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Los Angeles

“Looking for the Light Switch:”

Latina/o/x Student Experience in Transfer Level Math Courses after AB 705

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Education

by

Shelagh Elizabeth Rose

2022

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ABSTRACT OF THE DISSERTATION

“Looking for the Light Switch:”

Latina/o/x Student Experience in Transfer Level Math Courses after AB 705

by

Shelagh Elizabeth Rose

Doctor of Education

University of California, Los Angeles, 2022

Professor Cecilia Rios-Aguilar, Committee Chair

Although Assembly Bill 705 has done much to increase completion of transfer level math in the California Community College system, historically marginalized students including the Latina/o/x student population continue to experience equity gaps in transfer-level math completion. This qualitative case study investigated the experiences of Latina/o/x students at a community college that fully implemented the legislation by the Fall 2019 deadline by eliminating all prerequisite remediation. The data were collected through student focus groups, one-on-one student interviews, and classroom observations. The findings revealed that students require additional support in the form of career and academic advising to inform their choices of classes including whether to enroll in a corequisite. They also indicated that students experience math anxiety that can be reduced through academic validation from their instructors and would benefit from demystifying resources such as tutoring. Implications included the need to reimagine math instruction in ways that recognize students’ funds of identity through culturally

reflective curriculum and peer collaboration and that leverage first generation students' aspirational motivations for attending college through real life math applications. The experiences and perceptions of these students can be utilized to inform on-going AB 705 implementation efforts.

The dissertation of Shelagh Elizabeth Rose is approved.

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2022

DEDICATION

To my parents, Robert and Kathleen Rose.
Without you, this would not have been possible.

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CHAPTER ONE: INTRODUCTION

This study investigated the implementation process of AB 705 at one universal access community college, focusing on the experiences of Latina/o/x students enrolled in transfer level math classes with or without a corequisite math support course. The case study described the implementation process. It also explored the experiences and perceptions of students through the matriculation process as well as their experience in the corequisite course. The study identified additional supports needed for and barriers to successfully achieving the intent of the legislation.

Background to the Problem

With 116 colleges and approximately 2.1 million students, the California Community College (CCC) is the largest system of higher education in the world. It is also the higher education sector that serves the largest proportion of Latina/o/x students. In 2017-18, 44.54% of the students in the CCC identified as Hispanic (California Community College Chancellor's Office). Nationally, college attendance by Latina/o/x students has increased dramatically, yet this student population continues to experience lower completion rates than Asian and White students; in fact, the majority leave without completing a degree (Fry, 2002; Nora & Crisp, 2010). Latina/o/x students disproportionately attend community colleges; they are also more likely to attend part-time. These factors are associated with lower rates of bachelor's degree achievement (Arbona & Nora, 2007; Bailey, 2016)), as are attending low-performing high schools, first generation status, and work and family responsibilities.

Not surprisingly, Latina/o/x students often enter community college with lower levels of preparation for transfer level math classes (Crisp et al., 2017; Adelman, 2006; Brown & Niemi, 2007). This lack of preparation contributes to the overrepresentation of Latina/o/x students in remedial math classes and lower levels of success in math than experienced by White and Asian

students (Nora & Crisp, 2012). Latina/o/x students placing into remedial math classes have also been consistently placed in lower levels than their peers (Bahr, 2010), drastically reducing their chances of reaching transfer level math. Widespread use of standardized tests results in many of these remedial placements; further, these tests disproportionately place African-American and Latina/o/x students into remedial courses (Perry et al., 2010).

Because of the length of developmental sequences, students' time to completion is significantly increased. Remedial courses provide additional opportunities for students to exit both the math sequence and college (Kosiewicz et al., 2016). In fact, placing three levels or more below transfer level in math results in a less than 10% chance of completing remedial coursework and entering a college level math class (Hayward et al., 2014). Additional coursework also significantly reduces the likelihood that students who begin in a remedial course will achieve a degree or certificate (Lundberg et al., 2018).

To address disproportionate numbers of Latina/o/x and African American students in remedial math and English and low completion rates in these courses (Bailey, 2009), community colleges across the United States have experimented with curricular and structural changes. These changes include creating partnerships with high schools, designing twelfth grade transition courses, accelerating remedial sequences, and partially or completely eliminating all required remediation (Complete College America, 2012). Reduction of remedial coursework is also a key component of Guided Pathways, a national reform initiative stemming from the Community College Research Center at Columbia University that promotes guiding students quickly into a program of study to reduce time to completion (Bailey et al., 2015).

After years of trying to fix remediation through well-funded programs including the Basic Skills Initiative (Asera, 2020) and Student Equity (Felix & Castro, 2018), the state of

California passed Assembly Bill 705. Beginning in Fall 2019, this revolutionary legislation requires community colleges to rely primarily on high school performance measures to place students in math and English; it also requires colleges to provide direct access to credit-bearing courses to maximize the possibility that students complete transfer level math and English in their first year (Hern, 2019).

AB 705 is designed to increase student completion of transfer level math. A radical paradigm shift is required due to the history of extensive remedial offerings at community colleges and high proportion of students placed in these classes (Bettinger & Long, 2005). The effectiveness of AB 705 implementation will determine whether it increases outcomes for disproportionately impacted students including Latina/o/x students. Initial implementation data reveal significant increases in completion of transfer level math and English by all racial and ethnic groups (Cuellar Mejia et al., 2020). However, Latina/o/x students continue to experience significant equity gaps in completion of these courses. To discover the potential causes of these gaps, we need to investigate the experiences and perceptions of Latina/o/x students during the application, orientation, and registration process and their experience in core and corequisite math classes.

Inclusion of student voice is critical as implementing AB 705 demands a profound change in practice for community colleges. It requires colleges to think through a myriad of complex decisions, each with the potential to impact the success of the legislatively mandated reform. Colleges can learn from students' experience with key aspects of implementation including placement in transfer level courses and the communication about when to enroll and whether they should take support courses. Colleges stand to gain valuable insight about how and when to communicate with feeder high schools and how to develop processes that accurately

place students in math courses aligned with their career and major goals. Qualitative data about student experience can allow colleges to make more informed decisions about whether to offer corequisite support courses and how to design them, how to effectively schedule math classes to maximize completion, and how to prepare faculty to teach students with various levels of preparation and self-confidence about taking transfer level math. Increasing AB 705's potential to close equity gaps requires colleges to consider the experiences of Latina/o/x students from the time of application through participation in transfer level math courses.

Gaps in the Research

To best implement AB 705, we need to know how students experience being placed in transfer level classes. Due to the relative newness of AB 705 and the scope of the mandated changes, described as a “major transformation” of developmental education in the California Community College (Rodriguez et al., 2016), limited information currently exists about how to effectively implement the legislation. Preliminary implementation reports suggest some practices may result in higher first year completion rates for transfer level math and English. These practices include offering high percentages of transfer-only courses, scheduling corequisite support courses, and sharing remedial and non-remedial success data with students (Hern, 2019a; Hern, 2019b). However, we lack data about students' experience of these changes. We also would benefit from knowing more about students' understanding and perceptions of their placement in transfer level math and English and their enrollment decision making process. Community colleges exert significant effort to comply with the legislation and to communicate the changes to students. However, a gap exists in the data about student understanding of the changes and how their understanding, or lack thereof, impacts behaviors including which classes they choose to take and whether they select a corequisite course.

In spite of promising early implementation data for AB 705, equity gaps continue to exist for Latina/o/x students (Cuellar Mejia et al., 2020). To increase completion and close equity gaps, we require data about the experiences of students and specifically Latina/o/x students in corequisite classes. This data can inform areas of implementation in need of attention: support for math faculty to shift from a deficit mindset about student capacity, their preparation to differentiate instruction, and their training to teach courses outside their own disciplinary studies (Hern, 2019b). Colleges know little about what influences students' course selection, thus highlighting the need to collect data on how students learn about which math classes they should enroll in to ensure that students who will benefit from corequisite courses enroll in them (Hern, 2019b).

While initial implementation studies focus on completion data and report qualitative data from faculty, staff, and administrators about AB 705 implementation, none include student voice about their experience. This study provides valuable insights into students' understanding of their placement, their course selection process, and their perceptions of the value of corequisite math courses. Colleges can draw upon these data to incorporate Latina/o/x student voice as they make on-going decisions about AB 705 implementation.

Research Questions

- What are the experiences and perceptions of Latina/o/x students during the application, orientation, and registration process as they relate to AB 705 at RCCC?
- What are the experiences and perceptions of Latina/o/x students in core and corequisite math classes designed to increase success in transfer level math?
- According to Latina/o/x community college students, what are the qualities of core and corequisite math classes that support Latina/o/x student success in transfer level math?

Study Design

I conducted a qualitative case study to explore the experiences of the constituent group least studied in the implementation of AB 705—students. Case studies allow for exploration of a phenomenon occurring at a particular site during a specific time frame. By utilizing a range of data collection methods, I was able to conduct an in depth analysis of the case (Creswell & Creswell, 2017). The case study approach is appropriate due to the uniqueness of the site selected, one of two colleges that fully implemented AB 705 according to the legislation’s timeline. The newness of the legislation and the individuality of each college’s response to how to implement the law also align with this approach.

Since colleges began to implement AB 705, quantitative data has been collected about student retention, persistence, and success rates: further, qualitative data exists about the experiences of faculty, staff, and administration in the implementation process. Yet, we lack information about students’ experience navigating the placement and registration process and about their experiences in core and corequisite math courses. Therefore, a qualitative approach allowed for in-depth exploration into the experiences and reactions of students to the implementation. As Maxwell (2012) describes, qualitative studies are dedicated to not only understanding events, but also of “how the participants in your study make sense of these” (p. 30). This information could impact implementation decisions going forward including how we inform students about their placement and course options including whether to enroll in a corequisite course.

I conducted focus groups and semi-structured interviews of students to explore their experiences with the placement and registration process and their experiences in and perceptions of corequisite math courses. In addition, I observed several math corequisite courses to gain

additional insight into the student experience and qualities of effective courses. To more fully understand the effect of AB 705 on a student population who have historically experienced equity gaps in remedial math, I interviewed Latina/o/x students at an HSI with approximately 50% Latina/o/x students.

Site Selection

Rose City Community College (RCCC), one of two colleges that reported 100 percent offerings of transfer level math and English in the first semester of AB 705 implementation (Hern, 2019a), is classified as a strong implementer. A model for other colleges, RCCC still experiences challenges implementing the legislation to maximize successful completion of transfer level math and English, especially for the largest population of students at the college, Latina/o/x students.

Study Significance

As one of two colleges achieving 100 percent implementation of AB 705 in math and English by the Fall 2019 implementation deadline, RCCC leads the state in adopting these mandated curricular changes. Investigating the student perspective at a single college attempting to fully implement this law can provide valuable information. Areas for investigation included communication with students in the matriculation process as well as corequisite course curricular design, enrollment management, and professional development for instructors. This information is useful to all community colleges implementing AB 705, especially Hispanic Serving Institutions (HSIs) whose Latina/o/x students continue to experience equity gaps despite AB 705 implementation.

CHAPTER TWO: LITERATURE REVIEW

System-wide low completion rates and persistent equity gaps experienced by Latina/o/x and African-American students prevent California Community Colleges from delivering on their potential for students of color. Research has demonstrated that long remedial sequences in math and English have greatly contributed to these problems (Bailey, 2009; Bailey et al., 2010; Ngo & Kosiewicz, 2017; Martorell & McFarland, 2011; Fong et al., 2015).

Despite decades of investments and various efforts to improve outcomes for students who are placed into remedial courses, the vast majority of students and specifically Latina/o/x students fail to reach transfer level math and English (Acevedo-Gil et al., 2014; Fong et al., 2015; Nora & Crisp, 2012). To address this issue, the California legislature passed Assembly Bill 705, which requires community colleges starting in fall of 2019 to replace standardized placement tests with high school performance data and to eliminate or drastically reduce developmental sequences. Early data gathered on AB 705 implementation suggest that the legislation is contributing to increased success rates in transfer level math and English from students of all racial and ethnic backgrounds (Hern, 2019a; Hern 2019b; Cuellar Mejia et al., 2020).

In this literature review, I first describe the challenges experienced by Latina/o/x students in their attempts to complete their college education, the inseparable history of remediation and community colleges, and the impact of remediation on completion rates. Next, I explore the efforts prior to AB 705 to improve remediation in California, the growing evidence that eliminating remediation was the only solution, and the text of the bill itself. I then describe statewide implementation efforts and models for corequisite math courses. Finally, I conclude

with a brief overview of the literature on effective practices in math instruction. I then apply the complementary theories of academic validation and funds of identity to the study.

Latina/o/x Student Success in Community College

Although Latinos comprise 18.5% of the national population, they make up 27% of the country's public community college population and are more likely to attend a public two-year college than any other sector of higher education (Mcfarland et al., 2019). Compared to students from other racial or ethnic groups, they are also more likely to choose community college over other sectors of higher education (Adelman, 2005; de Brey et al., 2019). While associate degree attainment has steadily increased for Latina/o/x students, after three years of enrollment only 33% of students will have earned an associate degree while 42% will no longer be enrolled (Santiago, 2018). The majority of Latina/o/x students who begin at community college aim to transfer to a four-year university and complete a Bachelor's degree (Arbona & Nora, 2007; Crisp & Nora, 2010; Gándara, Alvarado, Driscoll, & Orfield, 2012). However, in California, transfer is also taking longer with only two percent of Latina/o/x students transferring within two years and 31% within six years; at the same time, the state is feeling pressure to drastically increase the number of working adults with degrees to 60% in order to meet market demand for educated workers (Bates et al., 2018).

The majority of research on student success, including community college retention and success by Latina/o/x students, has focused on student characteristics such as academic preparation, number of hours working, financial aid award, and parental degree attainment (Crisp & Nora, 2010). More recently, colleges have shifted from placing responsibility for lack of academic success solely on the students. Instead, the attention has turned to the role of the institution including offerings of career exploration resources, expenditures on academic support,

levels of faculty/student interaction, learning communities, and group advisement (Herrera, 2012). With a new focus on institutional barriers, current recommendations to increase Latina/o/x student degree completion include increasing access to financial aid and hiring more Latina/o/x faculty and administration; curriculum related changes center on creating streamlined associate degrees for transfer and reducing time to completion by eliminating remediation in English and math (Bates et al., 2018).

Placement in remediation has been shown to radically decrease students' chances of making progress toward their academic goals, especially when students start several levels below transfer. Developed with the goal of preparing students for "college-level" work, remedial courses have not been definitively demonstrated to increase students' skill level or chances of success in transfer level courses (Attewell et al., 2006; Bahr, 2008; Bettinger & Long, 2005). In the CCC system, for students who began three levels below transfer in math, a mere seven percent could expect to complete transfer level math within three years while 19% of students beginning at this level completed English (RP Group, 2014). These statistics cause serious racial equity concerns due to the disproportionate representation of students in remedial education in the nation's public 2-year colleges, where 78% of Black/African American and 75% of Latina/o/x students enrolled in remedial classes (Chen, 2016).

In California, efforts to address the remediation barrier have been multiple and decades long. The most notable of these was the Basic Skills Initiative, a statewide effort launched in 2005 that included annual funding in the tens of millions of dollars (Fiero, 2013). However, efforts to improve remediation fell short of the goal to markedly increase student outcomes. They failed Latina/o/x and African American students in particular as they continued to experience equity gaps resulting from placement in long remedial sequences. Ironically, the low success

rates in remedial courses could now be measured because of a tool that came out of the Basic Skills Initiative, the Basic Skills Cohort tracker; this tool allowed individual colleges access to their own disaggregated success and throughput data for cohorts of students placed into remedial courses (Asera, 2020). To fully understand the challenge of fixing remediation, it is necessary first to investigate its long history and inextricable relationship with the community college system.

A Brief History of Remedial Education

To provide context for the persistence of equity gaps in community colleges, it is important to understand the history of remediation in higher education in the United States. Today, remediation is viewed as a barrier to college completion and contributing factor for disparities in educational outcomes experienced by African American and Latina/o/x students; however, remedial education was first developed to increase enrollments at elite private schools and offered to the most privileged of students in higher education (Arendale, 2010). With the expansion of higher education through legislation including the Morrill Act of 1862 (US Department of the Treasury, 2012) and the GI Bill, increasing numbers of less well-prepared students attempted to complete a college education, resulting in a rapid expansion of remedial course offerings (Dotzler, 2003; Young, 2008). So widespread was the demand for remediation that a new system of colleges, referred to as junior colleges, was established and tasked with the responsibility of preparing large numbers of students for the rigors of university (Young, 2008; Burke, 2008).

In 1947, Truman's Commission on Higher Education for American Democracy shifted the focus of the junior college from preparation for university to service to the community. The renamed community colleges would now take on vocational training and adult education in

addition to offering two-year terminal degrees and preparing students to continue on to a university (Burke, 2008). This shift in mission, rather than diminishing the need for remediation, yet again expanded the segment of the population who had access to college, resulting in the need to offer additional courses in basic academic skills.

From the 1950s to the 1970s, access to higher education expanded significantly as a result of the Civil Rights movement and equal opportunity legislation. In these three decades, college enrollment tripled, with only 15% of 18 to 24 years old attending college in the early 1950s compared to 45% of this age group attending by the 1970s (National Center for Education Statistics, 1993). Many rural and inner city students as well as students of color entering colleges at this time were required to first complete remedial education; conversely, their privileged white peers, who entered better prepared for the rigors of a college education, did not (Arendale, 2010). Consequently, remedial education became associated with students of color for the first time during this era.

For decades now, the majority of African American and Latina/o/x students entering community colleges have been required to enroll in remedial math courses and at higher numbers than their white and Asian peers (Chen, 2016). These students, many of whom have not received adequate academic preparation from their high schools, have been classified as the “underserved half (Deil-Amen & DeLuca, 2010). The remedial courses these students have typically been funneled into were originally designed to prepare students who lacked access to a quality secondary education and increase their chances of completing a university degree. However, these courses have been identified as a barrier to completion that extended the time required to complete a degree and provided multiple opportunities for students to either fail or drop out (Bailey et al., 2010).

Countering long-held beliefs that compensatory education would address educational inequalities in K-12 schools, many now assert that racially biased standardized placement tests have disproportionately relegated African American and Latina/o/x students to long remedial sequences that compound the harm of educational inequity. In fact, students who begin in remedial classes are less likely to complete the requisite number of college credits to establish academic momentum, leading to lower levels of degree completion (Boatman & Long, 2010; Martorell & McFarlin, 2011).

The Problem with Remediation

The current trend of states eliminating or drastically reducing remedial course offerings (Rutschow et al., 2019) is a response to an increasingly well-documented barrier to educational goal completion. Between 40-60% of students entering the United States higher education system have been required to take remedial courses at a cost of 1.3 billion dollars annually (Jimenez et al., 2016). Community college remediation rates are significantly higher with two-thirds of students being placed into remedial math and/or English (Bailey et al., 2010). Of these students, fewer than half complete developmental course sequences, and only a fifth of students placed in remedial math complete a transfer level course within three years of taking a developmental math course (Bailey et al., 2016, p. 26). With transfer level math and English being required for completion, students who start in remedial sequences are less likely to earn a degree than students who are not placed in these courses. In fact, as few as one-fourth of community college students enrolling in remedial coursework finish college in eight years in comparison to 40% of students who start in transfer level math and English (Bailey, 2009).

With 78% of Black/African American students and 75% of Latina/o/x students, compared to 64% of White students, taking developmental courses; students of color are disproportionately

represented in remedial education in two year colleges (Chen, 2016, p.18). This accounts for at least a portion of the equity gaps experienced by these students. Complete College America (2012) has condemned remediation as engineered for failure both because of the high rates of discouraged students who fail to show up for their remedial courses and for the barriers erected between students and gateway transfer level courses. This problem has been compounded by well-meaning teachers and counselors' attempts to destigmatize remediation and to rescue students from challenging transfer level coursework (Deil-Amen & Rosenbaum, 2002).

In the last decade, Complete College America has been joined by other educational reform groups including the Center for American Progress (2016) and Community College Research Center (Bailey et al., 2010) in demanding changes to remediation. Recommended changes include creating accelerated sequences of remedial coursework (Complete College America) and increasing communication between K-12 and colleges so that students arrive better prepared and informed of expectations (CAP).

Pre Assembly Bill 705 Efforts to Reform Remediation in California

In 2006, as part of a new strategic plan focusing on student success and readiness, the California Community College Board of Governors (BOG) committed to the California Basic Skills Initiative (BSI). In support, the California Community College Chancellor's Office (CCCCO) dedicated \$31 million per year to fund the statewide efforts (California Community College Chancellor's Office, 2006). The plan and BSI funding coincided with the BOG raising the statewide minimum Associate degree requirements to freshman composition for English and intermediate algebra for math, with changes to take effect in Fall 2009. To support remedial reform efforts called for by the BSI, the CCCCCO commissioned the Research and Planning (RP) Group to publish *Basic Skills as a Foundation for Student Success in California Community*

Colleges. Commonly referred to as the “poppy copy” due to its bright orange cover, the study included a literature review of basic skills best practices and a self-assessment tool for colleges to measure their reform efforts (Boroch et al., 2007). The CCCCO also instituted the California Community College Success Network (3CSN) as a statewide professional development network dedicated to supporting BSI efforts (Asera, 2020).

Despite these significant investments of human and financial resources, limited adoption of significant instructional changes resulted in modest gains at best in basic skills completion in math and English (Cooper, 2014). However, one affiliated effort of the BSI showed promise for successfully moving students into transfer level English in a timely fashion--accelerated developmental sequences. Acceleration efforts in California were initiated by Myra Snell, math faculty at Los Medanos College, and Katie Hern, a faculty member in the English Department at Chabot College (Complete College America). Joining 3CSN as a Community of Practice in 2011, Hern and Snell leveraged the California Acceleration Project (CAP) to convince faculty across the state that long developmental sequences created high attrition rates caused by multiple exit points, often referred to as leakage, from one course to the next (Hern, 2012).

As acceleration spread statewide, CAP and 3CSN commissioned an evaluation of the intervention. The results published in the RP Group’s *Curricular Redesign and Gatekeeper Completion: A Multi-College Evaluation of the California Acceleration Project (2014)* revealed that students in accelerated English sequences were 1.5 times more likely to complete freshman composition and 2.3 times more likely to complete when enrolled in a high-acceleration model. Further, students in accelerated math sequences were 4.5 times more likely to complete a transfer level math class compared to students in unaltered remedial sequences. These results were also promising in terms of equity as they held true for students of all races and genders, for English

language learners, for low income students, and, perhaps most importantly, for students at all placement levels.

Armed with data, CAP could now advocate that colleges stop relying primarily on placement tests. Concurrently, Long Beach City College piloted an alternate approach to placement that included high school course completion and GPA in their multiple measures. Based on the success of this experiment, the RP group partnered with the CCCCO to conduct the Student Transcript Enhanced Placement Study (STEPS) at 11 colleges. This study demonstrated the predictive potential of high school transcript data for college English and to some extent college math (Willet, 2013).

The Argument for Eliminating Remediation/Placement Testing

Conservative efforts to improve developmental education failed to deliver significant improvements in student outcomes. As a consequence, calls soon arose to directly place students in transfer level classes and offer supplemental instruction in place of required developmental coursework (Bailey, 2009).

One powerful argument for eliminating remediation is evidence that students usually required to take these courses often succeed when given direct access to transfer level classes. In a randomized controlled trial conducted at three CUNY campuses, Logue, Watanabe-Rose and Douglas (2016) discovered that when placed directly in transfer level statistics with support, the majority of students who tested into remedial work passed the course. Studies also demonstrated that taking college-level math as a first course led to higher rates of educational goal completion than starting in developmental math (Logue et al., 2016; Okimoto & Heck, 2015).

A second argument for eliminating required developmental courses is the reliance on placing students using standardized tests. These exams have been proven to be poor predictors of

students' ability to succeed in college level courses, especially when compared to high school grade point average, a much more accurate tool for predicting student capacity (Belfield & Crosta, 2012). Also, standardized tests have disproportionately negative effects on students of color. Soares (2012) makes a strong case that "the more one relies on standardized tests, the more social disparities unfavorable to racial minorities, women, and low socioeconomic status (SES) students are passed along" (p. 66). In fact, prior to AB 705 the majority of Latina/o/x students in remedial math in California's community colleges were placed three levels or more below college-level in math, (Perry et al., 2010). As a result, fewer than six percent of these students reached transfer level math within three years (Basic Skills Cohort Tracker). Eliminating standardized tests and relying instead on high school GPA has been shown to significantly benefit Latina/o/x students, who place at higher rates into transfer level courses (Scott-Clayton & Stacey, 2015).

In response to increasing evidence that remediation harmed students more than helped them, several states, beginning with Florida in 2013, decided to reverse the practice of using standardized placement tests to enroll students in non-college credit bearing coursework. Starting in 2014, community college students in Florida could choose to enroll in developmental or transfer level courses; this led to fewer students opting for remedial classes and resulted in increases in the proportion of students passing a gateway math or English class in their first year (Hu et al., 2016). Other states including Texas and Tennessee soon adopted similar reforms to remediation (Rutschow et al., 2019). Following suit, California's state assembly asserted the potential to increase student outcomes through elimination of remedial classes by enacting Assembly Bill 705, which has forced colleges to eliminate prerequisite remedial math and English courses.

Assembly Bill No. 705

Assembly Bill No. 705 Chapter 745 amends Section 78213 of the Education Code, which pertains to community colleges. The landmark legislation has significantly altered the mission of the California Community College by eliminating long sequences of remedial course offerings in English and math. After a century of providing developmental education to prepare students for “college level” work, the bill now requires community colleges “to maximize the probability that the student will enter and complete transfer level coursework in English and mathematics within a one-year timeframe,” while allowing up to three years for completion of transfer level English if a student begins in English as a Second Language (p. 1). It also requires that colleges replace standardized placement tests and instead use some combination of high school coursework, high school grades, and high school grade point average, which have greater predictability of success.

Included in the law are data-based justifications for why it is needed. The arguments for eliminating remediation stated in the law include a 75% remediation rate for students entering community college and 30 percentage point completion gap for students placed into remedial math and English compared to their peers who start in transfer level classes. The bill also acknowledges equity issues related to remediation, including the propensity for placement tests to place students of color into nontransferable courses.

The bill recognizes that the practice of placing the majority of community college students in remedial math and English had previously been addressed legally, but that legislation designed to prevent this practice had been consistently violated. In fact, the bill specifically references rules established by the CCC Board of Governors that allow students access to courses which they have the potential to succeed in. These rules were created as the result of a 1991 Mexican American Legal Defense and Education Fund lawsuit over the disproportionate

placement of Latina/o/x students into remedial sequences. Title 5 of the California Code of Regulations also codifies the required use of multiple measures to place students. However, the bill's text states that, in spite of this requirement, placement tests were still primarily relied upon for course placement throughout the CCC system. It also concedes that Title 5 provides insufficient guidance in how multiple measures should be implemented. Section 55003 is referenced as an additional existing legal measure that allows community colleges to require enrollment in prerequisite courses only when a student is "highly unlikely" to earn a passing grade in the higher-level course. This policy was also ignored, especially in math as a result of "broad exceptions" that permit community colleges to require developmental coursework.

The bill's primary purpose then is to clarify and unify existing policies that protect students from being required to enroll in prerequisite courses prior to taking a transfer level course. It also provides clear guidelines for implementation with the ultimate goal of reducing the time required to complete a degree or certificate or to transfer. The bill gives the authority over "measures, instruments and placement models" to the Board of Governors, thereby preventing colleges from continuing to use ineffective and inequitable placement measures, especially standardized placement tests.

AB 705 references previously existing legislation that prohibits remediation except in cases when students are "highly unlikely" to pass transfer level math and English classes. Furthermore, it adds the additional requirement that colleges conduct placement research including high school measures (coursework, grades earned and overall GPA) to demonstrate a student's status as "highly unlikely" to succeed in those classes. Although the bill intends to greatly reduce or eliminate offerings of remedial math and English courses, it allows for concurrent support classes but requires colleges to conduct research to prove the beneficial effect

of enrollment in these classes. Recognizing that lack of access to high school performance data for placement purposes may have prevented the required use of multiple measures, the law also recommends collaboration between the State Department of Education and the CCC Chancellor's Office to make this data available. However, it also allows students to self-report high school performance data or self-placement in the absence of such data.

Implementation of AB 705 throughout California

In preparation for full implementation of AB 705 in fall 2019, many colleges initiated changes to their math and English offerings in the years prior. Statewide from 2017 to 2018, African American and Latina/o/x students experienced dramatic increases in access to transfer level English, 40% and 39% respectively, and to a lesser extent to transfer level math, with increases from 20 to 30% for African American and from 24 to 36% for Latina/o/x students (RP Group, 2019). These numbers proved predictive of AB 705 implementation with a significant increase in access to transfer level classes with higher rates of access in English compared to math.

The Public Policy Institute of California (PPIC) corroborated these initial findings. In a November 2020 implementation report summarizing student outcomes, the data included in the report reveal that access to transfer level courses drastically increased with 96% of students enrolling in freshman composition and 78% accessing college level math (Cuellar Mejia et al., 2020). Equity gaps in access to transfer level classes also significantly decreased as evidenced by a 31% gap in 2015 between White and Latina/o/x students accessing college composition, which had narrowed to 1% in fall 2019 and a 12% gap in math that narrowed to 4% in the same time frame. As gaps in access have significantly decreased, equity gaps in completion persist with 73 and 71% of Asian Americans and Whites completing college composition compared to 56% of

Latinos and 48% of African Americans. Math completion rates reflect similar gaps with 57% of Asian Americans and 49% of Whites passing while only 33% of Latina/o/x and 29% of African American students experienced success.

Whereas access to transfer level math has dramatically increased under AB 705 implementation, the number of enrollments in math decreased statewide with approximately 27,000 fewer first time students enrolling in 2019 than in 2015-2017. These declining math enrollments could be explained by students delaying math until they have decided upon their major, avoiding the challenge of transfer level courses or choosing to take math and English in different semesters because of high unit loads due to corequisites. However, enrollment management could play a role with colleges facing the challenge of finding teachers who are prepared to teach college level courses including statistics. Although these decreased enrollments are concerning, the significant increases in access to transfer level classes and resulting higher throughput rates outweigh the potential negative effects.

Also encouraging are the increased numbers of students of color selecting math courses that are prerequisites for business and STEM programs. According to the PPIC report, although two-thirds of students enter a statistics or liberal arts math (SLAM) pathway, 57% more students are accessing a business, science, technology, engineering, and math (BSTEM) pathway than previously; further, Latina/o/x students represent 62% of these increased enrollments. Despite the encouraging statistics for increased access to transfer level math, only two colleges of the 116 in the system offered universal access to transfer level math by the 2019 deadline. Eighteen colleges were categorized as “higher access” because at least 90% of students had access to transfer level math. However, 23 colleges were designated as “lower access” with fewer than 65% of first time students enrolling in transfer level math.

Early analysis of “higher access” and “lower access” colleges suggests that the distinction lies in placement practices. Previous studies confirm that prior to AB 705 colleges did not follow the requirements to rely on multiple measures; instead they primarily used standardized tests to place students in math (Rodriguez et al., 2016). As reported in the PPIC brief, since AB 705 has been implemented, all colleges now rely to some extent on multiple measures and are relying primarily on high school GPA. However, “higher access” colleges are more likely (36%) to consider other measures, including SAT/ACT, AP scores, and/or the Early Assessment Program (EAP), in a “disjunctive (either/or)” approach in order to determine students’ readiness for transfer level math (p. 48). This approach provides multiple opportunities for students to show their readiness. Conversely, “lower access” colleges are more likely to consider measures in a “conjunctive (both/and)” approach that requires students to fulfill two or more requirements in order to access a transfer level math course (p. 48). Although all colleges have revised their placement processes as a result of AB 705, many continue to deny students full access to transfer level coursework through restrictive placement procedures.

Corequisite Math Courses

One promising practice in AB 705 implementation is the replacement of prerequisite remediation with corequisite support courses. This model of remediation addresses students’ need for support without increasing time to completion or creating potential exit points. Corequisite remediation is defined as the “placing of students who have been designated as underprepared directly into college-level courses and providing necessary additional supports to help them effectively engage with the college-level coursework” (Dana Center, 2018). Corequisite math courses represent an alternative approach to supporting students who may not have received adequate preparation for transfer level math courses. The design differs from

traditional remediation by eliminating long sequences of developmental education courses that increase time to completion and provide opportunities for students to drop out (Hern & Snell, 2014). Additional benefits include just-in-time instruction on content that is immediately applicable to transfer level coursework (Daugherty et al., 2018; Vandal, 2014) and students' ability to immediately earn credits, a key milestone in degree completion (Offenstein et al., 2010). Placing students in transfer level courses directly with corequisite support also contributes to increased motivation (Scott-Clayton and Rodriguez, 2012). Not surprisingly, concurrent remediation results in significantly higher completion rates in transfer level math, especially when compared to enrollment in prerequisite remediation sequences (Boatman, 2012; Cho et al., 2012; Logue et al., 2019; Meiselman & Schudde, 2020; Ran & Lin, 2019).

With the publication in 2009 of Bailey's game changing article *Challenge and Opportunity: Rethinking the Role and Function of Developmental Education in Community College*, traditional prerequisite remediation was condemned for weeding out students before reaching transfer level coursework. With support from foundations including Lumina and Complete College America, states seeking alternatives to prerequisite remediation began experimenting with corequisite models. In fact, a 2018 survey from the Education Commission of the States documents that twenty-one states or systems had "authorized the use of innovative developmental education instructional methods and interventions" (Whinnery & Pompelia, 2018). Though the report doesn't define these innovative interventions or explain the level of implementation, various states, including Florida, California, Texas and Tennessee, have passed legislation eliminating prerequisite remediation in community colleges (Logue et al., 2019). Several states, though not California as of yet, also require that students assessed as having remedial needs enroll in corequisite support courses (Meiselman & Schudde, 2020).

To support states that committed early to dismantling prerequisite remediation, foundations quickly published recommendations of various approaches based on the level of students' "academic deficiencies" (Complete College America, 2012, p. 9). In one such publication, students with "few academic deficiencies" were advised to enroll in unaltered transfer level courses in the first year with the additional support of tutoring or self-paced computer labs. To support less ready students, colleges were recommended to offer redesigned transfer level courses extending content over two semesters instead of one along with corequisite support. In this model, students demonstrating "the most significant academic needs" would benefit from embedded remediation while pursuing a career certificate that integrated adult basic skills education (p. 9). As California community colleges started to implement AB 705 and design corequisite classes, they drew from these exemplars.

Corequisite Implementation in California

The latest AB 705 implementation study by the PPIC reveals key findings about corequisite courses that I explore in this section: most colleges are offering but not requiring students to enroll in math or English corequisites, Latina/o/x students are overrepresented in these courses and appear to benefit from them, many colleges rely on Directed Self Placement (DSP) to place students in support courses, three distinct models of corequisite courses have emerged, and faculty identify specific beneficial qualities of corequisite courses (Cuellar Mejia et al., 2020).

By passing AB 705 several years after other states eliminated prerequisite remediation, California has benefitted from research demonstrating the effectiveness of corequisite models. Ran and Lin's (2019) study of corequisite implementation at 13 colleges in Tennessee provides compelling causal evidence that students enrolled in corequisite support passed transfer level

math and English classes at significantly higher rates compared to those without the support. This research may explain the extensive offerings of corequisite support across California. The November 2020 AB 705 implementation study by PPIC (Cuellar Mejia et al.) presents a comprehensive look at corequisite courses in California community colleges. It reveals that while most colleges are offering corequisites, few require them for students who would likely benefit.

Universal access colleges have demonstrated commitment to AB 705 implementation by eliminating prerequisite remediation. They also boast higher rates of corequisite offerings than lower access colleges—94% vs. 71%; furthermore, they require corequisite classes at a higher rate—25% vs. 10%. Cuellar Mejia et al. (2020) conjecture that universal access colleges use of counselors to gather Directed Self Placement (DSP) data suggests that counselors help students decide whether to enroll in corequisite courses. If this is true, the high counselor-student ratios, as high as 1,800 to 1 (Student Success Task Force), and resulting lack of timely access to counseling may present a barrier to students making an informed decision.

In fall 2019, 101 of 116 California community colleges offered a corequisite support course in English. Latina/o/x students were overrepresented in corequisite models compared to standard composition courses (60% vs. 52%); promisingly, these students experienced increased success when enrolled in corequisite support compared to stand-alone composition classes. Faculty interviewed for the 2020 PPIC study reported specific qualities of successful English corequisite courses including increased instructional time, just-in-time remediation, collaborative classrooms, a culturally relevant and rigorous curriculum, attention to the affective domain, and on-going professional development.

Despite higher success rates in transfer level English for students enrolled simultaneously in a support course, a minority of students are accessing these courses. In fact, colleges typically enrolled 10 to 40% of students in corequisite models. These low enrollments could result from over half of colleges making corequisite support optional. Relying on factors such as historical course offerings and faculty availability to schedule these courses could present an additional barrier to students accessing corequisite courses. (Cuellar Mejia et al., 2020).

The models of corequisite composition support adopted by California community colleges since implementing AB 705 fall into three categories: linked, commingled, or enhanced. The linked model, adopted by 83 colleges, pairs a separate support course, often taught by the same instructor, with a transfer level class. The challenge of scheduling linked courses may provide an additional explanation for the limited number of corequisite offerings. Commingled classes, offered by 10 colleges, enrolled students taking only the core course along with those taking an additional support class. Fifteen colleges offered enhanced courses, a single higher unit composition class with embedded support. Although the comparative efficacy of these distinct models has not yet been measured, a higher share of corequisite models at a college correlates with a weak but positive throughput rate in English (Cuellar-Mejia et al., 2020).

In fall 2019, 95 colleges offered a math corequisite. As with English composition, higher access colleges were significantly more likely both to offer math corequisites and require students to take them compared to lower access colleges. In cases where students decided whether to enroll, speaking to a counselor was recommended, a problematic recommendation based on high counseling caseloads. Of the 95 colleges, support classes were most often paired with statistics (90) followed by trigonometry/precalculus (58), college algebra (49), applied calculus (23) and liberal arts math (19) (p. 61). Despite extensive offerings statewide and

emerging evidence that corequisite support increases success in college level math (Logue et al., 2019; Ran and Lin, 2019), only 18% of first time students registered for a paired math support course.

As with English, Latina/o/x students are overrepresented in math corequisite classes compared to stand-alone math courses (58% vs. 50%). They also are more likely to succeed when enrolled in a paired support course in both BSTEM and SLAM courses than when taking the transfer level class without a corequisite. However, equity gaps persist with Latina/o/x students experiencing only 70% of the success experienced by white students.

When interviewed, math faculty identified several features of corequisite courses that support success in transfer level math: the same instructor, just-in-time remediation, collaboration, attention to the affective domain, and relevant and rigorous curriculum. When asked to specifically identify practices with the potential to close equity gaps, faculty highlighted attention to the affective domain as well as creating a close classroom community, limiting high stakes tests, and professional development including training on addressing implicit bias. Unfortunately, lack of wide access to professional development may result in poorly designed corequisite classes; further, lack of equity-focused professional development could result in faculty bringing a deficit mindset to the classroom.

Effective Practices in Math Education

For AB 705 to deliver on its promise of closing equity gaps and increasing completion of transfer level math, corequisite courses should align with effective practices in math education. Recently collected qualitative data captures faculty views of what these effective practices consist of including student collaboration, culturally relevant curriculum, and attention to the affective domain (Cuellar Mejia et al., 2020). A survey of the existing quantitative research

conducted by the Community College Research Center corroborates several of these elements (Hodara, 2011).

The qualitative faculty data and existing quantitative data suggest that the failures of prerequisite remediation may result not only from the structural issue of multiple exit points but also from a skills based approach to teaching mathematics that does not align with effective practices. In fact, based on his observations of math classes in California Community Colleges, Grubb (2010) describes a “remedial pedagogy” that focuses on drilling decontextualized minor skills that is characterized by lecture, independent work, and problems disconnected from students’ lived experience (Grubb, 2010).

In contrast to this skills-based approach, The National Research Council identified five strands of mathematical proficiency that instructors must address for students to learn: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition (2001). Taken together, the first four strands, which are knowledge based, reveal that students should not only understand and apply mathematical concepts but also be able to formulate and represent problems and think logically about the relationships between concepts. The fifth strand, productive disposition, which is affective, posits that students need to view “mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy” (p. 16). In other words, students must feel confident that they can learn math and believe that the effort will improve their lives.

The body of research from K-12 and higher education suggests a number of promising instructional approaches that support students’ achievement of the five strands of mathematical proficiency. In a comprehensive review of the existing literature on instructional practices in mathematics, Hodara (2011) grouped existing research from K-12 and higher education into six

categories: student collaboration, metacognition, problem representation, application, understanding student thinking, and computer-based learning. The author grants that each of these six pedagogical approaches has the potential to increase student achievement of mathematical proficiency. However, she concludes that only two of the approaches, student collaboration and problem representation, have compelling evidence in the form of multiple rigorous studies. She also contends that the other approaches need to be further tested using Random Controlled Trials (RCT) as a method.

Although RCTs may add to the existing research on effective mathematical instruction, qualitative data from the student perspective would also assist community colleges to determine how best to support student success in transfer level math. Productive disposition, or students' belief in their potential in and the value of math, is key to students' mathematical proficiency. Therefore, students should be asked what specific practices in their math classes support their development of this disposition.

Conceptual Framework

This study is grounded in the complementary theoretical frameworks of *Theory of Validation* (Rendón, 1994; Rendón-Linares & Muñoz, 2006) and *Funds of Identity* (Esteban-Guitart & Moll, 2014). Both of these theories align with the intention of AB 705 to shift the responsibility for the academic success of students of color onto the institution rather than placing the burden on historically marginalized students. They also provide a frame for investigating whether institutions are validating Latina/o/x students' sense of belonging and self-efficacy in transfer level math and English as they initiate their college studies. Theory of validation and funds of identity further complement each other as students' validation results

when an institutional actor makes “them feel that their prior life experiences and knowledge were valuable” (Rendón-Linares & Muñoz, 2011).

Academic validation is defined as “an enabling, confirming and supportive process initiated by in- and out-of-class agents that fosters academic and interpersonal development” (Rendón, 1994, p. 44). Rendón generated her theory of academic validation as a result of a qualitative study funded by the U.S. Department of Education in the early 1990s. The Transition to College Project involved focus group interviews of 132 students enrolled in different types of higher education institutions. The “non-traditional” students attending the broad access community college and state university were predominately non-white, low-income, and first generation unlike the “traditional” higher-income white students who comprised the student body at a residential liberal arts college and research university. The Project, grounded in Astin’s (1985) student involvement theory, was designed to investigate how academic and social involvement in the educational institution impacted student learning.

By analyzing student responses, Rendón uncovered that non-traditional students, including community college and Latina/o/x students, were more likely to doubt their ability to succeed in college than their traditional peers. She also interrogated the concept of involvement, which puts the onus on students to invest time and energy into learning on their own while the institution assumes a passive role as it “simply affords students the mechanisms (i.e., organizations, tutoring centers, extracurricular activities) to get involved” (Rendón, 1994, p. 43). In contrast, the study revealed that nontraditional students thrive when they are validated by the institution, which occurs when an agent of the college “takes an active role in assisting them” (p. 44).

Rendón's theory asserts that students can succeed academically when validated by institutional agents. Because validation is most impactful as students enter college and especially in the first weeks in the classroom, it is critical that early interactions with faculty validate students' belonging in higher education. Rendón's (1994) analysis of student interview responses provides a guide for faculty to academically validate students in the classroom that includes showing "genuine concern for teaching students," being "personable and approachable," treating students equally, creating classrooms where students "experience themselves as capable of learning," providing individual assistance to students who need it, and providing "meaningful feedback" (p. 40). Students who experience these types of affirmation not only increase their capacity to learn but also their sense of self-worth.

Since its introduction as a framework, scholars have investigated the role of validation in the success of historically marginalized students in higher education. The first survey research to specifically measure the impact of faculty validation demonstrated its role in increasing the sense of integration and persistence of community college students; additionally, the findings suggested that Latina/o/x and female students "may be most likely to respond to faculty validation by continuing their studies at the institution" (Barnett, 2006, p. 112). A quantitative study of over 4,000 students in community colleges and universities also revealed that students of color rely on academic validation from faculty in the classroom in order to feel empowered to learn, a finding that does not hold true for white students (Hurtado et al., 2011). This same study uncovered a "stark difference" in classroom academic validation, with students of color reporting lower levels of validation compared to their white peers (p. 67). Acevedo-Gil et al. (2015) discovered in their study of Latina/o/x developmental math students that both placement into

developmental classes and the remedial pedagogy they experienced in these classes were experienced as invalidating.

Because faculty validation is critical to the academic success of students of color in the community college, we need further clarity on what validation entails. In a 2006 article that revisits validation theory, Rendón Linares and Muñoz emphasize core epistemological and ontological assumptions including the importance of seeing students as whole human beings, of valuing their experiences and ways of knowing, and of recognizing the funds of knowledge that they bring to the classroom.

Funds of knowledge theory insists on an asset-based perspective of student learning and the teaching and learning process that happens inside and outside classrooms and educational institutions. Funds of knowledge recognizes that students acquire knowledge and expertise in the context of their homes and cultural experiences and asks educators to draw upon these to contextualize teaching and increase learning (Moll et al., 1992). Originally applied to K-12 contexts, funds of knowledge has more recently been extended to higher education and used as a lens to investigate topics such as the transition to college and pedagogical practices in college classrooms (Rios-Aguilar & Kiyama, 2012; Kiyama & Rios-Aguilar, 2017). First introduced in 2011 by Saubich and Esteban-Guitart, funds of identity builds upon the earlier theory, exploring how funds of knowledge contribute to an individual's definition of self while acknowledging that identity is also constructed through informal learning experiences and peer interactions. Further developing the concept, Esteban-Guitart (2012) suggested an early definition of funds of identity as "a set of resources or box of tools. These tools have been historically accumulated and culturally developed; they are socially distributed and transmitted; and they are essential for constructing one's identity and for defining and presenting oneself (p. 177).

Funds of identity adopts a Vygotskian perspective, positing that “identity is a conceptual artifact that contains, connects, and enables reflection over the emotional and cognitive processes of self-understanding and self-defining” (Esteban-Guitart & Moll, 2014, p. 34). As each individual experiences the world differently, “lived experience” or the intersection of personal experience with the outside world and cultural context is an essential factor in identity development.

According to Esteban Guitart and Moll (2014) identity is defined by four distinct components:

1. The people, skills, knowledge, practices, and resources that people acquire and utilize in their daily activities
2. Artifacts, internalized and externalized, such as a flag associated with a national identity
3. Social institutions and practices, which serve as sites of social activity and interactions, available for observation and resources for identity formation
4. The social origin of identity as formed through the appropriation of discourses, narratives, and visions of identity

Esteban-Guitart and Moll (2014) originally classified five types of funds of identity (1) geographical; (2) practical; (3) cultural; (4) social and (5) institutional (p. 38). Since their creation, several additional types have been proposed including digital funds of identity, which acknowledges the critical role that technology plays in the identity formation of young people (González-Patiño & Esteban-Guitart, 2014; Poole, 2017). Poole and Huang (2018) also make a case for the recognition of existential funds of identity, arguing that both negative and positive emotions and experiences should be acknowledged in the classroom and as a source of identity formation. Zapata (2019) contends that community college faculty who acknowledge their

students' funds of identity are able to "recognize students' fears, anxieties and pitfalls and strategize pedagogical approaches that teaches to the students' strengths, that recognizes their lived experiences" (p. 33).

Funds of identity, as an asset-based approach to student learning, is a particularly relevant theoretical lens for this study. AB 705, by requiring colleges to maximize completion of college level math and English in the first year, assumes that all students are capable of succeeding in transfer level classes. For this to happen, teachers must recognize students' resources, even those that have been previously overlooked. Recognition of these resources constitutes an affirmation that students are capable of learning, a key element of academic validation. Acknowledgement of funds of identity and academic validation are especially critical for those Latina/o/x students who have historically been excluded from transfer level courses as a result of the widespread use of standardized placement tests, tests which have disproportionately placed Latina/o/x and Black/African American students into remedial math and English courses (Perry et al., 2010).

The drastic reduction or elimination of these remedial sequences as a result of AB 705 has finally granted Latina/o/x students access to the college level classes which they have historically been excluded from. Any attempt, therefore, to learn from the experiences and perceptions of Latina/o/x students in these classes must investigate the extent to which the institution is, or is not, affirming the funds of identity of Latina/o/x students and validating "students as creators of knowledge and as valuable members of the college learning community" (Rendón-Linares & Muñoz, 2011).

Summary

Assembly Bill 705 has resulted in a radical shift in the mission and function of the community college. The legislated change has required community colleges to drastically reduce or eliminate prerequisite remediation in math and English and reconceptualize support for students to increase their chances of success in transfer level courses. Preliminary data reveal that many more students are accessing and experiencing success in transfer level math and English since implementation in 2019. Despite these gains, equity gaps persist for the largest demographic in the California Community College system, Latina/o/x students. Current implementation efforts are informed by initial quantitative data about student performance and qualitative data gathered from faculty, managers, and staff. This study fills a gap in the research by including the Latina/o/x student experience of AB 705 implementation from the moment of application to the college through their experiences in transfer level math and corequisite support courses. This qualitative student data can help to identify supports for and barriers to successfully implementing this groundbreaking legislation.

CHAPTER THREE: METHODS

Prerequisite remediation has resulted in high attrition and low completion rates in community college math and English (Bailey, 2009; Bailey et al., 2010; Ngo & Kosiewicz, 2017; Martorell & McFarland, 2011; Fong et al., 2015). As a response, various states have greatly reduced or eliminated remediation preceding transfer level coursework (Hu et al., 2016; Rutschow et al., 2019). As of Fall 2019, Assembly Bill 705 required all California Community Colleges “to maximize the probability that the student will enter and complete transfer level coursework in English and mathematics within a one-year timeframe” (p. 1). This legislation resulted in drastic increases in access to transfer level math and English and significantly higher throughput rates; however, racial equity gaps persist in course success and throughput, especially in math (Hern, 2019; Cuellar Mejia et al., 2020). Corequisite math remediation offers a promising potential support to success in transfer level classes and recommendations based on faculty interviews exist for the design of these classes. Although quantitative data and qualitative data from faculty, staff, and administrators have been gathered on early AB 705 implementation, prior to this study we lacked data about the student experience related to AB 705 in general and in core and corequisite math classes specifically. These data can inform implementation efforts, improve communications with students about placement and course selection, and influence curriculum and pedagogy.

This study explored how Latina/o/x students experience AB 705 at a California Community College that was one of two full implementers by the Fall 2019 deadline. It investigated the student experience as they apply to the college, navigate orientation and registration, and enroll in and attend core and corequisite math classes. Because the legislation is recent, colleges continue to refine critical implementation decisions including communication of

placement information to new students and corequisite coursework design. Preliminary quantitative data indicate increased success in completion of transfer level math and English. Yet, equity gaps persist in retention, success, and throughput and little is known about the student experience of AB 705 implementation. Therefore, it is critical to gather qualitative data about the largest population of students who continue to experience equity gaps in math completion. This investigation sought to answer the following questions:

Research Questions

1. What are the experiences and perceptions of Latina/o/x students during the application, orientation, and registration process as they relate to AB 705 at RCCC?
2. What are the experiences and perceptions of Latina/o/x students in core and corequisite math classes designed to increase success in transfer level math?
3. According to Latina/o/x community college students, what are the qualities of core and corequisite math classes that support Latina/o/x student success in transfer level math?

Research Design and Rationale

I conducted a qualitative case study to explore the experiences of Latina/o/x students at an HSI that has fully complied with the requirements of AB 705 by eliminating all remedial math and English courses. Preliminary quantitative data have been gathered about course access, retention, success, and throughput; these data indicate increased success in transfer level courses yet persisting racial equity gaps (Cuellar Mejia et al., 2020; Brohawn et al., 2021). Qualitative data have also been gathered from faculty, staff, and administrators in relation to the implementation process, placement approaches, and corequisite course decisions as well as the impact of these changes on equity (Cuellar Mejia et al., 2020). Prior to my study, no similar

qualitative data had been gathered about student experience of AB 705 implementation. Therefore, a qualitative approach allowed for in-depth exploration into the experiences and reactions of students to the implementation of the legislation; this uncovered how they receive information related to placement and course selection and their perceptions of transfer level math with and without corequisite remediation. As Maxwell (2012) describes, qualitative studies are dedicated to not only understanding events, but also of “how the participants in your study make sense of these” (p. 30). This type of study permitted broad exploration of an unstudied population experiencing a novel occurrence in community college education.

Case studies allow the researcher to study a phenomenon occurring at a particular site during a specific time frame. By utilizing a range of data collection methods, the researcher is able to conduct an in depth analysis of the case (Creswell & Creswell, 2017). The primary methods for gathering data in this case study were student focus groups, semi-structured interviews with students, and classroom observations. This in depth individualized approach was warranted due to the uniqueness of the site selected, one of two colleges that fully implemented AB 705 according to the legislation’s timeline, the newness of the legislation, and the individuality of each college’s response to implementation.

Site Selection

The selected community college was one of two full implementers of AB 705 by the 2019 deadline out of the 116 community colleges in the state. Although nearly all California Community Colleges allowed full access to transfer level English, significant gaps in access to transfer level math persist statewide (Cuellar Mejia et al., 2021). Selecting an institution that has fully complied with the law by the established timeline can provide early insight into students’ experience and perceptions of the implementation; this may inform the decisions of colleges in

the process of implementing the law. This study also explored perceptions and experiences of Latina/o/x students in core and corequisite math classes, so it was appropriate to conduct this study at a large Hispanic Serving Institution where approximately 50 percent of students are Latina/o/x.

Participants

The study investigated the experiences and perceptions of Latina/o/x students in regards to AB 705 implementation. This student population comprises nearly 50 percent of the total community college population in California and continues to experience equity gaps in completion of transfer level math and English. Latina/o/x students historically have also been disproportionately placed into the lowest levels of remedial math and English by placement tests (Perry et al., 2010). I conducted three focus groups with a total of 11 student participants, five of whom were enrolled in a concurrent support class and six who were not. I interviewed five Latina/o/x students enrolled in transfer level math without a corequisite support class and seven enrolled in a transfer level math class with a corequisite support class. I had originally planned to interview up to twenty students; however, after analyzing extensive notes for novel themes, I realized that I had achieved saturation prior to reaching that number.

Recruitment

I employed purposeful and snowball sampling in my student recruitment process. Purposeful sampling aligned with the case study method in its “emphasis on in-depth understanding of specific cases: information rich cases” (Patton, 2015). My parameters for student participation asked that students be a full or part-time student at RCCC, to be currently enrolled in a math or statistics course or to have been enrolled in one of these courses in the past year, and to identify as Latina/o/x. I initially recruited by asking my own students in English and

the First Year Seminar to refer friends or family members who fit the criteria. Based on these referrals, I was able to identify seven students to participate in focus groups. I then reached out to the math faculty and asked if I would be able to stop by their face-to-face or Zoom classes to recruit in person. This generated another four students to participate in focus groups and eight students who were willing to be interviewed. I recruited the remaining four students to be interviewed by visiting campus success centers and division offices. The process was slightly more challenging because of the drastically reduced number of students present on campus during the first semester of face-to-face classes after the COVID-19 pandemic. However, I strove to recruit as diverse a group of students as the limited sample size allowed in terms of age, gender, and native vs. non-native speakers of English.

When the Fall 2021 class schedule became available, I reached out to faculty teaching transfer level first semester math and statistics classes both with and without a corequisite to recruit faculty who were willing to be observed. The four faculty who responded were all teaching a concurrent support class, so I decided to observe during the scheduled time for the corequisite course. I selected two face-to-face and two Zoom sessions for the observations as this reflected the modalities of the corequisite course offerings.

Access

I conducted my research at the site where I have taught full-time for twenty-five years. I have developed collegial relationships with numerous faculty in my roles as New Faculty Coordinator and Faculty Lead for the interdisciplinary first year seminar course. I leveraged these relationships to gain access to classrooms for recruitment and observation purposes. When deciding to study AB 705, I had asked math faculty their opinions about which angle of implementation to investigate. I also contacted the Dean of Mathematics and Computer Science

to inform her that my focus was the student experience of students in math classes. By including the math faculty and dean, I was granted permission to observe classes. Additionally, I have served for the last three years on the AB 705 Implementation group to remain apprised of implementation decisions.

Data Collection Methods

I conducted three focus groups and 12 interviews of Latina/o/x students enrolled in transfer level math courses both with and without a concurrent support course. I also observed four corequisite math classes, two in person and two on Zoom. These methods allowed me to provide a holistic view of AB 705 implementation for this case study.

Focus Groups

To initiate my data collection process, I conducted three focus groups of students who had registered for math in their first semester. Four students participated in each of the first two focus groups and three participated in the final group. I chose to start with focus groups so that I could develop a general sense of students' experience in transfer level core and corequisite math class that would allow me to further hone my questions for the semi-structured interviews that I would also be conducting. Because the information gathered from a focus group is the result of an "interactive discussion," it was important that I lay the groundwork for a productive conversation about students' experiences in math (Hennink, 2014, p. 2). To facilitate this, I invested in breaking the ice between students by having them introduce themselves and their favorite eating establishments. I also provided prompts asking students to silently reflect on their relationship with math and past and current experiences in math classes. This provided students with ample information to share throughout the hour long focus group session.

Interviews

To gather additional qualitative data about the experiences and perceptions of Latina/o/x students experiencing AB 705 implementation, I conducted semi-structured interviews with students enrolled in transfer level math courses within their first two years of community college. I aimed to compare the experiences of students taking these classes with and without a corequisite support course. This allowed me to gather critical information about the first research question, which focuses on student understanding of placement information and decision-making about course selection. Therefore, I interviewed representative numbers of students taking the transfer level math class without a math corequisite course (five) and those concurrently enrolled in a transfer level math course and a corequisite support course (seven). The interviews of students enrolled in core classes with and without corequisite support courses provided data related to research question two, which explored student experience in these courses as well as research question three, which inquires about the qualities students identify as contributing to their success.

To lower the affective filter potentially activated by interviewing in a non-primary language, I offered students the option of interviewing in the language they are most comfortable with as I am fluent in Spanish. Although none of the students chose to conduct the interviews fully in Spanish, several did elect to answer specific questions in Spanish as they felt better able to fully express themselves in their native language. I conducted 45 to 60 minute interviews, two of which were in person and ten on Zoom. I recorded the in person interviews on Zoom on my laptop and used my iPhone as a back up. I recorded the online interviews utilizing the Zoom platform. In both cases, I took notes throughout the interview.

Classroom Observations

As an additional measure, I triangulated data by observing corequisite support classes. This provided a supplementary data collection method to support my conclusions for research question number three. Two of these observations took place on campus and two were conducted on Zoom. Each observation was 45 minutes to an hour in length. During the observation, I took field notes, which I further developed and wrote up immediately following the observation. In addition, I utilized a rubric that I generated based on my conceptual frameworks of Academic Validation and Funds of Identity (See *Appendix C*).

Data Analysis

I initiated my data analysis process by concentrating on focus group data, looking for potential themes related to students' registration and placement in transfer level classes, their experiences and perceptions of their core and concurrent support classes, and the qualities of these classes that supported their success. I conducted a preliminary analysis of student focus group data by listening to the recordings first while simultaneously reading the transcripts. I generated extensive analytic memos for each focus group that allowed me to sort the data into major coding categories. These coding categories were derived from the three research questions and from the two guiding theoretical frameworks, Academic Validation and Funds of Identity. When needed, I added additional categories based on what emerged from the focus group data. For example, "students' complex lives" emerged as a theme connected to the first research question and their course taking decision making process.

After conducting the first focus group, I carefully reviewed the transcription generated by Otter.ai and conducted an analysis informed by my conceptual frameworks and research questions. This allowed me to generate an initial set of codes. Utilizing these codes, I conducted

a second round of analysis on the three focus groups. This allowed me to establish more specific codes within each larger category. For instance, within the category of Academic Validation, only two of the six forms of Academic Validation, “instructor approachability” and “concern for learning” arose from the data.

Once I had established my codes from the focus groups, I then analyzed my interview data. After analyzing the first few interviews, I added several more codes that emerged from the more specific questions in this interview protocol. Specifically, I created a new category related to “first generation students’ motivations for attending college” and another for “underutilized tutoring services.” With these new additions, the original codes from the focus groups allowed me to effectively sort the interview data and derive findings related to both my research questions and my conceptual frameworks. Throughout the process, I relied on Dedoose.com for support in creating my codebook, managing and analyzing the data, and grouping related excerpts.

To further inform the findings from the focus groups and interviews, I conducted observations of four corequisite math classes. During these observations, I utilized a rubric developed from my conceptual frameworks, Academic Validation and Funds of Identity. For Academic Validation, I utilized the six categories described by Laura Rendón (1994) in her seminal article “Validating culturally diverse students: Toward a new model of learning and student development;” these categories are demonstrating “genuine concern for teaching students,” being “personable and approachable,” treating students equally, providing opportunities for students to “experience themselves as capable of learning,” offering individual assistance to students, and giving “meaningful feedback” (p. 40). For Funds of Identity, I established two categories: faculty recognize students’ resources and faculty leverage students’

funds of identity. I took extensive notes during the observations in addition to recording them and utilized the rubric to identify instances of Academic Validation. There were few examples in the observations where students' Funds of Identity were leveraged, which became a significant finding supported by both interview and observation data.

Positionality

Prior to conducting my study, I was concerned that my roles as a faculty developer and program coordinator may have caused faculty whom I wished to observe to experience a level of insecurity that could present challenges. To address this, I emphasized that as an English as a Second Language instructor, I am not an expert in math. As co-chair of the Student Success Committee on my campus, I am generally viewed as a student advocate. The math department has demonstrated commitment to student success by eliminating all remedial math classes, creating corequisite support courses, and engaging in extensive professional development. This shared commitment to student success resulted in math faculty opening their classrooms to me.

In working with both faculty and students, I emphasized my role as a student and a researcher investigating a novel initiative rather than as an experienced instructor. I also offered to share my findings about the qualities of core and corequisite classes that students find valuable with the math department.

Ethical Considerations

My primary ethical concern was to do no harm to students while collecting data. Many students have suffered negative experiences in their math education that may result in low self-efficacy in math and as a learner in general. Schools are racialized spaces where Latina/o/x students have been historically viewed through a deficit lens, particularly in math (Zavala, 2012). Thus, interviewing students about their experiences in their math courses could have the

unintended consequence of negatively affecting students' self-concept as math learners. Because of this, I took particular care in writing my interview protocol to consider the student interviewee perspective. I also field tested my protocol prior to using it with my own students with whom I had developed high levels of trust.

A second ethical consideration was protecting participant anonymity. Students who shared honest reflections on their classroom experiences could fear retaliation by instructors; similarly, faculty could worry about negative repercussions resulting from classroom observations. Therefore, pseudonyms were used to replace the school's and participants' names. In addition, all collected data, including recordings, transcriptions, and notes are only accessible to me. All collected data was stored and managed in a secure password protected location using software designed for this purpose including Otter.ai and Dedoose.com.

Credibility and Trustworthiness

To ensure the credibility of my study, I first examined my own biases. As a student advocate, I often adopt a student-leaning perspective. This necessitated me exploring or bracketing these biases before I collected data (Merriam and Tisdell, 2015). To correct for bias, I also relied on rich, thick data and direct quotations to support my conclusions. Furthermore, I regularly checked in with a colleague from my campus who acted as a peer reviewer and played devil's advocate in questioning my interpretations and assumptions.

I interviewed Latina/o/x students, the majority of whom are low-income and first generation. As a white middle-aged, middle-class professor at the institution where the students are enrolled, I had to consider the mismatch in our "visible social identities" as an inherent power differential exists that could have affected students' answers (Merriam & Tisdell, 2015, p. 130). To counteract the potential reactivity produced by this mismatch, I shared my own

background as a child of low income immigrants, a product of majority Latina/o/x public schools, and a fluent speaker of Spanish. Prior to conducting focus groups and interviews, I also practiced interviewing to check my own reactions and to train myself not to insert any commentary.

To triangulate the data, I followed up the interviews by observing corequisite math support courses. This allowed me to observe firsthand what students described in the interviews. It also provided additional insight into the classroom atmosphere, pedagogy, curriculum, course activities, and instructor language.

Study Limitations

One limitation of this study is that it was conducted at a campus that had fully implemented AB 705 by the 2019 deadline. Only two of California's 116 community colleges met this deadline, mostly due to resistance by math faculty to eliminating prerequisite remediation. The math faculty at RCCC have been consistently proactive and progressive in their willingness to adopt various aspects of the legislation including eliminating standardized placement testing and piloting corequisite support instead of prerequisite remediation. Therefore, the results from this study may not be generalizable to all community college math departments who have not been as progressive. The focus on one student population, Latina/o/x students, represents an additional limitation. However, this study could be replicated on additional campuses and with other student populations in order to gather further data about AB 705 implementation and the student experience in transfer level math courses both with and without concurrent support.

Conclusion

Focusing on student perspectives offers valuable information to be utilized by other colleges in the AB 705 implementation process. Colleges can gain from knowing how students receive information related to placement and course registration, helping them refine their placement and course selection practices. In addition, colleges can also learn from data about students' experience in corequisite math courses, informing them as they decide whether and how to invest in this promising alternative to prerequisite remediation. The focus on Latina/o/x students in this study investigated potential contributing factors to equity gaps that persist despite AB 705 mandated reforms.

CHAPTER FOUR: FINDINGS

The purpose of this study was to investigate the implementation process of AB 705 at a universal access community college in Southern California. The study focused specifically on the experiences of Latina/o/x students enrolled in transfer level math classes with or without a corequisite math support course. I collected data through focus groups, one-on-one interviews, and classroom observations. My findings reveal the experiences of students during AB 705 implementation and suggest elements of core transfer level and corequisite math course design and additional recommended supports needed to achieve the intent of the legislation.

In this chapter, I provide context for the case study, introduce the participants, and share my findings. For this study, I conducted three focus groups including a total of 11 students, 12 one-on-one interviews, each approximately an hour in length, and four classroom observations, two on Zoom and two in person. These methods allowed me to answer the following research questions:

1. What are the experiences and perceptions of Latina/o/x students during the application, orientation, and registration process as they relate to AB 705 at RCCC?
2. What are the experiences and perceptions of Latina/o/x students in core transfer level and corequisite math classes designed to increase success in transfer level math?
3. According to Latina/o/x community college students, what are the qualities of corequisite math classes that support Latina/o/x student success in transfer level math?

Rose City Community College Context

To contextualize the findings and increase understanding of the study's significance, I describe the college's current sites and academic offerings, provide a brief background of RCCC

in relation to the Latina/o/x community, and describe the changing demographics in its student population over time, demographics which are not reflected in the leadership of the college.

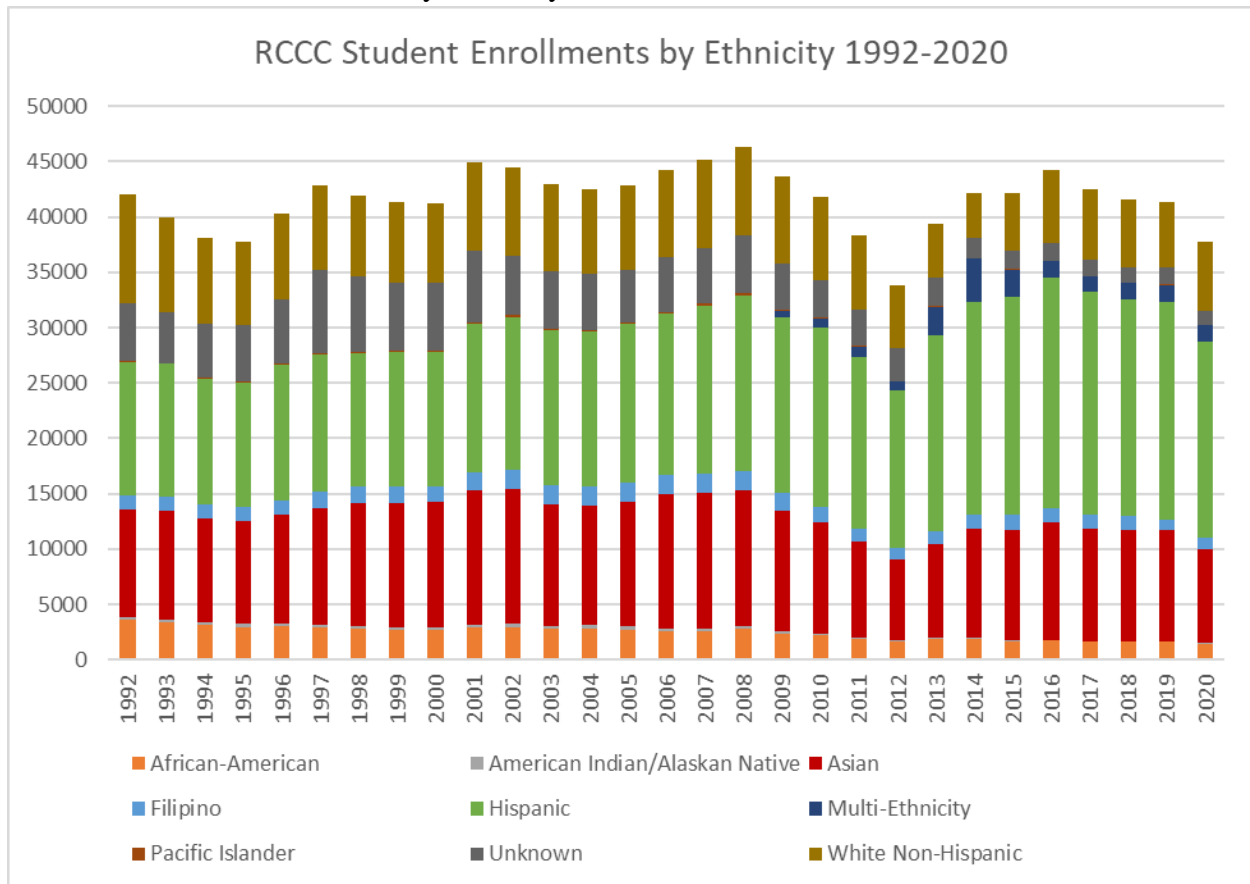
In 2019, just prior to the arrival of the COVID-19 pandemic, RCCC served 27, 331 credit and 1,942 non-credit students, numbers which were fairly steady in the years leading up to the pandemic. The college currently offers 141 Associate degree programs, 99 Certificate of Achievement programs, and 43 non-credit certificate programs. In addition to the main credit campus and the non-credit campus, the college has partnered with two local high school districts to establish sites that serve members of the district community. One of these sites offers both credit and non-credit courses while the other, which is located on a high school, offers general education credit courses and dual and concurrent enrollment courses that allow high school students to accrue college credit.

RCCC boasts an almost century long history. As acknowledged on its website, “RCCC was built on the unceded homelands of the Gabrieliño Band of Mission Indians of the Sisitcanongna Village and Kizh Nation and the secularized lands of the San Gabriel Mission.” According to the history of the college that was commissioned in honor of its 75th anniversary, the college was established in 1924 as part of the 6-4-4 program, which paired the 11th and 12th grades with two years of college level instruction and allowed students to choose to pursue either a vocational path or complete the first two years of a university education (Dodge, 2002). As the college grew and expanded its mission, it offered an extended day program for working adults wishing to pursue their 12th grade or community college diploma or a certificate during non-traditional hours. It eventually opened its first official Adult Center in 1963 (Dodge, 2002). In 1996, the college dedicated a new Community Education Center as a non-credit campus offering adult basic skills, high school diploma, non-credit English as a Second Language, and a

vocational training program. This center is located on the former site of one of the city's two segregated Mexican schools (Martinez, 2009).

RCCC received Hispanic Serving Institution (HSI) status in 1990 when its student population reached the 25% threshold required to achieve this federal designation. Since then, the college has maintained its HSI status; in fact, the Latina/o/x student population increased steadily until slightly over 49% of the student population identified as Hispanic/Latina/o/x in 2016. The increase in the Latina/o/x student population has been accompanied by a decrease in the number of African-American and White students (See *Table 1*). As a result of the COVID-19 pandemic and a poorly orchestrated return to campus, enrollment has decreased by approximately 10,000 students with a disproportionate loss of Latina/o/x and African American students. The campus is currently investing in outreach efforts targeted at rebuilding enrollment numbers for these two student populations.

Table 1: Student Enrollments by Ethnicity



Efforts to support retention and success of Latina/o/x students at the college have existed throughout its history, predating its HSI status and continuing to today. Thirty-one years after the college was established in 1924, a student organization was formed to “encourage the retention of Latina/o/x and Chicana/o/x students at the school” (RCCC Website). Additional efforts to support Latina/o/x student success include the establishment of the Puente Project at RCCC in 1991, creation of the MESA (Mathematics, Engineering, Science Achievement) program in 1999, and the development of the Latinx Resource Guide in 2020. Since 2000, RCCC has been awarded numerous Title V grants, federal funds designated exclusively for HSIs. Several of these grants were invested in the creation of RCCC’s First Year Experience program, which has received several state and national awards including being named an

Example of Excelencia by Excelencia in Education, a foundation dedicated to increasing Latino student success in higher education (Edexcelencia.org).

Despite these ongoing efforts, Latina/o/x students at the college have experienced persistent equity gaps in success and completion. According to the college's equity dashboard, five-year averages for course success and retention for Latina/o/x students at the college are 66% and 81% respectively. These numbers indicate significant equity gaps in course success and retention when compared to those for students who identify as Asian--81% and 88%-- and White--78% and 86%. The college's 2017-2019 Equity Plan indicates that Latina/o/x students experienced equity gaps in four of the five metrics that comprised the plan. In spite of these equity gaps, RCCC was the top ranked US community college for degrees conferred to Hispanic students in 2019-2020 (Hispanic Outlook, 2022). The relatively high but low absolute completion rates for Latina/o/x students have led practitioners dedicated to closing equity gaps at the college to informally adopt the motto, "We Suck Less." This statement reflects the incredible challenge of addressing equity gaps in institutions as complex as California's community colleges. It also speaks to the necessity of measures like AB 705, which directly address inequitable outcomes in transfer-level English and math.

As RCCC attempts to address these equity gaps and implement AB 705, it does so under the leadership of a governing body and administration of the college which do not reflect the student population. At the time of writing, the locally elected seven-member Board of Trustees (BOT) was comprised of two Asian, one African-American, and four White members. Only the student trustee identified as Hispanic. In its 98-year history, RCCC has had 17 presidents, only one of whom was Latino. As closely followed by local media including the Los Angeles Times, after the controversial decision to cancel the Winter Intersession, the Academic Senate took a

Vote of No Confidence on this president. Shortly after, he retired from the college (Song, 2018). The current college president is a White woman, who has been serving in this role since 2019.

The most recent college EEO plan indicates that only seven of the 31, or 23%, of educational administrators and a mere 17% of the 411 full-time faculty were Hispanic. When the plan was presented to the BOT in 2016, two of the board members insisted on meeting with the college president the next day to suggest that the plan be rewritten to identify Latina/o/x students and employees as White in order to conceal the mismatch between the student and employee populations. One of these board members, who was later defeated in his reelection campaign, had “Make PCC Great Again” hats designed to celebrate the election of former President Donald J. Trump (Gillespie, 2018). The board does not have an active role in the operations of the college; however, because they are the fiscal overseers of the college budget, their priorities can greatly influence the direction of the institution. A recent example is the board’s unanimous vote in 2016 not to place an \$888 million facilities bond on the ballot despite strong public support for the measure (Boekelheide, 2016). This fiscal conservatism has the potential to impact the success of any major effort undertaken by the college including the implementation of AB 705.

AB 705 Implementation in Math at Rose City Community College

The Math Department at RCCC is described by one of its lead faculty as “forward thinking and willing to try new things.” In 2010, when the math program included three levels of pre-transfer courses, a fourth prerequisite remedial class addressing arithmetic skills was created in an attempt to increase low success rates in pre-algebra. By introducing students to differing forms of numerals such as Roman and Arabic and by teaching students the Mayan concept of base five, they were able to help students grasp previously elusive mathematical concepts. In 2012, before the advent of AB 705, the math department recognized the need to create

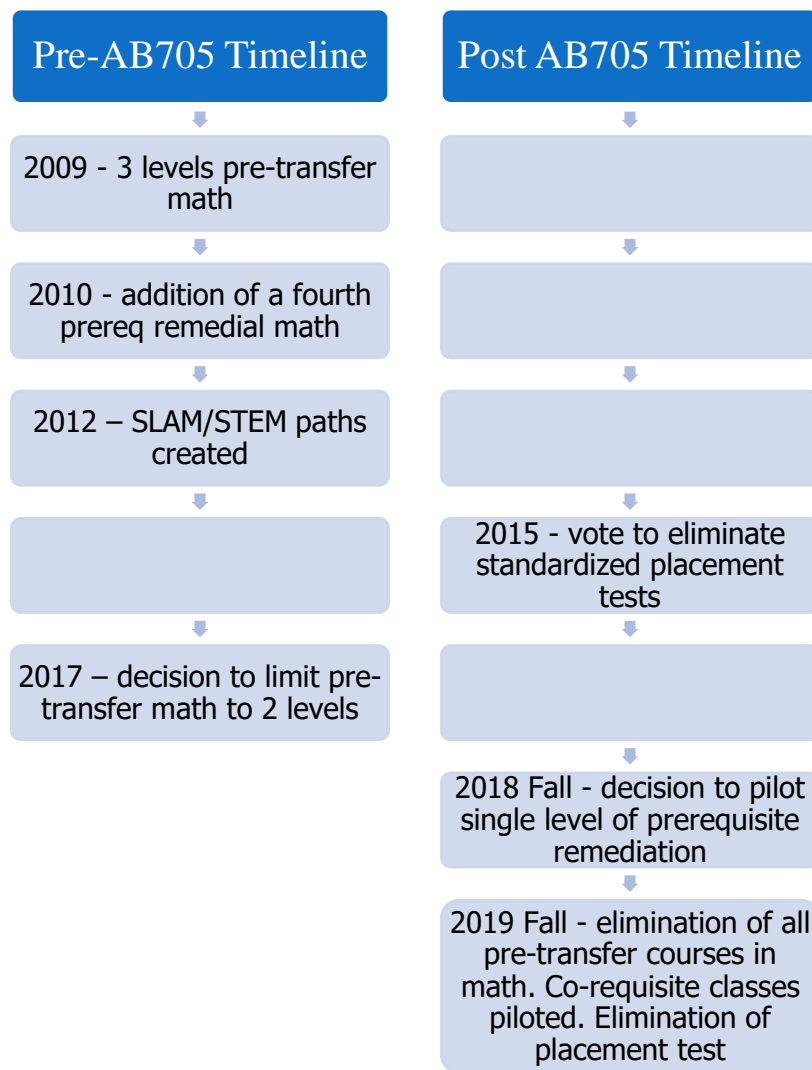
accelerated statistics and liberal arts math (SLAM) courses for non-STEM students who did not require the long sequence of algebra-based classes. These courses incorporated concepts of financial literacy and the use of Excel spreadsheets.

In 2015, The RCCC math department voted to eliminate the use of the standardized Accuplacer placement test after a presentation by John Hetts, former Director of Institutional Research at Long Beach City College (LBCC). In partnership with the Research and Planning group, Hetts led LBCC's participation in the Student Transcript-Enhanced Placement Study (STEPS), which demonstrated that high school data could more reliably predict student performance in college math than a problematic one-shot placement test (Fuenmayor et al., 2011; Hetts & Willet, 2012). Despite the math, and English, faculty's willingness to replace placement tests with high school performance data, the Admissions and Records Department's insistence on keeping placement tests stalled efforts until AB 705 required their elimination.

When the math faculty at RCCC first became aware of AB 705, they had already started having conversations about shortening the algebra-based sequence. Faculty paying attention to math sequence data had noticed that the multiple opportunities for students to fail, or to pass but not enroll in the next level, were weeding students out before they reached transfer level math. The department initially decided to shorten the prerequisite remedial course offerings to two levels below transfer; however, once they learned that to comply with AB 705 they could offer no more than one level below transfer, they decided to pilot a single level of prerequisite remediation in Fall 2018, a year ahead of the implementation deadline. To prepare for the changes, the Basic Skills Coordinator, a math instructor, visited remedial math classes to inform students of the changes and their course options as of Fall 2018, when they could choose either a prerequisite remedial class that was one level below Intermediate Algebra or a remedial course

designed to prepare students for either Statistics or Math for Liberal Arts. As the Chancellor’s Office shared more details about AB 705 in the year prior to the implementation deadline, RCCC math faculty learned that even one level of remediation was only permitted when “placement research that includes consideration of high school grade point average and coursework shows that those students are highly unlikely to succeed in transfer level coursework in English and mathematics” (Seymour Campbell Act, 2017). Consequently, they decided not to offer any remedial math courses in Fall 2019 in full compliance with the legislation.

Figure 1. Pre and Post AB 705 Implementation Timeline



The elimination of placement exams required the math faculty to adopt mechanisms for placing students into courses either with or without a corequisite support course. Fortunately, the math department was able to utilize the suggested high school GPA cut offs and placement protocols from the Chancellor's Office Multiple Measures Assessment Project (Willet et al., 2018). Using the major students indicated on the application to the college in conjunction with self-reported high school course and GPA data, the college was able to provide placement information once students completed the online orientation. Students were recommended a choice of classes based on whether they had indicated a STEM or Non-STEM major; also a corequisite was strongly recommended though not required for students with high school GPAs below 1.9 or who had one or more failing grades in high school math. These recommendations were delivered both through the online orientation video and by including the concurrent support course on the abbreviated education plans created by counselors and uploaded in the student portal. A guided placement alternative was created for international students who did not have high school data, and business majors, whose choice of math depended on their transfer institution, were referred to counselors for support.

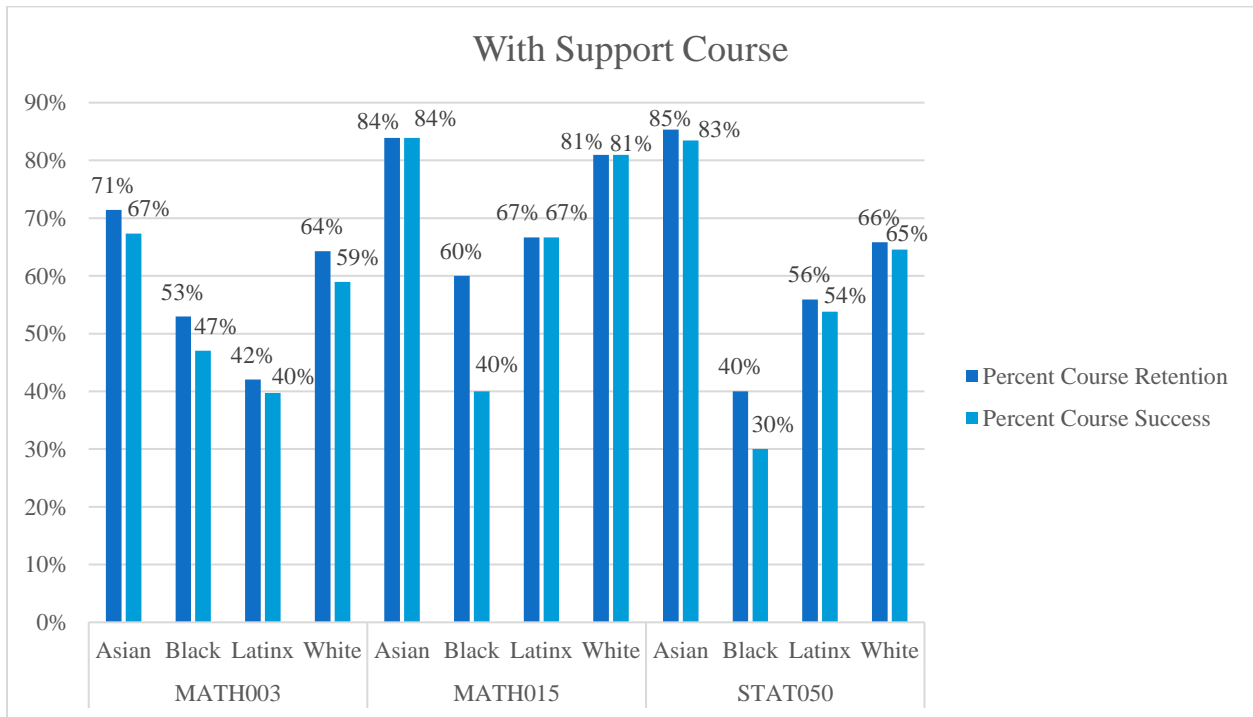
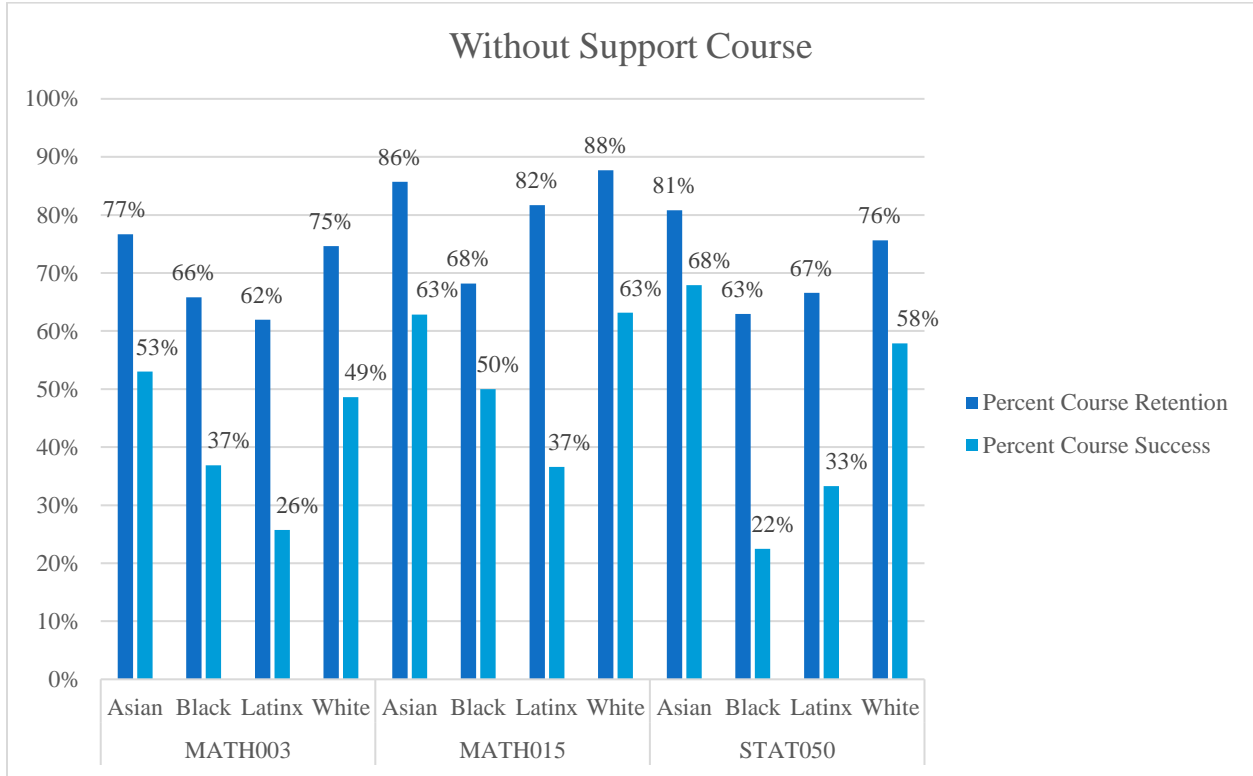
Various steps were taken to provide support for faculty in the early implementation phase. Preparing for the greatly increased enrollment in statistics under AB 705, two experienced statistics teachers ran weekly workshops to teach the content to instructors who may never have taught or even taken a statistics class. These sessions were recorded and made available to instructors who could not attend. Another faculty member recorded short videos teaching students how to use the scientific calculators that are frequently used in statistics courses and shared these with her colleagues. As a further support, course coordinators for each of the math classes provided instructors with sample instructional timelines, created shell courses

where instructors could access teaching resources, and held office hours for instructors. To facilitate teaching the half unit, two hour corequisite classes, a small group of faculty curated resources including materials to support the metacognitive and affective domain such as TedTalks, guided note-takers for students and activities to address study skills, test anxiety, and growth mindset. Even with the challenges presented by the pandemic, a small subset of the math faculty engaged in book clubs reading texts such as *Grading for Equity* by Joe Feldman (2018), which has led to the adoption of standards-based grading by a number of the math faculty.

Despite the comprehensive response to the changes resulting from AB 705, leaders in the math department recognize the need to provide additional support for teachers. For example, instructors who are teaching math for liberal arts majors, as math majors themselves, have likely never taken this class and need support in understanding how to approach the curriculum and pedagogy. In the department's most recent annual update, money has been requested to stipend experienced faculty to mentor new teachers and provide time for weekly individual and small group meetings for just-in-time instructional coaching.

The math department and AB 705 workgroup are currently exploring the data related to student success in math classes with and without corequisite support. Initial data suggest that the concurrent support course positively impacts success rates in MATH 3, College Algebra, MATH 15, Liberal Arts Math, and STAT 50, Elementary Statistics (See *Table 2*) for all racial groups with the exception of African-American students enrolled in Math 15. Further inquiry will also be conducted into whether the students enrolling in corequisite support courses have lower high school GPAs and fewer math courses in high school. If so, the positive impact of the corequisite support course would be more significant, suggesting that this intervention has the potential to increase success rates for all students in at least some math courses if required.

Table 2: Success in Math/Stats with and without corequisite support



Participants

Twenty-three Latina/o/x students participated in focus groups or one-on-one interviews as part of this study. One of the focus groups and two of the interviews were conducted in person and the rest were conducted on Zoom. Several of the participants were recruited by the researcher during classroom visits, both on campus and on Zoom. The rest were recruited through snowball sampling. All participants were either currently enrolled or had taken a first semester transfer level math or statistics course within two years of being interviewed. The students were enrolled in a variety of classes. The statistics courses included STAT 50, an introductory statistics class taught by math faculty or STAT 18, statistics for social and behavioral sciences, a course taught out of the Social and Behavioral Sciences Division, for which there is no corequisite support course. Courses typically selected by STEM majors included MATH 3, college algebra; MATH 5A, single variable calculus; and MATH 8, precalculus trigonometry. Additional choices included MATH 15, a non-STEM quantitative reasoning class, and BUS 14A, mathematical analysis for business, which does not have a corequisite support course option and is taught out of the Business Division.

Pseudonym	Age	Gender	First Gen	Veteran	CoreMath	Coreq	Mode of Delivery	FYE
Alejandro	28	M	Y	Y	STAT 50	Y	Hybrid	N

Adrian	18	M	Y	N	STAT 50	Y	Online – Zoom	Y
Beatriz	19	F	Y	N	MATH 15	N	Online – Zoom	Y
Cesar	26	M	Y	Y	STAT 50	Y	Hybrid	N
David	18	M	N	N	STAT 50	Y	Hybrid	Y
Eugene	48	M	Y	Y	STAT 50	Y	Hybrid	N
Elena	18	F	Y	N	BUS 14A	N	Online – Zoom	
Guillermo	18	M	Y	N	BUS 14A	N	Online – Zoom	Y
Inés	18	F	Y	N	STAT 50	N	Online	Y
Jacob	19	M	N	N	MATH 5A	N	Hybrid	Y
Jasmin	18	F	N	N	STAT 50	Y	Face-to- face	Y

Javier	19	M	Y	N	MATH 3	Y	Face-to-face	N
Jocelyn	19	F	N	N	MATH 3	Y	Face-to-face	N
Luis	18	M	Y	N	MATH 8	N	Face-to-face	Y
Marcela	19	F	N	N	MATH 15	N	Online - Zoom	Y
Marisol	18	F	Y	N	STAT 50	N	Online	N
Miranda	20	F	Y	N	STAT 50	Y	Face-to-face	Y
Michael	19	M	N	N	STAT 50	N	Online – Zoom	Y
Nelia	18	F	Y	N	MATH 8	N	Online	Y
Rich	52	M	Y	Y	STAT 50	Y	Hybrid	N
Sara	18	F	Y	N	STAT 18	N	Online – Zoom	N
Soraya	18	F	Y	N	STAT 50	Y	Online	Y

Tessa	18	F	Y	N	MATH 15	Y	Online	Y
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Finding #1: “It’s a dark room and I am looking for a light switch”

Students lack sufficient information needed to make informed decisions about what core math class to take and whether or not to take a corequisite.

In an effort to guide students in their first semester into an appropriate math class that aligns with their career and major goals, Rose City Community College has implemented various measures. Among these, the most effective appeared to be the placement protocols embedded in the online orientation, the abbreviated education plans generated by the First Year Experience (FYE) program, and the guidance provided by programs dedicated to serving specific populations such as veterans. Nevertheless, students continued to express confusion about which core math class to take and whether or not to enroll in a corequisite class, if they were even aware that it existed or that they had a choice in whether to choose one or not. Lacking sufficient guidance, students attempted to gather additional information through independent research or advice from family and friends. Without other sources of input, some students defaulted to choosing a class offered at a time that worked with their schedule.

Institutional Supports for Math Course Selection

RCCC, a leader in AB 705 implementation, has invested significantly in creating structures and protocols that narrow and inform students’ choice of a first semester math course. Depending on the major students indicate on either the application or the FYE intake form, counselors recommend a subset of math courses that align with a student’s declared academic goal. In some cases, this process worked well, and students were confident in the math course they were recommended to enroll in. To illustrate, Soraya, an 18-year-old theater major and

participant in the FYE program, described a streamlined process of checking the recommendations uploaded by her first year counselor in her student portal: “I just went with the suggestion that they put and then the math that I chose was just based on time and convenience.” Several students also reported speaking directly to a counselor, athletic coach, or Veteran’s Resource Center (VRC) employee, who was able to recommend a specific math course based on the student’s stated goals. This relatively uncomplicated selection process for the math course was juxtaposed with the experience of most of the students I spoke with.

Insufficient Information about Core Math Courses

A majority of students interviewed mentioned not feeling completely sure about which math class to choose. Sara, an 18-year-old first generation student who had taken various AP classes in high school, had originally planned to go straight to a four-year university but found her plans derailed by family and financial constraints. Once she decided to attend RCCC, Sara met twice with staff from the FYE program during their outreach visits to her high school. These meetings clarified her choice of English and guided her to take math in her first semester. However, she remained perplexed about which math class to register in, sharing:

And for math, that's the one I was really confused with. Because...I knew I wasn't good at math. And I didn't want to continue into calculus just yet. Because I didn't feel I was ready. So I had to learn on my own the different options, like statistics, or some other form of math that I had to do.

Unfortunately, Sara’s choice to enroll in social science statistics led to her feeling overwhelmed after just a few weeks; as a consequence, she dropped the class two months into the semester. Sara expressed the need for the college to give additional guidance to first generation students

like herself. She compared the process of a first generation student trying to navigate the application and registration process to that a person groping in the dark:

Because I am a first generation college student, I'm the first one in my family to go to college, there's no blueprint for me, I have to do everything by myself. And so I'm just figuring things out, you know, it's a dark room, and I'm looking for the light switch my experience, especially when they came when I came in, to register and everything, they expected me to know certain things already.

Several other students explicitly stated that they conducted their own research when presented with various math choices based on their math placement. Eugene, a 52-year-old veteran returning to college after decades without taking a math class, familiarized himself with the different types of math he could choose from before selecting statistics. He was particularly concerned about his choice because he had suffered a head injury that affected his memory. Because his placement options were not accompanied by detailed information about the course content, Eugene indicated that he felt the need to search for additional information on the internet: "So I looked at all the math, and then I went on to Khan Academy... for algebra or statistics. And I, I enjoyed the statistics. So I said, ... if I can enjoy it, I can learn it." Serendipitously, Eugene's choice of math aligned with the course offered in the veteran's cohort, and he was able to register in that section.

Students lacking concrete information about college math courses identified diverse reasons for selecting their courses such as recommendations from friends and family, misguided understandings of what the course would entail, or time and convenience. Regrettably, this limited information often did not prepare students for the rigorous expectations of the course as was the case with Marisol, the daughter of immigrant parents from Mexico. Marisol's mother is

an elementary school lunch lady, and her father works in a machine shop. Anxious about college, this first generation college student “bugged” her older brother who had transferred from RCCC to CSU Fullerton to explain to her “the whole structure of community college” and watched YouTube videos to learn more about how to succeed in community college. Hearing students on YouTube refer to IGETC, the Intersegmental General Education Transfer Curriculum, Marisol located RCCC’s IGETC pattern on the website and identified which math class would align with her goal to transfer to USC as a Business major. Despite her extensive research, Marisol acknowledged not having all the necessary information to support her success in her chosen math course:

Because you don't have an idea until you're in the class. Because ... all you see is the units ... Stats, it was four units, so I knew there's gonna be a lot of work. But then once you got like, into the class, and you look at the modules, and you're like, Oh my God, you have this assignment ... I don't think you can handle this with like with other responsibilities.

In contrast to Marisol’s considerable preparation, Guillermo admitted not having done sufficient research before choosing his Business 14A class, blaming his “own negligence” for not knowing where to look for his education plan. A first generation student with mild autism, Guillermo is the son of Puerto Rican immigrants and shared that his father had passed away from cancer when he was eight, leaving his mother to raise him and his younger sister. Stating affordability as his primary reason for choosing community college, Guillermo only considered two local colleges; he eventually selected RCCC based on the recommendations of his coworkers at the frozen yogurt shop where he worked in high school. Despite having gathered information from other sources about his choice of school, Guillermo reported relying on his

own previous experience in high school to guide his choice of math, “I regrettably chose Business 14 A ... because I thought it was gonna be like the business math class I took in my senior year of high school But this class is very difficult ... it's a lot more complicated than anticipated.” Basing his choice on the name “Business Math,” Guillermo mistakenly picked a challenging course when his experiences in “Business Math” in high school had led him to believe that it would be “easy and pretty straightforward.”

Uninformed Choices about Corequisite Classes

As one of two full implementers of AB 705 by the stated deadline, RCCC eliminated all prerequisite remedial coursework in both English and Math by Fall 2019. Following the recommendations of the California Acceleration Project, the math department brought several corequisite support classes through the curriculum process in time to offer them in Fall 2019 (California Acceleration Project, 2018). However, the math department decided not to require any students to enroll in the support classes. They chose instead to recommend enrollment based on math coursework completed in high school and high school GPA. Recommendations to enroll in corequisite classes are messaged both through the placement process connected to the online orientation and the abbreviated education plan loaded in the student portal. Despite these efforts at clear communication, a majority of the students I interviewed expressed that they were either unaware of or unclear about the role of corequisite courses.

Twelve of the participants in my study were enrolled in corequisite support classes. Several of these students expressed that they had enrolled in the support course without realizing that they were doing so while others indicated that they knew they were enrolling but believed the support class was required. Despite this lack of clarity about the support course, almost all of these students shared that they believed they would benefit from being in the corequisite. The

exception was the one math major who I interviewed. Miranda, an undocumented student planning to transfer to UCLA in the next year, was under the impression that support classes were required for lower-level math because the two introductory math classes she had taken were both paired with a support class. At the time of the interview, she was taking STAT 50 with the corequisite even though she had already passed discrete mathematics with an A and had successfully completed the three-semester calculus sequence.

Adrian was one of the students who expressed the value of the corequisite support class even though he was unclear what he was enrolling in. Adrian grew up in California's Central Valley in what he described as a "small, Latino-oriented town." RCCC was his first choice of college based on his research on the website Niche.com; thus, when a family member offered him the opportunity to live rent-free less than five miles from campus, he jumped at the chance. Adrian successfully navigated applying to the Educational Opportunity Program and Services (EOP&S) program, which serves low-income first generation students, and secured a work-study job as a clerk in the English Department, where I met and recruited him for an interview.

The summer before starting classes at RCCC, Adrian located his education plan, uploaded by his EOP&S counselor into his student portal, and attempted to enroll in the recommended courses, including STAT 50 and the STAT 150 corequisite. He recounted his attempt to register for these two classes:

I was kind of confused. I remember because I was assuming at first that... STAT 50 and STAT 150 were like, two individual courses. But that's not actually the case. And I was thinking like, Okay, I could get this professor, but then I can also get this professor. So I was struggling and I was like, Oh, my God, why can I not register for this class? And, you know, the reason being for that was because it had to be the same professor.

Adrian overcame his initial challenges registering for the course and realized that he was enrolling in a core statistics class with a paired support class taught by the same instructor. This came as a relief to Adrian, who had struggled with math in high school and looked forward to the opportunity for extra support provided by his instructor. Remembering his feelings when he realized he would have a support class, he related:

You know, I really liked that because it gave me a bit more confidence. And I felt like, oh, okay, so I don't have to like bother tutors or whatever. And I would just like be able to just talk to my professor and we could work things out.

Veterans – Additional Access to Information

Of the students who knowingly elected to enroll in a corequisite support class, several of them were veterans of the armed services. These veteran students strongly expressed their desire to enroll in the support class as part of the veterans' cohort program, which they had learned about through the college's award-winning Veteran's Resource Center. Cesar, a twenty-six-year-old army veteran, was enrolled in college for the first time and had chosen RCCC after several of his high school friends had completed their education at the college and found high-paying jobs. He expressed both trepidation at the prospect of taking math after being out of school for eight years and gratitude for the chance to be in a math class with support along with his fellow veterans:

I was so excited. Because having the support definitely made me a lot more comfortable taking math. Like, I was really, really, really insecure. And I can't, you know, I can't say that enough. Going into the class, I had high expectations, I wanted to do really well. I was ... scared that like, some of the things I wouldn't be able to kind of draw back from

memory. You know, math in general, but the support class gave me a feeling of relief when I understood exactly what like the intention was for it.

When I spoke with Cesar, it was just two weeks from the end of the semester. He shared that although the math was challenging he was doing “really great” in the class and that the extra time to go over the material provided by the support class had been “very, very helpful.” These sentiments were echoed by his fellow veterans who had also elected to enroll in STAT 50 with support based on the recommendation of the VRC.

Finding #2: Students experience anxiety and concern about math.

When asked about their experiences and feelings about math, every student I spoke with expressed some level of anxiety or concern about the prospect of taking math, their past or current experiences in math, and/or their ability to succeed in their current math classes.

Although all the students who participated in a focus group or interview voiced anxiety or fear, there was a wide variety in the ways students articulated their level of anxiety. The terms employed by students to describe their feelings about math ranged from “a little bit nervous” and “a little bit concerned,” to feeling “stressed” or “struggling” and even to being “really scared” or “really intimidated.”

First Generation Students vs. Non First Generation Students

Of the first generation students who participated in the study, nearly all of them communicated their struggles in high school math. A notable exception were two of the first generation students who described a positive overall experience in high school math. Both students, Marisol and Miranda, expressed a particular concern with the prospect of taking math in college even though they had experienced success in high school math. They described

having been warned by high school teachers or by friends and family that college math would be more challenging, resulting in anxiety about math in the unfamiliar world of higher education.

Marisol, a first generation student whose parents immigrated from Mexico, attended a public arts high school that had implemented teachers' office hours. She related a positive experience with her math education in high school describing her teachers as "Honestly, they're all amazing I'm so happy to have that experience ... Especially for office hours, I can go up to them and be like I need help on this concept or the homework. I'm going to get help." Despite this rewarding and supportive high school math experience, Marisol shared that, coming into college, and facing the possibility of having to take math classes, she felt a high level of concern, especially about the prospect of taking an online math class:

I was actually really worried. Yeah, I was talking to a success coach because I really wanted to take math in person. But all the classes were like filling out. And then I had a friend who was in Stats 50. And she's like, oh, like, I think my class is open ... And I was like, I don't know if I can do it. I was kind of worried, because like, everything's online. Now, I was like, I don't know, if I want to do math online, I was really scared.

Although Marisol reported being mostly concerned about taking math online, in her senior year of high school she also was taking online classes, a format in which she experienced success.

Similar to Marisol, Miranda was a high achiever in high school. She completed the International Baccalaureate program and took four years of high school math including pre-calculus. When asked to describe her feelings about math in high school, she expressed confidence, "I didn't think it was difficult for me. I really enjoyed the subject overall."

Nevertheless, Miranda felt apprehension at the thought of taking college level math, reporting that she had planned to take at least precalculus in her first semester, "But I actually felt really

intimidated. So I ended up taking college algebra over the winter break.” At the time of the interview, Miranda had declared a math major and had successfully completed the calculus sequence and discrete math.

Of the five participants whose parents were college graduates-- Jasmin, David, Jocelyn, Jacob, and Michael--, only David, an English major, expressed similarly high levels of anxiety about entering college math as the first generation students. Conversely, Jocelyn, Jacob, and Michael referred to how the experience of taking rigorous math courses in high school had prepared them to succeed in college. Michael, whose main goal for attending college was to play baseball, described his reaction to learning that he had to take statistics in his first semester, stating, “I’m honestly just the type of guy that will just like, go for it. Like, whatever, we’ll figure it out when we get there.” The confidence expressed by Michael stood in sharp contrast to the apprehension expressed by even admittedly well-prepared first generation college students.

Veterans - Determination to Overcome Math Anxiety

The four veterans I interviewed--Alejandro, Cesar, Rich, and Eugene--each demonstrated both a distaste for and anxiety about math and a strong determination to overcome this academic hurdle. They described unpleasant experiences in high school that resulted in them choosing the armed services over higher education. However, their life and career experiences led them to pursue a college education, and they expressed their willingness to face their anxiety in order to achieve their goals.

Rich, a 52-year-old former marine who retired from his job as a bus and train driver for LA Metro after an injury, was pursuing an Associate’s degree in paralegal studies that was being funded by the Department of Veterans’ Affairs. When asked about taking high school math over three decades ago, he clearly recounted the negative feelings evoked: “I had a really bad

experience. It was awful ... I was angry. I felt dumb.” Despite his years in the military and working in construction, Rich still harbored anxiety about school in general and math in particular as he shared with me, “I am telling you, I am barely shaking off any of the fears that I have.” However, Rich’s determination to eventually earn his law degree propelled him to face his fears and enroll in the veteran’s statistics cohort with his peers.

Similar to Rich, 48-year-old Eugene returned to college after an injury with the goal of eventually going to law school. He selected law because he wanted to spend the last years of his career engaged in what he referred to as “soul-fulfilling” work. In high school, Eugene recalled having “to throw the sink” at trigonometry in order to pass and shared that he had somehow managed to earn an AA in the late 1990s without taking any math, a feat that confounded his counselors at RCCC. Now enrolled in the veteran’s cohort of STAT 50 with corequisite support, Eugene crafted a metaphor that encapsulated both this fear of and resolve to complete college math:

I don't like math. ... I'm going to be the last guy in the room when they need volunteers to bust rocks into little rocks or volunteers to do math. I'll take the rocks all day long. But I had to do something, I had to take something.

The willpower expressed by Eugene to conquer an academic subject that he had struggled with since high school was echoed by his veteran peers, who were also returning to college after a long academic stop out. Moreover, each of the vets interviewed referenced the importance of being in the veteran’s cohort with classmates who faced similar challenges navigating higher education. Cesar, a 26-year-old veteran who found statistics “intimidating,” spoke to the importance of being “in that type of environment where I could feel like I'm not... the only one that hasn't sat in a classroom and taken notes in a while.” Being surrounded by peers who were

also returning to college allowed these veterans to overcome the anxiety they had expressed about enrolling in math.

Finding #3: “With the right teachers, you really could do anything:” Academic validation, especially faculty concern for student learning and approachability, helps counteract students’ math anxiety.

All students interviewed indicated experiencing some level of anxiety related to taking college level math; however, once enrolled the majority of students expressed a positive attitude towards math and especially towards their instructor. The study participants’ overwhelmingly affirmative ratings of their instructors aligned with Laura Rendón’s Theory of Academic Validation in the classroom. Rendón’s (1994) recommendations for faculty validation of students of color in their classrooms include six core components: showing “genuine concern for teaching students,” being “personable and approachable,” treating students equally, providing opportunities for students to “experience themselves as capable of learning,” offering individual assistance to students, and giving “meaningful feedback” (p. 40).

While study participants referenced each of these qualities of validation, the first two, concern for learning and approachability, far outweighed the rest in the number of mentions. Of the 23 students I spoke with, all but five described their math professors using complimentary terms such as “nice,” “kind,” “approachable,” “sweet,” “friendly,” “patient,” and “understanding.” Many of these students elaborated on their instructors’ genuine concern for teaching, referring to them as “helpful,” “enthusiastic,” or “passionate” and describing their willingness to “pay attention” to students, “help you pass,” and “make sure we understand.” In several cases, these favorable descriptions of teachers were linked to students’ willingness to engage in the class and specifically to ask questions.

Asking Questions

Nearly all of the students who described their teachers as approachable and concerned about student learning referred to the ability to ask their teachers questions either during class or in office hours. Marcela, a 19-year-old first generation student, was attending college after a COVID-19 gap year. Hoping to one day work with children, Marcela stressed the importance of having a degree to achieve her career goals and to “show the way” into higher education to her 15-year-old brother and five-year-old sister. She described herself as “heavily involved” in high school, where she was the cheer captain, a student government leader, and a volunteer for the Key Club, the Red Cross Club and Best Buddies, which provided social support to special needs students. Although she developed time management skills and allotted time for homework, Marcela struggled in math and had to repeat Algebra 2 in summer school after her sophomore year. She did, however, manage to pass calculus her senior year, crediting her classmates: “Group projects really saved me for my calculus class because I always would choose the groups that knew calculus, and they were good at it.”

Although she was “really nervous” to take college math, Marcela looked at [Ratemyprofessors.com](https://www.ratemyprofessors.com) and chose a teacher whose reviews indicated that she would be willing to help students learn. Describing her MATH 15 teacher as “really helpful” and “really nice,” Marcela shared that the majority of students were comfortable asking questions in class and only a few especially shy students didn’t regularly engage. To elucidate, she described a typical class session:

And then she explains more. We have questions on the lesson. And then we go over some homework questions if we needed help with them, and then after a while when the class is done, she'll wait a while in case people have questions like

office hours in a way but she explains it really well. Like if we have any questions...she really is adamant about us also going into groups, like break rooms and like talking to each other about questions or coming up with like solutions for the problem. And then we just all explained to her and then yeah, she's just really helpful with that.

Because of her professor's openness to questions and clear interest in students grasping the concepts, Marcela felt more comfortable staying after class for office hours. That said, she wished her professor had additional office hours that were not scheduled immediately after class so she could ask questions without her classmates listening in.

Javier, similar to Marcela, specifically identified his math instructor based on his desire for individual assistance. After spending his first six years in the Los Angeles region, Javier returned with his family to Mexico, where he completed ten years of his education. Because his family did not have the resources to pay for university in Mexico, Javier accepted his uncle's offer to move back to Los Angeles, where he could attend college after finishing high school. Javier admitted that his decision was influenced by watching his mother, a grocery store clerk, and father, a construction worker, "working like, a lot of hours getting paid the minimum wage." Since Javier's arrival in the United States coincided with the onset of the COVID-19 pandemic, he struggled in his last two years of high school but benefited greatly from the assistance of a Spanish-speaking counselor who helped him navigate the college application process.

When Javier arrived at PCC, he looked for instructors, counselors, and tutors with Spanish surnames, hoping that they would be able to provide him additional assistance if needed. Following the recommendations for MATH 3, College Algebra, with a support class that his counselor had placed on his education plan, Javier registered, choosing a professor with a

Hispanic-sounding last name. From the beginning of the class, Javier noticed his professors' concern for student learning, explaining, "he doesn't care if we don't understand like a simple problem, he will totally go back to like, basic math...That's very helpful...he will try his best to make us understand." Perceiving his math instructor's demonstrated patience and interest in student learning, Javier felt comfortable asking his professor for assistance. He eventually gained the confidence to ask him questions using his native language and shared, "if I have a doubt or question and I would like to ask him in Spanish... he will understand me. He will help me out."

When I visited the classroom described by Javier, I observed that not all of the students asked questions. The classroom was divided into six rows of desks and 18 students were present in the class. Ten of the students were sitting in the three rows on the right side of the classroom while eight students were sitting in the three rows on the left side of the classroom near the door. The professor stood at the front of the room next to the Smart podium. For the first half hour of the class, he used an app on his iPad to solve problems, which were displayed on the Smartboard in the front of the room. During this portion of the class, the instructor periodically paused to ask if students had questions. The students sitting on the right were grouped in clusters and talked to each other about the problems as they were being solved. Four of these students asked questions of the professor, interrupting him to explain his process as he was solving problems. Conversely, none of the students sitting on the left were speaking to each other and none of them asked a question. The professor also maintained eye contact almost exclusively with the students sitting on the right side of the room and only ventured down the rows to communicate with these students. Although the professor occasionally crossed the front of the room to stand in front of the students on the left, he turned his body and spoke to the students sitting on the right.

Because I had conducted the classroom observation prior to interviewing Javier, I asked him why he thought only half of the class was participating and asking questions. He attributed this divide in the class to the students:

We are like teenagers, so we kind of just like talk to each other. And the part where you were staying ... the lady you also asked for an interview, she's older so we don't know what to talk about with her, and also like the other guys don't talk a lot. They just sit and they're not really social.

When I asked if his professor had done anything to try to integrate these students in the class and to increase their participation, he indicated that the instructor had tried to get them to engage by telling them to sit closer. However, when I was present in the class, the students remained spaced out, and none of them spoke either to each other or to the professor during the hour-long observation. The professor also did not approach any of these students to enquire about whether they were able to solve the problems or had any questions. This contrasted with the professor's regular engagement with the students on the right side of the classroom who he repeatedly checked in on.

I had the opportunity to interview one of the non-participating students after this classroom observation. Jocelyn was a nineteen-year-old freshman who shared that she had a learning disability. Although she was interested in working as a cosmetologist, her parents wanted her to major in math to allow for more career opportunities. She was enrolled in MATH 003, College Algebra, with the support class because she was worried that college math was going to be hard. Jocelyn shared that it was not always clear what the professor was explaining when he was solving problems and that when she took tests in the class that "the questions were trying to trick us." When I asked Jocelyn whether she had reached out to her professor for help

with the tests, she said that she had not and instead watched Khan Academy videos or did practice test questions from the textbook. I followed up by asking if there was anything that her professor could do to help her better prepare for the tests, and she suggested that the professor could provide practice tests and post the answer key. In response to my question about whether she was comfortable making these suggestions to her professor she responded, “I don’t like telling teachers what to do ... because I might be making them feel that they are not a good teacher.” Jocelyn’s response revealed that her concern for hurting her teacher’s feelings about his abilities as a math instructor prevented her from asking for the assistance she required to succeed in her course.

Finding #4: Students are not experiencing culturally relevant curriculum in math.

Despite the recommendations that curriculum be relevant or validate students’ identities, the students interviewed reported not encountering any culturally reflective content in the courses. I also did not observe any culturally relevant curriculum in the four math classes that I observed. Most students did not understand what I was referring to when I asked if their math classes were culturally relevant though they were able to point to specific examples of campus events that validated their culture as well as to relevant curriculum in their English, social sciences, and first year seminar courses. Several male students expressed not even being able to imagine how math could reflect their culture though students in general were able to speak to the value of seeing their culture in the content of other classes. A few female students spoke to a desire to see themselves and their cultures reflected in the content.

Inability to Conceive of Math as Culturally Relevant

The majority of students interviewed struggled to conceive of how math could be culturally relevant. These same students often expressed appreciation for campus events that

reflected their culture and were able to name specific opportunities including panels of Latina/o/x alumni sharing their experiences overcoming challenges in achieving their education and events hosted by the center for undocumented students. Likewise, they were able to identify other classes where culturally relevant content was integrated. One such student was 18-year-old Adrian, a freshman who was a member of Puente. The Puente Project is a state-wide intersegmental program designed to increase college completion by first generation Latina/o/x students; students enroll in paired counseling and English classes with culturally affirming curriculum. Adrian expressed appreciation for the efforts the college was making to validate first generation Mexican-American students like him. He specifically mentioned the English department, which hosted a speakers series featuring writers from diverse backgrounds for being “inclusive” and “trying to reach every student base.” Although Adrian was able to describe the ways in which his math and English classes reflected his culture, he struggled to understand how this could also be true in math:

I never really have taken like, into consideration that, like, these math problems could ever apply to me.... Because you know, as compared to like English, you could actually learn about the people. In College One, we're learning about Yesika Salgado, and personally she for me is like a good representation for me in the classroom. But you know, as compared to like math, we're not doing that. It's just like, you know, math.

Adrian had self-selected to enroll in an empowerment program that featured culturally relevant curriculum and was able to articulate the value of this curriculum for validating his identity, yet he struggled to conceive how this could be accomplished in his math class.

Several of the male students I interviewed not only were unable to perceive how math could be culturally relevant but also drew a distinction between culturally relevant content and

what they considered to be academic content. Michael was an 18-year-old freshman baseball player. Both of his parents attended college, but he shared that his paternal grandparents were monolingual Spanish speakers who operated a landscaping business even though both were now in their 70s. When I asked about how the college affirmed his identity as a Latino, Michael replied, “I don't really think about anything like that ... there's nothing like that's made me feel uncomfortable or even comfortable. Like, it's just kind of just like normal.” Upon expressing that he didn't understand how classes could be culturally relevant, I offered up the first year seminar as an example since the curriculum was recently redesigned to be intentionally culturally responsive. In response to this Michael shared:

Yeah, we definitely looked at like the land that, like, we used to have here, like the native land, and then like, how it got taken away ... Like, that was definitely like, kind of eye opening for me, because I never even like knew half the stuff that I learned there. And like, it wasn't necessarily like, I didn't think of it as like school stuff. It was just like personal stuff.

In making the distinction between “school stuff” and “personal stuff,” Michael revealed his conception that the culturally relevant content he learned in this class was non-academic content.

Javier, a 19-year-old who completed the first two years of his high school education in Mexico, recently changed his major from biology and was planning on transferring to another community college where he could study forensic science. Javier appreciated the opportunity to speak with counselors, tutors, and instructors in his native language, Spanish, and looked for individuals with Latino last names in the hopes that they would be Spanish speaking. Despite this, when asked whether he could identify any curriculum that reflected his Latino identity in math, Javier responded, “I don't find like any like relation between math and my culture, so I

would say no....I feel like...math is not like that. Like my culture should not be in math.” Javier was also enrolled in the first year seminar required of all FYE students. When asked to reflect on the role of the culturally reflective content in that course, Javier stated, “I’m glad to have the opportunity to know, like, different perspectives and like different culture I can see just like culture knowledge but not like professional knowledge.” Similar to Michael, Javier indicated an appreciation for the content that he was learning in College 1, but also drew a distinction between the “professional knowledge,” or academic content, of his other classes and the “culture knowledge,” which was the cornerstone of the curriculum in the first year seminar.

Different from these two male students, two of the female students who I interviewed expressed a desire for more culturally reflective content in their math courses. Marisol was an 18-year-old first generation student who was attending college with the hopes of “paying back” her hard-working parents who immigrated from Mexico. She chose to attend RCCC partially because it was accessible by bus and because she developed a connection to the campus when she used to pass it on route to her singing lessons in high school. In response to a question about what the college had done to validate her Latina identity, Marisol volunteered that she greatly appreciated the content of her first year seminar citing, “Most of us are mixed with like indigenous family or blood, even though we don't really know that because over colonization, but I feel that is an important part of our history.”

Marisol expressed how the curriculum of her first year seminar contrasted with the math she had experienced so far at RCCC, which lacked content focusing on specific cultural or racial groups. In the absence of the instructor’s intentional inclusion of relevant curriculum, Marisol found herself extrapolating how word problems could relate to her, referencing a word problem about the age when individuals started smoking. She explained that “if students think about it

more, ... you see how it affects certain, like minority groups, you get to see that.” Marisol went on to express that an ideal math class would include a balance of race-neutral and race-conscious content:

So of course, like keeping it light, like switching it over, like having, Oh, this is a normal math problem of like this and that, but also, kind of like, throwing it in a little, just so that stays in the back of people's minds like that these minority groups are still going through things and suffering, even though you might not always hear it often in the news, but it's still something that groups have to face.

Marisol’s answers revealed how race-conscious word problems could be leveraged to help students see themselves in the math that they were learning.

Jasmin, an 18-year-old freshman, was enrolled in a face-to-face statistics class with a corequisite support course. Although she had completed four years of high school math, she was nervous about taking college math because she hadn’t encountered many teachers who had been willing to help her in the past. Jasmin chose statistics as the math required for her psychology major, which she hoped would help her achieve her goal of becoming a mental health professional. Similar to Marisol, she noted that the numerous word problems she encountered in her stats class were straight from the book and “there was no problems that were culturally relevant. No, they were just basically like a car this car that, but oh, I've never really seen any problems that had to do with my culture.”

When I followed up with Jasmin about how it made her feel not to see her culture or experience represented in the content of her class, she expressed resignation and frustration. She also indicated that culturally reflective content in her math classes would likely have a positive impact on her:

I'm like, Okay, so another problem that doesn't have to do with me I feel like maybe I would be more interested, just a little bit because it concerns my culture. I just feel like that goes with everyone. So if you see something that's relevant to you, you'll be “Oh, that catches my attention more to the problem.”

Although Jasmin struggled with math throughout her education, she was able to envision how the reflection of her culture in the problems that she was asked to solve had the potential to increase her engagement.

Finding #5: Instructors do not sufficiently leverage students' Funds of Identity by structuring collaboration and connecting math to students' lives.

The funds of identity framework teaches us that identity is formed through informal learning experiences and peer interactions (Saubich & Esteban-Guitart, 2011). Historically marginalized students, therefore, could benefit greatly from opportunities to develop their college-going and math identities through opportunities to learn with and from their peers in collaborative settings. This framework similarly emphasizes the importance of integrating students' “lived experience” into classrooms as a strategic pedagogical approach (Zapata, 2019). Although students expressed the value of both collaboration and connection to the real world in their math learning, the opportunities for students to experience these approaches appeared to be limited. While the extra time provided by corequisite classes could be a space for these approaches to be integrated, students did not report inclusion of these approaches in their support courses.

The Value of Collaboration

Several of the students I interviewed spoke to the value of working with classmates on projects or having the opportunity to learn from peers who had a deeper understanding of the

subject matter. Although most students described being encouraged or even required to check answers with their classmates, none of the students interviewed reported participating in any structured collaborative projects. One student who expressed the importance of learning from her peers was Marcela. Although she was not a first generation student, Marcela shared that her mother originally had intended to attend a University of California school but was unable to pursue this path when she became pregnant with Marcela. She did, however, attend community college and become a Registered Nurse. Marcela's mom harbored high aspirations for her first-born child, hoping that she one day earned a bachelor's or even a master's degree. Marcela planned to be the first in her family to graduate from a university and hoped to show her fifteen-year-old brother and five-year-old sister the way into higher education.

Despite describing how she "hated" math in high school, Marcela successfully completed precalculus as a sophomore and entered calculus in her junior year. She credited her classmates for helping her pass this challenging course and referred to the group projects that gave her access to her peers' knowledge:

Honestly, if I didn't have a lot of group projects in that class, I probably wouldn't have passed. Group projects really saved me for my calculus class because I always would choose the groups that know like, they knew calculus, and they were good at it. So yeah, because of them, I got good grades, and I have to thank them for that.

Marcela was taking MATH 15, a course designed for liberal arts majors and chose a professor with high rankings on Ratemyprofessors.com because she thought this professor would be more willing to help her succeed. She appreciated her professor's willingness to answer questions and her weekly reminders about due dates but wished there were more chances to work with classmates. When asked about whether there were any opportunities to participate in group

projects as in high school, she lamented the lack of structured collaboration, affirming that “if there were group projects, it would be so much easier.”

In the absence of collaborative activities, Marcela instead sought assistance from former high school friends who possessed strong math abilities. For example, Marcela regularly contacted her friend Emmanuel who just got accepted to UC Berkeley. She described how “he tells me and breaks it down to me. And he's like, you know, I can't do this for you. But this is how it's supposed to be done. And I really appreciate that.” To better understand why Marcela preferred reaching out to friends rather than going to her instructor directly, I asked her to explain how they helped her understand the math:

I feel like there's more time with them they're not teaching a whole class. And ... I'm their friend. So I'm like all singled out, and ... they have all the time in the world just to like help me because they don't have to worry about like 20 other students.

Marcela's response revealed that even though she selected her instructor based on student reviews describing her as helpful, asking a peer for assistance provided her the more individualized attention she required to understand concepts.

The Importance of Real life Examples

Several of the students who I interviewed spoke to the importance of seeing how math could be a valuable part of their lives. Unfortunately, only three of the 23 students I interviewed were able to describe math concepts that they could imagine utilizing in future. The few students who had encountered this in their classes expressed how seeing real life applications made the math more meaningful and understandable. Two of these students indicated that they appreciated access to information related to financial literacy that was unfamiliar to them as low-income first generation college students. Because of the potential for this information to

improve their lives and the lives of their family members, these students conveyed increased interest in learning these concepts.

Guillermo, a first generation student with a learning disability, was struggling in the Business Math course that he regretted having enrolled in. He chose Business Math because it had the same name as a course he took his senior year of high school that was only open to students with documented disabilities who had an IEP (Individual Educational Plan). Guillermo described his high school math class as a “real life math class” because of the focus on math concepts that had real life applications. Although he had struggled in previous math classes and failed Algebra, he described his “real life” math course as “pretty engaging and fun.” When Guillermo registered for Business Math at PCC, he was hoping that it would have similar content to his high school class, which covered financial concepts such as how to calculate a basic mortgage. Unfortunately, he soon discovered that his college Business Math was much more theoretical than his high school class causing him to struggle from the beginning. He described himself as a “fish out of water” in this class, which he referred to as a “rollercoaster” of ups and downs. Despite these challenges, Guillermo persisted in the course and described one project that was helping him stay motivated:

But we're also doing like, a semester long project, about, like, picking a car, and researching about our car and getting financial offers on our car, which hasn't, that hasn't been too bad. It's actually been kind of, like, enjoyable.

Similar to Guillermo, 28-year-old Alejandro, a veteran who was using his GI Bill to attend college, expressed appreciation for real life examples in his STAT 50 class. Alejandro had been out of school for a decade and was hesitant about taking math based on his bad experiences in high school. In spite of this, he was determined to pass math and complete his education.

Alejandro shared that his higher ed aspirations could improve not only his future, but that of his family members: “No one in my family really has a degree, so I want it to be just, like, a steppingstone for everyone else to get the degree.” Because he knew that passing statistics would be a challenge, Alejandro chose a section with an attached corequisite support course and appreciated that his teacher was patient and helpful. When asked what best supported his success in math, Alejandro specified that “real life situations” were his preferred kinds of problems and provided the following example:

So this one was one, according to the census bureau, 8.8% of the US population had no health insurance coverage. And ... suppose that in a recent random sample of 1200 Americans 130 had no health insurance. So she kind of asked us to like apply what we learn in this section to this kind of stat survey. So like she wants us to ... use a 0.02 significance level to test the claim that the current percentage of Americans who have no health insurance coverage is greater than 8.8%. Okay. So, yeah. So she has us do, like, these kinds of questions, and I think they're like, they're cool. Like, they're helpful and everything. It's interesting.

Able to see the relevance of these types of problems to real life, Alejandro expressed optimism that he would be able to pass statistics, go on to complete his Associate degree, and perhaps even transfer to a four-year institution.

Marcela, an 18-year-old child development major, is another student whose attitude towards math changed based on her ability to see how she might benefit from knowing certain math concepts in real life situations. After struggling through high school math, Marcela was thrilled at the prospect of never having to take math again mostly because she didn't see how it connected to her life or her future career as a preschool teacher. She shared, “I never thought I

would need it in high school. I'm like, we don't need this. This is not even part of my career.” Fortunately, the instructor for her liberal arts math course helped shift Marcela’s view of math. When asked what her teacher had done to help her understand the usefulness of math, she referenced real life problems like the following:

She uses real life examples, like in real life scenarios. So one example she may use is I want...to buy a house for \$400,000. And then it's like, I get a loan for \$180,000. And then it has a compound interest of like, 6%. So she uses like, real life examples. And then she'll be like, oh, so what's the interest? Or how much interest would he get back? How much does he owe monthly? And then that's how we would go about like, the lesson. She'll use real life examples, which is really good, because I was like, wow. Like, I never thought about it that way. Or even thinking like I could ever use it. Whenever I buy a house or something.

In their description of the real life concepts they were engaging with in their math classes, both Alejandro and Marcela provided a much longer and more detailed description of the type of problems they were solving than any of the other students I spoke with. This suggested that the connection to real life made these concepts not only more valuable but also more memorable.

Corequisite Courses: A Missed Opportunity

Corequisite courses provide extra instructional time and allow for instructors to incorporate curriculum and activities demonstrated to leverage students’ funds of identity. Potential uses of this time include structuring collaborative projects and connecting math to students’ lived experience. Additionally, instructors could use the support class to directly address the math anxiety so many students experience through strategies designed to lower the affective filter. As Zapata (2019) asserts, instructors who acknowledge students’ funds of

identity are able to “recognize students’ fears, anxieties and pitfalls and strategize pedagogical approaches that teach to the students’ strengths.” Unfortunately, some students enrolled in corequisite classes revealed that either the support class was not being held or that attendance was optional and most indicated that there was little distinction between the core and corequisite classes.

David, an 18-year-old English major who aspired to be an English teacher, was relieved when he realized that a support class was attached to his STAT 50 course. Though he excelled in most of his high school classes, he failed Algebra 1 twice and struggled to achieve a C- in Algebra 2. He was under the impression that all the STAT 50 classes were paired with a corequisite, indicating that it was “automatically tacked on.” Based on his low grades in high school math, the corequisite course was likely included in the education plan provided by the FYE counselors. David was relieved that he would have access to additional help in his corequisite course and was, therefore, disappointed when his teacher decided not to meet on the day dedicated to the support class, stating. “So Tuesday, I think was supposed to be the support class, but we like she just said to pretend like we're not doing it ... like it's not a thing.” Although David had paid for the extra half unit and anticipated engaging for an extra two hours in activities that would allow him to succeed in stats, his instructor chose not to utilize the time assigned for the corequisite course.

Other students who enrolled in corequisite classes did meet during the scheduled time though some teachers made attendance optional for students. Alejandro, a returning student veteran, was also enrolled in STAT 50 with a STAT 150 corequisite. When asked to describe his support class, he seemed a little unsure about whether it was required:

The support class is more like, it's kind of a, I don't really want to say it's like not, it's because it's not really a class because we just mainly, go for the quiz. And if we need help. So it's like, you don't have to go, but you know, you should go.

On days when the students were not taking a quiz during the time allotted for the support class, students who felt in need of additional help were encouraged to attend the Friday class. During these sessions, the teacher would either go over answers to the previous quiz or give students additional problems to solve. Alejandro described how his teacher would sometimes put students into breakout rooms. During these break-out room sessions, the instructor and her TA would visit the rooms to address specific problems the students had answered incorrectly on this quiz, have them solve the problems again, and “tell us what we probably did wrong.” Apart from the more individualized attention because of the smaller number of students in attendance, the corequisite sessions mirrored the core class meetings, which were also dedicated to “mainly like solving problems.”

Rich, a 52-year-old veteran who was enrolled in college for the first time, expressed great appreciation for the opportunity to take his STAT 50 class with a corequisite support class as part of the veteran’s cohort. Despite this appreciation, Rich’s description of the support class reveals little difference in structure or activities between the core and support classes:

Whatever we've done, during that week, we're going to go over and we're going to do some problems out of the workbook. It does help. Because it's still you know, keeps you fresh in your mind. Yeah, and that's, that's essentially what we're doing and if we have a test coming up, we're definitely going over everything that we've done workwise in the class as well.

Similar to Alejandro, Rich revealed that the time dedicated to the corequisite support class was mainly invested in reviewing the same material covered in the core class utilizing the same methods of problem-solving.

Finding #6: Resources, while valuable, may be underutilized by students.

RCCC has been a state-wide leader in efforts to reform student services through an equity lens. As a result of these efforts, students had access to numerous resources to support their success in math classes including semester-long loans of textbooks, laptops, and scientific calculators, which they could check out at the school library just by showing their student ID. The majority of students reported having been informed of these resources by their instructors and expressed great appreciation for them.

28-year-old veteran Alejandro's familiarity with the resources available to him suggested that the college's efforts to inform students of these supports were working. When I asked him what more RCCC could do to support students like him in achieving their academic goals, he responded:

To be honest, I think [RCCC] does a lot already, like... just by renting us calculators out. Just like very helpful right there. Even like, if you need a computer, you can just go and tell them you need one. You know, and so they're very supportive on everything. You know, it's like they want...you to do good and stuff. So I feel like they're doing good. The library is a cool place, you know, you can print/rent out almost anything there. Oh, there's a lot of resources for sure.

Alejandro's reference to the library as a hub for resources suggested that students visiting the library to access one resource could serendipitously discover additional resources that they may not have known about.

The resources provided by RCCC were a great support to Beatriz, a 19-year-old first generation student enrolled in Math 15, Liberal Arts Math. Beatriz was the daughter of immigrants from Mexico. Although her mother wanted to attend college in Mexico, it was not an option because she didn't have enough money to continue her higher education, "so ultimately, she had to give up on that dream." Committed to completing a college degree, Beatriz shared that her mother had expressed a desire for all of her children to go to college since they were little. She described how important it was for her to complete her degree and how it would provide her with options in life, stating "I won't have to work the rigorous jobs my parents work now. And I can be someone, yes, make something more of myself with higher education."

Despite this strong commitment to achieving her education, Beatriz experienced a rocky start to college the previous year, which resulted in her dropping her statistics class twice. Since enrolling in liberal arts math, she had gained a greater understanding of what she needed to do to succeed in math including having access to the textbooks. She described having learned, "that I have to be more focused on reading the materials because something so small, could fly over my head. And I need that information when doing a question." Fortunately, Beatriz knew she could have access to the textbooks through the library. An additional resource that Beatriz was utilizing to help her succeed in math was a scientific calculator. She explained how her affiliation with the EOP&S program helped her learn about this valuable resource:

I went through the ... Library because through EOPS, we learned that I could borrow ... I forgot exactly what calculator brand--it was the really expensive one. And so I was able to rent one for the time being so I'm glad they had that set up, because I couldn't afford it. So I was really happy that I didn't have to worry about where am I going to get this calculator because they had it. They already had it programmed.

With access to these resources, Beatriz felt confident that she would be able to pass her math class. She was looking forward to completing her Associate degree in communications and transferring within a year.

Pre-recorded and Zoom Videos: Staying on Track

Pre-recorded videos were a resource that many students referred to as being of great value in their math classes. In many cases, these videos were created because of the need to convert classes to an online format during the COVID-19 pandemic. Although they may have been intended as a stopgap measure, students articulated the merit of being able to watch and rewatch these videos at their own convenience. Students similarly communicated that recorded Zoom sessions provided helpful access to course content when they were unable to attend synchronous classes.

Miranda, an undocumented student majoring in math, started taking classes at RCCC in Fall of 2019. Unfortunately, she had to drop her classes including math in her first semester after her father passed away two weeks into the term. Looking forward to a fresh start in 2020, her spring semester was interrupted by the COVID-19 pandemic, and she struggled with the science classes she was enrolled in. She reported, “Well, my computer was also a factor. But um, yeah, I didn't deal with simulations for the labs. And yeah, it wasn't good.” Prior to the pandemic, Miranda had borrowed her math textbooks and scientific calculators from the library and had learned at that time that borrowing a laptop was also an option. However, Miranda didn't take advantage of this resource, admitting, “I should have asked for how and gotten a computer or something here from campus. But I stuck it out.” She later clarified that her full-time job delivering medical equipment to various locations around Los Angeles County made it challenging to come to campus and borrow a computer during the pandemic.

At the time of the interview, Miranda was back on track and taking a combination of face-to-face and online math classes. Although she enjoyed being back in the classroom, she recognized the learning advantages presented by recorded lectures:

Because what I really liked about online, even though I didn't really like online, is that the lectures were recorded. And I think that was like a huge advantage, especially for math. Because, I mean, it's different when you're like, in the classroom, you know, in person. Not a lot of people have good memory, I would say. So it's good to like have, you know, those links, and we could like, look back, maybe like, lectures were recorded ... that would, I think, help the professor and the students so that you don't have to repeat the same concepts over and you know, the students could just look back at those sections and that was really helpful. I think that's what I like, one of the things I'm gonna miss about the whole online thing.

Miranda convincingly articulated the advantage of access to content on demand as a tool for reviewing complex math concepts that require repetition.

An additional advantage to recorded lectures was the ability for students with complex lives to stay on track and catch up with missed work. Several students described recorded classes as helpful and appreciated not having to miss out if they had to be absent. One such student was Jacob, a first semester student enrolled in Math 5A, a calculus course. Juggling school, work, and family responsibilities, Jacob greatly appreciated that his professor recorded all their classes on Zoom, even though he was teaching in person. Jacob articulated the value of not falling behind even when he was unable to be physically present in the classroom:

Or let's say that I had to, there was days where like, something came up, and I couldn't come, I could watch the lecture. ... It didn't feel like I was missing things. And when I

had to miss, or if there was something that I didn't get that it was like, oh, no, I have to wait till the next day. I see. Oh, my goodness I can watch the lecture again. So that was a big help.

48-year-old Eugene, who was taking pre-law classes using his GI Bill, similarly appreciated having access to class content. Although Eugene's core math class, STAT 50, was face-to-face, his corequisite support class was taught over Zoom. Like Jacob, Eugene appreciated that access to recorded classes could ameliorate the disruption to learning often resulting from unexpected life events. In Eugene's case, the death of a close family member from COVID-19 required him to miss class for a week. He described how, in spite of this interruption, he managed to keep up with work:

I was gone for we had a death in the family, nothing needs to be said about it. ... I'm trying to capture how I got up to back to speed so fast. Because if one student who's decent at math misses a week, it's probably nothing to them. To me, it was like, oh my God, I'll never catch up. And ... whereas I really was only gone a week, I missed two labs, there's a video, you know, I can go back and review what was said. So I think out of everything that got me back to where I needed to be to catch up to my class, the recorded lab class sealed everything to make me feel like I'm ready. I'm ready again. I'm not behind.

Underutilized Tutoring

The majority of students interviewed reported utilizing resources provided by the library such as textbooks, scientific calculators, and laptops. Many students also volunteered that recorded videos were a critical resource that they benefited from. In contrast, when asked about tutoring, very few students acknowledged use of this resource. While some students ascribed this situation

to lack of information about tutoring, others suggested that fear of the unknown or the stigma associated with tutoring were responsible.

David, an 18-year-old freshman who aspired to become a high school English teacher, recently learned about RCCC's tutoring services when his English teacher took the students on a campus tour. Although his mother and father both graduated from university, he was still learning how to navigate the first higher education institution he had attended and was finding it a little overwhelming:

I didn't even know that we had, like so many centers and tutoring things available for us. And I feel like I have got a couple maybe here and there emails letting us know that you guys like [RCCC] offers things to help us, but they don't really specify like what they offer and where to go, you kind of have to do more research and really look into it. And then some people don't know really how to work our school's website. So it makes it harder to try to look for something you don't know how to work. So ... taking us to the centers was like really helpful, because it's a big campus too. So you just get lost.

A highly responsible student and member of the teacher preparation program, David read his campus emails regularly. In spite of these regular communications about campus resources, including tutoring, David asserted the need for more direct guidance from an institutional actor who could show him both where tutoring was housed and what exactly it entailed. He also expressed concern that students with less navigational capital would struggle even more than he did in locating and accessing these services, suggesting an even greater need to facilitate these students' connection with academic support in the form of tutoring.

As a veteran returning to college after a long stop out, Eugene had accessed a variety of support services including the counseling and advising offered by the Veteran's Resource

Center. Recognizing his need for additional academic support to succeed in his statistics class, he also elected to enroll in the corequisite support class. Because of this willingness to take advantage of the school's support services, it was surprising that Eugene had not accessed tutoring at any time during his 16-week semester in statistics. He explained that his resistance to tutoring stemmed from a long-held belief that tutoring was associated with an intellectual deficit:

Because the tutoring room still to me had the stigma of, oh, this is where the slow kids, you know, go. And I kind of hid all that from everybody that, you know, for the first couple of weeks. I didn't get it. But you know, so I would be one of the last persons to go into a tutoring room. It just felt like the slow room.

Following up on this response, I asked if the college could do anything to help students overcome the perceived stigma of tutoring so that students who needed these services were willing to utilize them. Eugene suggested that tutors from the centers visit each of the math classes to introduce themselves in the first weeks of the semester and put a "welcome face" to tutoring. Eugene's response, similar to David's, reiterates the need for institutional actors to assist in the process of demystifying and destigmatizing tutoring.

Summary

The findings of this case study of AB 705 implementation at a Hispanic-serving Institution revealed that the Latina/o/x students interviewed lack sufficient information to inform their choices of core classes and corequisite classes. These students, who all admitted feeling anxious about taking math, described receiving academic validation from their instructors; however, they did not experience culturally responsive curriculum and many struggled to conceptualize how this could be adapted to math content. While students spoke to the value of both real life examples and collaboration, instructional approaches that leverage students' funds

of identity, few reported the inclusion of either in their core or corequisite math classes. Resources such as free calculators, laptops, and textbooks and pre-recorded videos were perceived as valuable. Yet, students expressed a reluctance to access tutoring due to unfamiliarity or stigma. The experiences and perceptions of these students collected in this study can be utilized to inform on-going AB 705 implementation efforts.

CHAPTER FIVE: DISCUSSION AND RECOMMENDATIONS

My study was designed to inform the implementation of AB 705, a legislative attempt to radically improve the educational outcomes of all students in the California Community College (CCC) while addressing persistent racial equity gaps. The ability of the system to educate many more students than any other private or public higher education institution is critical to the economic health of the California economy, which has an ever-increasing need for college educated graduates (Johnson et al., 2019). The CCC also enrolls a disproportionate number of students of color. Thus, it offers these historically marginalized students the opportunity to gain an education that could result in higher wages, increased job security, and health and retirement benefits, resulting in a potential disruption to persistent intergenerational poverty. With the passing of AB 705, a significant structural barrier to educational attainment – prerequisite remediation in math and English – has been largely removed, thereby increasing the possibility that the CCC will realize its educational promise.

The purpose of this study was to explore Latina/o/x students' experiences and perceptions of AB 705 at a college that fully implemented the legislation by the Fall 2019 deadline. Although the passing of AB 705, with its requirement that colleges provide direct access to credit-bearing math and English courses, has done much to eliminate the structural barrier of remediation (Hern, 2019), we lacked information about how students experience being placed into transfer-level courses. I, therefore, gathered data by conducting student focus groups and interviews and by observing on campus and Zoom classes. The findings I uncovered suggest several recommendations for community colleges implementing AB 705 related to student placement practices, the design and instruction of core and corequisite math courses, and accompanying student supports.

By investigating the student experience of AB 705 implementation, my study revealed the need to provide increased guidance to students in the placement and registration process. More importantly, it uncovered that much work needs to be done in curriculum design and pedagogical approaches for both core and corequisite classes in order to leverage students' untapped funds of identity. Moreover, the findings revealed the need to address core student services by streamlining access to counseling and destigmatizing the use of tutoring.

This study contributes to the scholarly literature on the experiences of Latina/o/x students in community college math and confirms some initial recommendations about the design of corequisite math classes. Additionally, insights from my study provide a complex understanding of the emotional and intellectual experience of students directly entering transfer level math courses as they deal with feelings of anxiety around math that have the potential to derail their aspirational academic goals for themselves and their families.

In this chapter, I summarize the significant findings and contextualize them within relevant existing research. I then present recommendations for practice related to AB 705 implementation, identify the limitations of my study, and provide suggestions for future research. To conclude, I present an implementation update and include my reflection on what I have learned from conducting this study.

Discussion of Key Findings

Math Course Selection

This study revealed that many students were making uninformed choices about which math class to enroll in. This is of especial concern because of the high stakes nature of math course selection. Students participating in the study shared that their math registration decision was often based on the abbreviated student education plan (ASEP) uploaded by counselors into

their online portal. Counselors develop these one-semester plans based on students' indicated major at the time of application to the college; the recommendation of a corequisite, when available, is determined by students' high school math course completion and GPA. Although many students proclaimed the helpful nature of this tool, this advisement approach presents several potential flaws. As noted by Cuellar Mejia et al. (2020) in their comprehensive report on AB 705 implementation, counselors often play a gate-keeping role in preventing students from accessing higher-level or stand-alone math classes. It is doubtful that many first generation, first year college students realize that this plan is merely recommended rather than required. This was confirmed by several students' comments that they did not discover that they were enrolling in a corequisite course until they were registering or until the course began. These students, therefore, may not have fully understood that it was an option for them to register in the stand-alone math class without the corequisite or that they could choose to take a higher level math class if they were prepared for the challenge. Because the jury is still out on whether corequisite courses increase student success in core math classes (Cuellar Mejia et al., 2021), it is problematic that students may spend additional time, money, and units on these courses without full awareness of this registration decision.

The majority of students I interviewed registered for math in their first semester of college, often following the guidance of the ASEPs loaded into their student portal. These plans help to achieve the goal of AB 705, which is designed to maximize the possibility that students complete transfer level math and English in their first year. However, these plans recommend math courses based on a students' stated major at the time of application, which could prove problematic. Two previous studies conducted at RCCC on students' career and major decision-making process revealed that initial major choices are often made in the absence of essential

supports such as labor market data or career advisement. For example, Cesar Davis (2020) discovered that the majority of Black and Latina/o/x students in her study selected their major based on “casual, brief conversations” with either high school teachers or counselors or during their college orientations (p. 129). Furthermore, in a second study which explored the career and major decision-making choices of 102 students at RCCC, Colina Neri (2019) discovered that Latina/o/x students have less access to “expert knowledge and connections to the labor market” than other racial groups (p. 193). Because students’ initial math course often places them on a STEM or non-STEM track, advising them to enroll in a specific math course based on these uninformed major choices may foreclose students’ ability to access lucrative careers in the fields of science and technology. Of concern, uninformed math course selection disproportionately impacts historically marginalized students of color with less access to essential information needed to determine a career and major path when entering college.

The Benefits of FYE

While the majority of community college students enroll in classes without consulting a counselor or advisor, students who are part of the First Year Experience program at RCCC benefit from access to dedicated first year counselors and advisors. Many of the students in this study reported speaking to an FYE counselor or advisor during outreach visits to their high schools. These students received additional advice about which math course to take based on conversations with FYE staff. The benefits of FYEs have been long studied. In fact, the University of South Carolina, which is widely credited to have developed the inaugural FYE program in 1970, established the National Resource Center for the First Year Experience, which describes itself as a “clearinghouse for scholarship” on FYE programs. The purported benefits of these programs are wide and include academic and social adjustment (Mayhew et al., 2011),

increased connection between students and faculty (Nadler et al., 2004), and improved confidence and self-efficacy (Suzuki et al., 2012).

This study adds to the literature on FYE. It suggests that an additional benefit to FYE participation may be the personalized guidance students receive in selecting a transfer level math course. This guidance can serve as a valuable form of institutional validation for first generation students of color. Theory of validation recognizes that historically marginalized students may experience challenge navigating institutions of higher education and puts the onus on “validating agents” to initiate contact with students in an effort to provide them with support they may not be willing or able to request for themselves (Rendón Linares & Muñoz, 2011, p. 17). While AB 705 is contributing to closing racial equity gaps by increasing access to transfer level math classes, “validating agents” in the form of FYE staff could help ensure that students are supported in making an informed decision about which math class to choose.

Math Anxiety and Academic Validation

All student participants in this study shared with me that they experienced some level of math anxiety. Several of them expressed significant feelings of fear and dread about taking math classes. This math anxiety often resulted from warnings that students had received from teachers and peers about the increased challenge of college math compared to high school math. The almost universal expression of anxiety was even more significant considering that this study was conducted during the last four weeks of the semester, after the drop deadline, and that all but one of the students interviewed was still enrolled. If the study had been conducted earlier in the semester, a more representative population of students, including those who dropped the course, would likely have expressed even higher levels of fear and anxiety.

Twenty-year-old first generation student Miranda expressed her fears about college math in the following way:

I was kind of scared because it's college. So I was like, Oh my gosh, like, this is nothing compared to high school math. So I'm like, I hope it could, you know, be easier, but I was just in shock. I was like, wow, I was just really nervous to take them. I mean, I'm barely taking my math class right now. So I was kind of holding off on it for a while. So I was really scared to take it for sure.

Because of Miranda's self-confessed math anxiety, she chose not to enroll directly in math in her first year, a decision which could result in loss of math knowledge gained in her high school classes. This avoidance of math confirms prior research conducted at RCCC demonstrating that students' math anxiety led them to postpone taking math and to choose majors that required less math (Colina Neri, 2019). Additional studies have demonstrated that fears associated with math performance can cause students to procrastinate, thereby reducing the time students need to practice vital math skills (Paechter et al., 2017; Akinsola et al., 2007). The decision to delay or avoid taking courses that might "irrevocably confirm their academic inadequacy" was identified as a preventive strategy in *The College Fear Factor*, Rebecca Cox's exploration of the anxiety that community college students, many of them first generation, experience upon entering college (2009, p. 26).

The participants in this study suggested that their teachers' care, concern for their math learning, and approachability worked to directly address their math anxiety. This aligns with the research in the field, which reveals that teachers play an important role in influencing their students' attitudes toward math and can contribute to more positive inclinations towards math by encouraging their students, appealing to their students' feelings of self-efficacy, creating space

for students to make mistakes in the learning process, and providing assuring feedback (Luttenberger et al., 2018; Urhahne et al., 2011).

The teachers who are most capable of addressing their students' anxieties effectively are those who make the effort to understand why their students may fail to invest the requisite effort in the course and who work to break down the inherent hierarchical relationship between professor and student (Cox, 2009). Rich, a returning veteran student, exemplified the difference a teacher who invests in relating with students on their level can make on math learning. Whereas Rich's experience in high school math made him feel "dumb" resulting in him "blaming the teacher," he felt confident that he would pass his liberal arts math class and credited his teacher who he described as "pretty awesome" and "hilarious." He also shared, "One of these days, I'm gonna get her to say a bad word. She's just on the fringes," revealing a casual, close relationship between teacher and student that reduced the anxiety he felt towards math.

Students in my study reported that the teachers who they found most approachable and the least nervous around were those who shared aspects of their own lives. For example, Michael described his teacher's intentional sharing about himself and his family during classtime: "It felt like you kind of knew him a little like, I knew he had kids. I knew where they went to school. Like I knew what his daughter's favorite food was. I knew what his favorite food was." These efforts at academic validation clearly have the potential to reduce math anxiety by increasing instructor approachability. However, the research on funds of knowledge and funds of identity suggests that faculty must take an additional step in breaking down the student-teacher hierarchy if they are to create the conditions necessary for learning and overcome self-defeating behaviors that may result from math anxiety. Both Hogg (2016) and 't Gilde and Volman (2021)

discuss the importance of faculty modeling vulnerability in order to allow for their students to reveal their vulnerable feelings around learning. Whereas Zapata (2019) suggested the importance of faculty being able to “recognize students’ fears, anxieties and pitfalls,” a critical additional step is for faculty to share their own fears and anxieties, thereby allowing students to acknowledge and overcome these emotional barriers to learning.

The radical changes required by AB 705 have, in fact, created conditions that are producing significant fears and anxieties not only for students but also for teachers. Instructors who have taught remedial courses for years and even decades are now asked to abandon this familiar content and teach transfer level courses. Others who historically taught transfer level classes only to those students who aced the placement tests or survived the weeding out process of remediation are now asked to differentiate instruction to teach all incoming college students. Furthermore, teachers who have never taught statistics or liberal arts math must now quickly learn this content in order to meet demand for increased course offerings in these subjects. These instructors can strive either to hide their fear at their own lack of preparation for the challenges presented by AB 705 or leverage their insecurities as a way to identify with their students and create a shared vulnerability that has the potential to greatly reduce students’ anxiety about college math.

While addressing math anxiety is critical for all students enrolling in college math courses, I posit that the instructors’ role in addressing students’ math anxiety is especially critical in the case of students who have historically been excluded from higher education. This aligns with the findings of Crisp et al. (2017) that Latina/o/x students in remedial math benefit from faculty validation and reveals that it is also true for Latina/o/x students placed directly in transfer level classes.

Leveraging Students' Funds of Identity

My study revealed the importance of leveraging students' funds of identity to support their learning in math classes. As defined by Esteban-Guitart and Moll (2014) these funds are “historically accumulated, culturally developed and socially distributed resources that are essential for a person’s self-definition, self-expression and self-understanding” (p. 31). A pedagogical and curricular approach that leverages students’ funds of identity acknowledges that learners must be active participants in the acquisition of knowledge and that they bring their “whole lived experience” as well as “their trajectories, contexts and experiences throughout their lives to learning” (Esteban-Guitart, 2021; Esteban-Guitart, 2018; Esteban-Guitart et al., 2018). The funds of identity approach to teaching builds on the funds of knowledge framework yet shifts away from focusing primarily on the skills and knowledge that are acquired in the home and community from adults and instead centers on the identity development of children and young adults (Rios-Aguilar et al., 2011). Because many of the students impacted by AB 705 are adolescents in their first year of college, the focus on identity has the potential to increase the success of these students as they occupy a critical stage of identity exploration (Erikson, 1968; Meeus et al., 2010).

Teachers who acknowledge their students' funds of identity recognize the importance of creating opportunities for informal learning experiences and peer interactions (Saubich and Esteban-Guitart, 2011) and of drawing upon students’ lived experiences through culturally reflective curriculum (Zapata, 2019). Historically, the widespread use of standardized placement tests resulted in Black and Latina/o/x students being disproportionately placed in remedial math courses (Bettinger & Long, 2005; Perry et al., 2010; Sparks & Malkus, 2013). By requiring colleges to rely on high school performance data instead of placement tests and by eliminating

long sequences of remedial classes, AB 705 could potentially eliminate equity gaps resulting from racially inequitable placement processes. That said, although all racial groups are experiencing higher levels of success in transfer level math and English as a result of AB 705, significant racial equity gaps continue to persist. To illustrate, 39% of Latina/o/x students in the CCC successfully completed transfer level math in their first year in 2020, a year after AB 705 was first implemented, compared to 8% in 2015, prior to implementation. In contrast, 53% of White students succeeded in transfer level math in 2020 up from 18% in 2015. While both groups of students experienced greatly increased success rates in completing transfer level math, the racial equity gap between Latina/o/x and White students increased from 10% before AB 705 to 14% after its implementation (Cuellar Mejia et al., 2021).

One reason for these persisting and even increasing gaps may be the lack of curricular and pedagogical approaches that leverage the funds of identity of students who have been historically excluded from higher education because of their race. Because our institutions and our courses were not designed with these students in mind, it is the responsibility of the college and the faculty to address these equity gaps through curricular and pedagogical reforms. The students in my study spoke to the importance of collaboration with peers to support their learning. They also talked about the value of math content that reflected their lived experience and had the potential to improve their lives, such as activities that addressed financial literacy.

Zipin et al. (2015) posit that students from socio-economically challenged backgrounds may benefit from teaching that leverages their aspirational funds of identity. While recognizing real and continuing barriers to economic prosperity, this approach allows students to imagine a future with different economic opportunities than their parents experienced. Incorporating aspirational funds of identity into math instruction supports the ambitious goals for their future

expressed by the students I interviewed; further, it addresses their interest in math activities that contribute to their knowledge of financial activities such as purchasing a car or managing credit card debt.

Aspirational funds of identity, which address students' striving for economic opportunities not available to their predecessors, intersects with social funds of identity, which focuses on important individuals in students' lives. This can be seen in the case of the highly motivated first generation student Marisol, who expressed that her motivation to attend college was centered on her desire to give to her family something that they were unable to access:

I feel like my family deserve to get an education that they couldn't get being from Mexico with the government over there. So I feel like I'm paying it forward for them, and showing them that I can get a degree and kind of pay back to them, if that makes sense. Like giving back.

Math instructors who are able to identify these intersecting funds of identity have the potential to contextualize their curricular and pedagogical practices in ways that tap into students' resources, including deeply meaningful motivations for attending college.

A funds of identity approach to math instruction aligns with recommendations included in the most recent AB 705 implementation report generated by the PPIC, which suggests strategies such as creating “a student-centered classroom design that emphasizes engagement, collaboration, and community-building” (Cuellar Mejia et al., 2021, p. 31). The report further recommends that faculty implement culturally relevant curriculum, problems that incorporate financial literacy skills, and various real world problems. These recommendations line up with existing research in the field of math learning. In a comprehensive review of the existing literature on instructional practices in mathematics published by the Community College

Research Center, Hodara (2011) concludes that student collaboration is one of two approaches, the other being problem representation, demonstrated through multiple rigorous studies to increase learning in math. The National Research Council recommends that to ensure math learning that teachers must address students' productive disposition, which can be developed when students view "mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy" (p. 16).

Unfortunately, many of the students I spoke with were not experiencing these types of curricular and pedagogical approaches, which have the potential to affirm their funds of identity, in either their core or corequisite math courses. Because of the clear intersections between recommended practices in math instruction and the funds of identity focus on teachers' role in affirming the personal and learner identities of historically marginalized students (Hogg & Volman, 2020), my recommendations center on piloting this approach in the classroom.

Underutilized Tutoring Services

Despite the drastic increases in transfer level math completion rates across all racial groups under AB 705 implementation, a majority of Latina/o/x and African-American students do not experience success in their first attempt at transfer level math (Brohawn et al., 2021). Low first semester success rates suggest that these students could benefit from additional academic services such as tutoring. Although the impact of tutoring on student success is difficult to isolate, at least one study at an open access community college has demonstrated a positive impact of tutoring on student success in English and math for all racial groups (Kostecki & Bers, 2008). However, a small minority of the students I interviewed had taken advantage of the extensive math tutoring services offered either face-to-face or online by the college.

Students reported a variety of reasons for not accessing tutoring including lack of awareness of the services or time constraints due to work and family responsibilities that prevented them from visiting the tutoring centers. They also expressed a stigma associated with tutoring as a support recommended for underperforming students or indicated that a lack of familiarity with the process of tutoring acted as a barrier. When asked why she hadn't accessed tutoring services, Sara, a first generation student who dropped her statistics class mid semester, revealed that a fear of not knowing what would happen during tutoring prevented her from utilizing this support:

I would say that one of the things I struggle with is like, how would they be tutoring me? Is it gonna be like one on one? Am I gonna just drop the course material onto them? Do they know the course material? What's what's happening? You know?

Javier, another first generation student, reported feeling “awkward” and “afraid” when he visited the tutoring center.

Because of the limited data on the efficacy of corequisite math classes for addressing racial equity gaps, the PPIC suggests that colleges increase other forms of academic supports that do not require students to enroll in additional units (Cuellar Mejia et al., 2021). However, if students are failing to access these supports, as my study suggests, the expansion of tutoring services will be a wasted investment.

Recommendations for Practice

Provide early intrusive counseling and advising on career and major.

Through my interviews, I learned that some students had access to additional information and advising that influenced their decision about which math course to choose and whether to select a corequisite. These students were associated with programs such as FYE or the Veterans

Resource Center that conducted early outreach to incoming students and provided enhanced counseling and advising resources. Colleges can support students' ability to make informed choices about their math courses by expanding their FYE programs to serve all incoming students. A robust FYE program would allow colleges to increase their outreach efforts, host required orientations to familiarize students with the various math pathways, and connect students to career counseling in the months prior to registration. This recommendation aligns with the efforts associated with the statewide Guided Pathways initiative, which has a focus on "getting students on the path" or providing a guided entry to college. One important caution is to design these FYE programs with the needs of first generation historically minoritized students in mind and direct additional resources related to career and major exploration towards these students.

Provide professional learning to address affective factors including math anxiety.

The overwhelming prevalence of math anxiety reported by students in my study suggests that this pervasive issue must be addressed in all math classes. Although students appreciated the academic validation they received from their instructors, none of them reported that their instructors directly addressed strategies for reducing math fear/anxiety. Recommendations for AB 705 implementation initially suggested that the affective domain be part of the design of corequisite courses (Cuellar Mejia et al., 2020); however, my findings revealed that even students who experienced success in high school math felt strong feelings of anxiety about college math. Hence, strategies to reduce math-related fear and its accompanying deleterious effects on learning must be integrated into all transfer level math classes both core and corequisite. Faculty require professional learning support in order to integrate these strategies.

More importantly, they need opportunities for deep inquiry in how best to address their students' math anxiety including strategies for modeling vulnerability themselves.

Create opportunities for faculty to learn about their students' funds of identity.

In the history of the community college, remedial offerings increased over time in response to a deficit-based view of student capacity and an approach to instruction that did not recognize the cultural assets of low income students of color. In the absence of opportunities for faculty to explore asset-based approaches to viewing and teaching their students, they will, by default, continue to hold on to traditional deficit-based views of students of color. The elimination of remediation requires a paradigm shift in how math is taught. In order for instructors to reinvent their curriculum and pedagogy to leverage students' funds of identity, they must first be given the opportunity to learn what they are. Faculty should be provided time and compensation to investigate their students' funds of identity through a variety of means including classroom activities (Zipin, 2009) as well as narratives and artifacts created by the learners... and the observation and use of objects that are meaningful to the learners (Hogg & Volman, 2020). The state's dedication to closing equity gaps through funding for equity centered work is an opportunity to invest these funds in piloting faculty exploration of students' funds of identity.

Redesign core and corequisite math classes to leverage students' funds of identity.

Though many more Latina/o/x and African American students are passing transfer level math in California's community colleges as a result of AB 705 implementation, significant racial equity gaps persist. This calls for a radical redesign of course curriculum and pedagogy to integrate instructional practices that have been demonstrated to close equity gaps that leverage students funds of identity. These include incorporating opportunities for meaningful peer collaboration, designing culturally responsive and reflective curriculum and addressing students' aspirational,

social, practice-based and other funds of identity. Because course redesign requires time and effort, faculty must be provided time, professional learning support, and compensation to do this work.

Connect students intentionally to academic supports such as tutoring.

When asked how the college could increase the use of tutoring, many participants in this study reported needing additional information about tutoring. They suggested a variety of ways that colleges could accomplish this including providing FAQs about tutoring, posting short videos demonstrating the tutoring process, visiting tutoring centers during class time and inviting tutors to introduce themselves in the early weeks of class. In courses where students are experiencing low levels of success, embedded tutors could provide additional instructional support as well as peer validation, a proven support for Latina/o/x students in math classes (Crisp et al., 2017). Because students also identified a stigma associated with tutoring, these services must be advertised and conducted in ways that leverage students' assets. Recommendations include hiring diverse tutors who reflect the racial background of the student population and approaching tutor training through an asset-based lens i.e. funds of identity.

Limitations and Implications for Further Research

Although I purposely selected a community college that was one of the two full implementers of AB 705 by the legal deadline, the uniqueness of this site could also be viewed as a limitation. Characteristics of the college that allowed it to fully implement AB 705 may also distinguish this college from the typical California Community College. For example, the majority of math faculty at the study site agreed to eliminate all offerings of prerequisite remedial math whereas many other colleges are still struggling to convince their math faculty to do so. A study at one of these non-complying colleges may have yielded substantially different

findings about the experiences of Latina/o/x students in math classes. My study site has also received numerous awards for its highly effective and scaled FYE program, which supports students through the application and registration process and aids in the selection of math courses. A study at a college without these supports may have uncovered differing student experiences in relation to math class placement and registration. Furthermore, my study was impacted by the occurrence of the COVID-19 pandemic. The need for faculty to rapidly shift to the online environment may have impacted their pedagogy and limited their ability to develop curriculum for courses that they had not previously taught.

Although this study included findings from students who identify as English Language Learners and student veterans, more in-depth research dedicated to understanding the experiences of these and other specific populations within the Latina/o/x student community should be conducted. As the first qualitative study of Latina/o/x students in math classes since AB 705 implementation, the themes identified in this study suggest directions for further research of this and other student populations as they attempt to complete transfer level math in the community college.

Conclusion

At its core, AB 705 is social justice legislation. Throughout the history of the community college, remedial classes have erected a structural barrier that has contributed to low completion rates and to inequitable outcomes for students of color (Kosiewicz et al., 2016). In fact, long prerequisite remedial math sequences have arguably been the most egregious factor in preventing students, and disproportionately students of color, from achieving their academic goals with

fewer than 10% of students placing three levels or more below transfer-level ever reaching a college level math class (Hayward et al., 2014).

Assembly Bill 705, with its provision that colleges eliminate placement tests and allow access to transfer level math and English courses, has made significant advances in dismantling remediation. Early implementation data reveal that the legislation is achieving its goals. Students from all racial groups as well as students with disabilities, foster youth, veterans, EOP&S, Puente and Umoja student populations experience increased throughput in both English and math under AB 705; moreover, in Fall 2019, the greatest gains in math completion were experienced by Latinx students, the largest population in the CCC, with an additional 11,201 students completing transfer-level math compared to the previous fall (Brohawn et al., 2021). Although these numbers represent an undeniable success in achieving the goals of the legislation, faculty resistance to change and persisting deficit-thinking about student capacity are preventing the law from fully realizing its potential to close racial equity gaps.

AB 705 requires that any college still offering below transfer level math and English classes must prove that these courses increase success rates in transfer level classes. Despite these requirements, many colleges continue to deny students direct access to transfer level classes even when the data demonstrate that students are more likely to pass when placed directly into these classes. In fact, of the 28 colleges where more than 200 students were enrolled in below transfer level classes, only four could demonstrate that students were more likely to succeed when starting in remedial courses (Cuellar Mejia et al., 2021). Perhaps of greatest concern is the inequitable impact that continuing remedial offerings are having on Black and Latina/o/x students. As prior to AB 705 implementation, these students continue to be

disproportionately represented in remedial classes; as a consequence, they are less likely to reach and pass transfer level math (Cuellar Mejia et al., 2021).

The implementation studies so far have failed to include the student experience with AB 705. While focusing on retention, success, and throughput rates is necessary, we have not examined the human cost of denying students access to transfer level math and English classes. In my interviews with students, they shared their aspirational goals for pursuing a higher education. Many of them spoke about their wish to “pay back” their parents and to have a career that did not require the back-breaking manual labor they witnessed their parents doing. They expressed their desire to be a “stepping stone” for their younger siblings and to “show them the way” into higher education. They spoke passionately about their willingness to face down their fears of math if it would result in a better future for themselves and for their families.

I am fortunate to work at a college that has fully implemented AB 705, a college that allows all incoming students access to transfer level math and English. Unfortunately, this is not the case for far too many of California’s community college students. Three years into implementation we should be focusing our efforts on curricular and pedagogical redesign of core classes and investigating the potential of corequisite remediation and additional supports such as supplemental instruction and embedded tutoring. Instead, we are continuing to have conversations about student deficits and denying students, and especially Latina/o/x and African American students, access to the transfer level classes they need to achieve their goals. To address the failure of dozens of colleges to fully implement the law, the California Assembly is currently considering additional legislation to achieve its aims. Assembly Bill 1705, introduced by Jacqui Irwin, “would prohibit a community college district or community college from using specified factors as justification for placing a student in a pretransfer level course.” Hopefully, if

this bill passes, it will finally guarantee full and equitable access to all students in the CCC. Perhaps then, we can dedicate ourselves to the real work of helping our students succeed in transfer level math and English while closing racial equity gaps.

APPENDICES

Appendix A: Focus Group Protocol

I am interested in getting to know a little bit about you as students and your experiences so far at the college and especially in your math classes. Our learning from these interviews will help the college improve to better serve students. I am going to take some notes while you are answering, but if you are ok with it, I would also like to record your answers so I don't miss anything. Are you ok with me recording? Ok, let's get started.

First let's take a minute to introduce ourselves. Please share your preferred first name and your favorite place near PCC to get something to eat or drink.

I am going to first ask you to do a few short writing pieces to get warmed up. I am going to give you some words and ask you to write down everything that comes to mind when I say them. Don't edit yourself, just put down everything that pops into your head.

Ok, the first word is "math." (Give students 3 minutes to write)

The second phrase is "math in high school" (Give students 3 minutes to write)

The third phrase is "math in college" (Give students 3 minutes to write)

Thank you so much for taking the time to do that. Now I would like to ask a few questions to learn more about your experiences in math.

1. Tell me about your experiences with math in high school.
2. Tell me about how you decided to come to PCC.
3. Tell me about how you learned about which math and English classes to take here.
 - a. What supported you in figuring out what to take?
 - b. Was anything confusing or frustrating when figuring out what to take?
4. What math did you decide to take?
 - a. Why?
5. Did you consider taking a math support class with your math class?
 - a. Why or why not?
6. What has your experience in math been like so far?
 - a. What do you like about math?
 - b. What don't you like?
 - c. How do you feel about the way your instructor teaches?
 - i. Why do you feel that way?

7. What has your experience in your math support class, if you have one, been like so far?
 - a. What do you like about your math support class?
 - b. What don't you like about it?
 - c. How does or doesn't the teacher help you in that class?
8. What advice would you give your math instructors about teaching students like you?
9. What else would you like to tell me about taking math at PCC?

Appendix B: Interview Protocol

I am interested in getting to know a little bit about you as a student and your experiences so far at the college and especially in your math classes. I am going to take some notes while you are answering, but if you are ok with it, I would also like to record your answers so I don't miss anything. Are you ok with me recording? Ok, let's get started.

1. Where did you go to school before coming to PCC?
2. Tell me a little bit about yourself as a student in high school.
 - a. What strengths or qualities did you have as a high school student?
3. Tell me about your experiences in math classes in high school.
 - a. What kind of student would you describe yourself as in your math classes?
 - b. How did you feel about your math teachers in high school?
 - c. What were your best/worst experiences in math classes in high school?
4. Why did you decide to come to college?
 - a. Why did you choose to come to PCC?
 - b. Who or what supported you in coming to college?
5. What classes are you currently taking?
6. Are these classes that you feel good about?
 - a. Why?
 - b. Why not?
7. How would you describe yourself as a student now that you are in college?
 - a. What strengths or qualities do you bring to being a college student?
 - b. Who or what has supported you now that you are in college?
 - c. How, if it all, has your experience at the college so far made you feel like you belong as a college student?
 - d. What more could the college do to make you feel like you belong?
8. Describe to me how you learned about what math and English courses you need to take.
 - a. What do you remember about any emails or other communications you received from the college? What actions did you take when you received that information? What response did you have to that information?

- b. What, if anything, did you read on the website about which math and English classes to take? What actions did you take as a result? What response did you have to what you read?
 - c. What role, if any, have counselors played in your decisions about which math classes to take? What did you experience when meeting with counselors? What actions did you take as a result?
9. Tell me about how you registered for your math classes.
- a. What made it hard to register?
 - b. What supported you in your ability to register?

If taking a corequisite class:

10. How did you choose to take a math support class?
11. Please describe a typical session of your support class.
- a. What activities do you do?
 - b. What do the students do?
 - c. What does your instructor do?
12. What have you done in your support class that has been helpful?
- a. Why do you find that to be helpful?
 - b. How does your instructor help you?
13. What parts of your support class haven't been helpful?
- a. Why do you think those parts aren't helpful?
 - b. Are there things your instructor does that you don't find helpful?
14. Tell me how you feel as a student in your math class.
- a. What strengths or qualities do you bring to your math class?
 - b. What does the teacher do that contributes to this feeling?
 - c. How have your feelings about math changed as a result of being in this class?
 - d. In what ways have your feelings about math stayed the same?
15. Do you feel affirmed or engaged in your math support class?
- a. Why/why not?
 - b. What does your instructor do to affirm you?
 - c. How do you now perceive yourself as a math student?
16. What would you suggest to make your support class better?

17. Is there anything else that you would like to tell me about your experience taking math at PCC?

If not taking a corequisite class:

1. Did you consider taking a support class along with your math class?
 - a. Why/Why not?
2. Please describe a typical session of your math class.
 - a. What activities do you do?
 - b. What do the students do?
 - c. What does your instructor do?
3. Do you feel affirmed or engaged in your math class?
 - a. Why/why not?
 - b. What does your instructor do to affirm you?
 - c. How do you now perceive yourself as a math student?
4. What would you suggest to make your math class better?
5. What advice would you give your teacher about how to teach this class?
6. What advice would you give your teacher about how to interact with students?
7. Is there anything else that you would like to tell me about your experience taking math at PCC?

Appendix C: Observation Protocol

Criterion	1	2	3	Not Observed
Instructor demonstrates a genuine concern for teaching students	Lesson/activities are not well-prepared or do not support student learning Instructor does not solicit questions Few or no comprehension checks are included in the lesson No additional explanations are provided	Lesson/activities support the learning of some but not all students Instructor sometimes solicits and/or answers questions Some comprehension checks are included in the lesson Instructor sometimes provides additional explanations	Lesson/activities support the learning of all students Instructor consistently solicits and thoroughly responds to questions Regular comprehension checks are included through formative feedback (i.e. exit tickets, polling, one minute paper, students explaining their reasoning, etc.) Instructor consistently provides additional explanations using alternative forms of problem representation (i.e. using manipulatives, showing a picture, drawing out the problem, offering a symbolic representation, etc.)	
Instructor is personable and approachable toward students	Instructor does not greet students Instructor does not inquire about students' well-being or social activities/interests Instructor does not solicit questions	Instructor greets students with a general salutation Instructor inquires in general about students' well-being/activities and/or addresses one or two students Instructor sometimes solicits students' questions and provides answers	Instructor invests several minutes in greeting students using most students' names Instructor enquires about students' well-being, social activities, interests/hobbies, etc. Instructor consistently solicits students' questions and offers additional opportunities for students to ask questions i.e. staying after class, reminder of office hours, etc.	
Instructor treats students equally	Instructor repeatedly pays particular attention to some students while ignoring others	Instructor sometimes pays more attention to some students while ignoring others	Instructor pays equal attention to all students Instructor consistently distributes time answering students' questions and/or	

	Instructor spends significant additional time answering certain students' questions and/or explaining concepts/problems to them Instructor demonstrates patience when working with some students while expressing impatience with others	Instructor does not consistently distribute time answering students' questions and/or explaining concepts/problems to them Instructor demonstrates patience with most students while expressing impatience to others	explaining concepts/problems to them Instructor treats all students with patience (listens to students' questions, provides complete answers, etc.)	
Instructor structures learning experiences that allow students to experience themselves as capable of learning	Explanations of concepts/problems are not designed with students' current level of knowledge or understanding in mind Activities are too challenging for most students to complete Many students express frustration or do not attempt to complete work	Explanations of concepts/problems are designed with some but not all students' level of knowledge or understanding in mind Activities are too challenging for some students to complete Some students express frustration or do not attempt to complete work	Explanations of concepts/problems are designed with all students' level of knowledge or understanding in mind Activities are capable of being completed by all students Students are actively engaged in completing work	
Instructor works individually with those students needing extra help	Instructor does not provide individual attention to any students OR Instructor only works individually with students who do not need extra help	Instructor spends additional time working with some but not all students who need extra help OR Instructor allocates some time to working individually with students needing extra help but does not prioritize those students over those not	Instructor consistently utilizes formative feedback to identify students needing extra help Instructor consistently prioritizes working individually with all students identified as needing extra help	

		identified as needing extra help		
Instructor provides meaningful feedback to students	Instructor provides no feedback to students Feedback is too general to be useful Feedback is deficit-based	Instructor provides limited feedback to students (a few words or phrases) Feedback includes some specific suggestions Feedback is both deficit and asset-based	Instructor provides detailed feedback to students (several written or spoken sentences at minimum) Feedback includes instructive and actionable suggestions Feedback is asset-based	
Instructor recognizes students' resources	Instructor expresses that students are lacking in resources for learning in general and/or for learning math specifically i.e. lack of study habits, time management, problem-solving skills etc.	Instructor occasionally refers to students' resources OR Instructor refers to a few students' resources i.e. dedication, persistence, hard work, problem-solving ability, etc.	Instructor regularly refers to the resources all students bring to learning in general and learning math specifically i.e. dedication, persistence, hard work, problem-solving ability, creativity, etc.	
Instructor leverages students' funds of identity	No connection is made between the class activities and students' funds of identity	Instructor makes some connections between class activities and a few students' funds of identity such as introducing culturally relevant examples, referring to students' lived experience, providing opportunities for students to learn from each other	Instructor makes consistent connections between class activities and many students' funds of identity such as introducing culturally relevant examples, referring to students' lived experience, providing opportunities for students to learn from each other	

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