b).

Adjusted Cohort Graduation Rate (ACGR). Identifies a graduation cohort as a group of students who start grade 9, adding in any students who enter the group in grades 9, 10, or 11, and subtracting any students who transfer out to another educational program, move to a

different country, or pass away (California Department of Education, n.d.-c).

California Dashboard. A dashboard-style accountability system for public education in California. The dashboard utilizes multiple measures to determine a school's or district's performance (Bush et al., 2017)**.**

College and career readiness indicators. Measurement for high schools on the California Dashboard accountability system that identifies students who are considered college and career ready when they graduate high school. To be college and career ready, students need to meet a combination of the indicators, including assessment scores, AP scores, dual enrollment participation, CTE pathway, Seal of Biliteracy, or ROTC (California's New School Dashboard, 2017).

Every Student Succeeds Act (ESSA). Law passed in December 2015, which set guidelines for federal K-12 education policy (U.S. Department of Education, n.d.).

No Child Left Behind (NCLB). A Federal law passed in 2001 that outlined requirements for school districts and teacher preparation programs in order to receive federal funding.

SAT. Scholastic Achievement Test developed by College Board, which tests students in English and math, and which may be a requirement by universities for students to apply to a four-year university (Appelrouth & Zabrucky, 2017).

Signaling value of education. Economic theory regarding hiring practices by employers. The theory argues that education acts as an indicator for employers when screening candidates, in order to identify possibly productivity (Clark & Martorell, 2014).

Socioeconomically disadvantaged. Students who are eligible for free or reduced price meals or who have parents/guardians who did not receive a high school diploma (California Department of Education, n.d.-a).

Significance of the Study

High school graduation requirements can vary from school district to school district within a state (Howell, 2014; Mahnken, 2018; O'Rourke et al., 2016). In California, the state sets minimum requirements, but individual school districts often add additional requirements to receive a diploma from that district (Gao et al., 2017; Zaff et al., 2017). The collection of graduation rates by the California State Department of Education only tracks if students receive a diploma, not the requirements set by each district to receive a diploma. There is no database of district requirements that go beyond state requirements. The lack of information on requirements from different districts makes it difficult to identify if requirements impact student achievement. Stakeholders in California interested in updating district requirements to reflect changing educational standards have no basis to identify if specific requirements impact student achievement (Rubin, 2017; Weikart, 2015). Alternatively, a lack of information on graduation requirements can lead to changes that may disproportionally impact socioeconomically disadvantaged students.

Information on differing requirements is significant for the impact on populations who have a higher rate of mobility (Berger & Archer, 2018; Von Stumm, 2017). This can include families that move due to employment, an economic crisis, involvement in the military, or any factors that affect a student's education, such as trauma (Griffen, 2019; Henderson, 2017; Paugh, 2018). It is important to recognize the potential long-term challenges in educational opportunities students moving from district to district may face, as their curriculum and degree requirements are impacted by relocation.

The benefits of this dissertation include looking at school districts that have different math requirements to graduate to determine the impact the graduation requirements can have on

student's graduation rates and college eligibility rates. Math is the chosen criteria to analyze, as this is a content area where the minimum requirement by the state of California is two years but some districts require three or four years (Agrawal, 2019; Phillips et al., 2015). It is worth noting that, across the country, states which have updated their graduation requirements in the last decade typically require three or more years of math (Wang et al., 2017; Weikart, 2015). Collecting information and data on districts with different requirements can provide guidance for districts that may consider making graduation requirement changes or if the State of California decides to update state requirements for students.

The individuals that would benefit from the research would be stakeholders that influence policy at the local, county, and state levels of the public secondary educational system. Stakeholders may include the academic community, the California Department of Education, school districts, parents, and students, all of whom are impacted by the preparation and opportunities for students beyond high school. Completion of the study will provide unique advantages for school districts that are considering changes to their high school graduation requirements. Changing requirements to graduate is often a multi-year process, requiring updates to policies that are managed by a district's managing body (Agrawal, 2019; Alexander, 2020; Weikart, 2015). This study will provide insight into the impact changing the graduation requirements can have on students beyond the K-12 education environment.

Theoretical Framework

Ecological systems theory, which focuses on the impact the environment has on an individual's development, will be used to frame this study (Bronfenbrenner, 1979). Ecological systems theory recognizes the multiple ecosystems that impact student development and contribute to overall growth. Identifying a process, person, context, and time approach,

individuals are identified as having multiple environments and systems that impact their development (Bronfenbrenner, 1979). The ecosystems include microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1979). The five levels of systems are often represented using concentric circles, with the individual in the center. Each layer toward the center increases the direct connection to the individual in the center. Alternatively, the outer layer is the most distant collection of people and places who affect the individual (Bronfenbrenner, 1979).

This study will focus on the impact of state and school district education policy on a student meeting graduation requirements and college eligibility requirements. School board policies, which identify requirements for students in a school district, would be identified in the exosystem, while requirements set by the California State Board of Regents to enter a California State school are identified in the macrosystem (Bronfenbrenner, 1979; Crawford, Snyder, & Adelson, 2020). Since the study will focus on laws and policies that influence educational achievement and eligibility, the ecological systems theory will contribute to understanding how policies can affect child development and future opportunities in the secondary and post-secondary setting.

Overview of Research Methods

California school districts with the greatest enrollment, making up approximately 50% of students in California, will be the focus of the study, with data collected from the California Department of Education used for analysis. School districts in California report graduation rates, A-G eligibility rates, test scores, demographics, SES, and other information (California Department of Education, n.d.-a). Data is available to the public through the California Department of Education DataQuest tool. Graduation and A-G eligibility rates are collected for

an adjusted cohort of students graduating from the school district and meeting the requirements set by that district (California Department of Education, n.d.-c; Freedberg, 2017). Individual district requirements are available on school district's websites, which provide the governing school boards set requirements for the students. School district website information is available through the California Department of Education (California School Dashboard, n.d.). Using A-G rates, the study will identify possible relationships between graduation requirements, a school district's graduation rate, and four-year college eligibility. Additional analysis will include identifying how SES impacts the variables. Statistical analysis using SPSS 25.0 will be utilized to disseminate data.

Chapter II

Review of Literature

Introduction

Educational literature identifies a focus on graduation requirements in multiple states, including addressing ways to successfully increase academic expectations and course requirements of students (Ross, 2016; Walston et al., 2017; Wooldridge, 2018). A shift has occurred in education expectations for high school students across the United States; however, California has not changed state graduation requirements since 2003. Given that literature has outlined the benefits of updating academic requirements for the 21st century student, it is important to analyze how California's failure to update these requirements is impacting students in the state. While certain California school districts have increased graduation requirements, course expectations for students across the state are not unified (Freedberg, 2017; Gao, 2016). This lack of consistency for graduation requirements is not tracked at the state level, and how these differing requirements impact graduation rates and college entrance eligibility should be analyzed in order to understand how educational opportunities can differ for students, specifically for students from a disadvantaged background (Alexander, 2020; Buddin & Croft, 2014; Plunk et al., 2014; Weikart, 2015).

To identify the effects of changes in high school education requirements, states that have implemented additional rigor at the state level are tracking graduation rates as well as reviewing programs and policies that affect high school graduation and postsecondary enrollment (Bowman et al., 2018; Curry, 2017). The literature focuses on graduation rates, rather than analyzing how differing graduation requirements may contribute to graduation rates, both at the state level and specifically among districts. A change in academic rigor in high school impacts state graduation

rates, making it difficult to clearly compare district achievements within a state where the expectations differ (Booth et al., 2017; Görlitz & Gravert, 2018; McFarland et al., 2018; Walston et al., 2017). Additional analysis of the program and barriers students face in graduation is needed to identify connections between student rigor and postsecondary success (Bowman et al., 2018; Gitterman et al., 2015; Unlu, Edmunds, Fesler, & Glennie, 2015).

The literature review examines the various factors impacting graduation requirements, including federal and state policy, academic expectations, state requirements, education barriers to college, parental influence, and student involvement (Walston et al., 2017; Weikart, 2015). Through reviewing state and federal education policy, the literature identifies local education reforms that have been implemented in the United States to increase student expectations (Cross & Education Commission of the States, 2015; Stotsky & Holzman, 2015). Requirements currently in place for students in states outside of California to graduate high school, as well as to enter a four-year college, are examined (Alexander, 2020; McFarland et al., 2018; O'Rourke et al., 2016; Plunk et al., 2014). Additionally, academic and nonacademic barriers for students in meeting the academic requirements are analyzed, focusing on socioeconomically disadvantaged students and how an increase in requirements affects underrepresented populations of students (Imbrenda, 2018; Knaggs et al., 2015). Programs that schools implement to support postsecondary goals are reviewed to see the impact on graduation requirements and postsecondary enrollment (Bowman et al., 2018; Christian, Lawrence, & Dampman, 2017). The purpose of the literature review is to highlight the multiple factors that can impact graduation rates and the requirements that have been implemented in states outside of California (Hudson, 2017; Zaff et al., 2017). Analysis of education policy, high school academic expectations, outside influences and academic preparation for college provides the opportunity to identify

programs that are currently incorporated at school sites. Through the clarity of policies and programs that are currently implemented, further analysis of the impact of the specific requirements themselves can provide insight into ways to support students in completing rigorous high school graduation requirements to be prepared for postsecondary success.

Theoretical Framework

This study is framed using Bronfenbrenner's ecological systems theory. The ecological systems theory identified the impact environment can have on child development, in addition to biological factors (Bronfenbrenner, 1979). Implementing a broader approach to development, children are impacted by multiple environments, and each of these environments or ecosystems influence individuals in various ways (Aubrey & Riley, 2018; Bronfenbrenner, 1979). Following a model of process, person, context, and time, the theory describes the interconnectedness of factors that influence human development, as well as the later consideration of the factor of time (Bronfenbrenner & Ceci, 1994). With the incorporation of time, the ecological systems theory identified the five ecosystems around the child, where close ecosystems have the greatest connections to the individual (Bronfenbrenner, 1976). The ecosystems include microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner & Ceci, 1994).

Analysis of the ecological systems theory can be broken down to consider process, person, context, and time in an attempt to explain what factors can influence human development (Aubrey & Riley, 2018; Bronfenbrenner, 1976). The process component includes interactions an individual has between a person and their environment (Bronfenbrenner & Ceci, 1994). The person component includes the biological characteristics a person can have (Aubrey & Riley, 2018; Darling, 2007). Characteristics can include age, gender, appearance, skills, intelligence, drive to succeed, as well as access to housing. Early studies would consider the impact of process

and person in child development, whereas ecological systems theory incorporated context and time as a factor of development (Aubrey & Riley, 2018; Bronfenbrenner & Ceci, 1994).

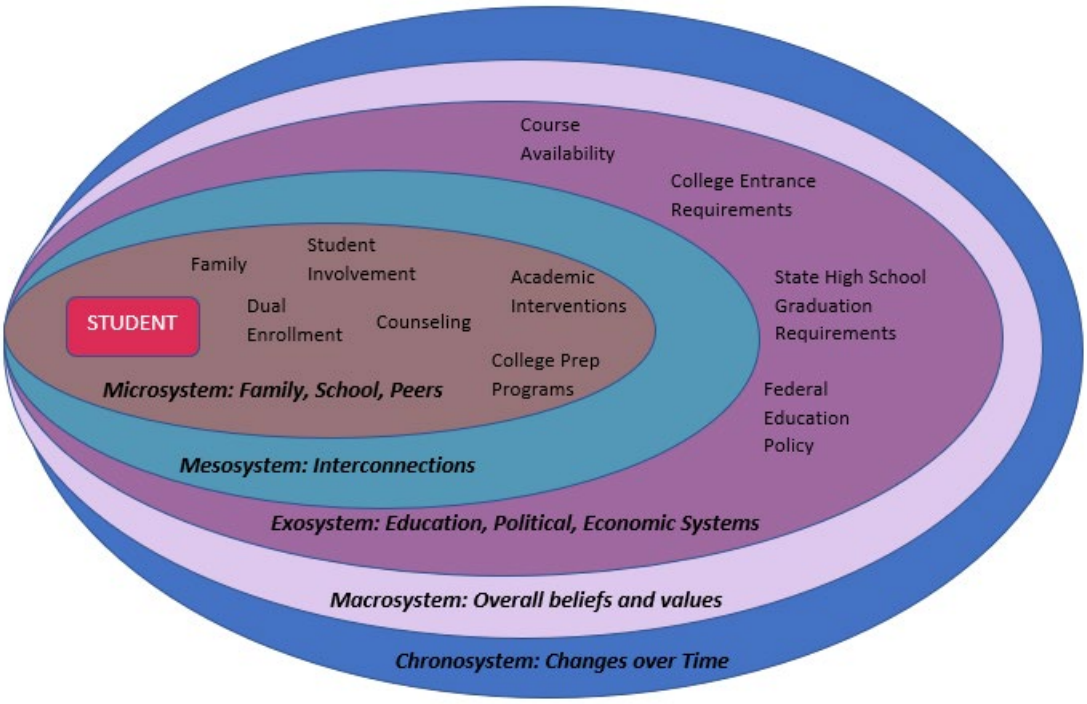
Framing the study with the ecological systems theory will provide the opportunity to analyze environmental factors that impact student graduation rates and college eligibility rates in California. Analysis of each ecosystem and how it influences education will contribute to understanding how school district and state level policies can influence a student's education (Aubrey & Riley, 2018; Zhang, 2018). The first environment a child is exposed to is the microsystem, the smallest environment in which a child lives (Bronfenbrenner, 1979; Darling, 2007). This ecosystem can include parents, friends, classes a student is enrolled in, interactions with school counselors, as well as other close relationships such as religious involvement (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1994).

Moving outside of the direct connections in the microsystem, the mesosystem provides links within the microsystem (Bronfenbrenner, 1979). Interactions are constant as relationships between family, peers, classmates, teachers, and extracurricular activities can influence the child (Bronfenbrenner & Ceci, 1994; Crawford et al., 2020). The exosystem further identifies an area of influence by recognizing the people and places that may not have a direct engagement with a child, but still have an impact on the child's life (Bronfenbrenner, 1976; Bronfenbrenner & Ceci, 1994). Examples of the exosystem include the parent's workplace, extended family, as well as factors such as religious affiliation, political system, parent job security, community safety, and school board policies. The macrosystem outlines the largest and most distant connection to the child. The macrosystem can include the state department of education, the media, state agencies, and the overall beliefs and values of an individual (Aubrey & Riley, 2018; Bronfenbrenner, 1976).

Within the ecological systems, the concept of time was also added to the chronosystem layer (Bronfenbrenner & Ceci, 1994). The chronosystem recognizes that many ecological systems change and that considering time in relation to development is important (Aubrey & Riley, 2018; Bronfenbrenner & Ceci, 1994). A child's family structure, peer group, and community can all change, therefore time is an important factor in development as well (Bronfenbrenner & Ceci, 1994). The levels of the ecological systems are identified in Figure 1, which shows each ecosystem and is adapted from Bronfenbrenner ecological model (Bronfenbrenner & Ceci, 1994). Understanding how the levels influence student development can lead to supporting student achievement.

Figure 1

The Ecological Approach



In considering the many factors that impact a student's ability to meet graduation requirements and college entrance requirements, factors fall within the various ecosystems.

Federal education policy and state education policies fall within the exosystem. Barriers to student achievement, including interventions, counseling programs, course availability, and student involvement fall within the microsystems. The ecological systems theory will be used to frame the study to determine how exosystem factors can influence student graduation rates and college eligibility rates.

Federal Educational Policy

Historically, education policy has been considered a right reserved for the states to oversee. Nowhere in the United States Constitution is public education addressed or analyzed, and, consequently, it was considered a right reserved for the states, as outlined in the Tenth Amendment of the Constitution (Cross & Education Commission of the States, 2015; Moran, 2015). In the 1950's, a series of events led to changing views of education policy and the role of the federal government in education. The launching of the Soviet satellite Sputnik kicked off national concerns about the level of student success in areas of math, science, and foreign language (Moran, 2015). Federal programs were developed to encourage students entering these areas of studies, and Congress began to enact legislation influencing the school system.

Further programs were implemented in the 1960's in response to President Johnson's "War on Poverty" initiative in order to provide support to low-income students. The primary and secondary education systems in the United States were struggling academically and socially, and, in 1979, the creation of the Department of Education was authorized by Congress. The responsibilities of the Department included implementing federal education policy and ensuring equal opportunity education to students (An Overview of the U.S. Department of Education, 2018). Further challenges to the state of the education system were outlined in *A Nation at Risk*, published in 1983 during the Reagan Administration; it outlined concerns for national security

due to the state of the public school system (Maranto, 2015; Moran, 2015). Education was now a national concern, with the executive and congressional branches actively developing policies.

No Child Left Behind (NCLB) was a federal education policy impacting teachers and students. NCLB was passed in 2001, and set new requirements for students and teachers in order to set guidelines for the education system (Jones, 2009; Moran, 2015). Previously, passage of the Elementary and Secondary Education Act (ESEA) by President Johnson changed the role of the federal government in education (Every Student Succeeds Act, 2017). With NCLB, states were tasked with identifying content standards to follow in the core curriculum, including English, math, science, and social studies. Students were to be tested in core academic areas throughout their educational careers, and schools were tasked with identifying growth. Schools who were not successful faced additional oversight and restrictions. Teacher preparation programs were also included in the legislation, ensuring that teachers completed fieldwork hours and passing content examinations in order to teach within a certain discipline (Maranto, 2015; Moran, 2015). The NCLB policy emphasized student achievement on standardized tests, which consequently led to a decrease in critical thinking for students (Jones, 2009; Moran, 2015). Some researchers argued the focus on identifying the correct answer from a set of multiple-choice options decreased students ability to achieve higher order thinking and problem-solving skills (Royster et al., 2015; Rubin, 2017). With a concern for the overuse of assessments for students graduating high school, modifications to the policy were enacted in 2015 (Lansing et al., 2017; Stotsky & Holzman, 2015).

Federal education guidelines under the Every Student Succeeds Act (ESSA) replaced policies under No Child Left Behind and outlined expectations for states and school districts in the United States to have all students prepared for postsecondary education (Palmadessa, 2017).

The shift in focus on student preparation for postsecondary opportunities led to changing state education policies. Some states were already implementing legislation requiring students to develop postsecondary plans or changing graduation requirements to ensure students completed a rigorous course of study (Blankenberger et al., 2017; Pierson, Hodara, & Luke, 2017).

Increasing Academic Expectations at the State Level

In recent years, individual State Departments of Education have begun increasing graduation requirements. Students entering high school in 2009 in New Mexico were required to complete a minimum of one advanced course to graduate high school (Booth et al., 2017; Walston et al., 2017). North Carolina implemented new graduation standards, identified as the Future Ready Core requirement, which required students to complete additional levels of college preparatory courses (Robertson, Smith, & Rinka, 2016; Unlu et al., 2015; Weikart, 2015). Michigan increased expectations for students, starting with the graduating class of 2011, by requiring students to complete Algebra II and two years of a foreign language to graduate (Jacob et al., 2017). California, however, has not updated graduation requirements since 2003, when it updated the math requirement to require students to pass Algebra I to graduate high school (Gao et al., 2017). In states that have increased graduation requirements, the policy change has been completed to prepare students for postsecondary education (Plunk et al., 2014).

For students to be prepared for postsecondary opportunities, states have also called for increased rigor and postsecondary planning (Muñoz et al., 2016; Walston et al., 2017). New Mexico implemented a graduation exam and advanced math and science requirements for the Class of 2013 (Booth et al., 2017). The increased rigor had adverse effects for some racial/ethnic subgroups, but had an overall upward trend in graduation rates and students graduating with higher proficiency scores (Booth et al., 2017; Walston et al., 2017). The gaps in achievement

after requiring an advanced course were mainly pronounced at schools identified with lower progress (Walston et al., 2017). This identification is needed to understand the impact changing graduation requirements can have on students and how the demographics and characteristics of a school district are an essential consideration when making changes to graduation requirements. Changing graduation requirements in New Mexico not only changed expectations but also generated a discussion of interventions and ways to support the needs of the students (Booth et al., 2017; Walston et al., 2017).

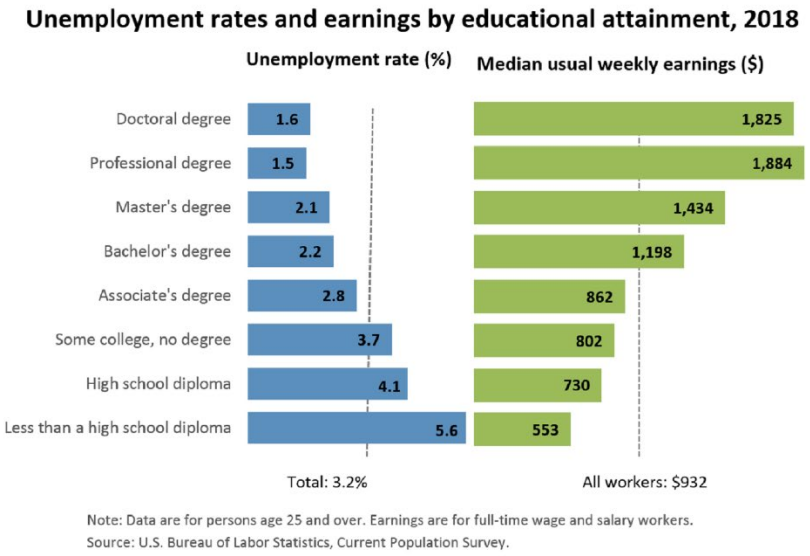
North Carolina increased rigor for students graduating high school by implementing the North Carolina Future Ready Core graduation requirements, which require students to complete four years of English, four years of math, and three years of science. Implementing these requirements ultimately resulted in students completing more college preparatory courses than before the requirements changed in 2013 (Weikart, 2015). The state's implementation of increased academic requirements found that students were meeting the higher expectations while also gaining important critical thinking and higher order comprehension skills (Phillips et al., 2015; Unlu et al., 2015; Walston et al., 2017; Weikart, 2015).

In the 21st century, a skilled workforce is key to national competitiveness as well as individual wages and opportunities (Görlitz & Gravert, 2018; Shivakumar, 2018). Individuals who have education and training beyond high school see an increase in earnings across their lifetime (Christian et al., 2017; Gitterman et al., 2015; Wang et al., 2018). Figure 2 identifies the earnings and unemployment rate for individuals in 2018, based on educational level. The value of increasing technical skills and higher order comprehension skills has influenced the demand for states and school districts to implement additional rigorous standards for students to lead to greater postsecondary opportunities and achievement (Görlitz & Gravert, 2018; Walston et al.,

2017; Weikart, 2015). The increase in graduation requirements implemented as a policy decision, rather than reliance on student choice, led to an increase in enrollment in college preparatory high school courses, with postsecondary enrollment following (Görlitz & Gravert, 2018; Walston et al., 2017; Weikart, 2015).

Figure 2

Unemployment Rates and Earnings by Educational Attainment, 2018



Note. From "Unemployment rates and earnings by educational attainment," by U.S. Bureau of Labor Statistics, (n.d) https://www.bls.gov/emp/chart-unemployment-earnings-education.htm. In the public domain.

Alignment of State Graduation Requirements and College Entrance Requirements

Academic rigor in high school is considered an important indicator for the success of students in postsecondary education (Görlitz & Gravert, 2018; Murray, 2012; Phillips et al., 2015; Walston et al., 2017). State Departments of Education determine academic requirements for high schools, but school districts can elect to add additional requirements for students to

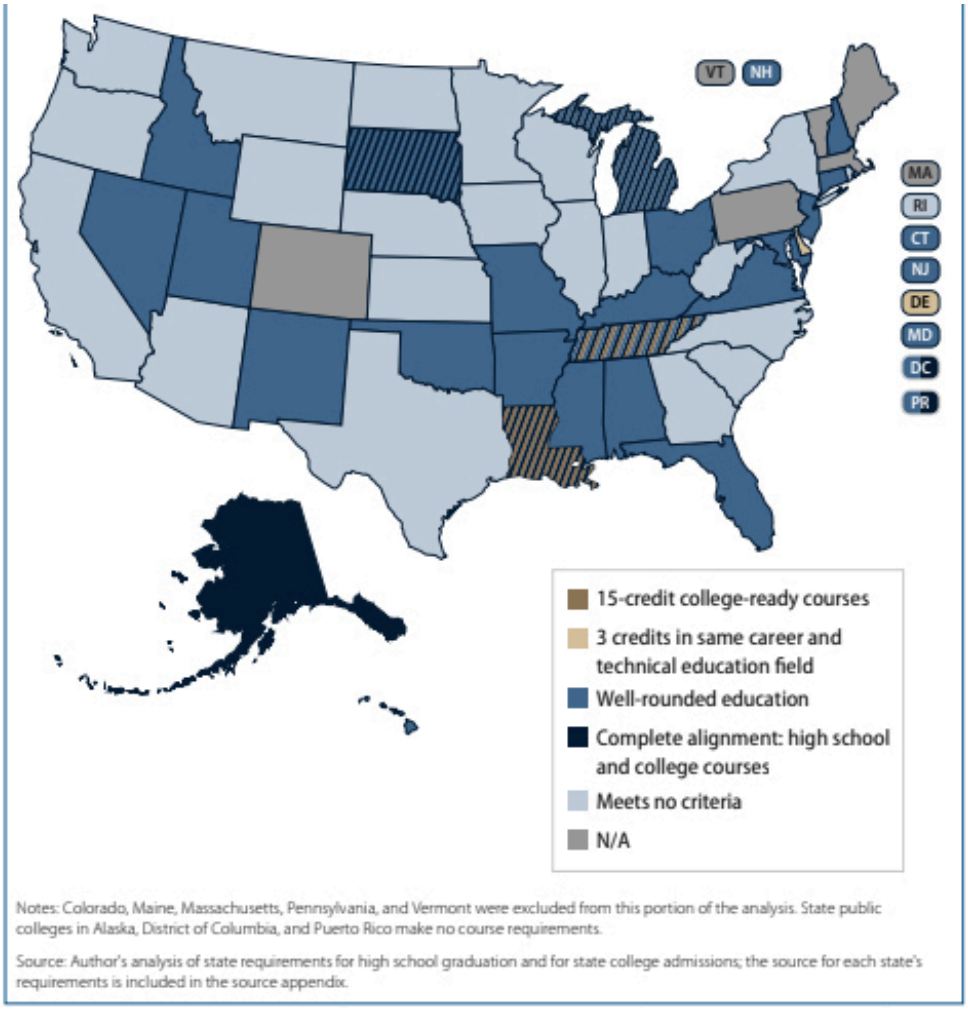
receive a diploma (Gao et al., 2017; Jacob et al., 2017). The increase in requirements is a response to concerns about student's preparation for postsecondary education, as well as their ability to enroll in four-year colleges (Murray, 2012; Walston et al., 2017). Students not considered college-bound typically take fewer math and science courses, starting at an earlier point in high school (Gao, 2016; Murray, 2012). The impact of the lack of academic rigor for students is then amplified throughout high school, especially for low socioeconomic students (Curry, 2017; Jacob et al., 2017; Phillips et al., 2015). When students who have not taken rigorous academic courses graduate high school, their chance of postsecondary persistence decreases along with potential earnings in the future (Hochanadel & Finamore, 2015; Knaggs et al., 2015). The connection between education and earnings has seen a marked increase in twenty-first century opportunities, with increasing demand for technical employment and limited opportunities offered to students immediately out of high school (Gitterman et al., 2015; McDermott, Donlon, & Zaff, 2019).

The alignment of high school graduation requirements and college entrance requirements can impact a student's ability to continue in postsecondary education (Jacob et al., 2017; Mahnken, 2018; Rodriguez, 2018). In states such as South Dakota, Tennessee, Louisiana, and Michigan, students graduating from high school already meet entrance requirements for a state four-year college (Mahnken, 2018). Other states give students the opportunity to choose either a college track or a track with minimal requirements that do not align with university acceptance (Görlitz & Gravert, 2018; O'Rourke et al., 2016). Developing a two-tiered system can disproportionately impact socioeconomically disadvantaged students, as their knowledge and supports are not available throughout their educational career (Atkinson, 2017; Mahnken, 2018; Weikart, 2015). Figure 3 identifies the alignment of high school graduation requirements and

college entrance requirements by state. Colleges often outline a set of recommended coursework to prepare a student for college and career opportunities; however, the complete list of recommendations by colleges are not required by any state for a student to earn a high school diploma (Görlitz & Gravert, 2018; Lansing et al., 2017). College preparation is typically identified as a 15-course sequence of academic classes, and in California these are closely compared to A-G requirements, which students are expected to complete to be eligible to apply to a four-year college (Mahnken, 2018; Walston et al., 2017). No states require this 15-course sequence to complete high school. Four states, Louisiana, Michigan, South Dakota, and Tennessee have high school requirements that qualify students for public universities in their own state. However, these requirements are often viewed as not rigorous enough and fall short of the recommended 15 courses that many schools in the United States require for college eligibility (Freedberg, 2017; Mahnken, 2018). Due to the nature of state oversight within education, states can set graduation criteria at the level they feel is appropriate. This often means students graduating high school in states across the country complete coursework with no consistent academic alignment, and students are frequently graduating without the coursework needed to apply to a four-year university (Plunk et al., 2014; Walston et al., 2017).

Figure 3

States Meeting High School Graduation Requirements Quality Criteria



Note: From "*In 46 states, high school graduation requirements aren't enough to qualify for nearby public universities*" by K. Mahnken, 2018 (https://www.the74million.org/new-report-in-46-states-high-school-graduation-requirements-arent-enough-to-qualify-for-nearby-public-universities/). Reprinted with permission.

Requiring additional academic classes to graduate high school can be a struggle for students, especially in mathematics (Gaertner et al., 2014). However, implementing additional

requirements is found to particularly impact minority students and socioeconomically disadvantaged students who otherwise would not take the additional academically rigorous courses (Buddin & Croft, 2014). Algebra II is considered a barrier for students, specifically students of color or socioeconomically disadvantaged students, who face math remediation and are often pushed to lower math classes to meet credit requirements for high school graduation (Gaertner et al., 2014; Murray, 2012). The implementation of additional math requirements should not reflect a need for lower math courses, but rather a path forward for targeted student intervention to support students (Ellison & Swanson, 2016; Murray, 2012). A concern of requiring additional academic courses is that it has a greater impact on a low-skilled student or can impede high school graduation (Green, 2018; Kotok, 2017). However, setting higher expectations can also empower students who may have stopped the academic courses if they had been given the opportunity (Buddin & Croft, 2014; Jacob et al., 2017).

Analysis of student achievement in high school has found that multiple factors can impact students (Berger & Archer, 2018; Wang et al., 2018). One of the factors that can influence potential success in education is student motivation. Student motivation in high school can vary greatly depending on a student and their background (Heining, Hughes, West, & Myung Hee Im, 2014). Family life, peer influence, extracurricular activities, and personal grit can all influence whether a student is motivated to pursue success in high school and postsecondary education (Heining et al., 2014; Paixão & Gamboa, 2017). College preparatory programs at school can support student motivation by developing a curriculum that participating students are required to participate in during high school (Bowman et al., 2018; Wooldridge, 2018). However, for students who are not a part of definitive programs, when graduation requirements and college eligibility requirements do not align, students who may not have the

additional motivation can easily fall behind in courses that can impact future educational opportunities (Gao et al., 2017; Mahnken, 2018). Students who attend schools that require a minimum of two years of math, as identified by one state requirement, might not continue in the courses needed to apply to most four-year colleges (Gaertner et al., 2014; Green, 2018). Without motivation by the student or an outside influence pushing the student forward, a student may find themselves no longer eligible for postsecondary opportunities (Freedberg, 2017; Heining et al., 2014).

Education policy is the purview of an individual state's Department of Education. For sweeping changes to occur across a state, the leadership within the education department has to have the time, resources, and willingness to be an advocate for change (Blankenberger et al., 2017; Pierson et al., 2017). North Carolina, for example, has recently implemented a change to high school graduation requirements for students, resulting in an increase in college preparatory courses during high school (Unlu et al., 2015; Weikart, 2015). Additional states have also implemented changes to requirements, clearly developing a timeline for the new expectations (Pierson et al., 2017; Walston et al., 2017). For a state's education policy and graduation requirements to be updated, multiple stakeholders must be involved. This process would include multiple phases, such as data collection, feedback from stakeholders, analysis of educational research, and a tiered implementation (Plunk et al., 2014; Weikart, 2015; Zinth, 2016). Consequently, as the students enter high school, they would have a clear understanding of requirements (O'Rourke et al., 2016; Robertson et al., 2016)

Changes to high school graduation requirements can also be influenced by course offerings within a school (Booth et al., 2017; Garland & Rapaport, 2017). Requiring additional advanced courses in schools is a challenge in smaller school districts where the student

population does not support the availability of multiple levels of courses (Booth et al., 2017; Garland & Rapaport, 2017). Smaller schools must also consider staffing abilities when determining the courses that are offered (Garland & Rapaport, 2017). The availability of advanced courses that align with the challenging curriculum is necessary for students to take the information from the course and be able to apply it to postsecondary education (Garland & Rapaport, 2017; Plunk et al., 2014; Walston et al., 2017). However, enrollment in advanced coursework is not enough to have a drastic change in college enrollment (Plunk et al., 2014). Identifying the multitude of additional factors that are a part of a student's postsecondary decisions is also important when analyzing ways to improve college enrollment (Buddin & Croft, 2014; Castleman & Page, 2014).

California graduation requirements. In 2018, 83% of California students completed high school within four-years (California Department of Education, n.d.-c). Of the students who graduated high school in California in 2018, 49.9% met A-G requirements to be eligible to attend a four-year college (California Department of Education, n.d.-c). California has set the following graduation requirements: three years of English, two years of math, two years of science, three years of social science, two years of physical education, and one year of a foreign language or fine art. These are the minimum number of courses that students must complete in order for the state of California to consider the student to have met graduation requirements; however, a district can choose to add additional requirements that students must complete in order to receive a diploma from their qualifying district (California Department of Education, n.d.-d).

California is one of only three states that only require two years of math to graduate, one of two states that require three years of English coursework, and one of eight states that require two years of science courses (Alexander, 2020; Gao, 2016). There is limited research into the

impact of increased graduation requirements (Gao et al., 2017), which leads to the question of why districts do not increase expectations. Concerns regarding staffing, graduation rates, finances, and school board policies, can influence the decision to change expectations (Robertson et al., 2016; Walston et al., 2017). In California, approximately 51% of school districts do require additional requirements beyond the state minimums, which emphasizes the value districts place on academic rigor and that the barriers to additional requirements, such as the cost of hiring teachers, is not a concern for many districts across the state (Gao, 2016; Phillips et al., 2015). However, the California Department of Education does not track graduation rates for school districts based on the requirements that are implemented within that district. Data for the Department of Education is reported on whether a student satisfies graduation requirements, but not the requirements that are identified for that district (California Department of Education, n.d.-d).

Within the State of California, the requirements to receive a high school diploma vary greatly depending in which district the student is enrolled. This can lead to an unequal comparison of data for school districts when they are measured purely by graduation rates (California Department of Education, n.d.-d). Districts with additional academic requirements must weigh the need for increasing academic expectations and rigor against possible decreases in graduation rates (Phillips et al., 2015). Graduation rates are used for school district accountability, and this measurement does not consider differences in requirements or how those differences impact various populations of students (Gao et al., 2017).

The implementation of a new measurement for districts in California, the California Dashboard, uses graduation rates as a major factor in assessing California high schools. (California Department of Education, n.d.-c). In the Dashboard, high schools are reviewed based

on graduation rates as well as whether a graduating student can show they are prepared for postsecondary success, as determined by the state of California (California's New School Dashboard, 2017). Students can show they are prepared for postsecondary education by meeting common college entrance requirements, referred to as A-G requirements, scoring minimum scores on state assessments or AP exams, participating in dual enrollment, Career Pathways, or receiving a Biliteracy Seal (Fensterwald, 2018; O'Rourke et al., 2016). Each of these various areas is only considered if a student has achieved a high school diploma. Districts are then tasked with finding the balance between meeting state expectations, student completion of four-year college entrance requirements, and student graduation rates (California's New School Dashboard, 2017).

In 2005, the Los Angeles Unified School District began to phase in additional high school graduation requirements for its students (Phillips et al., 2015). Rather than students being required to complete two years of math, they were required to complete three, as well as additional foreign language requirements. The increase in requirements aligned with student completion of college A-G requirement courses (Phillips et al., 2015). Los Angeles Unified reported that students identified as high risk did not have a statistical change in graduation rates or college requirement completion (Phillips et al., 2015; Weikart, 2015). Changing course requirements alone was not considered enough of a bridge to support students at risk for completing college entrance requirements (Buddin & Croft, 2014). Support is needed to go beyond requirements, to academic, social, and informational awareness (Buddin & Croft, 2014; Phillips et al., 2015). Implementing changes to requirements is considered one step, of multiple necessary, to challenge students to develop skills for educational opportunities in the future (Buddin & Croft, 2014). Since the adoption of tougher high school graduation requirements, the

Los Angeles Unified School District has observed steadily improving graduation rates (Phillips et al., 2015) as well as increases in students meeting A-G requirements (California Department of Education, n.d.-b). However, the district also implemented a waiver program for students that met specific criteria, such as a student with an Individualized Education Plan, where they are not held to the same requirements as other students (Phillips et al., 2015). With waivers in place, the long term potential for an even greater achievement gap can increase, as additional circumstances can lead to students following a different set of requirements and a de facto multi track graduation system can be created (Booth et al., 2017; Walston et al., 2017)

Barriers to Meeting College Entrance Requirements

Requirements within a state can vary greatly due to the ability of districts to self-select requirements beyond the state minimum. For example, in the state of California, about 51% of districts align their graduation requirements with the requirements that are needed to enter a four-year college (Gao, 2016). Consequently, students that face academic struggles have the option to take a non-rigorous course load or to take vocational education classes instead of additional math and science (Cha, 2015; Murray, 2012). Increasing academic requirements to graduate high school decreases the number of students not taking the necessary coursework required for postsecondary opportunities (Booth et al., 2017; Green, 2018). The number of years required of a particular subject does not in and of itself lead to increase in academic achievement down the road, however. While students from low-income families have an increased likelihood of taking additional math courses than students who are not identified as socioeconomically disadvantaged, the additional courses are often remedial and do not lead to advanced coursework in mathematics (Cha, 2015; Rodriguez, 2018). States that are requiring students to achieve a certain level in an academic area, such as completing Algebra II in the math curriculum, rather

than a year requirement, are finding that socioeconomically disadvantaged students are struggling at a disproportionally higher rate than students from other categories (Stoker, Mellor, & Sullivan, 2018).

The transition to high school requires students to reconsider their view of coursework, grades, and credits earned (McMahon, 2018). Math, like other subjects in high school, requires successful completion before a student can move forward (Ellison & Swanson, 2016; Green, 2018). A student failing a high school course will repeat the course to complete the necessary requirements to graduate high school. This can be accomplished through summer school, after-school programs, or retaking the course in the school day (Kotok, 2017; McMahon, 2018). Remediation for a student can have a long-lasting effect, as the ability to meet college entrance requirements and still stay on track for a four-year college can be difficult (Stoker et al., 2018). To make up courses or allow for additional support to understand coursework, targeted interventions of support are necessary to support students early on in high school (Green, 2018; Saw, 2016).

Additional Impacts on Student Achievement

High school is an integral component for a student planning postsecondary achievement (Kotok, 2017; Robertson et al., 2016). A student's course placement and achievement in high school determines their opportunities after high school and potential earnings for their future (Görlitz & Gravert, 2018; Hochanadel & Finamore, 2015; Kotok, 2017). It has been identified that socioeconomically disadvantaged students face increased barriers to academic success (Bardhoshi, Duncan, & Schweinle, 2016; Robertson et al., 2016; Ross, 2016). Parent involvement in a student's education, child engagement at a school site, intervention accessibility, counseling programs, college preparation programs, and dual enrollment can all

impact a students' successful completion of coursework required for college admittance (Abid & Akhtar, 2020; Bardhoshi et al., 2016; Kolbe et al., 2019; Lile et al., 2018; Ross, 2016). Each of these factors can lead to the widening of the achievement gap, as without the targeted interventions of support, socioeconomically disadvantaged students are not enrolling in advanced courses necessary for college admission (Drotos & Cilesiz, 2016; Knaggs et al., 2015; Kotok, 2017). The consequence of low enrollment for socioeconomically disadvantaged students leads to students not meeting college entrance requirements or potential undermatching in the college selection process (Rodriguez, 2014; Tiboris, 2014).

Parental influences. Parents have a strong impact on high school completion and postsecondary enrollment, including a connection between parent educational experiences and expectations (Bahar, 2016; Ross, 2016). An increase in parent participation at high school functions has been identified with decreases in dropout rates and increasing student success (Calvin, 2017; Heining et al., 2014; Ross, 2016). The literature identifies the influence a family places on education as a major indicator of a student's success throughout their educational career (Cavendish, 2013; Ross, 2016). In homes where more value is placed on education, parents tend to have a higher involvement in school activities and academic planning (Cavendish, 2013; Gottfried, Owens, Williams, Kim, & Musto, 2017). Parental involvement through academic support and postsecondary planning are essential on the path to high school graduation and postsecondary entrance, and this involvement is disproportionally lacking for students from a disadvantaged background (Cavendish, 2013; Page & Scott-Clayton, 2016; Ross, 2016).

Parent involvement for students from a socioeconomically disadvantaged background has been found to have a 36% effect on enrollment in advanced math courses (Gottfried et al., 2017).

Parent involvement in choosing advanced courses is also tied to parent and student awareness, including the value additional years of academic rigor can have on postsecondary educational achievement (Bardhoshi et al., 2016; Gottfried et al., 2017). Parent awareness for additional academic courses, specifically in STEM coursework, through information mailings and workshops is one area where parents influence academic opportunities (Gottfried et al., 2017; Sengul et al., 2019). One study found that, with increased awareness, parents placed a higher emphasis on academic courses, leading students to place an increased value on the challenging courses, all of which are important for future success (Gottfried et al., 2017; Li et al., 2018; Ross, 2016).

Student involvement. Student involvement on campus is another positive indicator of a student's "on track" status to graduation, as well as completing courses beyond the academic minimum (Cavendish, 2013; Niehaus, Irvin, & Rogelberg, 2016). Involvement for students can include extracurricular activities as well as showing a greater interest in general school experiences. Students identified with an increased investment in the school community though involvement in campus programs, athletics, or various other activities are shown to have a higher academic achievement (Abid & Akhtar, 2020; Heppen et al., 2018). Athletics in high school typically requires minimum academic requirements. These minimum standards set a level of achievement for students who may not otherwise be successful in school. Sports teams develop study sessions, tutoring, and a sense of camaraderie that can impact a high school student's academic achievement (Abid & Akhtar, 2020; Pratt, 2017). In addition to academic support, extracurricular involvement can lead to a strong peer group that also offers emotional support that follows a student throughout high school (Heppen et al., 2018; Li et al., 2018). Peers can increase the expectations of a student at school through encouraging enrollment in advanced

academic courses as well as extracurricular activities (Heining et al., 2014; Taggart, 2018). Peer influence impacts student engagement on campus as well as the activities they are participating in after school. An increase in academic achievement, postsecondary enrollment, and long-term earnings, can be tied to students that are involved as high school students (Heining et al., 2014; Niehaus et al., 2016). Additional analysis identified that students who have positive peer interactions have a lower chance of dropping out or having disciplinary concerns at school (Shaunessy-Dedrick, Suldo, Roth, & Fefer, 2015; Wang et al., 2018). The impact of peers on a high school student can be long reaching, beyond the four years spent on a high school campus.

Interventions. With increased requirements comes a need for increased interventions to support student success (Page & Scott-Clayton, 2016; Stoker et al., 2018). School-level, targeted interventions can promote gains for students in struggling academic areas (Heppen et al., 2018). Socioeconomically disadvantaged students who do not have access to additional support are found to need interventions in the school setting to stay on track for additional academic rigor (Drotos & Cilesiz, 2016; Faria et al., 2017; Green, 2018). One option to overcome a barrier in the area of mathematics is implementing a double block period for math courses (Martinez et al., 2016). Underperforming students placed in a double period of math, along with additional interventions, saw a significant increase in math scores, allowing the students to successfully complete academically rigorous coursework as they progressed in their education (Bingham, 2017; Martinez et al., 2016).

Interventions can occur through increased course availability (Finning et al., 2018; Green, 2018) as well as tutoring opportunities (Green, 2018; Ulichnie, 2015). Limited course opportunities in an academic area such as math leads to varying degrees of success (Green, 2018). The natural sequencing of mathematics courses often requires successful completion of

one course before another may be completed (Cha, 2015; Martinez et al., 2016). If the pacing of a course or content within a course leads to potential barriers, additional classes to support a student's transition from one class to the next, in order to slow the pacing of the curriculum, can support student achievement (Garland & Rapaport, 2017; Green, 2018).

Interventions are also identified through the access and availability to peer and adult tutoring (Gottfried et al., 2017). Tutoring can occur through a student's peer group as well as in structured environments during or after school. The accessibility to tutoring can impact academic achievement, as potential costs outside of school act as a barrier to success (Kotok, 2017; Martinez et al., 2016). Programs that embed tutoring during the school day, through homeroom courses where a teacher is the point of contact or through academic programs such as AVID, can lead to interventions for students that may not have access otherwise (Bowman et al., 2018; Paugh, 2018). Socioeconomically disadvantaged students benefit from built-in interventions that are not as impacted by family obligations and other environmental factors (Kolbe et al., 2019; Wooldridge, 2018).

Counseling departments. The impact of a counseling department on student success can also be an important factor in long-term educational achievement (Çapulcuoğlu & Gündüz, 2017; Deslonde & Becerra, 2018; Mulhern, 2020). Academic counselors make recommendations on student coursework, which can influence students from socioeconomically disadvantaged backgrounds in enrolling and completing rigorous high school coursework and postsecondary planning (Deslonde & Becerra, 2018; Paolini, 2015; Rojas, 2020). Student academic planning in high school is ideally determined by the counselor, parent, and student, working as a team. However, the type of counseling program implemented at a school site can have a bearing on the access to information available to students. Counseling programs are often responsible for

student awareness of graduation requirements, college entrance requirements, college application requirements, financial aid processes, and course of study recommendations (Christian et al., 2017; Deslonde & Becerra, 2018). The value of a counseling program to socioeconomically disadvantaged students is rising, as these students may not have access to postsecondary planning or educational awareness at home (Aguilar, Nayfack, & Bush-Mecenas, 2017; Mulhern, 2020; Paolini, 2015). Weekend or night workshops regarding four-year plans for high school, navigating the college process, understanding the need to complete additional rigorous courses beyond minimum requirements, and identifying possible college and career paths are all responsibilities of a counseling department (Deslonde & Becerra, 2018; Rojas, 2020; Shamsuddin, 2016).

The American School Counselor Association (ASCA) identified recommended student counselor ratios, to assist students in the school setting. The recommended ASCA ratios in a high school setting are 250 students to 1 counselor (Hawkins, 2018). In California, the average counselor ratios are closer to 945 to 1, some of the worst ratios of any state (Research on School Counseling Effectiveness, n.d.). This increase in caseload can lead to decreasing support for students in educational and postsecondary planning. Students that need support in identifying course placement to maximize opportunities for long term success frequently do not have access to their school counselor (Deslonde & Becerra, 2018; Fitzpatrick & Schneider, 2016). When the counseling department has limited resources, students from a disadvantaged background can be affected at a significant rate in relation to other students (Fye et al., 2017; Paolini, 2015; Rojas, 2020). The impression that a counseling office can have on socioeconomically disadvantaged students can bring about large changes in a student's postsecondary goals (Deslonde & Becerra, 2018; Mulhern, 2020; Paolini, 2015).

College preparation programs. In 2011, 11% of high school students stated that they developed a graduation and career plan, submitted their plan, and then reviewed the plan with a counselor (Hudson, 2017). Academic guidance and planning are needed for students to succeed in high school and beyond, and this is increasingly imperative for students with socioeconomically disadvantaged backgrounds (Deslonde & Becerra, 2018; Knight & Duncheon, 2020). To support students on an academic and postsecondary path, schools have implemented additional support programs. College preparatory programs that students can participate in bring together parents, students, teachers, and counselors, to implement change within the many areas that act as a barrier to postsecondary enrollment (Bowman et al., 2018; Knight & Duncheon, 2020; Wooldridge, 2018). Integrated programs during the school day, such as Advancement via Individual Determination (AVID) and Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP), immerse students in a culture of academic preparation throughout a student's entire high school career (Knaggs et al., 2015). GEAR UP has found to increase college enrollment rates by 3-4% (Bowman et al., 2018; Knaggs et al., 2015). Studies on GEAR UP differ on the implications for college persistence, but student responses support the value the program offered to students from a disadvantaged background (Bowman et al., 2018; Wooldridge, 2018).

An essential component of programs that have been successful in supporting underrepresented student achievement is that the programs are multifaceted and include the student as well as parent involvement (Bowman et al., 2018; Knaggs et al., 2015). Information about four-year plans, parent workshops on college planning, financial aid information, volunteering requirements, college visits, and comprehensive academic services are all important to the students and the parents (Bowman et al., 2018). Implementing a program for

socioeconomically disadvantaged students can provide daily feedback for students on their academic progress and plans that is not always possible with an academic counselor with large caseloads (Deslonde & Becerra, 2018).

College preparatory programs cultivate a culture of academic expectations and college awareness. Students that participate in the GEAR UP and AVID programs are expected to challenge themselves academically. Additional years of math and science courses, as well as honors or Advanced Placement classes, are part of a student's four-year plan (Knaggs et al., 2015; Kolbe et al., 2019). When a state or school district does not require a rigorous course schedule for students, programs such as AVID and GEAR UP challenge students to take the courses and to not "lighten" up their schedule their senior year. The rigor expected in high school continues with a foundation for college enrollment and persistence (Knaggs et al., 2015; Kolbe et al., 2019). College preparatory programs support student achievement by setting high expectations that students strive to meet (Buddin & Croft, 2014; Wooldridge, 2018). In states or school districts that do not require a rigorous course of study, a program such as GEAR UP or AVID is one way to hold students accountable who may not be aware of the benefits of rigor in high school (Knaggs et al., 2015; Kolbe et al., 2019; Wooldridge, 2018).

GEAR UP programs met with challenges when the cost of the program was weighed against the identified increase in college enrollment for students that participated in the program (Bowman et al., 2018; Deslonde & Becerra, 2018). For schools identified as having a large population of socioeconomically disadvantaged students, programs such as GEAR UP found significant gains in student achievement and college enrollment (Deslonde & Becerra, 2018; Wooldridge, 2018). The overall benefits of GEAR UP include not only the academic support but that a "student is gaining not only intrinsic motivational force but also trust in others, academic

self-confidence, and the ability to overcome challenges or obstacles in life" (Knaggs et al., 2015, p. 20). Consequently, beyond the measurable academic outcomes, the programs provide benefits that are not always measurable in graduation rates, postsecondary enrollment, or persistence data (Kolbe et al., 2019; Wooldridge, 2018).

Dual enrollment. School district implementation of rigor can also be encouraged in ways beyond additional requirements of core academic subjects, such as dual enrollment (Duncheon, 2020; Fink, Jenkins, & Yanagiura, 2017; Lile et al., 2018; Walston et al., 2017). Dual enrollment is when high school students are completing college courses while still in high school, typically through a community college. Students that heavily participate in dual enrollment programs in high school may complete multiple college courses while in high school, and may even complete an associate's and high school degree simultaneously (Fink et al., 2017; Shivji & Wilson, 2019). Courses offered through dual enrollment programs may be offered during the traditional high school day, after school hours, in summer sessions, or online (Harrington & Rogalski, 2020; Lile et al., 2018; Shivji & Wilson, 2019). Courses during the school day give students an opportunity to take courses with fellow high school students while being stretched with college curriculum.

One challenge for students who have access to a dual enrollment program is the ability or opportunity to participate in it. Dual enrollment programs, along with other programs that support student achievement, are sometimes only be offered after the traditional school day has ended (Drotos & Cilesiz, 2016; Duncheon, 2020). Socioeconomically disadvantaged students do not always have transportation available to them or the time to be able to give to various programs. Students who have responsibilities outside of the school day, such as working or caring for family members, cannot take part in after-school programs that could boost their

academic and postsecondary success (Burns, Ellegood, Bernard Bracy, Duncan, & Sweeney, 2019; Drotos & Cilesiz, 2016). Developing nontraditional support during the school day, such as a seven-period day or changing requirements to a senior schedule to require academic rigor, are ways to challenge students to fulfill their potential (Li et al., 2018; Murray, 2012; Wilkins & Bost, 2016).

Dual enrollment programs are considered a positive way for high school students to experience the expectations of a college student while still having the support of the high school embedded in their day (Harrington & Rogalski, 2020; Lile et al., 2018). Students who participate in dual enrollment are found to have lower suspension rates and remain academically on track for college entrance requirements (Lile et al., 2018; Page & Scott-Clayton, 2016). The long-term benefits of dual enrollment programs, such as college credit, college expectations, and long term college persistence, are especially helpful to a student that faces adversity in postsecondary education (Fink et al., 2017). When a student has success in an environment they are comfortable with, they can take that success into a postsecondary environment (Li et al., 2018). As the number of dual enrollment programs is increasing, students who may not have had opportunities in the past are now gaining access (Shivji & Wilson, 2019). Socioeconomically disadvantaged students can complete entry-level courses while in high school, which contributes to overcoming barriers students face in the early months of postsecondary enrollment. Students who complete the first year of postsecondary education increase the odds of continuing with their education, and dual enrollment is a program that can influence a student's chances in the future (Fink et al., 2017; Lile et al., 2018).

Conclusion

High school graduation requirements are set by each individual state's Department of

Education, and, within a state, additional requirements can be identified by school districts (McFarland et al., 2018). To increase rigor, some states have implemented additional requirements for students to graduate high school, setting high expectations for students so they will be prepared for postsecondary education and work (Jacob et al., 2017; Walston et al., 2017). The challenge with the increase in academic requirements is that students from a socioeconomically disadvantaged background do not have access to support that other students may have, including tutoring, counseling offices, informational awareness, and family support (Bardhoshi et al., 2016; Drotos & Cilesiz, 2016; Ross, 2016). Increasing requirements for high school graduation can then lead to a lower graduation rate, especially for students from various populations that face disadvantages in education (Gao et al., 2017; Rodriguez, 2018).

Some schools have implemented college preparatory programs embedded in the school day, such as GEAR UP, which offer support to socioeconomically disadvantaged students and families (Bowman et al., 2018; Wooldridge, 2018). However, districts have to analyze the benefits of the college preparatory programs against the district cost of providing the program (Bowman et al., 2018). Data from multiple areas conflict on the cost-benefit analysis of postsecondary preparation programs (Kolbe et al., 2019). The United States Department of Education has outlined the need for rigor and postsecondary options for students; however, how states will encourage students to strive for increased rigor may come at the expense of high school graduation rates (McFarland et al., 2018; Robertson et al., 2016). This leads to additional challenges from districts, as graduation rates are a tool used to “grade” schools (Bush et al., 2017).

As states such as North Carolina, New Mexico, and Illinois update graduation requirements to closely align with college eligibility, the question of why states such as

California are not considering similar changes should be considered. Academic literature on the California education system focuses on programs to support post-secondary achievement and barriers to success without considering how changes to California state graduation requirements could impact certain subsets of students. The literature identifies directed programs and policies that can influence a student's course success in high school and college but does not focus on whether the requirements set by a school district or the state could also impact a student's chances for post-secondary achievement.

California educates a large plurality of students enrolled in the education system, but graduation requirements have not been updated since 2003, when a specification of the math requirement was identified, and prior updates occurred in 1987. Given the importance of students being prepared for postsecondary opportunities and that many school districts across California set increased requirements beyond the state requirements, how increased academic requirements for graduation impact graduation rates and college eligibility is an area of needed analysis. Insight by high school counselors who interact with students during course planning and completion can lead to possible connections between academic requirements and post-secondary planning. How differing graduation requirements by district impact graduation rates, and possible correlations with college eligibility A-G rates, can provide insight into a possible course of action for the state to update requirements to align with 21st century educational needs.

Chapter III

Design and Methodology

Introduction

Requirements to receive a high school diploma in the United States can be as diverse as the states themselves (Gewertz, 2016; Zinth, 2018). Each state department of education can set their own requirements and expectations for students within the state (Gao et al., 2017; Mahnken, 2018). Consequently, high school graduation requirements can vary greatly. Federal policies have guided education policies and programs, such as the development of a multi-layered assessment of the school districts. However, there have been no federal mandates on the expectations for courses students must complete to graduate high school (Palmadessa, 2017). In California, the most populous state in the United States, graduation requirements have remained the same since 2003 (Gao et al., 2017). When the graduation requirements were updated in 2003, no additional coursework was required; rather, clarification was included in the terminology to outline the level of math completion required to receive a diploma recognized by the state (California Department of Education, n.d.-d; Gao et al., 2017).

The requirements to graduate high school in California and the minimum coursework necessary for eligibility to a public four-year university are outlined in Table 1. The high school requirements are the minimum courses a student must meet to fulfill state coursework. This coursework does not specify career technical training or college readiness; instead, it is a set of courses in primary content areas. In comparison, minimum requirements for entrance into a four-year university in the California public university system are identified as A-G requirements. These requirements include additional years of core academic subjects. Given that school districts only have to require the state minimum for a student to receive a diploma, students do

not always complete courses that could lead to long term educational or professional achievement (Hollister, 2015; Mahnken, 2018).

Table 2

California Minimal High School Graduation Requirements and A-G College Eligibility

Subject	CA High School Minimum Requirements	CA Public University Minimum A-G Requirements
English	3 years	4 years
Mathematics	2 years (including Algebra I)	3 years
Social Studies	3 years	2 years
Science	2 years (biological and physical)	2 years (biological with lab and physical with lab)
Arts/CTE	1 year of visual/performing art, foreign language OR career technical education	1 year visual/ performing arts
Foreign Language	N/A	2 years – same language
Physical Education	2 years	N/A
Electives	N/A	1 year

(California Department of Education, n.d.-d)

School districts also consider funding sources when developing graduation requirements (California Department of Education, 2018). In California, for schools to collect state funding for a student, a student must be enrolled in a minimum of five courses during a high school day. The exceptions to this policy include if a student participates in a special program, such as taking college courses or participating in a work-study program (Pupil Attendance Accounting for Business Office Personnel, 2019). Due to the nature of school funding, academic preparation, the structure of comprehensive high schools, and stakeholder input, school districts often increase graduation requirements beyond the state minimum to reflect the need for courses that are the equivalent of five periods across all four years of high school (Carrison, 2019; Zinth, 2018). The

increase in coursework is developed at the local, district level. Districts develop their criteria for graduation, which then is approved by the school board or local educational agency (Alexander, 2020; Gao et al., 2017). Some of the largest school districts in California increase the requirements beyond the minimum in multiple subject areas. How many additional courses are required, and what subject areas the courses are in, depends on the school district. Districts often increase English requirements to four years, but the math requirements can vary from two years to four, depending on the district.

Bronfenbrenner's ecological systems theory provided a structure for the researcher to connect policy and curricular changes with students (Bronfenbrenner, 1976). Ecological systems theory recognizes the multiple ecosystems that impact student development and contribute to overall growth, including policies such as graduation requirements set at the state or local education agency (Bronfenbrenner, 1976; Bronfenbrenner & Ceci, 1994). Since the study focused on laws and policies that influence educational achievement and eligibility, the ecological systems theory provided a framework to help the researcher understand how policies can affect child development and future opportunities in the secondary and post-secondary setting.

The researcher collected data from the 76 largest school districts in California. Information collected included population size, graduation rate, A-G rate, and demographics, including socioeconomic school district rates, and ethnicity. Data was collected from the CA School Dashboard, accessed on April 26, 2019 (California School Dashboard, n.d.). Additional information identified the varying requirements at the district level for each of the 76 school districts in the sample. Graduation requirements include the number of years a student is required to complete within a content area, including English, math, science, social studies, visual and

performing arts, foreign language, and physical education. Graduation requirement information for each school district was collected through district websites.

The lack of changes to graduation requirements in California is surprising, given the population of students the state serves. Other states across the country, such as Michigan, Illinois, New Mexico, and North Carolina, are actively reviewing high school graduation requirements and making updates based on stakeholder feedback, 21st-century educational goals, and the state department of education priorities (Jacob et al., 2017; Walston et al., 2017; Weikart, 2015). Given the changes that are taking place with regard to student course expectations across the country (Blankenberger et al., 2017; Booth et al., 2017; Unlu et al., 2015), the question of how school districts in California are impacted by varying requirements is an area in need of analysis. School districts are individually increasing requirements for students, but no change has occurred at the state level. Consequently, students who receive a high school diploma in school districts with increased requirements may have a more significant opportunity in meeting college entrance A-G requirements than a student from another district (Mahnken, 2018; Phillips et al., 2015). How these changes impact socioeconomically disadvantaged students is also essential to analyze, as high school graduation requirements often guide the scheduling of coursework in high school; identifying potential connections between graduation requirements and A-G eligibility is needed. Research questions were used to guide the research. The use of a null and directional hypothesis is outlined to provide guidelines for each question.

1. In the 76 largest school districts in California, what differences exist in high school graduation rates between districts that require only two years of math and those that require three or more years of math?

    The null hypothesis is identified as:

H_0: There will be no difference between high school graduation rates at school districts that require two years of mathematics to graduate high school and high school graduation rates for students at school districts that require three or four years of mathematics to graduate.

The non-directional hypothesis is identified as:

H_1: The graduation rate for students graduating from a school district with two years of math required is different from the graduation rate for students graduating from a school district with three or four years of math required.

2. What differences exist in A-G completion rates among students in the 76 largest school districts in California, based on the number of years math is required?

   The null hypothesis is identified as:

   H_0: There will be no difference between A-G rates at school districts that require two years of mathematics to graduate high school and A-G rates for students at school districts that require three or four years of mathematics to graduate.

   The non-directional hypothesis is identified as:

   H_1: The A-G rate for students graduating at a high school with two years of math required is different from the A-G rate for students graduating from a school district with three or four years of math required.

3. In the 76 largest school districts in California, what impact do school district math requirements have on the graduation rates and A-G rates for school districts with greater than 50% of students who are socioeconomically disadvantaged?

   The null hypothesis is identified as:

   H_0: There will be no difference between graduation rates and A-G rates for school

districts with greater than 50% of students who are socioeconomically disadvantaged when accounting for district math requirements.

The non-directional hypothesis is identified as:

H_1: The Graduation and A-G rate for school districts that require two years of math will differ from the rates for school districts with greater than 50% of students who are socioeconomically disadvantaged that require three or four years of mathematics to graduate high school.

The purpose of this study was to explore the impact increasing high school math graduation requirements, beyond the state minimum in California, has on student postsecondary eligibility using data from graduation rates and A-G rates. Graduation rates and four-year college A-G rates are reported to the state of California by each school district. However, no data is collected regarding individual school district requirements and the impact differing requirements can have on students. The outcome of this research can guide school districts and the state of California in determining educational policies by determining the impact of setting minimum high school requirements on a student's postsecondary opportunities. Chapter III provides information regarding research design, participants, data collection, analytical methods, and limitations of the study.

Research Design

In developing the study, districts in California were selected to analyze and quantitative data on graduation rates for these districts was determined. A quantitative approach was used in order to analyze information about multiple variables (Creswell & Guetterman, 2018), including graduation rates, A-G rates, course requirements, and school district socioeconomic rates. A group comparison design provided the opportunity to analyze whether the relationship between

the variables was by chance, as well as the possible magnitude of the relationship (Hoy & Adams, 2015). The variables were reported to the California Department of Education and were considered reliable and valid (Creswell & Guetterman, 2018). Multiple school districts were selected for quantitative data collection to identify the possible impact graduation rates can have on school district A-G rates. A null hypothesis and directional hypothesis allowed the opportunity to test the null hypothesis and determine possible relationships between the variables (Hoy & Adams, 2015). The quantitative research focused on ad hoc data collected from the California Department of Education DataQuest tool. DataQuest is a free data retrieval tool on the California Department of Education's website, providing information on state, county, district, and school level demographics, academics, staffing, and other information that districts are required to report yearly (California Department of Education, n.d.-c).

With a multiple variable analysis, a group comparison design was utilized to categorize possible trends that occur. The correlational design uses concepts of sample size, precise measurements, and unbiased samples to approach ideas about relationships (Creswell & Guetterman, 2018). In order to gain clarity on the impact of the variables related to one another, an explanatory research design was followed. Explanatory research design includes common steps and provided analysis on how changing graduation requirements in a school district would have an impact on graduation rates and A-G rates. Data collection occurred for a specific set of time, with information reported yearly to the state of California (Creswell & Guetterman, 2018). School districts in the state were analyzed as a particular group to identify graduation and A-G rates using a statistical test in the data analysis. From the statistical test, conclusions were drawn to guide further research and education policy (Creswell & Guetterman, 2018).

Participants

The participants in the research were students from the 76 largest school districts in California. This led to a large sample size in each graduating class, with a minimum of 1,000 students graduating from a school district in the given year. Each of the school districts identified students who graduated high school and, separately, students who had completed A-G four-year college entrance requirements. The state of California follows a cohort model for student data collection. The Adjusted Cohort Graduation Rate (ACGR) identifies a cohort as a group of students who start grade 9, adding in any students who enter the group in grades 9, 10, or 11, and subtracting any students who transfer out (California Department of Education, n.d.-c). For a student to be subtracted from a graduation cohort, federal policy outlines they have to pass away or enroll in another education system, whether the system is within the state, international, or a part of another program such as a juvenile court system (California Department of Education, n.d.-c; Every Student Succeeds Act, 2017). The number of students who graduate and graduation rates for each of the school districts are then reported yearly to the state department of education.

The school districts analyzed included those with enrollment greater than 20,000 students. This incorporated the top 76 out of 1,037 school districts in California, based on 2018-2019 enrollment (California Department of Education, n.d.-a). The determination in developing the sample size of school districts used required analysis of district size within the state of California, in order to create a representative sample (Frey, 2016; Hoy & Adams, 2015). Including districts above 20,000 students led to a sample population from urban and suburban areas, rather than districts that may only have minimal graduates in a given year. The districts with student populations greater than 20,000 provided a representative sample that allowed for further analysis of graduation requirements on the sample group across the entire state (Creswell

& Guetterman, 2018). The larger districts had multiple high schools in each district, and graduation class sizes varied. Due to the nature of the district sizes, however, no graduating class size, by district, was less than 1,000 students. Each of the districts had varying graduation requirements for their students, with specific requirements collected for each district. Information regarding A-G eligibility, rates of socioeconomically disadvantaged students, population size, and demographic breakdown were also collected.

Table 2 indicates the total number of graduates in the study, based on the information reported to the California Department of Education by each school district. The table also identifies total graduates across all districts in the study by gender, socioeconomically disadvantaged status, English learner status, students with disabilities, and ethnicity. The student group categories identified represented a minimum of 5% of the student population within the entire state of California. The categories for ethnicity include race/ethnicity groups who were identified as greater than 1% of the student population in all of California (California School Dashboard, n.d.). Specific information in Table 2 regarding participants, student group, and ethnicity, includes data of the students from the 76 participating school districts. Data included represents a compilation of specific district information. Individual data on district participants, participants meeting high school graduation requirements, and A-G requirements, gender, student groups, and ethnicity are included in Appendix B.

Table 3

Participant Demographics, 2019

Demographics	Count
Participants	
Number of participant districts	76
Number of participants	2,702,615
Participants meeting district graduation requirements	89.4%
Participants meeting A-G requirements	49.8%
Student Group	
Participants identified socioeconomically disadvantaged	65%
Participants identified English Learners	19.6%
Participants identified Students with Disabilities	12.3%
Participants identified Homeless Youth	3.8%
Ethnicity	
African American	6.6%
Asian	10.5%
Filipino	2.7%
Hispanic	57.6%
Two or more races	3.2%
White	**17.8%**

Data Collection

The California Department of Education was accessed through a public website to collect data regarding high school graduation rates, A-G rates, and socioeconomic information. The data was retrieved from the DataQuest program, a data tool incorporated in the California Department of Education website, which is open to any individual with internet access. The data retrieved included information by state, district, or school sites, and included raw scores and percentages.

DataQuest had available ex post facto information for graduating students from previous years in the State of California.

Updated school data regarding graduation and college eligibility is available to the public from the California Department of Education each December. Due to the parameters of the research process, data from the 2018-2019 school year was the most recent data available. Appendix B identifies information for the school districts included in the research process. Data collection for each school district includes:

a. County District School Code (CDS): The unique number given to school districts by the California Department of Education for tracking and information related to funding, assessment, accountability, grant applications, and data reporting.
b. District Student Population (DSP): The number of students enrolled in the school district.
c. Graduating Class Population (GCP): The number of students enrolled who completed high school graduation requirements, as outlined by a school district's governing body.
d. Graduation Rates (GR): The rate of students who completed high school graduation requirements, as outlined by a school district's governing body.
e. A-G Completion Population (AGP): The number of students who completed A-G requirements, as outlined by the California State University System.
f. A-G Completion Rates (AGR): The rate of students who completed A-G requirements, as outlined by the California State University System.
g. District Socioeconomic Status (SES): The rate of students within the school district who were identified for free and reduced lunch.

Information regarding specific graduation requirements for the school districts was collected from school district websites. School district websites were navigated from the California Department of Education Dashboard, where district information is available to the public (California School Dashboard, n.d.). Each school district website outlined course requirements set by the school district governing body for a student to receive a high school diploma. Specific courses required were outlined in school board policies provided on public websites and are outlined in Appendix C. The information regarding high school course requirements included:

a. English (E): The quantitative data for the school year 2018-2019, which identified the number of English credits required to receive a diploma.
b. Math (M): The quantitative data for the school year 2018-2019, which identified the number of Math credits required to receive a diploma.
c. Science (S): The quantitative data for the school year 2018-2019, which identified the number of Science credits required to receive a diploma.
d. Social Studies (SS): The quantitative data for the school year 2018-2019, which identified the number of Social Studies credits required to receive a diploma.
e. Physical Education (PE): The quantitative data for the school year 2018-2019, which identified the number of Physical Education credits required to receive a diploma.
f. Visual and Performing Arts (VAPA): The quantitative data for the school year 2018-2019, which identified the number of Visual and Performing Arts credits required to receive a diploma.
g. Foreign Language (FL): The quantitative data for the school year 2018-2019,

which identified the number of Foreign Language credits required to receive a diploma. Districts that allow students to meet this requirement within the VAPA category are identified with an *.

The collection of data was stored on a private computer with a password, as well as using Cloud storage. The ex post facto data received from the California DataQuest tool is available to the public and, therefore, did not require specific guidelines for destroying the information (Hoy & Adams, 2015). There was no remuneration to specific school districts or students, given the public nature of the information (Creswell & Guetterman, 2018). All raw data collected included populations with a minimum of 150 students in the school district to ensure anonymity by the State of California when reporting data (California School Dashboard, n.d.).

Analytical Methods

The quantitative research used post hoc data from the California Department of Education DataQuest tool and individual school district websites. Data was collected based on the 2018-2019 school year, which was reported to the state in September of 2018, and available to the public in December 2019. Data was loaded in SPSS in order to collate information and create descriptive and frequency tables to further analyze the information (Field, 2018). Scatterplot graphs also provided a visual representation to identify possible relationships between the variables (Field, 2018; Frey, 2016). Measures of mean, median, and mode were calculated in order to identify the central tendency and recognize possible outliers (Field, 2018). Demographic data were included in the SPSS information and allowed for overall participant information on gender, socioeconomics, ethnicity, as well as district graduation rates, A-G completion rates, and the number of years required for math within a specific district.

Determining the appropriate study design for the research questions required analysis of

the variables and the purpose of each question (Hoy & Adams, 2015). Research questions one and two center around a common theme of determining possible differences between independent groups. The independent groups were identified as those school districts that require students to complete two years of math in high school to meet graduation requirements and those school districts that require three or four years of math to meet graduation requirements. Identifying the types of variables in each question determined whether the study design was appropriately followed by checking assumptions of normality, homogeneity of variances, and identification of outliers (Field, 2018; Hoy & Adams, 2015). Analysis of assumptions occurred using SPSS 25 by referring to descriptive statistics, boxplots, and histograms (Field, 2018).

The process to decide the appropriate design determined the number and types of variables for each research question. Research question 1 refers to identifying whether a significant difference exists between years of math required in high school and graduation rate. The outcome variable, the graduation rate, is continuous. The predictor variable, the years of math required, is categorical since students were required to complete two years or three-plus years of math. The populations were from different entities, as a student would not graduate from two different school districts. Given the parameters outlined, the appropriate statistical test would be an independent t-test (Field, 2018).

Identifying the appropriate design for research question two was a similar process to question one. The different variable is the outcome variable, which would be A-G rates. The A-G rate would also be a continuous variable. Therefore, the appropriate test would be an independent t-test (Field, 2018; Laerd Statistics, n.d.). The t-test for research questions one and two provided information on the validity of the null hypothesis and whether a statistical significance occurred between the variables.

Identification of the appropriate study design for research question three required incorporating an additional variable, adjusting for the rate of socioeconomically disadvantaged students within a school district identified which school districts to gather data from. Research question three considered the 76 districts in the study and ranked the districts by percent of students identified as socioeconomically disadvantaged. Districts with greater than 50% socioeconomically disadvantaged student population were included in the analysis. The outcome variable was the graduation rate and the A-G rate, each of which were continuous variables. The predictor variable was years of math required, a categorical variable. Given the analysis of variables, the appropriate statistical test was a one-way multivariate analysis of variance or MANOVA (Field, 2018; Hoy & Adams, 2015). The MANOVA allowed for testing two dependent variables using a linear composite. The types of variables identified in research question three meet assumptions required for the one-way MANOVA (Field, 2018). Research question three also had independence of observations, where there were no relationships between the groups themselves (Laerd Statistics, n.d.). The MANOVA test allowed an analysis of how years of math for districts with more than 50% socioeconomically disadvantaged students impacted the variance in Graduation and A-G rates. Analysis of the coefficients in SPSS and the matrix scatterplot ensured assumptions were met and the study design was appropriate. Findings from the study design identified whether the predictor variable had an impact on the outcome variable (Field, 2018).

The study analyzed variables including graduation rates, A-G rates, and their relationship to years of math required to graduate high school; it also incorporated the graduation rate of socioeconomically disadvantaged students. Relationships between years of math, graduation rates, and A-G rates were identified using an independent t-test, and a MANOVA test was

completed when incorporating the rate of socioeconomically disadvantaged students in the school district. The results of the statistical analysis are identified in chapter IV.

Role of the Researcher

Involvement in the secondary public-school system by the researcher has provided multiple opportunities to support students academically, socially, and personally. The researcher's involvement with students has been as a classroom teacher and an academic counselor. The roles have varying emphasis within a student's education, but the main purpose is to support students in graduating high school and preparation for post-secondary life. Limiting the bias of professional experiences is needed in order to gain a clear picture of how the variables impact each other. The bias the researcher had to consider as a counselor was finding the balance between supporting student achievement in high school and meeting graduation requirements, along with attempting to prepare students for life beyond high school. The researcher's personal experiences contributed to a needed awareness of nontraditional educational paths for students, including various options for postsecondary planning. Considering alternative paths for students, beyond the researcher's history, identifies a need to confront and mitigate potential personal bias.

In order to minimize bias, it was important to recognize literature that spoke to high school graduation and post-secondary information. During the research process, providing credit to individuals that have analyzed similar topics as well as ensuring that research is not duplicated is key to the role of the researcher (Creswell & Guetterman, 2018). The researcher determined an area of inquiry and identified a gap in the literature concerning graduation requirements. The researcher developed a plan using post hoc data, which provided the opportunity to respond to the research questions and to interpret results. The researcher followed the analytical methods outlined to identify possible outcomes from the information. By focusing on using correct

statistical analysis and appropriate questions, the researcher was able to limit personal bias that might influence the outcome of the research.

Delimitations

Delimitations are choices made by the researcher that can influence the study. The school districts used in this research study consisted of students in large urban and suburban school districts with large high schools. Due to the nature of the school districts included, smaller districts were not included in the data. The impact graduation requirements have on smaller high school campuses, which do not have the resources or staffing to offer multiple levels of core academic courses, is not addressed in the study. The research focused on the 76 largest school districts in California during the 2018-2019 school year. School districts with less than the population threshold were not included in the study and could impact the generalizability of the results.

In addition, small districts face a scarcity of resources that larger districts may not have. This was identified in a district that requires four years of math but does not have the funding or population to offer many different levels of math courses for students that are at different pacing within the academic subject. The number of courses offered to fulfill a graduation requirement, specifically in a subject such as math where students may be at different abilities, can impact the years of math completed. The data collection process also did not account for neighborhood factors beyond recognizing district socioeconomic rates. Large districts in urban areas may cover neighborhoods with higher and lower risk factors that impact graduation rates, which is not identified.

Another delimitation of the study is that the study did not address the impact on highly mobile students. Students that are tied to the court system, such as the foster system, qualified for

exemptions to meeting increased graduation requirements set by a school district and would be identified as receiving a diploma by the school district. However, for a family that moved multiple times due to economic or familial matters, the impact of the requirements on the student is not evident. Identifying populations of students that moved multiple times in high school was not collected due to the nature of the ad hoc data available.

Limitations

Limitations are influences that the researcher cannot control. The timely release of data is beyond the control of the researcher. Data collection from the 2018-2019 school year was used in the data analysis. Updated data collection on graduation rates and A-G rates can also impact the study. The release of data for the 2019-2020 school year was in December of 2020, beyond the timeline for the current project.

Updating 2020 data for school districts in California was a challenge due to the pandemic. The 2019-2020 school year was greatly impacted by the worldwide pandemic, and, in California, some school districts changed graduation requirements and the grading process for seniors when schools were closed prematurely. Graduation rates and A-G rates for the class of 2020 were impacted due to state and local policy changes. Consequently, updated data would not be as consistent as for prior years, and data may be impacted for additional years in the future.

Protection of Human Rights and Approval

To begin the research process, the researcher completed the Ethics and Human Subjects Protection certification held by the Association of Clinical Research Professionals. Completion of the course identifies that the researcher gained training in how to conduct appropriate studies and identified protections necessary when conducting research with human subjects. Verification of completion is identified in Appendix A. Research proposals had to be approved by the

University's Institutional Review Board (IRB) Committee prior to a research proposal being considered and data collected. The committee is made up of faculty and an individual that is not associated with the college (Creswell & Guetterman, 2018). This IRB Committee determines if the research is ethical and whether students may continue with their research.

The nature of the data collection for this research allowed an exempt form to be completed and submitted to the IRB Committee. An exempt form is an option if the data collected poses a less than minimal risk to the subjects. This less than minimal risk can occur if the data is retrieved from a source available to the public and/or the data is statistical in nature and anonymous due to how the data is collected (HRRC - Northwest Nazarene University, n.d.). The data used for this research project is ex post facto, collected by the state and provided to the public through public databases online. The existing records were collected and analyzed for statistical analysis. The data collected from the California Department of Education met both criteria outlined above. Therefore, an exempt form was submitted and approved by the IRB Committee.

Chapter IV
Results

Introduction

High school graduation requirements are determined at the state level in the United States (Mahnken, 2018; Zinth, 2018). With each state having an outlined educational program students are required to follow, course requirements can differ across the country (Calvin, 2017; Gewertz, 2016). This is further expanded within a state, where local educational agencies identify requirements for a specific school district. In the state of California, the state outlines minimum requirements for students, and local school districts can then choose to expand on those requirements (Freedberg, 2017; Gao et al., 2017). School districts report yearly to the state department of education data for student demographics, graduation rates, A-G rates, and other required information (California Department of Education, 2018). The information required from the state of California does not include specific information about courses required for graduation (California Department of Education, 2018). The impact that graduation requirements can have on student graduation rates and A-G rates is not easily identifiable due to the lack of cohesive data collection.

Review of the literature did not result in any research on whether differing graduation requirements in California can impact high school graduation and post-secondary four-year college eligibility, or A-G rates. Current literature analyzes the impact of student involvement, parent involvement, student academic programs such as Gear Up and AVID, dual enrollment, and the counseling program on student achievement (Burns et al., 2019; Hawkins, 2018; Knight & Duncheon, 2020; Millett, Rojas, & Kevelson, 2018; Shivji & Wilson, 2019). The literature found that student achievement can be impacted by various factors, but how school district graduation requirements can impact graduation rates and A-G rates was an identified gap.

Purpose

The California Department of Education has identified indicators for school districts to report for transparency and clearly identifiable progress. Graduation rates and A-G eligibility are factors that are reported yearly. The purpose of this study was to examine the relationship between graduation rates and A-G eligibility across school districts that have varying graduation requirements. District-specific math requirements were analyzed due to the varying requirements identified across school districts in the state of California. The results of the study address the impact that additional required years of math can have on students graduating high school and meeting A-G college entrance requirements in California.

The researcher was intent on providing study results that would bring awareness to the importance graduation requirements set by a school district can have on student's ability to finish high school with a diploma and also meet A-G requirements for four-year college. The researcher anticipates the results can impact future legislation and school district decision making for graduation requirements, to contribute to student success.

The questions guiding this dissertation study included the following:

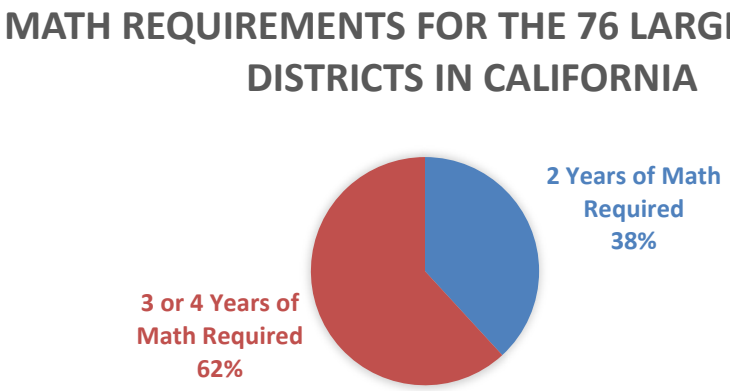
1. In the 76 largest school districts in California, what differences exist in high school graduation rates between districts that require only two years of math and those that require three or more years of math?
2. What differences exist in A-G completion rates among students in the 76 largest school districts in California, based on the number of years math is required?
3. In the 76 largest school districts in California, what impact do school district math requirements have on the graduation rates and A-G rates for school districts with greater than 50% of students who are socioeconomically disadvantaged?

Research Design and Methodology

As discussed in Chapter III, the methods implemented for data collection consisted of ex post facto student data collected from the California Department of Education website for the Class of 2019. The data was collected in raw scores and percentages, and it included information from reports on demographics, graduation data, and A-G rates. Additional graduation requirement information was collected from individual school district websites for each of the 76 districts included in the study.

This chapter outlines the results of the study for each research question. Organization of the results begins with descriptive statistics for the 76 participating school districts, including graduation rates and A-G rate for each group. School districts were assigned groups based on the number of years of math the district required to graduate. Districts requiring two years were grouped, and districts requiring three or more years were grouped. The two independent groups are identified in Figure 4, which clarifies the percentage of participating districts who require two years of math or three or more years of math.

Figure 4
Math Requirements for the 76 largest school districts in California



Each research question is addressed with statistical and boxplot analysis. Independent samples t-tests were utilized to determine if a difference existed between the means of the groups for research questions one and two. A one-way MANOVA was utilized to identify the differences in the means of the dependent variable between groups. School district graduation rates and A-G rates were analyzed, rather than raw data, in order for the analysis to not be arbitrarily impacted by the size of the school district.

The California Department of Education has a Fall Census Day, identified as the first Wednesday in October, where school districts report student demographics to the state based on enrollment on the census date. The information is then made public through the California Department of Education website (California Department of Education, n.d.-a). Files from this website were downloaded to provide information about the school districts included in the study. The files included all school districts in California, and were then narrowed down to data files with only participating school district data. Table 3 outlines the data files collected from the California Department of Education.

Table 4

Data Information Collected from California Department of Education

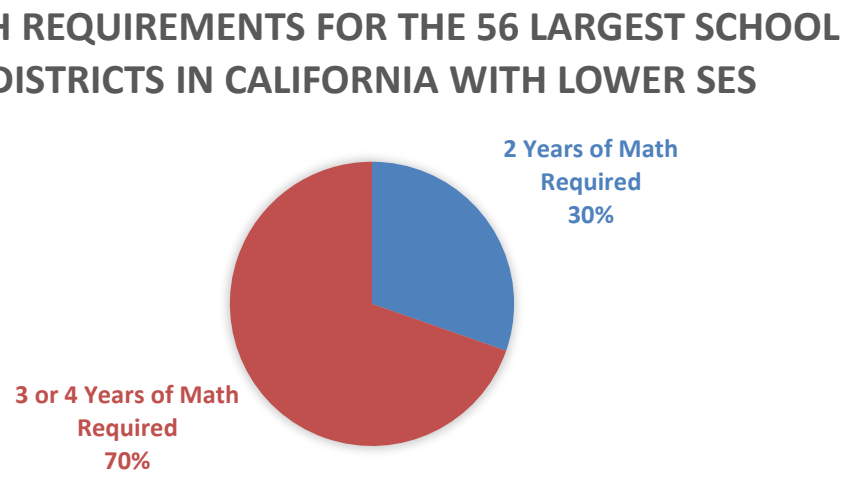
Webpage Heading	Data File Name
Student Poverty Free or Reduced Price Meals	Unduplicated Student Poverty – Free or Reduced Price Meals Data 2018-2019
Enrollment by School	enr18
2019 Dashboard: Data Files and Records Layouts	Enrollment Demographics
Adjusted Cohort Graduation Rate and Outcome Data	acgr19

Data collected from the Department of Education was identified with a school district numerical code (CDS) and compiled into one data set. Information on school district graduation rates, A-G rates, enrollment, ethnic breakdown, rates of socioeconomically disadvantaged, English learner, and special education were identified. Data collected for math requirements, school district graduation rates, and A-G rates were uploaded into SPSS for analysis. Descriptive, boxplots, and statistical analysis were run on the data to determine if an independent samples t-test would be an appropriate measure to determine group differences (Laerd Statistics, n.d.). The process and results for each question were then outlined. Initial analysis identified that, of the 76 participating school districts in the study, 29 school districts require students to complete two years of math to meet high school graduation requirements and 47 school districts require a student to complete three or four years of math to meet high school graduation requirements. The two participant groups were then referenced to answer research questions one and two.

Research question three considered the 76 school districts and ranked the districts by percent of students identified as socioeconomically disadvantaged. Only those school districts with greater than 50% of students who were socioeconomically disadvantaged were kept as identified participants. This decreased the participating school districts from 76 to 56 school districts for research question three. Of those school districts, 17 required two years of math to graduate and 39 school districts required three or more years of math to graduate. Figure 5 identifies the breakdown of math requirements for the school districts with greater than 50% of students who were socioeconomically disadvantaged. Each participant group was then referenced for research question three.

Figure 5

Math Requirements for School Districts with Greater than 50% Socioeconomically Disadvantaged Students



Results: Research Question #1

Graduation rates in California are published yearly, in December, along with other data that schools are required to report. Graduation rates are identified in data files on the California Department of Education website, as well as on the California dashboard for school districts and individual schools (California School Dashboard, n.d.). When reporting information about graduation rates, school districts report raw numbers of graduates but no information on the coursework required for a student to meet the requirements outlined by the local educational agency or school district. Data collection of course requirements for a student to complete a high school diploma can provide analysis to determine the possible impact those requirements have on graduation rates. School districts who are considering changing requirements should be aware of the impact that courses can have on graduation rates.

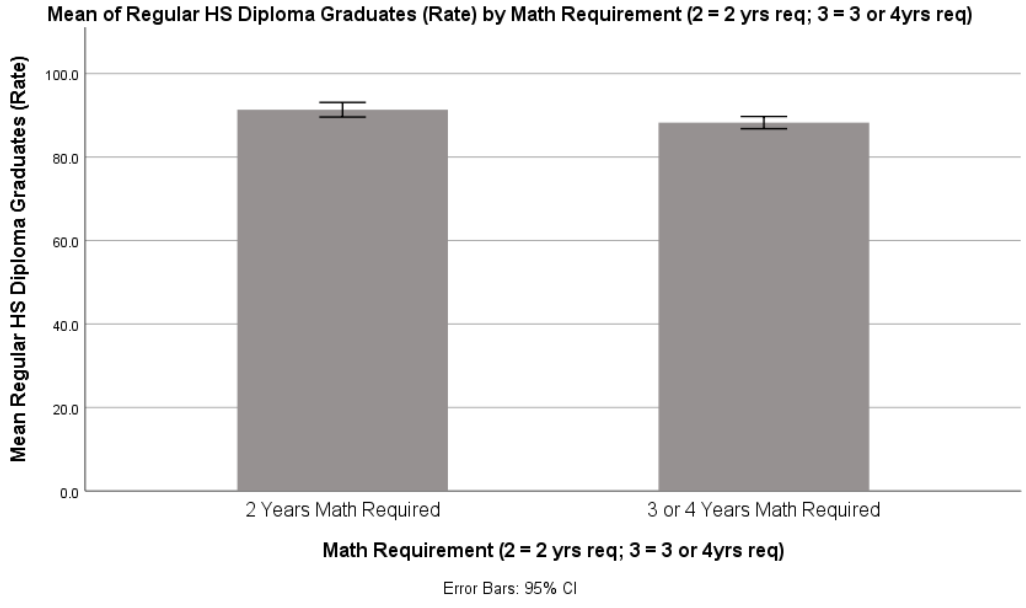
Research question one attempted to identify possible relationships between math

graduation requirements and graduation rates in the top 76 school districts in the state, which accounted for approximately 50% of California students in public education. The first research question the study sought to answer was: In the 76 largest school districts in California, what differences exist in high school graduation rates between districts that require only two years of math and those that require three or more years of math? Based on the question and the types of variables the researcher reviewed, running an independent samples t-test was appropriate (Frey, 2016; Laerd Statistics, n.d.).

SPSS was used to complete the statistics for the independent t-test. An initial visual inspection of the mean scores of high school graduation rates by years of math required was completed. Figure 6 identifies the mean scores of graduation rates.

Figure 6

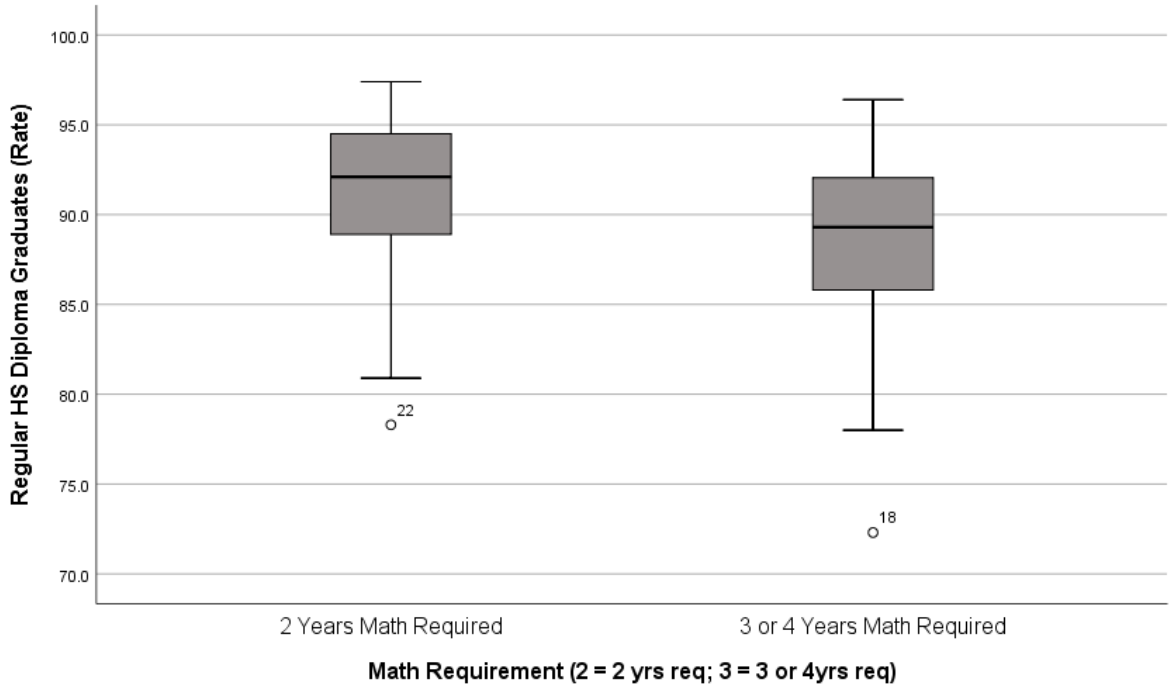
Graduation Rates Mean Scores



The initial analysis used boxplots to determine possible outliers. Boxplot analysis identified one outlier in each group. Stockton Unified was an identified outlier for the group that required two years of math to meet graduation requirements and Oakland Unified was an identified outlier for the group that requires three or four years of math to meet graduation requirements. The boxplots with outliers are identified in Figure 7.

Figure 7

High School Graduation Rate Boxplots



While each group had an identified outlier, due to how robust the independent samples t-test is, the researcher continued with analysis (Field, 2018). Additional assumptions required to run an independent samples t-test required the dependent variable to be approximately normally distributed for each group and that the independent variable had homogeneity of variances (Field, 2018; Laerd Statistic*s*, n.d.). To determine whether the variables met the assumptions for a t-test, an analysis was completed in SPSS which provided descriptive information for the

variables. The review of assumptions for an independent samples t-test was completed, and the t-test was able to move forward. The descriptives are outlined in Table 4.

Table 5

Regular High School Diploma Rate Descriptive

Math Requirement (2 = 2yrs required; 3 = 3 or 4yrs required)				Statistic	Std. Error
HS Diploma Graduation Rate	2 Years of Math Required	Mean		91.341	.8535
		95% Confidence Interval for Mean	Lower Bound	89.593	
			Upper Bound	93.090	
		Variance		21.126	
		Std. Deviation		4.596	
		Skewness		-1.258	.434
		Kurtosis		1.399	.845
	3 or 4 Years of Math Required	Mean		88.251	.7295
		95% Confidence Interval for Mean	Lower Bound	86.783	
			Upper Bound	89.719	
		Variance		25.012	
		Std. Deviation		5.0012	
		Skewness		-.945	.347
		Kurtosis		1.031	.681

An independent samples t-test was run to determine if there were differences in high school graduation rates in school districts that required two years of math to meet graduation requirements and school districts that required three or more years of math to meet graduation rates. Data are mean ± standard deviation unless otherwise stated. There were 29 school districts

that required two years of math to meet high school graduation requirements and 47 school districts that required three or more years of math to meet high school graduation requirements. There was one outlier for each participant group, as assessed by inspection of a boxplot. High school graduation scores for each category of math requirements were not normally distributed, but the similar nature of the skewness continued the analysis. There was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = 0.598$). The graduation rates were greater for school districts that require two years of math to graduate high school (91.34 ± 4.6) than for school districts that require three of four years of math to graduate high school (88.25 ± 5). There was a statistically significant difference of 3.09 (95% CI, 0.81 to 5.37), $t(74) = 2.697$, $p = 0.009$, $d = 40.27$.

Results: Research Question # 2

A-G requirements in California are identified as the course requirements students need to complete in high school in order to be eligible to attend a public university after high school (California Department of Education, n.d.-b). The number of eligible students that meet these requirements is identified to the California Department of Education, yearly, by the student's graduating school district.

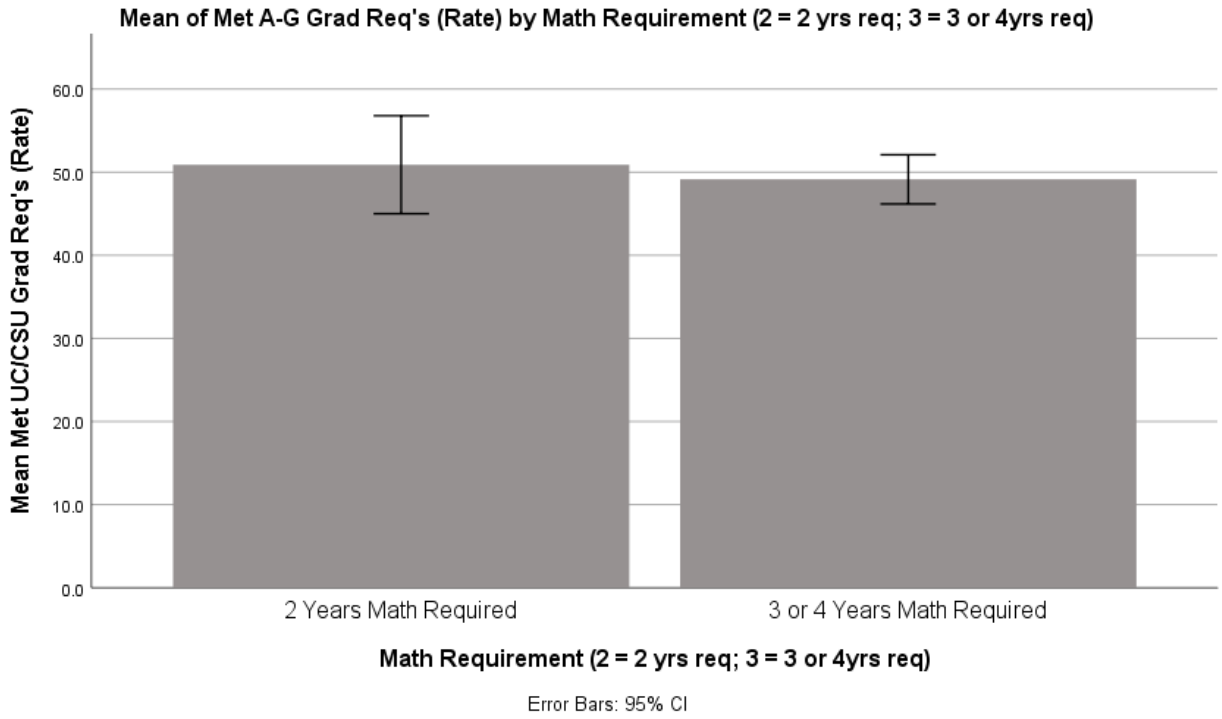
Research question two attempted to identify possible relationships between math high school graduation requirements and A-G rates in the top 76 school districts in the state, which accounted for approximately 50% of California students in public education. The second research question the study sought to answer was: What differences exist in A-G completion rates among students in the 76 largest school districts in California, based on the number of years math is required? For the nature of the question and the types of variables the researcher reviewed, running an independent samples t-test was appropriate (Frey, 2016; Laerd Statistics,

n.d.).

SPSS was used to complete the statistics for the independent t-test. An initial visual inspection of the mean scores of A-G rates by years of math required was completed. Figure 8 identifies the mean scores of A-G rates.

Figure 8

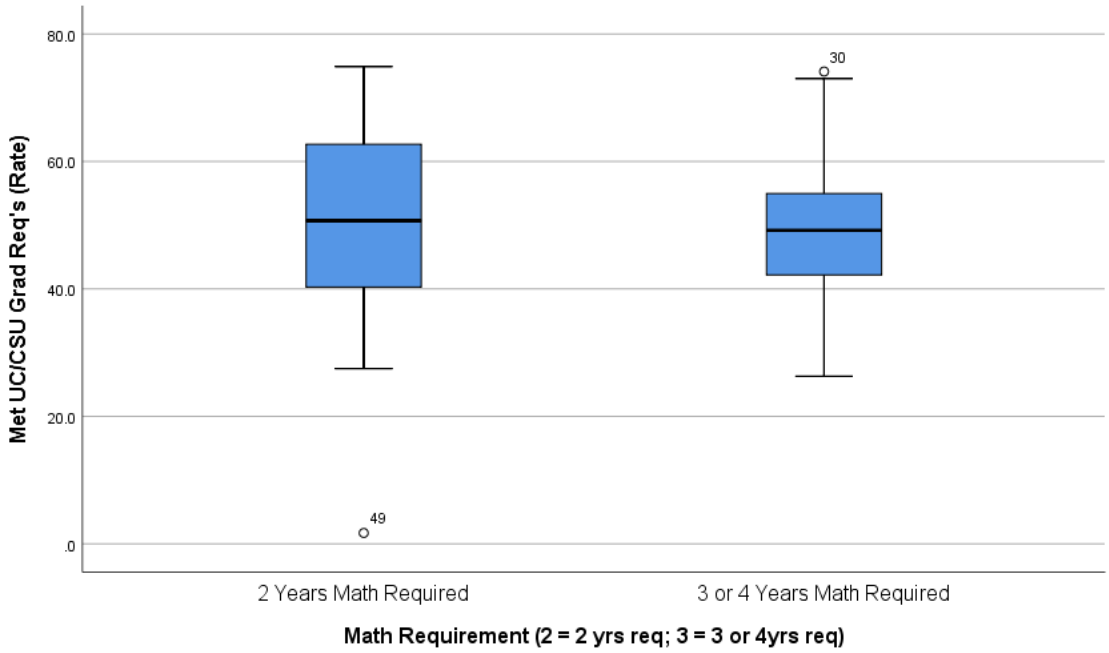
Mean A-G Rate



The initial analysis used boxplots to determine possible outliers. Boxplot analysis identified one outlier in each group. Colton Unified was an identified outlier for the group that required two years of math to meet graduation requirements, and Temecula Valley Unified was an identified outlier for the group that requires three or four years of math to meet graduation requirements. The boxplots with outliers are identified in Figure 9.

Figure 9

High School Graduation Rate Boxplots



While each group had an identified outlier, due to how robust the independent samples t-test is identified as, the researcher continued with analysis (Field, 2018). Additional assumptions required to run an independent samples t-test required the dependent variable to be approximately normally distributed for each group and that the independent variable had homogeneity of variances (Field, 2018; Laerd Statistics, n.d.). To determine whether the variables meet the assumptions for a t-test, an analysis was completed in SPSS which provided descriptives information for the variables. The descriptives outlined in Table 6 provide information about the variables needed to move forward with testing.

Table 6

A-G Rate

Math Requirement (2 = 2yrs required; 3 = 3 or 4yrs required)				Statistic	Std. Error
HS A-G Rate	2 Years of Math Required	Mean		50.893	2.877
		95% Confidence Interval for Mean	Lower Bound	44.999	
			Upper Bound	56.787	
		Variance		240.105	
		Std. Deviation		15.495	
		Skewness		-1.016	.434
		Kurtosis		2.262	.845
	3 or 4 Years of Math Required	Mean		49.134	1.472
		95% Confidence Interval for Mean	Lower Bound	46.171	
			Upper Bound	52.097	
		Variance		101.816	
		Std. Deviation		10.0904	
		Skewness		.256	.347
		Kurtosis		.342	.681

The normality for the variables was assessed with the Shapiro-Wilks test for normality. The Shapiro-Wilks tested whether the A-G rates were normally distributed for each of the math categories (Laerd Statistics, n.d.). A-G rates for each participant group, based on years of math required to graduate high school, were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$).

Homogeneity of variance was analyzed to determine if the population samples from each

of the groups of school districts had equal variances (Field, 2018). There was homogeneity of variances for A-G rates for school districts that required two years and school districts that required three or more years of math, as assessed by Levene's test for equality of variances (p = .052). The review of assumptions for an independent samples t-test was completed, and the t-test results could be determined.

An independent samples t-test was run to determine if there were differences in A-G rates in school districts that required two years of math to meet graduation requirements and school districts that required three or more years of math to meet graduation requirements. Data are mean ± standard deviation unless otherwise stated. There were 29 school districts that required two years of math to meet high school graduation requirements and 47 school districts that required three or more years of math to meet high school graduation requirements. There was one outlier for each participant group, as assessed by inspection of a boxplot. A-G rates for each category of math requirements were normally distributed. There was homogeneity of variances, as assessed by Levene's test for equality of variances (p = 0.052). The A-G rates were greater for school districts that require two years of math to graduate high school (50.89 ± 15.49) than for school districts that required three of four years of math to graduate high school (49.13 ± 10.1), though it was not a statistically significant difference of 1.76 (95% CI, -4.08 to 7.6), t(74) = .6, p = 0.55.

Results: Research Question #3

Research question three required an initial analysis of a school district's socioeconomic data to determine which of the participants of the original 76 school districts were to be included. A school district reports the socioeconomic data for its students to the California Department of Education every year in October (California Department of Education, n.d.-a). School district

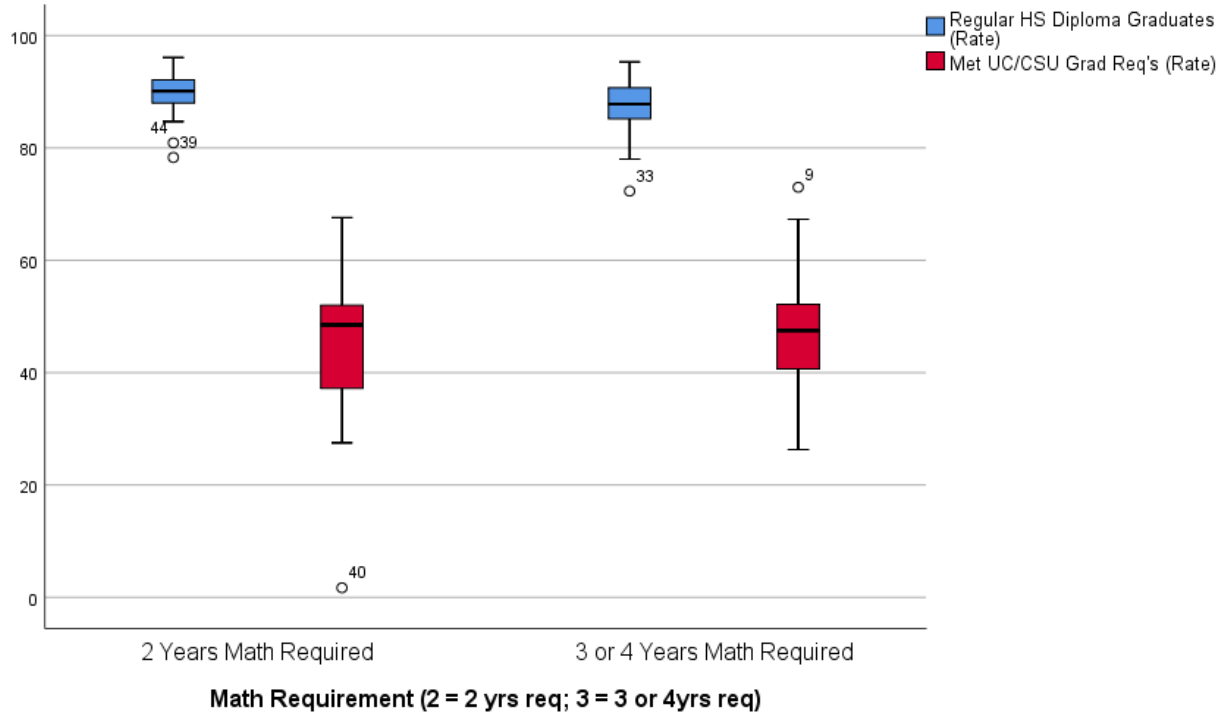
socioeconomic data is then reported as part of the California Dashboard, a reporting tool used in the state of California. Information for the socioeconomic data was determined by the number of students eligible for free and reduced-price meals (California School Dashboard, n.d.). Appendix D outlines the rate of socioeconomically disadvantaged students for the 76 participating school districts. The districts that had greater than 50% socioeconomically disadvantaged students are identified in Appendix E. Fifty-six school districts were identified as meeting this threshold. Considering the school districts identified by socioeconomic status, research question three attempts to answer: In the 76 largest school districts in California, what impact do school district math requirements have on the graduation rates and A-G rates for school districts with greater than 50% socioeconomically disadvantaged students? Based on the question and the types of variables the researcher reviewed, running a one-way multivariate analysis of variance (MANOVA) for the dependent variables, graduation rates, and A-G rates was appropriate (Frey, 2016; Laerd Statistics, n.d.).

To answer research question three, the one-way MANOVA identified the dependent variables as graduation rates and A-G rates, each of which was a continuous variable. The independent variable, years of math required to graduate, was a categorical variable with two groups. The groups were identified as districts requiring two years of math to graduate and districts requiring three or more years of math to graduate. Of the 56 districts considered for this research question, 17 required two years of math to graduate and 39 required three or four years of math to graduate. SPSS was used to determine potential outliers, distribution, and variance of graduation rates. In the group that required two years of math to graduate, boxplot inspection identified two school districts, Desert Sands Unified and Palm Springs Unified, that were identified outliers for graduation rates, as shown in Figure 10. The group that required three or

more years of math to graduate had one identified outlier for graduation rates, Moreno Valley Unified. Boxplot analysis for A-G rates identified one outlier from each group. The group that required two years of math had an outlier in Napa Valley Unified and the group that required three of more years of math had an outlier in Chaffey Joint Unified. Each of the outliers identified was not considered extreme and was included in analysis (Field, 2018; Laerd Statistics, n.d.).

Figure 10

High School Graduation Rate and A-G Rate Boxplots for Districts with greater than 50% socioeconomically disadvantaged students



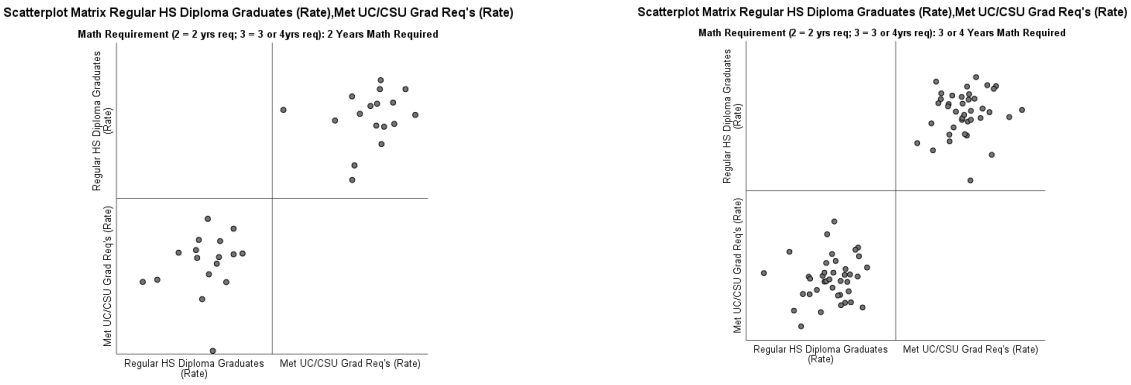
Analysis of graduation rates and A-G rates for school districts with more than 50% socioeconomically disadvantaged students, was needed to identify the next step in statistical testing. The Shaprio-Wilk test was completed to determine if the independent variable, years of

math required, met conditions of normality (Laerd Statistics, n.d.). Graduation scores for each group of math requirements were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). Analyzing multicollinearity was completed to determine whether graduation rates and A-G rates were possibly correlated (Laerd Statistics, n.d.). There was no multicollinearity, as assessed by Pearson correlation ($r = .137$, $p = .314$)

Variances for the two groups were required to be equal in order to continue with the one-way MANOVA, once normality had been determined (Field, 2018). There was homogeneity of variances for graduation rates for both groups, as assessed by Levene's test for equality of variances ($p = .720$). There were no multivariate outliers in the data, as assessed by Mahalanobis distance ($p > .001$). For the linearity assumption, linearity was analyzed with a scatterplot matrix. Figure 11 identifies that there was an approximate linear relationship between graduation rates and A-G rates for each math requirement, as assessed by a scatterplot.

Figure 11

Scatterplot Matrix



Further assumptions required for a way-way MANOVA include the assumption of sample size, equality of covariance-covariance, and homogeneity of variances (Laerd Statistics, n.d.). There was homogeneity of variance-covariances matrices, as assessed by Box's test of

equality of covariance matrices (p = .203). Reviewing the sample size of each of the participant groups for math requirements, it was identified that the assumption of sample size was met as each group had a minimum of two school districts that fall within the group.

Table 7 outlines descriptive statistics for the variables, graduation rates and A-G rates.

Table 7

Descriptive for School Districts with Greater than 50% Socioeconomically Disadvantaged Students

	Math Requirement	Mean	Standard Deviation	N	95% Confidence Interval	
					Lower Bound	Upper Bound
Graduation Rates	2 Years of Math Required	89.5	4.71	17	87.13	91.87
	3 or 4 Years of Math Required	87.31	4.93	39	85.74	88.87
	Total	87.98	4.93	56		
A-G Rates	2 Years of Math Required	45.12	15.18	17	39.46	50.78
	3 or 4 Years of Math Required	47.5	9.78	39	43.76	51.23
	Total	46.77	11.59	56		

A one-way multivariate analysis of variance was run to determine the effect the number of years of math required to graduate high school had on a school district's high school graduation rate and A-G rate. Data are mean ± standard deviation unless otherwise stated. The top 76 school districts in California were identified and the rate of socioeconomic students in the district was collected. School districts with greater than 50% socioeconomically disadvantaged students were kept to create a participation group of 56 school districts. Of these, there were 17 school districts that required two years of math to graduate high school and 39 school districts

that require three or more years of math to graduate. School districts had higher graduation rates (89.5 ± 4.71 and 87.3 ± 4.93, respectively) than A-G rates (45.12 ± 15.18 and 47.5 ± 9.78, respectively). The differences between the math requirements on the combined dependent variables was not statistically significant, $F(2, 53) = 1.631$, $p = .205$; Wilks' $\Lambda = .942$; partial $\eta^2 = .058$

Conclusion

The independent samples t-test completed for research questions one and two provided the evidence for hypothesis testing. Research question one identified a statistical difference between means, where we can reject the null hypothesis and accept the alternative hypothesis, which stated: There is a difference between graduation rates for school districts that require two years of math versus school districts that require three or more years of math. The independent samples t-test completed for research question two and the one-way MANOVA completed for research question three, was not statistically significant, where the alternative hypothesis is rejected and we fail to reject the null hypothesis.

Chapter IV provided the results of the statistical testing required to identify possible statistical significance between the dependent and independent variables outlined in each research question. The data was collected from the California Department of Education for graduation rates, A-G rates, and demographic information. Data regarding school district graduation requirements was identified from school district websites and navigated from the California Department of Education website. The data was ex post facto data, published for the 2018-2019 school year.

Chapter V will expand on the outcomes from the statistical results. Emphasis will be given to distinguish the impact the consequences of the statistical analysis may have on changing

graduation requirements for students in the state of California. Possible implications for the outcome of the study and other avenues for research will be a topic for discussion.

Chapter V
Discussion

Introduction

Education policy in the United States can vary from state to state as it is a right not outlined in the United States Constitution but, rather, reserved for the states (Cross & Education Commission of the States, 2015). Consequently, state education policy can vary greatly, and each state can set its own requirements based on the education policy within that state (Bush et al., 2017; McFarland et al., 2020). In recent years, some states have taken the opportunity to increase graduation requirements for high school students to be eligible to earn a diploma, with the intent of preparing students for additional college and career opportunities (Booth et al., 2017; Mahnken, 2018; Weikart, 2015). In the state of California, high school graduation requirements were modified in 2003 to specify the required completion of Algebra I, but no other curriculum changes have been implemented in more than 30 years.

In California, the state sets minimum requirements, but school districts often add additional requirements to receive a diploma from that district (Gao et al., 2017; Zaff et al., 2017). The minimum requirements for a student identified by the state includes 130 credits completed, with 20 of those credits being in math. Some school districts increase this minimum to 220 credits or more, with math requirements set at 20, 30, or 40 credits. Students who want to enter a four-year university are also required to meet A-G requirements, which specify high school course and grade requirements. Varying standards for students makes it difficult to compare and analyze graduation rates and district achievement across the state. The collection of graduation rates by the California State Department of Education tracks whether students receive a diploma, but not the requirements set by each district to qualify to receive the diploma. There is no tracking of district course requirements that goes beyond the state minimums. The lack of

information on requirements from different districts makes it difficult to identify if varying requirements impact student achievement. Stakeholders in California interested in updating district requirements to reflect changing educational standards have no basis to identify if specific requirements impact student completion of high school or college eligibility (Rubin, 2017; Weikart, 2015). Additionally, a lack of information on graduation requirements can lead to changes that may disproportionally impact at-risk students, due to the lack of research on the topic.

Information on differing requirements is significant due to the impact potential policy changes can have on students, including those populations who have a higher rate of mobility (Berger & Archer, 2018; Von Stumm, 2017). This can include families that move due to employment, economic crisis, involvement in the military, or any factors that affect a student's education, such as trauma (Griffen, 2019; Henderson, 2017; Paugh, 2018). These direct factors, and others, are identified by Bronfenbrenner's Theory of Ecological Systems (Bronfenbrenner, 1976). The impact of direct factors has been studied, but additional consideration of policy changes, such as course requirements and how those changes impact long term educational opportunities, is important to research.

The benefits of this dissertation include looking at school districts that have different math requirements to graduate and the impact these requirements can have on student's graduation rates and college eligibility rates. Math is the criteria analyzed in different school districts in California, as this is a content area where the minimum requirement by the state of California is two years, but some districts require three or four years (Agrawal, 2019; Alexander, 2020; Phillips et al., 2015). Alternatively, math requirements in states that have updated their graduation requirements in the last decade have requirements set at three or more years (Wang et

al., 2017; Weikart, 2015). Collecting information and data from districts with different requirements can provide guidance when other districts consider making graduation requirement changes or if the state decides to update state requirements for all students.

The purpose of this study was to explore the impact increasing high school graduation requirements in mathematics, beyond the state minimum, in California had on high school graduation and A-G rates. The study analyzed state enrollment data and determined that the top 76 school districts, by enrollment, would account for approximately 50% of the students in public schools in California. The study determined that, of these 76 districts, the number of districts that increase minimum requirements in math is disproportionally larger, at 62%, than the number of districts that require the state minimum of two years of math, which is 38%. As a result of this study, requirements for school districts across the state were cataloged, which can be used to provide analysis in math requirements at the local and state level.

Summary of Results

Regarding the impact of math requirements set by school districts, the study answered the following research questions:

1. In the 76 largest school districts in California, what differences exist in high school graduation rates between districts that require only two years of math and those that require three or more years of math?
2. What differences exist in A-G completion rates among students in the 76 largest school districts in California, based on the number of years math is required?
3. In the 76 largest school districts in California, what impact do school district math requirements have on the graduation rates and A-G rates for school districts with greater than 50% of students who are socioeconomically disadvantaged?

The researcher collected data enrollment, graduation rates, A-G rates, socioeconomic rates, and demographics from the California Department of Education. Enrollment data was used to determine which school districts in the state would make up approximately 50% of students in California, and the largest 76 school districts were determined to be a fit for the study. All school districts had at least one high school, and the local educational agency or school board for each district determined the requirements to receive a high school diploma. The researcher used descriptive statistics completed with SPSS 25 to analyze and interpret data, run statistical tests, and plot graphs. Outliers were identified for each statistical test completed and data were verified as correct. The outliers were not considered extreme and were included in the tests and analysis.

Summary of Results and Discussion for Research Question #1

Research question one analyzed the impact years of required math had on high school graduation rates. For the 76 school districts included in the study, the graduation rate varied by 25%, with the group requiring two years of math having a higher average graduation rate than the group requiring three or more years of math. The difference in graduation rates between the two groups was identified as statistically significant, and a difference in graduation rates based on math requirements was identified. For the thousands of students that do not receive a high school diploma in California, these varying requirements can have a long-term impact across their lives. Additional discussion of equity for students should also be a consideration when analyzing the data. Students that do not meet graduation requirements in one district, may be able to go to another district and meet the requirements for a high school diploma. Where a student resides, and the requirements outlined by a local educational agency, can have an impact on a student's educational attainment.

A previous study on the impact of graduation requirement changes on grade point

average found that course changes, including math, were found to have a statistically significant decrease in grade point average for students in one urban school district (Alexander, 2020). In comparison, the current study found that an increase in course requirements was found to decrease graduation rates. While grade point average and graduation rates are not the same measurements, studies have identified that students with a lower grade point average have a decreased chance of meeting graduation requirements (Henderson, 2017; Hickman et al., 2017).

Implications for professional practice for research question #1. The identified significance between years of math required and graduation rates can have implications for policies at the state and local level. School districts are often increasing requirements to meet stakeholder demands for increased preparation for college and career readiness. The outcome of research question 1 brings into question whether the increased requirements are at the expense of the student. Alternatively, if the state or school district plans to increase requirements, an increase in funding for intervention support may be needed for students that might no longer be on the path to graduate. The long-term consequences of changing course requirements can impact many students across the state.

Summary of Results and Discussion for Research Question #2

Research question two analyzed the impact years of required math had on school district A-G rates. The lack of statistical significance identified in research question 2 led to the conclusion that differing math requirements did not have the same impact on A-G rates as they did on graduation rates. The outcome of this research question leads to the need for data analysis on school districts that, due to a belief that it supports students' college eligibility, are increasing graduation requirements. Without a positive change in A-G rates for school districts that have additional math, the value of those requirements should be reconsidered.

Implications for professional practice for research question #2. Analysis of A-G rates for school districts with varying graduation requirements is important as states and local school districts consider increasing course requirements for students. Prior to course changes, the analysis of whether a policy will lead to the desired outcome is essential. In reviewing the data and determining that there was not a statistical difference in the mean A-G rates, school districts and states should consider whether other programs to improve A-G rates can have a greater positive impact on students than changing math requirements. Previous research on the impact of college preparation programs, such as AVID and GearUp, has identified an increase in A-G rates, which could be a stronger path to student college eligibility than course requirement changes.

Summary of Results and Discussion for Research Question #3

Research question three analyzed the impact years of required math had on school district graduation rates and A-G rates when only considering districts with greater than 50% socioeconomically disadvantaged populations. Research question three decreased the participant school districts to 56, and found the graduation rate to be higher for school districts that require two years of math versus three or more. However, the average A-G rate was higher for districts that required additional math than only two years of math. Analysis determined no statistical significance between years of math and graduation rates or A-G rate when only analyzing districts with higher a higher population of socioeconomically disadvantaged students.

While no statistical significance was identified, the participating school districts were disproportionally made up of districts requiring three or more years of math. School districts with a higher rate of socioeconomically disadvantaged students were mainly in the group that requires more math, versus the group that only requires two years. The outcome of this research

question leads to consideration of the many facets that can impact graduation rates and A-G rates. The data provides further reflection on what the demographics of a district look like in relation to what the graduation requirements are.

Implications for professional practice for research question #3. Analysis of graduation rates and A-G rates for school districts who have more than 50% socioeconomically disadvantaged students is important to review as states and local school districts consider increasing course requirements for students. School districts with larger percentages of students that are socioeconomically disadvantaged may consider many types of programs to support student achievement, often beyond direct changes to the course requirements. This provides opportunities to support many different students with innovative programs rather than a one-size-fits-all approach such as modifying course requirements. Previous research on the impact of parent engagement, counseling programs, and college preparation programs such as AVID and GearUp has identified an increase in graduation and A-G rates, which could be a stronger path to student college eligibility than changing high school graduation requirements.

Major Findings

This quantitative study was conducted to identify possible relationships between graduation and A-G rates based on the years of math required to graduate high school. Previous literature outlined the impact that factors such as parent involvement, counseling programs, college preparatory programs, and dual enrollment may have on students meeting graduation and A-G requirements, but no state-level data had been collected and analyzed about the graduation requirements themselves (Calvin, 2017; Deslonde & Becerra, 2018; Knight & Duncheon, 2020; Shivji & Wilson, 2019). The state of California does not collect individual school district requirements, but, rather, it identifies the minimum requirements a school district must follow

and leaves it up to the local educational agency to determine if additional requirements would be mandated. The study extended the current research by analyzing the impact of course requirements on student graduation and A-G rates. Data for graduation and A-G rates were collected from the class of 2019 from the California Department of Education website as well as school district websites.

Data analysis found a statistically significant relationship between years of math required and graduation rates for the 76 largest school districts in California. Analysis of A-G rates with the incorporation of student socioeconomic status was determined to not have a statically significant relationship. The results of the study consider an opposing view from where many states are moving with regard to increasing graduation requirements. The literature identified various states that are increasing requirements for students; however, the statistical analysis found that increasing the math requirement had a negative impact on graduation rates and no statistical impact on A-G rates in California. This analysis leads to the consideration of whether increasing requirements are helping the students that most need it or influencing a decline in graduation rates for students who may have otherwise received a high school diploma. When considering a policy change, such as graduation requirements, if a negative effect on graduation rates occurs with no subsequent positive influence on college eligibility, the long-term consequences of the policy should be reviewed.

The group of school districts that required two years of math were found to have higher graduation rates than the group that required three or more years of math. The districts that met this threshold were collectively from districts across the state with varying socioeconomic levels. With the exception of one district, the districts that require two years of math also require two years of science. These districts have similar credit requirements as districts with increased math

requirements, however rather than additional math, students have the opportunity to take courses in any subject area of interest. The lower math and science requirements can provide the opportunity for students to take courses that are of greater interest or career technical courses. Additional student choice for courses taken in high school can provide opportunities for students to pursue interests within specific content areas, such as the arts, ROTC programs, or work experience programs. For students who may have plans after high school that do not include higher education, this opportunity supports gaining skills and experience in the field they plan to pursue. Consequently, while the number of credits required for students is similar across districts in the study, the districts with a two-year math requirement saw an increased level of choice by the students and had higher graduation rates. The students that find success in school districts with lower math requirements may then find increased opportunities after high school with an awarded diploma to take with them as they enter the next phase of their lives.

Before implementing new courses and requirements, school districts and states should determine if the potential outcome of the policy could lead to more students not finishing high school than students meeting college eligibility requirements (Alexander, 2020; Kist, 2020). School districts should determine how best to serve all students, considering various courses of study for students rather than implementing additional requirements aimed at increasing college eligibility. Would alternative programs to support college and career readiness have a greater impact without the decrease in graduation rates? The emphasis moving forward may also be a shift to additional career support. If changing course requirements does not have the noticeable impact on improving A-G rates, additional consideration by school districts should be undertaken to determine what is best for students (Hanson & Fantz, 2020). Embracing robust career programs that start in high school can provide support for students looking to follow a

path outside of traditional postsecondary education. Overall, providing the opportunities to meet high school requirements and A-G requirements is important, but increasing specific course requirements does not have the intended effects.

This study shows that changing course requirements does not have the positive outcome that school districts are often looking for. The many factors that influence student achievement can make it difficult to determine how one policy will affect students across a state; however, recognizing a relationship between math requirements and graduation rates can start the conversation about what additional steps of support should be taken if policy changes occur. Overall, this study determined that math requirements could impact a student's ability to receive a high school diploma. Results of these research questions provide a view of whether the goal of increased math requirements is leading to the desired outcome by policymakers (Kist, 2020). Requirements for additional math courses showed a significant decrease in graduation rates and no identified statistical difference in A-G rates. If the only identified significance is negative for high school graduation rates, further analysis is needed to determine if the policy to support student college eligibility is having the desired impact. Only after recognizing how the many ecosystems that influence a student work together can programs of support be developed to help students with their postsecondary planning.

Methodology

The study used a quantitative research approach with ex post facto data on graduation and A-G rates from the graduating class of 2019. The researcher used the California Department of Education website to collect publicly available information about a school district's graduation rates, A-G rates, demographics, and socioeconomic rates. Links from the California Department of Education website provided information on the school district website to collect graduation

requirements for specific school districts. Data was collected in spreadsheets and compiled to include only the districts included in the study to further explore. An independent samples t-test was used to test for differences between years of math required to graduate and graduation rates and A-G rates. A MANOVA was used to test for differences when including SES. The results of the statistical tests determined whether or not statistically significant differences existed between the variables.

Theoretical Framework

The study was framed by Bronfenbrenner's Ecological Systems Theory, which focuses on the impact the environment has on an individual's development (Bronfenbrenner, 1979). Ecological systems theory recognizes the multiple ecosystems that impact student development and contribute to overall growth. By identifying a process, person, context, and time approach, individuals are identified as having multiple environments and systems that impact their development (Bronfenbrenner, 1979). Each layer toward the center increases the direct connection to the individual in the center. Alternatively, the outer layer is the most distant collection of people and places that affect the individual (Bronfenbrenner, 1979).

This study focused on the impact of state and school district education policy on a student meeting graduation requirements and college eligibility requirements. School board policies, which identify requirements for students in a school district, were identified in the exosystem, while requirements set by the California State Board of Regents to enter a California State school were identified in the macrosystem (Bronfenbrenner, 1979; Crawford et al., 2020). As identified in the outcome of the study, school and state policies can have an impact on students, even when the environment is farther from a direct connection with a student. Students in school districts with additional math requirements had a statistically significant decrease in graduation rates.

Consequently, the math policy implemented at the exosystem level was impacting student's ability to receive a high school diploma, which could then impact other areas of a student's life.

Conclusion

The requirements set by each state and the local education agencies have a direct impact on students all over the country. When determining possible policy changes, many factors should be considered, including whether the changes have the desired impact. The outcome of the research found that increasing math requirements had a statistically significant decrease in graduation rates with no statistical difference in A-G rates for students from the top 76 school districts in California. Additional analysis of student graduation rates for school districts with more than 50% socioeconomically disadvantaged students found that no statistical significance was determined for increased math requirements on high school graduation or A-G rates. These findings underline the importance of thorough analysis before public policy changes are implemented. The increased demand for college and career readiness may not be as straightforward as changing course requirements for students. However, identifying alternative programs of support can lead to the desirable outcome of supporting a student's ability to move toward a future with increased opportunities.

Recommendations for Further Research

The research presented in the study provides an analysis of the impact of math requirements across multiple school districts. Further analysis of the impact of increasing math requirements within a school district, and the impact on student graduation rates and A-G rates at the student level, could provide further clarity on how changes to course requirements can impact one community. Recommendations for further research include:

1. School District Level Analysis: Analysis at the district level would provide the

opportunity to consider the diverse communities and backgrounds throughout the state, an area not available when considering a large number of school districts across California. Research at the school district level could be analyzed for school districts that have increased requirements, as well as districts that have decreased core requirements. Analyzing statistical data for both scenarios could provide support to determine the impact of course requirements within a community.

2. School District Socioeconomic Status: The research identified a decrease from the original participating districts when there was a minimum threshold of 50% socioeconomically disadvantaged students. The districts that met the threshold were predominately part of the participant group that required three or more years of math. Further research analyzing a possible relationship between graduation requirements and socioeconomic status of the districts would be beneficial. Researching possible disparity between requirements for districts with more socioeconomically disadvantaged students would provide enrichment to current studies.
3. Math Offering Analysis: When reviewing the districts that require three or more years of math, further analysis could be completed to identify if the years of math required are the equivalent to the levels of math completed. Determining whether a district that requires three years of math but takes Algebra I and slows the courses down into three years, could provide a clear picture of how school districts are fully implementing math requirements.
4. Mixed Methods or Qualitative Study: Research using a qualitative or mixed method approach with surveys or interviews with students who have attended schools in districts with changing requirements could increase the picture of how changing

requirements impact students directly. Further qualitative studies that reach out to students that have moved from districts with one set of requirements to another could further expand the research. This research could provide additional understanding of how policy changes impact students directly.

5. College Completion: This research could be taken further by acquiring information on college completion rates for students from the school districts included in the study. While A-G rates did not have a statistically significant impact in this study, research on whether additional math required for students would have an impact on college completion or college persistence could support policy initiatives for school districts and state officials.
6. Private College: Further research to identify the impact of graduation requirements would be to analyze post-secondary success for students that entire private schools where the math requirement to enter the college may be lower. Private schools have more flexibility in the requirements students must complete to enroll in the school. Researching students who attend private schools where the entrance requirements for math are less than three years can provide opportunities to identify possible relationships between college success or completion and the impact of math requirements.

The findings of the study lend to the need for additional research to support the education in the K-12 and postsecondary environment.

In addition, the COVID19 pandemic has provided a unique opportunity to consider graduation requirements in California for the class of 2020 and 2021. The California Department of Education sets minimum requirements at 130 credits. School districts can then set their own

minimum requirements above this number, and college entrance requirements may then be even higher, with additional course and grade requirements. Many school districts across the state of California decreased graduation requirements from state minimum of 130 for the class of 2020 and 2021. For example, districts that required 225 credits to graduate decreased the requirement to the state minimum of 130 credits. Analyzing graduation rates for students from those school districts that modified graduation requirements provides an opportunity to compare graduation rates when the local school district requirements are lower versus higher. Additional analysis comparing graduation rates at the minimum levels, along with A-G rates during this same time period, can provide information on whether A-G rates changed when there was a major change in high school course requirements, such as lowering requirements during COVID. This analysis could provide further insight into the impact that increased requirements have on A-G rates for students across the state and whether the districts that are increasing requirements are having any changing effect on student eligibility for four-year college. In addition, analysis of graduation rates and A-G rates for students who experienced distance learning during the early years of high school can contribute to identifying how the COVID pandemic impacted long term educational paths.

Implications for Professional Practice

Implications for professional practice that are supported with this study underline the importance of researchers and educators to be involved with the state and school districts that are considering making changes to course requirements or educational policy. Thorough study and analysis should be completed before making policy changes, as the desired outcome is not always the result. This study identified that increasing math requirements had a negative impact on graduation rates but no statistical impact on A-G rates. While policymakers argue that

increased requirements are in place to support a college-going culture, the study identifies that increasing the requirements does not always lead to that outcome. Increasing the math requirements ultimately decreased graduation rates while having no discernable difference in A-G requirement completion. Advocating for interventions, college preparatory programs, and other resources for students could be another path to achieve the desired result without decreasing the graduation rate for the students who would have otherwise received their high school diploma. Programs that support all students and provide a path to college should be the goal, without harming other students.

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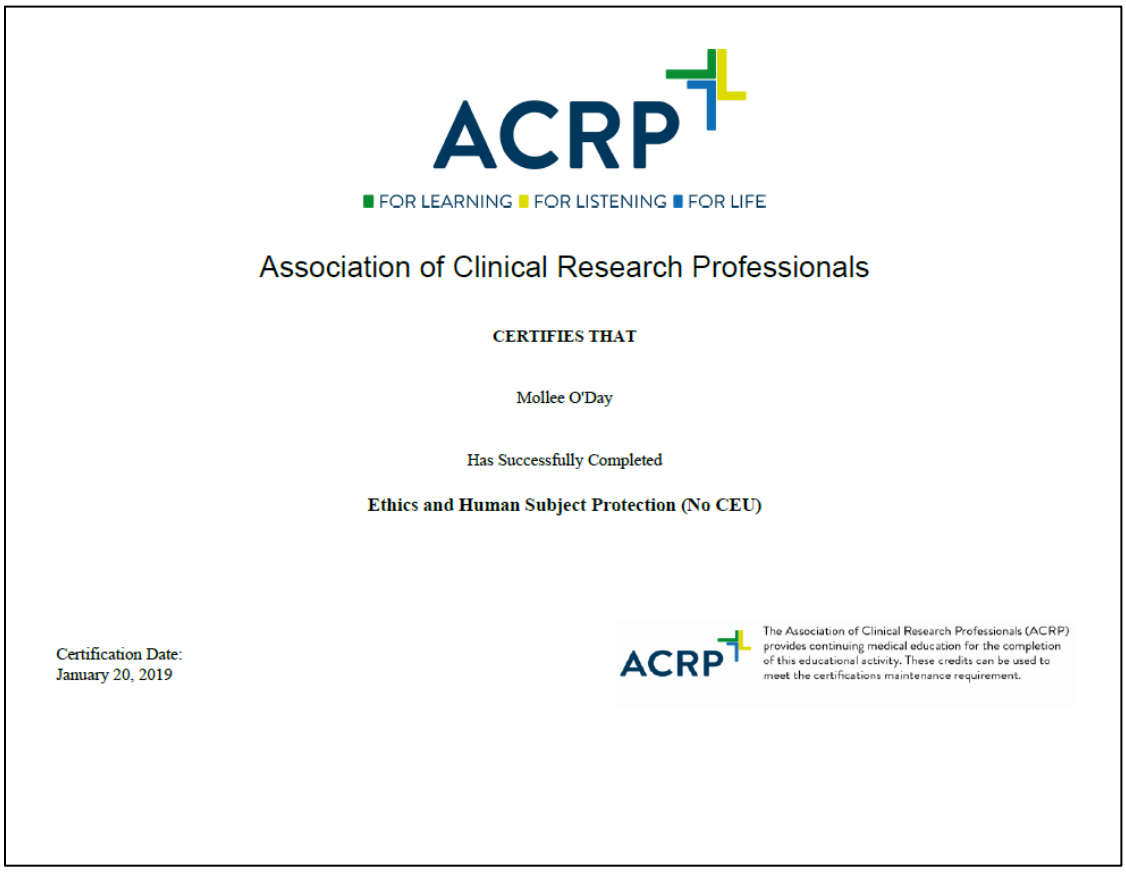
Appendix A



ACRP

FOR LEARNING FOR LISTENING FOR LIFE

Association of Clinical Research Professionals

CERTIFIES THAT

Mollee O'Day

Has Successfully Completed

Ethics and Human Subject Protection (No CEU)

Certification Date:
January 20, 2019

ACRP

The Association of Clinical Research Professionals (ACRP) provides continuing medical education for the completion of this educational activity. These credits can be used to meet the certifications maintenance requirement.

Appendix B

California School District Data and Demographics

District Code	District Name	DSP	GCP	GRP	GR	AGP	AGR	SES
64733	Los Angeles Unified	453,276	31,622	24,671	78	14,669	59.5	84
68478	San Diego Unified	103,194	6,881	6,053	88	4,421	73	58.1
64725	Long Beach Unified	72,935	5,870	5,134	88	3,004	58.5	69.3
62166	Fresno Unified	70,749	4,352	3,736	86	1,877	50.2	88.3
70540	Elk Grove Unified	62,869	4,775	4,311	90	2,121	49.2	54.6
67033	Corona-Norco Unified	53,002	4,332	4,044	93	2,319	57.3	46.4
69666	San Francisco Unified	52,468	3,966	3,427	86	2,306	67.3	54.4
68338	San Bernardino City Unified	48,936	3,235	2,924	90	1,075	36.8	90
67652	Capistrano Unified	47,205	4,019	3,846	96	2,413	62.7	25.3
66670	Santa Ana Unified	46,597	3,625	3,177	88	1,381	43.5	87.8
73676	Clovis Unified	42,866	3,068	2,881	94	1,736	60.3	44.4
66522	Garden Grove Unified	42,301	3,494	3,238	93	1,957	60.4	69.1
67439	Riverside Unified	40,708	3,186	3,037	95	1,593	52.5	66.9
73635	Sacramento City Unified	40,660	2,575	2,180	85	1,106	50.7	72
63529	Kern High	39,884	9,717	8,675	89	3,500	40.3	72.2
67447	San Juan Unified	39,779	2,900	2,551	88	1,226	48.1	53.2
68411	Sweetwater Union High	39,165	7,064	6,087	86	3,319	54.5	59.6
73569	Oakland Unified	36,524	2,643	1,911	72	955	50	73.8
67843	Poway Unified	36,450	2,779	2,629	95	1,968	74.9	18.5

67710	Fontana Unified	36,335	2,853	2,611	92	1,291	49.4	85.8
73650	Irvine Unified	35,291	2,523	2,411	96	1,684	69.8	18.7
68676	Stockton Unified	35,255	2,318	1,815	78	656	36.1	79.5
61176	Fremont Unified	35,176	2,414	2,249	93	1,277	56.8	20.5
67124	Moreno Valley Unified	32,736	2,326	2,122	91	890	41.9	83.7
61804	San Ramon Valley Unified	32,138	2,617	2,550	97	1,876	73.6	6.2
61754	Mt. Diablo Unified	30,727	2,137	1,828	86	737	40.3	47.7
64246	Anaheim Union High	30,292	5,129	4,503	88	2,259	50.2	73.7
68585	Lodi Unified	28,581	2,111	1,877	89	517	27.5	68.7
68452	West Contra Costa Unified	28,121	2,146	1,767	82	855	48.4	70.6
75192	Temecula Valley Unified	27,992	2,285	2,112	92	1,565	74.1	28.9
62117	Chino Valley Unified	27,590	2,392	2,214	93	1,190	53.7	47.6
67876	Saddleback Valley Unified	26,747	2,300	2,134	93	1,137	53.3	31.2
64451	Desert Sands Unified	26,356	2,430	2,198	91	1,139	51.8	70
64568	Glendale Unified	25,789	1,922	1,698	88	970	57.1	51.9
64907	Placentia-Yorba Linda Unified	25,477	2,074	1,970	95	1,032	52.4	37.7
64808	Montebello Unified	25,409	2,223	1,798	81	669	37.2	85.2
69799	Orange Unified	25,246	2,267	2,143	95	1,070	49.9	50.3
67215	Rialto Unified	25,066	1,897	1,724	91	795	46.1	89.7
67678	Chaffey Joint Union High	23,883	5,815	5,229	90	3,534	67.6	62.9
73643	Tustin Unified	23,768	2,017	1,906	95	1,279	67.1	41.2
68593	Manteca Unified	23,496	1,793	1,690	94	587	34.7	62
76505	Twin Rivers Unified	23,457	1,418	1,206	85	393	32.6	85.8

65060	Torrance Unified	23,394	2,052	1,957	95	1,249	63.8	31.3
75200	Murrieta Valley Unified	23,251	2,094	2,019	96	1,261	62.5	36.6
67314	East Side Union High	22,606	5,565	4,886	88	2,539	52	51.4
68296	Pomona Unified	22,473	1,586	1,418	89	659	46.5	90.1
61796	William S. Hart Union High	22,416	3,837	3,597	94	1,999	55.6	30.8
69427	Downey Unified	22,064	2,078	1,997	96	1,005	50.3	70.3
73437	Colton Joint Unified	22,014	1,529	1,388	91	24	1.7	80.2
75044	Hesperia Unified	21,806	1,778	1,657	93	596	36	72.1
67173	Palm Springs Unified	21,791	1,735	1,588	92	717	45.2	89
67082	Hemet Unified	21,347	1,704	1,469	86	682	46.4	85.4
75176	Lake Elsinore Unified	21,265	1,551	1,377	89	551	40	67.7
66464	Antelope Valley Union High	21,077	5,128	4,229	83	1,718	40.6	70.1
67850	Redlands Unified	21,012	1,686	1,553	92	878	56.5	59.8
73791	San Marcos Unified	21,007	1,446	1,363	94	497	36.5	38.5
73759	Compton Unified	20,933	1,277	1,074	84	456	42.5	91.1
72256	Vista Unified	20,756	1,636	1,404	86	649	46.2	64.7
66597	Newport-Mesa Unified	20,641	1,777	1,636	92	822	50.2	45.2
67330	Folsom-Cordova Unified	20,487	1,528	1,379	90	703	51	36.1
64212	ABC Unified	20,465	1,529	1,426	93	876	61.4	50.7
75242	Val Verde Unified	20,141	1,612	1,524	95	956	62.7	83.8
65243	Madera Unified	20,011	1,229	1,100	90	393	35.7	90.7
61192	Hayward Unified	19,909	1,292	1,047	81	426	40.7	74.2
67090	Jurupa Unified	19,344	1,462	1,317	90	525	39.9	76.4

66431	Alvord Unified	18,504	1,525	1,399	92	518	37	79.3
73445	Hacienda la Puente Unified	18,097	1,413	1,317	93	639	48.5	74.6
67686	Coachella Valley Unified	17,787	1,231	973	79	324	33.3	94
66621	Oceanside Unified	17,648	1,333	1,158	87	546	47.2	62.7
64840	Norwalk-La Mirada Unified	17,387	1,335	1,227	92	595	48.5	76
68130	Grossmont Union High	16,760	3,917	3,237	83	1,539	47.5	62.2
75713	Alhambra Unified	16,531	1,841	1,721	94	989	57.5	64.1
66266	Napa Valley Unified	16,526	1,467	1,296	88	718	55.4	52
61648	Antioch Unified	16,362	1,378	1,111	81	292	26.3	71.6
64881	Pasadena Unified	16,340	1,249	1,067	85	521	48.8	61.6
66548	Huntington Beach Union High	15,967	3,926	3,587	91	1,794	50	38.5

Appendix C

California School District Graduation Requirements

District Code	District	Credits Required	E	M	S	SS	PE	VAPA	FL
64733	Los Angeles Unified	210	40	30	20	30	20	10	20
68478	San Diego Unified	220	40	30	30	30	20	10	20
64725	Long Beach Unified	220	40	40	20	30	20		10*
62166	Fresno Unified	230	40	30	30	30	20		10*
70540	Elk Grove Unified	220	40	40	20	35	20	10	10
67033	Corona-Norco Unified	220	40	20	20	30	20		
69666	San Francisco Unified	230	40	30	20	30	20	10	20
68338	San Bernardino City Unified	220	40	30	30	30	20		10*
67652	Capistrano Unified	220	40	20	20	30	20		10*
66670	Santa Ana Unified	220	40	30	20	30	20	10	20
73676	Clovis Unified	230	40	20	20	30	40		20*
66522	Garden Grove Unified	220	40	30	20	30	20	10	
67439	Riverside Unified	220	40	30	20	30	20		30*
73635	Sacramento City Unified	230	40	20	20	40	20	10	10
63529	Kern High	220	40	30	20	30	20		10*
67447	San Juan Unified	220	40	20	20	35	20	10	
68411	Sweetwater Union High	220	40	30	20	45	20	10	20
73569	Oakland Unified	230	40	30	30	30	20	10	20
67843	Poway Unified	230	40	20	20	30	20		10*
67710	Fontana Unified	230	40	30	20	30	20		10*
73650	Irvine Unified	215	40	20	20	30	20		10*
68676	Stockton Unified	210	40	20	20	30	20		10*
61176	Fremont Unified	230	40	30	20	30	20		10*
67124	Moreno Valley Unified	220	40	30	20	30	20		10*
61804	San Ramon Valley Unified	220	40	20	20	35	20		20*
61754	Mt. Diablo Unified	200	40	20	20	30	20		10*
64246	Anaheim Union High	220	40	30	20	30	20		10*
68585	Lodi Unified	230	40	20	20	30	20		10*
68452	West Contra Costa Unified	225	40	30	20	40	20	10	10
75192	Temecula Valley Unified	220	40	30	20	30	20		10*
62117	Chino Valley Unified	225	40	30	20	30	20		20*
67876	Saddleback Valley Unified	220	40	30	30	30	20		10*
64451	Desert Sands Unified	220	40	30	20	30	20		10*
64568	Glendale Unified	220	40	20	20	30	20		10*

64907	Placentia-Yorba Linda Unified	230	40	20	20	30	20		10*
64808	Montebello Unified	220	40	20	20	30	30		10
69799	Orange Unified	230	40	20	20	30	20		10*
67215	Rialto Unified	220	40	30	20	30	20		10*
67678	Chaffey Joint Union High	230	40	20	20	30	20		10*
73643	Tustin Unified	230	40	20	30	30	20		10*
68593	Manteca Unified	275	40	30	0	30	20		10*
76505	Twin Rivers Unified	220	40	30	20	30	20		10*
65060	Torrance Unified	220	40	20	20	30	20		10*
75200	Murrieta Valley Unified	230	40	30	30	30	20	10	10
67314	East Side Union High	220	40	20	20	30	20		10*
68296	Pomona Unified	220	40	30	20	30	20		10*
61796	William S. Hart Union High	220	40	30	20	30	20		10*
69427	Downey Unified	220	40	20	20	30	20		10*
73437	Colton Joint Unified	220	40	20	20	30	20		10*
75044	Hesperia Unified	220	40	20	30	30	20		10*
67173	Palm Springs Unified	225	40	20	20	30	20		10*
67082	Hemet Unified	220	40	30	20	30	20		10*
75176	Lake Elsinore Unified	220	40	30	30	30	20		10*
66464	Antelope Valley Union High	230	40	30	20	30	20		10*
67850	Redlands Unified	225	40	20	20	30	20		10*
73791	San Marcos Unified	230	40	20	20	40	20		10*
73759	Compton Unified	220	40	30	20	30	20		10*
72256	Vista Unified	220	40	30	20	40	30		10*
66597	Newport-Mesa Unified	230	40	20	20	30	20		10*
67330	Folsom-Cordova Unified	220	40	30	30	30	20		10*
64212	ABC Unified	230	40	30	20	30	20		10*
75242	Val Verde Unified	200	3	20	20	30	20		10*
65243	Madera Unified	230	40	30	20	30	30		10*
61192	Hayward Unified	195	40	30	30	30		10	20
67090	Jurupa Unified	220	40	20	20	30	20		10*
66431	Alvord Unified	220	40	30	20	30	20		10*
73445	Hacienda la Puente Unified	230	40	30	30	30	20		10*
67686	Coachella Valley Unified	220	40	30	20	30	20	10	20
66621	Oceanside Unified	220	40	30	20	30	20		10*
64840	Norwalk-La Mirada Unified	180	40	20	20	20			10*
68130	Grossmont Union High	220	40	30	20	35	20	10	10
75713	Alhambra Unified	210	40	30	20	30	20		10*
66266	Napa Valley Unified	220	40	30	20	30	20	10	20

61648	Antioch Unified	220	40	30	20	30	20		10*
64881	Pasadena Unified	220	40	30	30	30	20	10	10
66548	Huntington Beach Union High	220	40	30	20	30	20		10*

Appendix D

School Districts with SES

District Code	District Name	Socioeconomically Disadvantaged rate
64733	Los Angeles Unified	84
68338	San Diego Unified	58.1
64725	Long Beach Unified	69.3
62166	Fresno Unified	88.3
67314	Elk Grove Unified	54.6
67033	Corona-Norco Unified	46.4
68478	San Francisco Unified	54.4
67876	San Bernardino City Unified	90
66464	Capistrano Unified	25.3
66670	Santa Ana Unified	87.8
62117	Clovis Unified	44.4
66522	Garden Grove Unified	69.1
67215	Riverside Unified	66.9
67439	Sacramento City Unified	72
63529	Kern High	72.2
67447	San Juan Unified	53.2
68411	Sweetwater Union High	59.6
12590	Oakland Unified	73.8
68296	Poway Unified	18.5
67710	Fontana Unified	85.8
73650	Irvine Unified	18.7
68676	Stockton Unified	79.5
11760	Fremont Unified	20.5
67124	Moreno Valley Unified	83.7
18040	San Ramon Valley Unified	6.2
17540	Mt. Diablo Unified	47.7
66431	Anaheim Union High	73.7
68585	Lodi Unified	68.7
17960	West Contra Costa Unified	70.6
75192	Temecula Valley Unified	28.9
67678	Chino Valley Unified	47.6
73635	Saddleback Valley Unified	31.2
67058	Desert Sands Unified	70
64568	Glendale Unified	51.9
66647	Placentia-Yorba Linda Unified	37.7
64808	Montebello Unified	85.2
66621	Orange Unified	50.3

67850	Rialto Unified	89.7
67652	Chaffey Joint Union High	62.9
73643	Tustin Unified	41.2
68593	Manteca Unified	62
76505	Twin Rivers Unified	85.8
65060	Torrance Unified	31.3
75200	Murrieta Valley Unified	36.6
69427	East Side Union High	51.4
64907	Pomona Unified	90.1
65136	William S. Hart Union High	30.8
64451	Downey Unified	70.3
67686	Colton Joint Unified	80.2
75044	Hesperia Unified	72.1
67173	Palm Springs Unified	89
67082	Hemet Unified	85.4
75176	Lake Elsinore Unified	67.7
64246	Antelope Valley Union High	70.1
67843	Redlands Unified	59.8
73791	San Marcos Unified	38.5
73437	Compton Unified	91.1
68452	Vista Unified	64.7
66597	Newport-Mesa Unified	45.2
67330	Folsom-Cordova Unified	36.1
64212	ABC Unified	50.7
75242	Val Verde Unified	83.8
65243	Madera Unified	90.7
11920	Hayward Unified	74.2
67090	Jurupa Unified	76.4
66977	Alvord Unified	79.3
73445	Hacienda la Puente Unified	74.6
73676	Coachella Valley Unified	94
73569	Oceanside Unified	62.7
64840	Norwalk-La Mirada Unified	76
68130	Grossmont Union High	62.2
75713	Alhambra Unified	64.1
66266	Napa Valley Unified	52
16480	Antioch Unified	71.6
64881	Pasadena Unified	61.6
66548	Huntington Beach Union High	38.5

Appendix E

School Districts with Greater than 50% SES

District Code	District Name	Socioeconomically Disadvantaged rate
73676	Coachella Valley Unified	94
73437	Compton Unified	91.1
65243	Madera Unified	90.7
64907	Pomona Unified	90.1
67876	San Bernardino City Unified	90
67850	Rialto Unified	89.7
67173	Palm Springs Unified	89
62166	Fresno Unified	88.3
66670	Santa Ana Unified	87.8
67710	Fontana Unified	85.8
76505	Twin Rivers Unified	85.8
67082	Hemet Unified	85.4
64808	Montebello Unified	85.2
64733	Los Angeles Unified	84
75242	Val Verde Unified	83.8
67124	Moreno Valley Unified	83.7
67686	Colton Joint Unified	80.2
68676	Stockton Unified	79.5
66977	Alvord Unified	79.3
67090	Jurupa Unified	76.4
64840	Norwalk-La Mirada Unified	76
73445	Hacienda la Puente Unified	74.6
11920	Hayward Unified	74.2
12590	Oakland Unified	73.8
66431	Anaheim Union High	73.7
63529	Kern High	72.2
75044	Hesperia Unified	72.1
67439	Sacramento City Unified	72
16480	Antioch Unified	71.6
17960	West Contra Costa Unified	70.6
64451	Downey Unified	70.3
64246	Antelope Valley Union High	70.1
67058	Desert Sands Unified	70
64725	Long Beach Unified	69.3
66522	Garden Grove Unified	69.1
68585	Lodi Unified	68.7
75176	Lake Elsinore Unified	67.7

67215	Riverside Unified	66.9
68452	Vista Unified	64.7
75713	Alhambra Unified	64.1
67652	Chaffey Joint Union High	62.9
73569	Oceanside Unified	62.7
68130	Grossmont Union High	62.2
68593	Manteca Unified	62
64881	Pasadena Unified	61.6
67843	Redlands Unified	59.8
68411	Sweetwater Union High	59.6
68338	San Diego Unified	58.1
67314	Elk Grove Unified	54.6
68478	San Francisco Unified	54.4
67447	San Juan Unified	53.2
66266	Napa Valley Unified	52
64568	Glendale Unified	51.9
69427	East Side Union High	51.4
64212	ABC Unified	50.7
66621	Orange Unified	50.3

Appendix F

Permission to use Figure

---------- Forwarded message ---------
From: **The 74 Media** <info@the74million.org>
Date: Sun, Feb 28, 2021 at 1:29 PM
Subject: Re: permission for copyright image
To: Mollee ODay <molleeoday@nnu.edu>, Steve Snyder <steve@the74million.org>

Sure you have permission to use. Would love to see the dissertation when it's done? Always looking for new insights to guide our coverage. I'm the editor of the site, copying my personal email into the chain as well, as we only check this account once a month or so.

On Wed, Feb 24, 2021 at 9:25 PM Mollee ODay <molleeoday@nnu.edu> wrote:

Good afternoon,
I am a doctoral student at Northwest Nazarene University working on my doctoral dissertation analyzing the impact graduation requirements have on high school graduation rates and college eligibility rates. During my research I have referenced an article from 2018, *In 46 states, high school graduation requirements aren't enough to qualify for nearby public universities.* In this article is a graphic referenced as, Figure 1: States meeting high school graduation requirements quality criteria. I would like to ask permission to use this graphic in my doctoral study. I have included the direct link to the article, for your reference.

Thank you for your time and consideration.

Mollee O'Day
NNU Doctoral Student