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## COMMUNITY COLLEGE AND HIGH SCHOOL PARTNERSHIP: COLLEGE MATH READINESS PROGRAM

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COLLEGE MATH READINESS PROGRAM

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A Dissertation  
Presented to the  
Faculty of  
California State University,  
San Bernardino

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In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Education  
in  
Educational Leadership

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by  
Ernesto Oscar Reyes

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June 2016

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## ABSTRACT

This study describes the partnership between an urban community college and seven high schools from its inception. The purpose of the partnership was to increase the number of high school seniors transitioning into college-level math courses through the college math readiness program, an existing community college intermediate algebra course. In addition to archival records and documents, college math faculty, high school math teachers, administrators and staff, and college students were interviewed for this study. Four major challenges were identified in the following areas: student recruitment process, data management, lack of information to students, and collaboration among math faculty and math teachers. Despite all challenges, the partnership and the college math readiness program was perceived by stakeholders to be a successful program for the students and the institutions involved.

## DEDICATION

I would like to dedicate this dissertation to my lovely wife Judith and my beautiful daughter Olivia for their understanding and support throughout this journey; to my parents for their love and support; to my friends from church who kept me in their prayers; and to my friends and colleagues for their support and encouraging words.

I dedicate this dissertation to my committee chair, Dr. Schnorr, who never stopped believing in me; to my committee members, Dr. Mahoney and Dr. Jesunathadas for their time, support, and dedication. May you continue to lead, teach, and inspire others for many years to come.

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## CHAPTER ONE: INTRODUCTION

### Problem Statement

Community colleges continue to play a pivotal role as the gateway to higher education. However, the high number of high school students lacking the skills to take college-level math courses is unprecedented and hinders their ability to obtain an associate degree, certificate, or to transfer to four-year institutions. Approximately 70-90% of high school students place in community college remedial courses and only 25% of community college students manage to complete a college-level math course in six years (Bailey, Jeong & Cho, 2010; CCCCOa, 2013). The low completion rates are not without consequences; the California Community College Task Force projects there will be a shortage of people with technical and vocational education. Community college students will lack the skills needed to compete in the fast-changing global economy of the 21<sup>st</sup> century (CCCCOb, 2103).

The lack of college-level skills to undertake future jobs will result in more economic and social disparities between people with a college degree and those without a college degree. The most affected people are in two groups already underrepresented in higher education, Latinos and African Americans, who make up the majority of remedial math students (Bailey et al., 2010).

It is documented that neither high school graduation requirements nor community college remedial math programs help the majority of the students to

transition into college-level math courses (Attewell, Lavin, Deil-Amen & Rosenbaum, 2002; Bahr, 2010; Bahr, 2012; Bailey et al., 2010; Domina, & Levey, 2006; Edgecombe, 2011; Melguizo, Hagedorn, & Cypers, 2008; Hoffman, Varga, Venezia & Miller, 2007, p. 82; Woodard & Burkett, 2010). Credit-based programs such as Advanced Placement (AP), International Baccalaureate (IB), early and middle college, summer programs, and Early Assessment Program (EAP) only target a small high-achieving group of students but not the majority (Alaie, 2011; Bunnell, 2011; Conley, 2005; Dadgar, 2012; Kinnick, 2012).

The kindergarten through post-secondary (K-16) partnership is an educational reform advocating for statewide-level collaboration along the educational pipeline to improve students' success. The principles behind the K-16 partnership program include alignment of social and academic expectations, governing structures, accountability, and student data system (Brown & Niemi, 2009; Conley, 2005; Conley, 2007; Kirst & Venezia 2006; Larson & Novak, 2001). However, no statewide K-16 partnership currently exists in the U.S.

Establishing common standards in math between community colleges and local high schools has the potential to address the influx of students in need of remedial math courses (Brown & Niemi, 2009; Kirst, & Venezia 2006; McCabe, 2005). However, community colleges and high schools tend to work in isolation due to different governing and financing systems. The lack of collaboration between community colleges and high schools might explain why the literature on common standards in math through collaborative work between community

college and high school is mainly informational and theoretical (Hodara, 2013; Kirst & Venezia, 2001; Kirst & Venezia, 2006).

In 2010, an urban community college received a grant from the Bill & Melinda Gates Foundation to increase college and career readiness by creating a college math readiness program, a fourth-year math course that aligned the high school math exit standards with community college prerequisites for college-level math courses. The college math readiness program was an existing intermediate algebra course, a course that was one level below a college-level math course at the participating urban community college, offered to high school seniors and taught by high school math teachers. Students who successfully completed the college math readiness program qualified to transition into a college-level math course.

When the grant ended in 2012, a small number of high school students were participating in the program. As the urban community college and high schools continued to collaborate, the number of students in the college math readiness program increased. However, little information has been published about the partnership between the urban community college and high schools and students in the math readiness program.

### Purpose Statement

The purpose of the study was to describe how the historical context of the partnership between an urban community college and seven high schools was described from its inception by key stakeholders, including the purpose of the

college math readiness program designed to prepare high school seniors to take college-level math courses, in order to better understand a community college and high school partnership. The historical context included factors relevant to the development and establishment of the partnership and its college math readiness program, student demographic background, retention, persistence, academic performance on placement test and subsequent math courses, and stakeholders' perceptions. This study showed how an urban community college and high school joined forces to combat the influx of high school students in need of remedial math courses and low completion rates.

This was a descriptive mixed methods case study, a research design in which the researcher used data triangulation to answer the research questions below. Data sources included structured interviews, archival records and documents, and students' academic performance and characteristics. More detailed information regarding the research design is provided in Chapter 3.

### Research Questions

The following were the two central research questions in this study:

1. How would the historical contexts of an urban community college and high school college math readiness program designed to prepare high school seniors for college level math courses be described from its inception by key stakeholders, including its purpose?

2. What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses?

### Significance of the Study

Aligning academic standards between community colleges and high schools is a potential solution to address the influx of high school graduates placing into remedial math courses (Brown & Niemi, 2009; Conley, 2005; Conley, 2007; Kirst & Venezia, 2001; Kirst & Venezia, 2006). However, a gap exists in the literature concerning the establishment and sustainability of partnerships between community colleges and high schools on common standards in math.

Therefore, the significance of this study is to add knowledge to the current literature about joint efforts between community colleges and high schools to prepare students for college-level math courses through common standards in math. Locally, this study provides opportunity to understand a five-year-old partnership collaborative model by describing how math faculty, math teachers, college and high school administrators and staff, and students perceive this partnership. Additionally, this study will provide qualitative and quantitative data on students who participated in the college math readiness program. The findings have potential to be a source of information that pave the way for policy and practice changes within the community college to improve and strengthen the current partnership.



## Assumptions

The researcher made the following assumptions in this study: First, administrators, staff, faculty, teachers, and students provided honest and accurate responses during the interview sessions. Second, recruited students were students who participated in the college math readiness program. Third, all high school teachers in the college math readiness program were subject-matter experts with approved teaching credentials.

## Delimitations

The central focus of this study is to describe the characteristics of an urban community college and high school college math readiness program with the following delimitations.

1. High school or community college classroom observations were not included in this study.
2. This study did not describe parents' perceptions of the community college and high school college math readiness program.
3. This was a descriptive mixed methods case study design with no effort made to generalize the findings beyond the sample.
4. Students' confidence and motivation levels in math were not described in this study.

## Limitations

With regard to the interview data from students, findings cannot be generalized to all students who have participated in the college math readiness program due to a small number of students interviewed who did not represent all participating high schools in this study. Also, the community college simply did not track all students who participated in the program between 2011 and 2015; data pertaining to students' academic performance at the community college described in this study were based on students who were successful in the college math readiness program.

## Role of the Researcher

The researcher was an associate math professor at the community college described in this study and had been the liaison between the community college math department and local high schools between 2013 and 2016. The role of the researcher was to meet with high school math teachers regarding the college math readiness program, work in conjunction with community college's outreach department, and provide reports to the math department.

According to Cresswell (2009), there are more advantages than disadvantages when the researcher has previous experiences or knowledge of a specific subject being studied. With the researcher's previous experiences and knowledge, the researcher can access information that can provide an in-depth understanding of a particular phenomenon being studied. However, previous experiences or knowledge may also lead a researcher to biased interpretation.

As recommended by Cohen, Manion and Morrison (2005), the researcher made every effort to side all preconceived ideas and understanding during the study, especially during the interviews. The researcher studied participant responses through the lenses of the participants without formulating any conclusion based on previous knowledge. By using data triangulation, the researcher was able to use data from different sources to generate themes and conclusions.

#### Definitions of Key Terms

**Accuplacer® Test** is a common student assessment tool used in most community colleges and four-year institutions.

**College math readiness program** is the intermediate algebra courses offered to high school seniors.

**Course-content alignment** refers to idea of post-secondary institutions and K-12 system having common academic standards in math.

**College math readiness program final exam** is a comprehensive final exam high school seniors in the college math readiness program take at the end of the school year.

**City Community College (CCC)** is the pseudo name for the community college in this study.

**Feeder high school** refers to high schools whose students attend a particular community college.

**Remedial/basic skills/developmental math courses** are courses offered at the community college to remediate unprepared and underprepared students in math.

**Students' completion rates** refers to the proportion of students completing an associate degree or certificate in relation to total number of students in an institution.

### Summary

Math is one of the cornerstones to any academic program in higher education. There are serious repercussions for high school students who graduate from high school without the math skills necessary to take college-level math courses. Since community colleges receive their incoming freshmen students from local high schools, there is an assumption that community colleges work collaboratively with the local high schools to ensure students' success. However, community colleges and high schools differ greatly in their missions, practices, academic standards, and policies which results in students not being academically prepared to take college-level math courses in community college.

In the current literature, researchers are advocating for the partnership between community colleges and high schools to address the lack of college readiness in math. By promoting common math standards and expectations between high schools and community colleges, students will increase the probability of placing into college-level math courses upon admission to a community college.

Describing the characteristics of a current urban community college and high school college math readiness partnership program will help show how these distinct systems are collaborating to address the lack of college readiness in math. Since collaboration between community colleges and high schools that specifically address the lack of college math readiness is not common, this study will add knowledge to the current literature. Locally, this study has the potential to pave the way for changes in policy and practices at the community college. The following chapter provides a comprehensive review of the literature pertaining to the efforts of community colleges and high schools to address the lack of college readiness in math.

## CHAPTER TWO: LITERATURE REVIEW

### Introduction

In the United States of America, community colleges are an integral part of higher education. According to the U.S. Department of Education, there are 1,655 community colleges nationwide serving over 5.6 million students (U.S. Department of Education, 2015). President Barack Obama referred to community college education as a “ticket to the middle class” in his 2015 State of the Union address (Whitehouse, 2015). The low tuition fee and open-enrollment policy are two characteristics that make community colleges an ideal access point to higher education (McIntosh & Rouse, 2009). Nearly half of all students at four-year institutions begin their education at a community college. In addition to courses transferable to four-year institutions, community colleges also provide certificates for vocational and technical programs, including English as Second Language (ESL) courses.

Unfortunately, the lack of collaboration between community colleges and high schools to establish common standards has resulted in an influx of high school students in need of remediation programs, particularly in math. Approximately 60% of students (3.4 million students) require remedial math and English courses in community colleges (Bailey et al., 2010; Goldrick-Rab, 2010). In California, an estimated 70-90% of students arrive at community colleges in need of remedial courses in math, English, or both (Scott, 2011). In certain

Southern California community colleges, the need for remediation is as high as 96% (CCCD, 2014).

The graduation and completion rates in community colleges are devastating. Only 20% of students in community colleges finish the assigned remedial math courses within three years. Additionally, 25% of all California community college remedial math students manage to complete a college-level math course in six years (Bailey et al., 2010; CCCCOa, 2013). The success rate is even worse for some community colleges; for instance, the community college in this study has a completion rate of 14% for remedial math students.

In California, 61% of students placing in remedial math courses are Latinos and African Americans versus 35% of their White counterparts (Bahr, 2012; Melguizo et al., 2008; Phipps, 1998). Latino and African American students continue to fall further behind their White counterparts, given that students in remedial math courses are 15% less likely to graduate from a post-secondary institution, widening the achievement gap in higher education. Due to disproportionate number of Latinos and African Americans in community college remedial math courses, remedial math is labeled as a “gatekeeper” of higher education.

The price tag on tax-payers for remediation in community colleges is between 2.3 - 2.6 billion dollars annually nationwide (Bailey et al., 2010; Melguizo et al., 2008). Even with this massive expenditure on remedial programs, community colleges have not been successful in increasing the completion rates

of students seeking a certificate, associate degree, or transferring to four-year institutions. According to Scott (2011), the low completion rates at the community colleges would continue to negatively impact the workforce development, which has a direct impact on the local economy, if community colleges cannot address the problem of remediation in math.

Brown and Niemi (2009), Conley (2005), and Kirst and Venezia (2006) are leading educational researchers and strong advocates for the establishment of common academic standards through joint efforts between community colleges and high schools. They believe course-content alignment in math through a partnership between community colleges and high schools as the strategy to address the problem of remediation in community colleges. Currently, the kindergarten through post-secondary (K-16) partnership is a comprehensive educational reform that seeks to establish common standards and collaboration between K-12 and higher education. In this study, the college math readiness program is a specific example of the K-16 partnership reform in which a community college and high schools worked collaboratively to create common standards in math.

The Common Core State Standards (CCSS) initiative is the most recent and comprehensive educational reform in the K-12 system. The CCSS are the result of a nationwide collaboration among teachers, policymakers, higher education, and other stakeholders to establish common standards to better prepare students as they transition from one grade to another, including post-



secondary education (CCSS, 2015). While the K-16 partnership and CCSS call for common standards, only a K-16 partnership promotes a continual collaboration between higher education and K-12 system. As Phillips and Vandal (2011) noted, “Simply having standards in place is no assurance that higher education and K-12 teaching are aligned to the standards and to the expectations for college-level work” (p. 23). Therefore, the CCSS initiative does not make this study irrelevant; instead, the CCSS might be the policy change needed at the legislative level to promote the K-16 partnership ideology.

During the writing of this dissertation, many schools were gradually transitioning into the CCSS, with the need for several more years to complete the CCSS implementation. It is also too early to evaluate the impact CCSS might have, if any, on students’ performance in post-secondary math level courses. Furthermore, Heitin (2015) stated that people who worked on the high school CCSS rushed to adopt the standards that they failed to include specific math topics in geometry.

The purpose of this literature review is to present the current publications related to the efforts of community colleges and high schools to address the lack of college readiness in math. The organization of the literature is as follows: a) Description of the definition of college readiness as it pertains to math; b) Overview of the educational reforms in community college and high school; c) A brief description of the history and policies for remedial courses, programs reforms, and placement test at community colleges; d) A brief description of the

history and programs, EAP (Early Assessment Program), and graduation requirements at high schools; and e) Analysis of the K-16 partnership, including the partnerships between community college and high school on course-content alignment in math. English and writing are other important subjects that contribute to students' success in community college; however, the focus of the study is the college math readiness program.

### College Readiness in Math

The most common definition for college readiness is based on students' academic preparation which allows them to enroll in and perform college-level math work without the need for any math remediation (Byrd & Macdonald, 2005; Conley, 2010; Roderick et al., 2009). In general, depending on the institution, college readiness encompasses a combination of high school grade point average (GPA), number and types of math courses taken, test scores from the non-profit organization such as American College Testing (ACT), a placement test, and existing state exiting exam (Conley, 2010; Roderick et al., 2009). Community colleges nationwide typically have an open-admission policy, and they make use of variety of assessment tools such as Accuplacer® test, or others, to assess incoming students' academic ability in the areas of writing, reading, and mathematics. Further discussion regarding the Accuplacer® test and its implications to course-content alignment in math is provided later in this chapter.

Conley (2010) and Karp and Bork (2014) stated that there are other important components to college readiness which include non-cognitive skills, norm of performance, and college knowledge. The non-cognitive skills and norm of performance refer to “student self-awareness, self-monitoring, and self-control—study skills, work habits, time management, help-seeking behavior, and social problem-solving skills” (Roderick et al., 2009, p. 190). Similarly, college knowledge refers to students’ ability to understand how to navigate the college system including the procedures required for admission, financial aid, student support programs, testing center, college options, and college norms and culture (Conley, 2010; Roderick et al., 2009). The non-academic aspect of college readiness is addressed later in this chapter.

Although college readiness can be defined as a multifaceted concept, the definition of college readiness employed in this study is defined as high school students’ preparation to enroll into community college-level math courses, which Conley (2010) referred to as content knowledge.

### Community College and High School Educational Reforms

The idea of increasing students’ success in community college is not a new concept. High schools and community colleges are inundated with educational programs and reforms focused on improving students’ college readiness in math and increasing the low completion rates in community college, see Table 1. Several of these reforms include dual enrollment, Advanced Placement (AP), International Baccalaureate (IB) compressed/accelerated

courses, summer interventions, modular courses, and others. Note that all educational reforms, with the exception of K-16 partnership, reinforce the disconnect between community colleges and high schools (Brown & Niemi, 2009; Conley, 2005; Krist & Venezia, 2006).

Table 1. High School and Community College Educational Reforms

Community College	High School	Community College/High School Partnership
Remedial Programs <ul style="list-style-type: none"> <li>• Acceleration/Compressed Program</li> <li>• Mainstreaming Program</li> <li>• Modules</li> <li>• Contextualize</li> <li>• PathWays</li> </ul>	Credit-Based Transitional Programs <ul style="list-style-type: none"> <li>• International Baccalaureate (IB)</li> <li>• Advanced Placement</li> <li>• Tech Prep</li> <li>• Singleton Programs</li> <li>• Comprehensive Programs</li> <li>• Early College Programs</li> </ul>	K-16 Partnership Programs  Community College/High school Partnership
Intervention Program		
Summer Program		
College Entrance Exam Policy		
Student Academic Services	Early Assessment Program (EAP)	
Financial Support Services		
Professional Development	Professional Development	
	Common Core State Standards	

Note: These are the major education reforms found in the literature.

Bailey, et al. (2010) and Melguizo, et al. (2008) claimed most of these programs were ineffective to improve students' college-readiness in math.

However, the effectiveness of these educational reforms will be addressed later in this chapter.

### Community College: Brief History

In the 1800s, the U.S. government signed into law a bill that created grant-land colleges in every state with an emphasis in agriculture and mechanics research (Phipps, 1998). With the establishment of land-grant colleges, access to higher education became a reality for many poor farmers' children throughout the U.S. (Biemiller, 2012).

The most dramatic policy came in 1944, when President Franklin D. Roosevelt passed into law the Servicemen's Readjustment Act, also known as G.I. Bill, which paved the way for thousands of veterans who had served during World War II to attend college and universities (Gilbert & Heller, 2013). By 1946, President Harry Truman sought to create a more democratic and equitable society by transforming and expanding the existing junior colleges into what became known as the community college system, to improve and increase access to higher education for all students, regardless of their socioeconomic status, race, gender, or religion (Gilbert & Heller, 2013; Hutcheson, 2007).

In California, the structure of higher education was outlined in the 1960 Master Plan. In this document, University of California (UC) institutions were assigned as research institutions offering bachelor's, master's, and PhD degrees while California State University (CSU) institutions became teaching institutions to offer bachelor's and master's degrees (University of California Office of The

President, 2009). The California Community Colleges' primary function was to provide transferable college-level courses to four-year institutions, along with ESL and other vocational and technical certificates (Intersegmental Committee of Academic Senates, 2009; Levin et al., 2011).

As major transformation and restructuring were taking place in higher education in the 1960s, there was simply no discussion on what role, if any, on how the K-12 system would be integrated with higher education, at least with community colleges. As a result, the K-12 system was never integrated with higher education, resulting in two educational systems with different goals, missions, values, and academic standards. According to Conley (2005), higher education and the K-12 system were never integrated at the beginning for these three reasons: higher education was not necessary for financial stability; only a small number of colleges existed; and very few people attended college. These factors do not hold true anymore; in today's fast-paced global economy, a college education is imperative for social mobility (Offenstein & Shulock, 2011).

Conley (2005) also argued that community colleges and high schools have already remained disconnected for many years for the "right" reasons at the time; however, as more high school graduates are placed in community college remedial math courses, both systems must work collaboratively to address the issue. This is why the Intermediate Algebra course in this study is a direct result of a partnership between a community college and local feeder high schools in

response to low completion rates and the influx of students taking remedial math courses in a community college.

### Community College Math Remediation

Community college remedial math programs are also known as developmental or basic skills math programs, and these terms will be used interchangeably throughout this chapter. The main purpose of remedial math courses is to provide underprepared students the basic algebraic skills needed to succeed in college-level math courses. Additionally, most remedial math courses tend to be non-credit courses; they do not count towards a degree completion and are not transferable to four-year institutions (Melguizo, et al., 2008).

According to Adelman (2004) and Attewell et al., (2006), math is the subject where most remediation takes place. There are also remedial courses in other subjects, including English and reading. However, this literature review is limited to remedial math programs because the intervention program in this study is in math. As Hoffman et al. (2007) stated:

Algebra is a key building block for college math. Without a deep understanding of a basic algebraic concepts and techniques, students will struggle with much of the math they encounter in other subjects. Some key elements of algebra are the abilities to manipulate polynomials; compose and decompose functions; understand exponent, roots, and their derivatives; understand basic theorems of exponents and roots; understand logarithms and their properties; solve linear equations,

including quadratic equations; distinguish the relationship between equation and graphs; and use all of these understanding and techniques to solve a range of common problems (p. 93)

It is important to have a historical perspective of remedial courses to better understand the current dilemma with remedial math courses in the community colleges. According to Phipps (1998), the need for remediation in college can be traced as far back as 1600s, when Harvard College students sought tutoring in Greek and Latin. With the passage of the 1944 G.I. Bill and the establishment of the community college in 1947, the student population in community college tripled, creating the need for remediation courses as never seen before (Boylan & Bonham, 1994; Phipps, 1998).

Boylan and Bonham (1994) stated that currently many educators and policymakers have a preconceived notion that remediation in college has only been a recent problem. This belief that all students were somehow college-ready in the past and that institutions of higher education did not offer any remedial programs is simply false and unfounded; remedial programs have always been an integral component of higher institutions which provide many benefits to students (Gallard, Albritton, & Morgan, 2010; Levin, Cox, Haberler, & Cerven, 2011; Phipps, 1998). One of the missions of the California community college system is to offer remedial basic math courses, a mission many educators grapple with (Phipps, 1998).



With the open-admission policy in place, students in remedial math courses are students with diverse cultural, economic, social and educational backgrounds. Many of these students in remedial math courses are veterans, have raised a family, are first-generation college goers, and ESL students (Adelman, 1996; Oudenhoven, 2002). Advocates for remedial programs at the community colleges have argued the central role of community colleges is to train and prepare students to join the workforce, or to pursue a college degree. However, others do not agree that community colleges should reteach more than 70% of their incoming students on subjects they should have learned in K-12 school system (Gallard, et al., 2010).

The most common remedial math courses community colleges offer are basic arithmetic, pre-algebra, beginning algebra, intermediate algebra, and geometry (Bahr, 2012; Bailey, et al., 2010). An important characteristic of remedial math courses is that they are sequential, see Table 2. Once a student is placed in a remedial course, the student is required to take the next set of remedial courses until the student reaches a college-level math course.

The number of levels of remedial courses varies among the community colleges. In a study of 53 two-year institutions, 66% of community colleges offered more than three levels of remedial math courses below a college-level math course, 17% of community colleges offered two levels of remedial math courses, and 17% of remaining community colleges offered only one level of remedial math courses (Bailey, et al., 2010). The national average of remedial

math levels in community colleges is 3.6. The need for community colleges and high school to collaborate on common standards in math is crucial, for it could reduce or eliminate the need for remedial courses altogether.

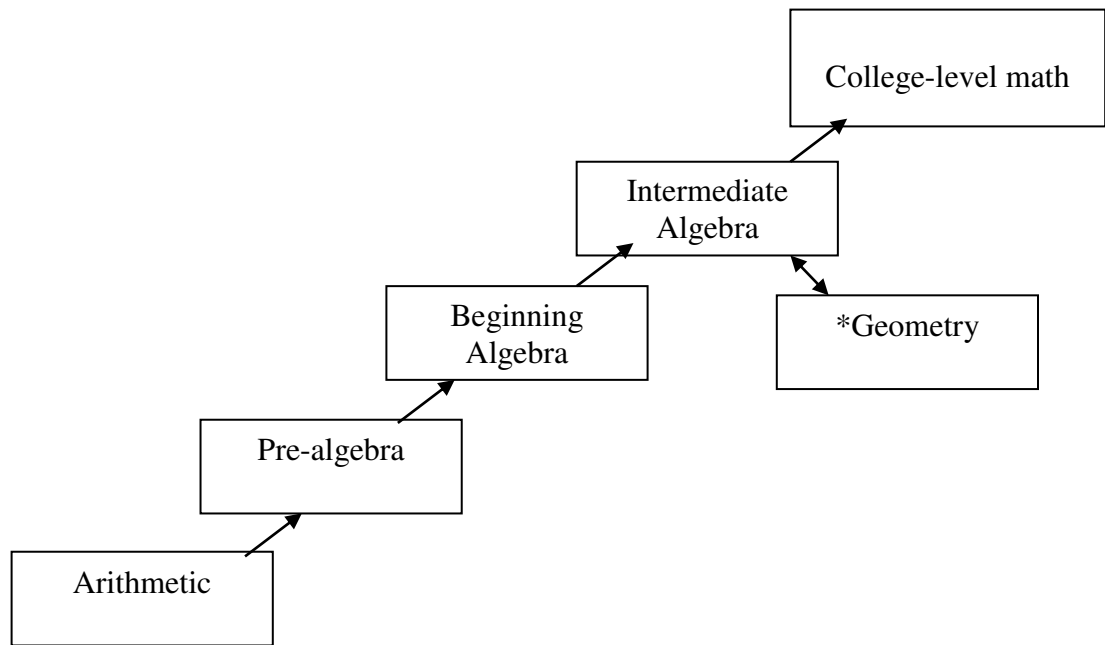


Figure 1. Hierarchy of Remedial Math Courses in Community Colleges.

Even with the assumption of 100% success rate in remedial courses, it will still take up to two years for a student placed at the lowest remedial level to complete the remediation process. However, the success rate in remedial math is abysmal. Bahr (2010) found only 38% of students in remedial courses in California community college successfully complete a college-level course within six years. In a comprehensive study on students' enrollment and completion rates in 80 community colleges in 15 different states, Bailey et al. (2010) found

only 20% of students who placed into two or three levels below a college-level math course completed a subsequent remedial course in two years (Bailey et al., 2010). The failure of remedial math programs in community colleges is unquestionable. The levels of success of remedial programs vary. One community college may do slightly better or worse than another community college; however, all recent studies indicate remedial programs are not effective. Students who were placed in remedial math courses before enrolling in college-level math have significant lower college completion rates than of those students who placed directly into college-level math courses (Bailey et al., 2010; Barh, 2008; Barh, 2013; Conely, 2005; Parmer & Cutler, 2007; Venezia & Kirst, 2003).

Some community colleges have even lower completion rates in remedial math programs. For instance, 14% of CCC students in remedial math programs manage to complete a college-level math course within six years (Martinez, 2010). Based on a data set from 2013-2014 academic year, the average success rate in each level of remedial course was less than 50%, see Figure 2. The low completion rates in remedial math courses is one of the arguments for community colleges and high schools to align their academic standards and expectations so that high school graduates do not take remedial courses at the community college (Brown & Niemi, 2009).

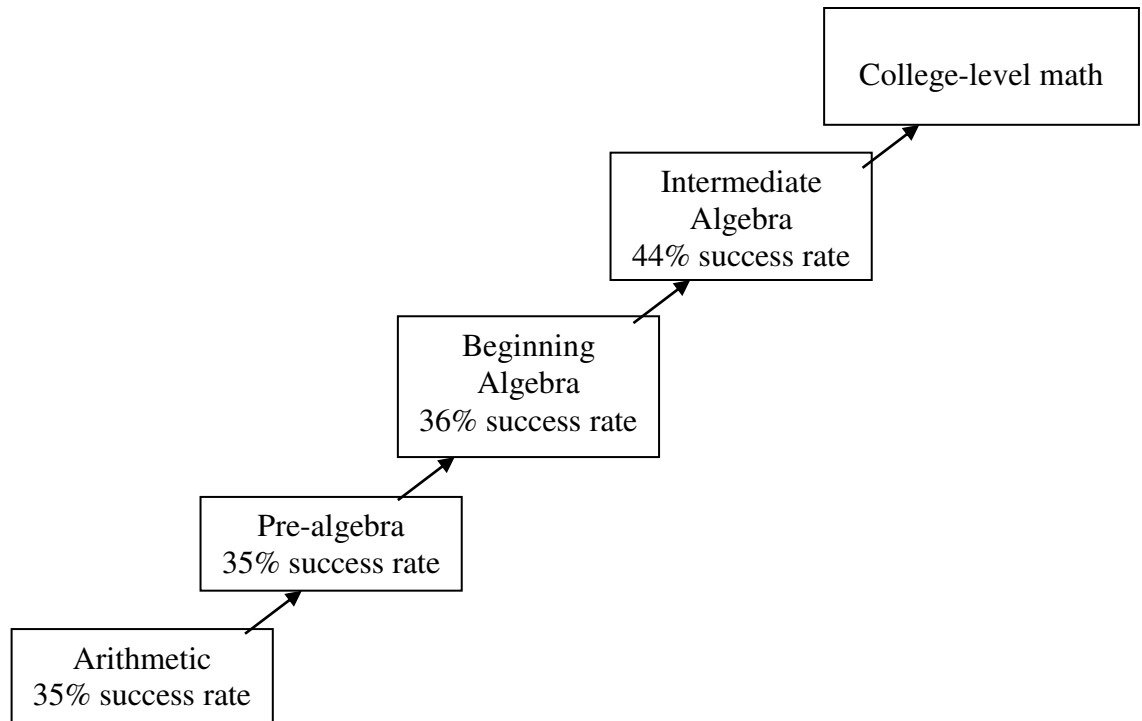


Figure 2. Math Passing Rates in CCC.

Latinos and African Americans make up 61% of students in community college remedial math programs and only 20% and 11%, respectively, complete their college-level math courses within six years (Melguizo et al., 2008). Failure to attain college-readiness has dire consequences for the future of these ethnic groups already underrepresented in higher education (Attewell et al., 2006; Bahr, 2008; Bailey et al., 2010). Researchers insist that aligning math standards between high school and community college is one key to address the influx of underprepared high school students and increase students' completion rates (Brown & Niemi, 2009). Adelman (2006) stated students who take rigorous math

courses in high school are 70% more likely to complete a degree or certificate than those who take the minimum high school requirements.

### Current Remedial Math Programs

To address the low completion rates in semester-long and traditional face-to-face remedial math courses, community colleges are continuously reforming existing remedial math programs to increase students' success and completion rates. Some of these reforms include compressed remedial courses, mainstreaming, modules, and contextualization.

Compressed math courses are traditional remedial math courses offered in a short amount of time, seven- to eight-week format (Edgecombe, 2011). This format provides an opportunity for students to complete two remedial math courses in one semester.

A descriptive study conducted by Sheldon and Durdella (2010) revealed students enrolled in compressed remedial math courses of eight weeks duration, were 67% more likely to continue in the subsequent remedial math course compared to only 52% in a 16-week long remedial math course. However, one shortcoming of this study is that it did not provide any evidence on how these students performed in their subsequent remedial and college-level math courses, which is imperative to improve completion rates. There is no benefit for students to complete remedial math courses if they are unable to complete college-level math courses.

In another study on compressed remedial programs, Brancard, Baker, and Jensen (2006) concluded that students in compressed remedial math courses were 30% more likely to earn more credits than those taking semester-long courses. A weakness of this study was that only 12 students participated in the compressed course. The difference in performance between the intervention group and comparison group might have been attributed to class size rather than the compressed course. Similar to the study by Sheldon and Durdella (2010), there was no evidence that compressed remedial math courses had any impact on students' completion rates. Although the students in the study were 30% more likely to earn more credits, there was no indication that students reached college-level math courses.

Other rigorous studies on compressed remedial programs exist; however, they tend to focus on English remedial courses (Cho, Kopko, Jenkins, & Jaggars, 2012). It is difficult to make a strong case in favor of compressed remedial math courses without statistical evidence that linked students in compressed remedial course with placement and success in college-level math courses. Unlike studies on compressed remedial math courses, the current study on the Intermediate Algebra course will provide in-depth information about the Intermediate Algebra course and students placing into college-level math courses at a community college.

Mainstreaming is another education reform in which students are challenged to take both remedial math and college-level math courses

simultaneously. Students in mainstreaming courses also receive additional academic support such as math tutoring to improve their performance (Burdman, 2013). Unlike traditional remedial courses, mainstreaming remedial courses give students a greater sense of belonging than traditional remedial programs (Perin, 2002). A study conducted by Boatman (2012) found that students who participated in a mainstream structured course at Austin Peay State University, Tennessee, doubled the students' success rates in college-level math courses.

Although mainstreaming curriculum is a common practice in four-year universities, it is uncommon in the community colleges due to students' lower academic preparation in community colleges (Burdman, 2013; Perin, 2002). Perin (2002) reported that 69% of community colleges nationwide seem to lack the structure and policy to support mainstreaming in remedial math courses for several reasons, including course-taking pattern restriction. For instance, remedial math courses are prerequisite, not co-requisites, to college level math courses. Additionally, it is also reported that mainstreaming is likely to discourage remedial students permanently from continuing their education if they fail, this is particularly true for Latinos and African Americans who are already susceptible to drop out of community college (Perin, 2002).

Another approach to the existing remedial math courses in community colleges is the modularization of a course. Modularized remedial math courses are semester-long remedial courses partitioned into sequential modules. For instance, a basic arithmetic course can be divided into various levels of

increasing difficulty modules-e.g., module a, module b, and module c. With modularized remedial math courses, students have an opportunity, especially students who already had advanced math courses such as Algebra II or higher in high school, to quickly move through familiar math topic areas and focus on common areas of weaknesses, like operations on fractions. Additionally, modularized courses are enhanced with the use of mathematical software such as MyMathLab®, Wiley Plus®, WebAssign®, Assessing and Learning in Knowledge and Space to track students' progress (Boatman, 2012).

While few studies exist on modularized courses, Boatman (2012) found no difference (SMD=0.2) in students' completion rates between students in modularized courses and those in traditional semester-long remedial courses. Persistence was a major problem, as students in modularized courses were 36% less likely to continue on to the next math course than remedial students in semester-long courses (Boatman, 2012). The idea behind modularized courses is to give students the opportunity to accelerate the completion of remedial math courses; however, modularized courses create more exit points, see Figure 3, for remedial students (Boatman, 2012). Another weakness of modularized remedial courses was that students learned math procedurally rather than conceptually due to the heavy use of mathematical software (Epper & Baker, 2009).



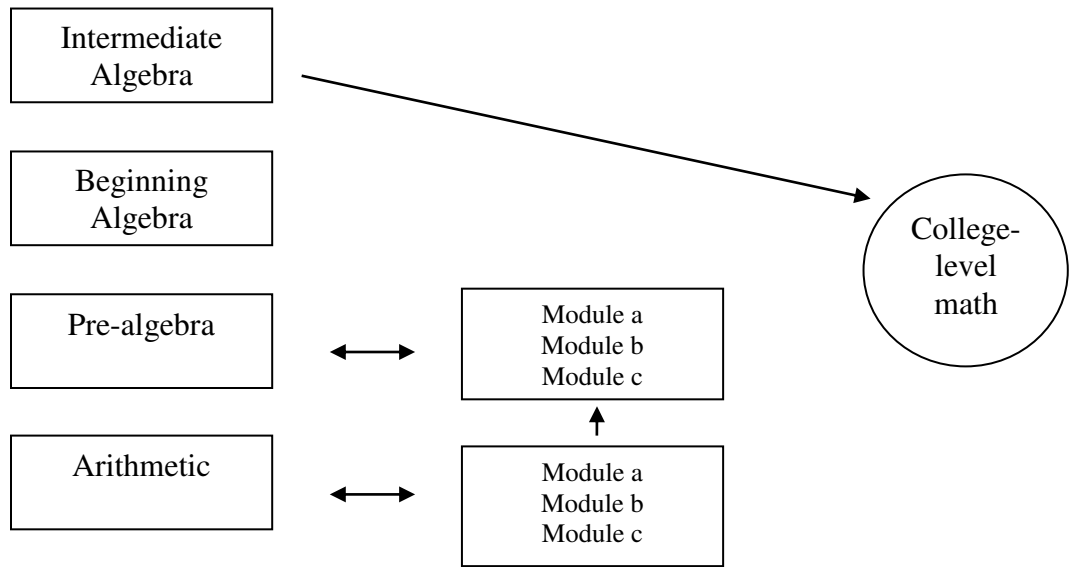


Figure 3. Modularization of Remedial Math Courses Model.

Contextualized remedial math course reform refers to courses designed to be taught in the context of a specific technical or vocational program. Wiseley (2011) conducted a study in the California community college system and found students' passing rate in contextualized remedial math courses was 86% compared to 59% in remedial course taught traditionally. The main problem with this program is the transferability of the courses; most four-year institutions will not accept these types of courses (Burman, 2013; Hamilton, 2013; Perin 2011; Perin, 2006). More studies need to be done to fully understand the impact of contextualized courses on students who go on to enroll in college-level math.

#### Community College Placement Tests

There is also debate over whether the reasons for students placing into remedial math courses has more to do with community colleges' placement test

policies and practices than the students not having the skills to take college-level math courses. For example, there are cases in which even high school students who have taken precalculus or calculus courses were placed in remedial math courses in community colleges based on their performance on the placement test (Callan, Finne, Kirst, Usdan, & Venezia, 2006; Conely 2005).

The purpose of a community college placement test is to accurately assess students' math skills and place them at the correct level of math to maximize their success. Otherwise, students may enroll in math courses that are either too difficult or too elementary (Medhanie, Dupuis, LeBeau, Harwell, & Post, 2012). Most post-secondary institutions in the nation, including community colleges, use Accuplacer®, Compass®, or other-state approved placement tests to evaluate students' ability in math, reading, and writing; however, this literature will focus on math (Medhanie et al., 2012; Bueschel, 2003).

According to College Board, Accuplacer® is a “computer-adaptive diagnostics, online intervention, and placement testing system” (College Board, 2012). Computer-adaptive means students' performance on a math problem determines the difficulty level of the following problem. Approximately 2.5 million students take the Accuplacer® test annually at 1500 different post-secondary institutions. The Accuplacer® math portion consists of arithmetic, elementary algebra, and college algebra (College Board, 2012). Depending on the community college policies and practices, Accuplacer® may be the primary or the only measuring tool that assesses students' math skills.

Many students planning to attend community colleges are unaware of the existence of a placement test (Conley, 2005). In a qualitative study, Bueschel (2003) found that community college students “do not always love the results of their placement, but aren’t really fazed by it suggest that we may be making more of the consequences than they are” (p. 33). However, Accuplacer® test is a high-stakes test that can have dire consequences on students’ academic future (Hughes & Scott-Clayton, 2011). It is well-documented that students who place in lower remedial math course are 15% less likely to complete an associate degree or certificate than those who place in higher level of remedial courses (Attewell et al., 2006; Bahr, 20013; Bailey et al., 2010). Attewell et al. (2006) found only 28% of community college remedial students complete a degree or certificate in 8.5 years.

The central issues surrounding the use of the Accuplacer® test as a placement test in community colleges are score reliability and cut-off scores. In a study of 1300 students from 20 different post-secondary institutions, Medhanie, et al. (2012) found the ACT® math test to be a significant predictor ( $B=.18$ ) of students’ success in remedial math courses than students’ Accuplacer® test scores. However, College Board, the organization in charge of Accuplacer®, conducted a meta-analysis that included 47 studies, 14 community college, and two four-year institutions and claimed an average of 70% reliability in predicting students’ success (Packman & Mattern, 2009). Hughes and Scott-Clayton (2011) argued placement test such as Accuplacer® cannot provide an effective

assessment of community college students due to “vast range of underprepared students” (p. 340).

Other possible factor that might explain students’ poor performance on the Accuplacer® test at the community colleges is the lack of information to high school students about the community college placement test. Bueschel (2003) found high school seniors were unaware of a math placement test requirement at community colleges and did not take any math courses during their senior year, which may have diminished their probability to do well on the placement test. Ineffective methods of disseminating information to high school students about the placement test requirement for community colleges and other factors might also explain the inconsistency of Accuplacer® validity.

Community colleges are urged to use the Accuplacer® test as an informative tool rather than a mandatory placement instrument, and to consider multiple measures including students’ course work, grade point average (GPA), ACT scores, and Advanced Placement (AP) courses, for a more accurate placement in math. Using multiple measures to evaluate newly admitted students could potentially improve student math placement accuracy (Hughes & Scott-Clayton, 2011). However, high school GPA continues to be the best predictor of success in community college math courses (Burdman, 2013; Koswski, 2013; Roderick et al., 2009).

Whether the Accuplacer® test accurately places students in the appropriate math courses or not, the reality is that more than 70% of students

place in remedial math courses through Accuplacer® and their completion rate is around 15%. Medhanie et al. (2012) argues that students should not even take the Accuplacer® test or any placement test altogether. Community colleges and high schools need to establish common standards in math in order for high school students to successfully transition into college-level math courses without taking Accuplacer® test for placement purposes.

### High School: Brief History

The history of the public high school system began in the late 1800s with the establishment of land-grant colleges (Biemiller, 2012; Phipps, 1998). By 1820, Boston became the first state to offer free public education to everyone, providing poor people access to education to which only wealthy people previously had access. In the following years, policymakers identified a need to establish a more uniform high school system. By 1892, the National Education Association formed a committee known as “the committee of ten” to establish a common curriculum and rigorous standards for the high school system. According to Kirst and Usdan (2004), the committee members at the time had a low expectation of student in the high school system in that a small percentage student would transition to higher education. With the influx of immigration in the early 20<sup>th</sup> century, high schools experienced enrollment increases which were addressed with the new educational reform, the Cardinal Principles of Secondary Education (Kirst & Usdan 2004; Tyack & Cuban, 1995).

By 1918, the Cardinal Principles of Secondary Education was the new set of principles that dramatically changed the structure, curriculum, and mission of high schools. The new principles lowered the rigor level of the previous curriculum under the reform led by the committee of ten with a curriculum focused on “work, family life, good health, citizenship, ethical character, and worthy use of leisure...[and] many students were viewed as incapable of learning the traditional academic curriculum” (Tyack & Cuban, 1995, p. 50-51).

When Russia launched Sputnik in 1957 during the Cold War, the high school system became the scapegoat to blame for producing under-prepared students, which was the reason U.S. failed to be the first to launch a satellite into orbit. As a result, the emphasis on math, science, engineering and foreign languages reemerged in the public school system (Tyack & Cuban, 1995). A *Nation at Risk* in 1983 and the No Child Left Behind (NCLB) Act in 2001 were the two significant educational reforms that called for more rigorous curriculum, high-stakes assessment to measure outcomes, and accountability for low-performing schools. The high-stakes standardized testing in high school was highly criticized because as did not improve students’ success; instead, “teaching to the test” became a common practice in high school (Hoffman Varga, Venezia, & Miller, 2007; Tanner, 2013).

The consequences of past educational reforms in the high school system, the Cardinal Principles of Secondary Education reform, *Nation at Risk*, and the NCLB, revealed the reasons the higher education and high school systems are

so different in mission, goals, policy, and values- higher education was never part of the discussion in these monumental reforms. When more than 90% of high school students want a college education and more than 70% take remedial math courses in community college, it is an obligation for these two systems to create common standards to ensure students are prepared for college-level courses (Conley, 2005). The Intermediate Algebra course in this study is an effort to bridge the existing disconnect between a community college and local high schools by aligning the standards in mathematics.

### High School Math Programs

The past educational reforms mentioned above created a separation between high schools and community colleges resulting in misaligned curriculum and standards (Conley, 2005). The majority of students with a high school diploma are underprepared to take college-level math courses. In return, community colleges and universities often place the blame on high schools for not having a rigorous math curriculum as part of the high school graduation requirements. In return, high schools blame middle schools and middle schools blame the elementary schools. This is known as the “chain of blame” (Frost, Coomes, & Lindeblad, 2009; Ponessa, 1996).

Many high schools across the nation currently offer specific programs to better prepare students for post-secondary education. These specific academic programs include credit-based transition programs, Early Assessment Program (EAP), graduation requirement initiative, and professional employment. This

section discusses the effectiveness of these programs on improving the community college math remediation program.

Credit-based transition programs are programs with some form of articulation between high schools and post-secondary institutions which do not require any curriculum change. They are designed to provide students the opportunity to take challenging and rigorous academic programs in mathematics. The goal of these programs is to help students transition into college-level-math courses and increase their completion rates (Fowler & Luna, 2009). The U.S. Department of Education website lists all credit-based transition programs currently operating in high school nationwide: Advanced Placement (AP), Dual/Concurrent Enrollment, International Baccalaureate (IB), Middle College High Schools, Tech Prep, Singleton Programs, Comprehensive Programs, and Enhanced Comprehensive Programs.

Depending on the relationship and policy between a high school and the post-secondary institution, college credits are awarded to students who are successful in credit-based programs (Allen & Dadgar, 2012; Fowler & Luna, 2009). Researchers argued that credit-based transition programs provide a true college experience and expectations for students (Conley 2005; Culross & Tarver 2011; Kinnick, 2012). Students in these types of programs tend to enroll into four-year institutions (Allen & Dadgar, 2012; Kinnick, 2012). However, the problem with these programs is that they are expensive and exclusive; only a small number of high-achieving and highly motivated students enroll in these



courses, excluding the majority of high school students (Bunnell, 2011; Conley, 2005; Dadgar, 2012; Kinnick, 2012).

Challenging and rigorous curriculum in high school has been shown to have a positive impact on students' success in post-secondary institutions (Adelma, 2006; Kaniuka & Vickers, 2010). Fowler and Luna, (2009) reported that high school students who participated in an Early College program increased their retention by 30%, graduation rate by 20%, and enrollment to a four-year institution by 22% compared to similar students who did not participate in the Early College program. However, Conley (2005) and Kirst and Venezia (2001) stated that high schools should not have specific programs or courses that raise the academic standards in high school; instead, high school general education should be rigorous enough to prepare students to take college-level math courses in post-secondary institutions.

The EAP test is a California State University (CSU) college readiness measurement tool embedded in the California Standardized Test (CST). The EAP serves a basic function: to inform high school juniors who are planning to attend a CSU institution of their academic preparedness in English and math (Callan et al., 2006). High school students take the EAP test during their junior year. Those who score above the cut-off score are exempted from taking remedial courses or placement test and qualify for CSU college-level math courses. Students who fail the test receive detailed information on specific math topics they need to focus on during their high school senior year (Hodara, 2013).

The only comprehensive quasi-experimental analysis on the EAP effectiveness was conducted at California State University, Sacramento by Howell, Kurlaender and Grodsky (2010). They found high school juniors who participated in EAP lowered their probability to be enrolled in a remedial math courses at CSU campus by 4.1% (Howell et al., 2010). Similar to the EAP program, El Paso Community College implemented a program that assessed high school students prior to enrolling into El Paso Community College, and the program increased the number of students placing into the highest level of remedial math course by 13%. Unfortunately, the program at El Paso Community College provides only descriptive data (Rutschow & Schneider, 2011).

According to a recent report, more than 70% of juniors who take the EAP test do not pass it (CCCCO, 2013). With the low success rate on the EAP test, policymakers and educational leaders believe this test can potentially discourage students from applying to post-secondary institutions altogether (Howell et al., 2010). Although the success rate was minimal, the EAP test was the first statewide effort to bridge the disconnect between high schools and post-secondary institutions (Venezia, Callan, Finney, Kirst, & Usdan 2005).

In 2011, the California Community Colleges Chancellor's office (CCCCO) granted community colleges the local authority to determine whether to accept students' EAP cut-off scores for CSU admission as an alternative method for placing students into a college-level math course (ECCTYC, 2010). While 50%

of California community colleges reported they accept the EAP test, only 17% actually do (CCCCOb, 2013). There are no available studies on the effectiveness of the EAP program on the California community college students in math.

### High School Math Requirements

Increasing high school graduation requirements in math has been the focus of other educational reforms. Currently, the California Department of Education (CDE) requires a minimum of two years of math, including Algebra I, to receive a high school diploma (CDE, 2013a). For students who complete Algebra I in eighth grade, they simply need to take one more math courses during high school to complete the math requirements for graduation. However, the CDE does not state which topics in math need to be included in the second required math course. As a result, high school students often fulfill their math requirements by taking finance math that does not prepare them to take the community college placement test, which strongly emphasizes algebra (Brown, 1999).

The state minimum high school graduation requirements in math contradict the findings of a comprehensive study conducted by Adelman (2006) who stated high school students should take a minimum of three or more math courses, including precalculus, to increase their chances of earning a bachelor's degree. Students who completed Algebra II during their senior year are 70%

more likely complete an associate's degree than those who did not take Algebra II during their senior year (Adelman, 2006).

The minimum math graduation requirements in high school are not enough to prepare students to take college-level courses in post-secondary institutions, including community colleges. Approximately 90% of high school students want to attend college and believe their high school education is enough to succeed in community college; unfortunately, these students are surprised when they are placed into remedial math courses (Adelman, 2006; Conley, 2005, p. 9).

Adelman (2006) provided the results emphasize two very important recommendations: a) high school students need more rigorous math courses; and, b) high school students need to take a math course during their senior year. In this study, two of the goals the participating community college in the present study and local participating high schools are trying to achieve with the Intermediate Algebra course are: 1) to offer a rigorous and comprehensive college math readiness course that is specifically designed to provide students the skills for college-level math at City Community College; and, 2) to target high school seniors who have failed Algebra II during their junior year or students who have fulfilled their graduation requirement and are not enrolled in any math courses during their senior year.

## Disconnect Between Community College and High School

### Background

Historically, community colleges and high schools were established as two different and separate systems; they differ in values, missions, goals, and objectives (Conley, 2005; Conley, 2007; Brown & Niemi, 2009; Kirst & Venezia, 2001; Kirst, & Venezia 2006; Venezia, Kirst & Antonio, 2003). During an interview with Clark Kerr, the architect of the California 1960 Master Plan, stated that “there was an assumption that high schools were doing well and there was no need to incorporate K-12 in the Master Plan” (University of California Office of The President, 2009).

The K-16 partnership movement came in response to the lack of cohesiveness in policies, practices, and expectations in the public education pipeline, kindergarten through post-secondary. The partnership between community colleges and high schools is a specific effort to establish common expectations to produce college-ready students (Conley, 2005; Conley, 2007; Brown & Niemi, 2009; Kirst & Venezia, 2001; Kirst, & Venezia 2006; Venezia, Kirst & Antonio, 2003).

Practices and policies that are misaligned between community colleges and high schools occur in: a) high school standardized tests and community college placement test; b) high school and community college math standards; c) higher education institutions’ math requirements; d) high school students’ senior year and first semester of college; and, e) nonacademic factors (Byrd &

Macdonald, 2005; Conley, 2005; Karp & Bork, 2014; MacCann, Fogarty & Roberts, 2012; McLendon et al., 2009; Smith & Wertlieb, 2005; Venezia et al., 2005).

### Misalignment on Policies and Practices

There are several standardized tests students can take during high school to obtain early college admission, which help assess students' academic skills, and can predict students' overall success in higher education. Some of these tests include the California Standards Test (CST), augmented CST, Scholastic Assessment Test (SAT), American College Testing (ACT), and other assessments. However, these standardized tests do not correlate with students being college ready for math courses (Droogsma, 2011).

Using a statistical test called G-Test, Brown and Niemi (2009) concluded the math components of the augmented CST, which is a portion of the EAP test, were not aligned with the math topics assessed by the Accuplacer® test. There is an emphasis on Arithmetic and high levels of algebra in Accuplacer® test; however, these topics are not on the augmented CST (Brown & Niemi, 2009). According to Brown and Niemi (2009), only 2% of all California high school students who took the algebra component of the CST tested into college-level math courses. The misalignment between the math content areas on the augmented CST and the Accuplacer® test exemplifies the disconnect between high schools and community colleges in assessing student math performance (Conley, 2005).

The California Department of Education (CDE) establishes what every high school student needs to know before he/she graduates from high school. To ensure these requirements are met, the CDE requires every high school student to pass the California High School Exiting Exam (CHSEE). According to the CDE (2013b), "California created the test CHSEE to improve student achievement in high schools. The test helps to ensure that students graduate from high school with grade level skills in reading, writing, and math." Many researchers argue CHSEE requires no more than eighth-grade skills to pass the math portion of this exam. According Haycok (2010), the reason CHSEE has such low standards is based on the assumption that not everyone is meant to attend college. Conley (2005) stated:

The standards that states developed did not connect with post-secondary success. State standards development processes were geared toward creating well-educated citizens and ensuring that all students were prepared to enter the workforce, not necessarily college. The standards were not anti-college; they just did not give college much thought. (p. 37)

These discrepancies attest to the disconnect between high school and community colleges in regards to math performance.

Adelman (2006) showed that a minimum of three or more years of high school math, which includes Algebra II courses and beyond, increased the probability of completing complete a college degree. However, the minimum graduation requirements in the state of California are two years of math,

including Algebra I and other non-rigorous math course such as business math (California Department of Education, 2013). The general graduation standards for California high schools do not provide the necessary skills for high school students to take college-level math courses in community colleges (Adelman, 2006). The California high school math graduation standards might be a possible reason more than 70% of high school students with high school diplomas are underprepared for success in post-secondary institutions.

Educators agree on the need for a placement test in community colleges that effectively measures students' math knowledge and places them into the correct class. However, the inconsistency of the policies and practices regarding the community college placement tests is another reason the misalignment between community colleges and high school persists; it is impossible to define what college-readiness in math means when each community college is employing different types of assessment tools and different cut scores (Hughes & Scott-Clayton, 2011; Kirst & Venezia, 2004). With different cut scores, students may place in a remedial math course in one college but place in a college-level or different remedial math course at a different community college.

According to Kirst and Venezia (2004), the different standards across community colleges make it difficult for high school counselors and administrators to disseminate the correct information to students planning to attend a community college. In a qualitative study on 18 different community colleges in six different states, Perin (2006) found one state did not mandate a



placement test at all, while 11 community colleges administered the Accuplacer® test and seven administered the COMPASS test. While community colleges in four states were allowed to set their own placement test cut scores; other community colleges followed the mandated statewide cut scores for the placement test.

In California community colleges, Accuplacer® is the main assessment tool used to determine students' math placement. The cut scores were set locally by administrators with the input of math faculty approximately 15 years ago with no additional adjustments after its implementation. Additionally, the cut scores at the participating community college differ from other nearby community colleges. With the Intermediate Algebra course as an intervention program in place, high school students who successfully complete this intervention do not need to take the community college Accuplacer® for placement.

Conley (2001) and Kirst (2000) argued certain practices and policies during high school students' senior year negatively affect students' success in post-secondary institutions, especially for students planning to attend community colleges. Some common practices and policies that cause high school students confusion include post-secondary admission deadlines practices, high school senioritis, high school policies, and high school mission.

Currently, the deadlines to apply for CSU and UC schools are October 1 and November 30, respectively, and letters of acceptance are sent out in March (CSU, 2013; UC, 2013). According to Conley (2001) and Kirst (2000), this

practice leads students to take or even drop rigorous courses, such as math, in the second semester of their senior year. Not taking a math course during the second semester of the senior year implies that there is a gap between the last math course taken in high school and the math taken at a college. The length of time between the math courses can have a negative impact on students' performance in a college math course (Puente, 2012).

Using a meta-analysis, Cooper, Nye, Charlton, Lindsay, and Greathouse, (1996) found students who did not take courses during the summer suffered a loss in math computation ( $d = -.32$ ) when school resumed in the fall semester. Due to high school minimum graduation requirements in math, many students do not take any math courses for a year or more before starting college. This may explain why more than 90% of incoming students, including students who take precalculus or calculus in high school, place in remedial math courses (Puente, 2012).

Adelman (2006) found that students who take Algebra I and Algebra II and/or a higher level of math increase their completion of a four-year degree by 70%. However, the high school minimum graduation requirements guidelines set by the State of California and the ineffective use of the senior year is contrary to what high school students should do in order to increase their chances to complete a degree at a post-secondary institution. Currently, one simply needs only a high school diploma or equivalent to gain admission into a community

college. This means students arriving at community colleges are more likely to be underprepared to take college-level math courses.

Furthermore, unlike four-year institutions, community colleges have an open-admission policy; they cannot force students planning to attend community college to take more math courses in high school than the minimum requirement for graduation. As long as students obtain their high school diploma or equivalent, they are admitted in community colleges. However, four-year institutions have more authority in terms of admission requirements; they can implement policies that require students to take more math courses during their senior year for admission purposes, as some selective universities are implementing (Adelman, 2006). The missed opportunities during the high school senior year are of a great concern. Venezia et al. (2005) declared:

States need to make sure that what students are asked to know and do in high school is connected to post-secondary expectations—both in coursework and assessments. Currently, students in most states graduate from high school under one set of standards and face a disconnected and different set of expectations in college. Many students enter college unable to perform college-level work. (p. 29)

Furthermore, the high school curricula are mainly based on “show and tell” and they lack the critical thinking skills component which is a skill needed in post-secondary education (Conley, 2005). Post-secondary education relies heavily on

critical thinking skills and college instructors demand more independent work than high school graduates expect (Conley, 2005 pg 43).

The misalignment between community college and high school also occurs at the non-academic level. Karp and Bork (2014) interviewed 169 community college faculty and students and found students encountered higher expectations in community colleges than in high school. The researchers categorized these roles into four components: academic habits, balancing multiple demands, cultural know-how, and the ability to seek help.

Academic habits are practices that help students become independent learners, effectively manage their time to study, complete assignments, and develop note-taking strategies. Academic habits also encompass students' ability to balance the multiple roles they encounter as college students. Time management is one the most important skills students need to learn to acquire to succeed in college, especially for first generation college students (Conley, 2010, p. 73; Byrd & Macdonald, 2005; Karp & Bork, 2014; MacCann, Fogarty & Roberts, 2012). Unfortunately, many high schools do not offer enough programs to help students foster the degree of time management required in community college. By the time students arrive at the community college, they are expected to organize and prioritize numerous tasks on a daily basis.

Community college cultural know-how refers to students' ability to understand the community college culture and norms regarding class participation and attendance, classroom commitment, classroom rules and

behavior, and student-professor interaction. First-generation college students and underrepresented minorities are more likely to violate these cultural norms as they are not familiar with this set of cultural norms (Karp & Bork, 2014). For example, a student may not complete a class assignment due to his/her inability to seek help. Additionally, Wortman and Napoli (1996) found a strong relationship ( $r=0.449$ ) between social and academic integration and persistence in a community college.

Byrd and MacDonald (2005) conducted a survey and found help seeking or self-advocacy was another important background factor that help students' success in a community college. Self-advocacy helps students to identify their strengths and weaknesses, find the existing academic and nonacademic resources community colleges offer, and take the initiative to find the resources. In Karp and Bork's (2014) study, they reported, "students are expected to funnel themselves into a preexisting structure of supports made available by the institution. The college offers the services, and students need to find and use them on their own" (p. 25).

### K-16 Partnership Theoretical Framework

The effort to create common standards in math through a continual collaboration between community colleges and local high schools comes from a broader educational reform called Kindergarten through post-secondary (K-16) partnership (Kirst & Venezia, 2004). The K-16 partnership educational reform is an educational reform with four basic principles that call for common academic

standards between K-12 system and post-secondary institutions, a single K-16 budget, a single data systems to track students' progress from Kindergarten to college, and an accountability mechanism for K-12 and higher education (Domina & Ruzek, 2012; Hoffman et al., 2007; Kirst & Venezia, 2001).

The K-16 partnership movement seeks to create a statewide structure that promotes cooperation among representatives from the K-12 system, community colleges, four-year institutions, local and statewide government, private businesses, and other influential stakeholders. The goal is to promote career and college readiness to improve students' completion rate in post-secondary institutions, especially in community colleges (Venezia et al., 2005). Andrea Venezia, Michael Kirst, and David Conley have been the leading advocates for statewide K-16 partnerships, and they are the source of much of the literature on the K-16 educational reform, especially on content aligning in math between K-12 systems and community colleges. Venezia et al. (2005) stated, "public post-secondary education is a part of the nation's mass system of education, yet we have outdated systems based on the assumption that only an elite group attends college" (p. 9).

In a report on the current K-16 partnerships in four states, Florida, Georgia, New York, and Oregon, Venezia et al. (2005) argued that in order to achieve a statewide K-16 partnership, there needs to be an organizational structure that involves the leadership of stakeholders in the K-12 system, community colleges, four-year universities, and the support of state-level

representatives. Also, there needs to be a mechanism to reconcile any existing educational cultures and political differences (Venezia et al., 2005). While many reports on the K-16 partnerships exist, these reports only provide educational policies and best practices that could help establish a successful statewide comprehensive K-16 partnership.

Unfortunately, there is not a single state in the U.S. that has fully adopted the four fundamental principles of the K-16 partnership (Domina & Ruzek, 2012). As of 2007, forty-two states have established councils whose work is to provide recommendations regarding the content alignment policies and practices between K-12 and higher education; however, there has been little progress. In fact, only course-content alignment and a data system to track students' progress between K-12 and higher education are being promoted in 19 states (Domina & Ruzek, 2012). As a result, the full impact of a comprehensive statewide K-16 partnership with all four principles is unknown. Moreover, because a K-16 partnership is a recent educational reform, the lack of data makes it difficult for researchers to conduct experimental studies (Domina & Ruzek, 2014; McLendon et al., 2009).

Although California does not have a statewide K-16 partnership, numerous district-level K-16 partnerships are active throughout the state. The Alliance for Regional Collaboration to Heighten Educational Success (ARCHES), a nonprofit organization, provides grants and assistance to at least 19 existing local K-16 partnerships in California (ARCHES, 2014). Not all K-16 partnerships

are equal; each partnership is addressing local community needs in public education (ARCHES, 2014). Furthermore, other district-level K-16 partnerships choose to incorporate into existing programs that emphasize professional development, A-G requirements (UC admission requirement), AP offerings, Common Core State Standards, Science Technology, Engineer, and Mathematics (STEM), and Free Application for Federal Student Aid (FAFSA) applications (ARCHES, 2014). For these reasons, Venezia et al., (2005) call for states to implement a comprehensive statewide K-16 partnership.

In a quasi-experimental study, Domina and Ruzek (2012) analyzed the district-level K-16 partnerships, which included K-12 schools and four-year institutions in California, and found these partnerships increased enrollment to CSU by 35% (Domina & Ruzek, 2012). However, community colleges were not taken into account in this study as community colleges are not selective post-secondary institutions; instead, community colleges are post-secondary institutions with an open-admission policy. The community colleges student access is not an issue; however, the influx of high school students in remedial math courses and the low completion rates in certificates or associate degrees are definite areas of concern. Although the quasi-experimental study conducted by Domina and Ruzed (2012) excluded community colleges, the study was one of the first attempts to understand the effectiveness of K-16 partnerships.



## Community College and High School Partnership Model

The potential benefits of partnerships between community colleges and high schools to address the problem of remediation are discussed in the literature; however, few studies report any lessons learned from existing partnership models or strategies needed to sustain partnerships between community college faculty and high school teachers.

In California, the Long Beach Education Partnership (LBEP) has been an example of a K-16 partnership in action. LBEP was established in 1992 and it was a partnership among Long Beach Unified School District (LBUSD), Long Beach Community College District (LBCCD), and California State University, Long Beach (CSULB). According to a report by Nielse and McCarthy (2009), the representatives from LBUSD, LBCCD, and CSULB worked collaboratively on revising and aligning their content standards, and provided student academic support programs for a seamless transition from LBUSD to CSULB.

The descriptive statistics on the 2014 data revealed that students' success rate in math increased by 5% with LBEP in place (CSULB, 2014). While students' success rate improved, the success rate for remedial math students at LBCCD has not improved significantly. According to a statewide online student success scorecard for community colleges, LBCCD completion rates for remedial math students from 2005 and 2010 were between 25.3% and 27.1%, which was below the 32.7% average completion rate of all California community colleges (CSULB, 2014; CCCCOa, 2013). Additionally, Nielse and McCarthy (2009)

reported the long-term sustainability of LBEP depended, in part, on communication, commitment, and common goals.

In a descriptive study, Berry (2003) found that logistics such scheduling a meeting time was a difficult task to accomplish during the collaboration between one community college and high schools rather than faculty's or teachers' willingness to participate. Additionally, Matlock (1990) highlighted the important of community colleges to take the initiative to lead, participate and communicate regularly, share information about students' performance, promote college-going to high school students, and to share resources and student services for a partnership between a community college and high schools to succeed.

Similar to the K-16 educational movement framework, the present study sought to describe the partnership between an urban community college and its feeder high schools from two school districts. The partnership was established in 2010 to increase college and career readiness by; 1) aligning common standards in math; 2) sharing data between the community college and high schools; 3) promoting college education as a standard for the community; and, 4) creating a center of information for students and community members. Approximately 96% of high school graduates who arrive at this community college need remedial math courses. One of the objectives of the present study is to understand the community college/high school partnership.

## Summary

Community colleges are integral to the workforce and economic development (ACCC, 2014; Scott, 2011). State-level policy makers, local businesses, and other stakeholders demand community colleges produce a skilled workforce to compete in local and global markets (AACCC, 2014). However, the high number of students in remedial math courses and the alarmingly low completion rates are factors that contribute to students' failure in the community college system throughout the U.S. (Venezia, et al., 2003).

While students graduate from high school believing they are ready for college-level math courses, 75% of them place into remedial courses, especially in math (Scott, 2011). Remedial math students are less likely to complete a certificate, two-year degree, or transfer to four-year institution (Adelman, 2006). Latinos and African Americans make up 61% of students in remedial math courses, leading to unseen educational and earning disparities (Bailey et al., 2010).

While current efforts attempt to address the issue of math remediation, most educational reforms in community colleges, as well as in K-12 system, are ineffective in increasing college readiness or completion rates of degree or certificate. Azinger (2000), Conley (2010), and Venezia et al. (2003) asserted that by bridging the disconnect between community colleges and high schools, students would be more academically prepared to transition into college-level math courses.

The K-16 partnership is the educational reform aiming to bridge the disconnect between K-12 and higher education by aligning the academic expectations, creating a data system across the educational pipeline, bringing accountability to higher education, and sharing resources. No comprehensive K-16 partnerships exist yet in the nation. However, there are district-level partnerships in place, those between high schools and four-year universities or high schools and community colleges; however, many of these district-level partnerships focus on student support programs.

The focus of this study is to describe the partnership between a community college and its local feeder high schools through a college math readiness program. Although this partnership and its college math readiness program is not a direct result of a K-16 partnership movement, the partnership exhibits two of the principles found in the K-16 partnership program: common standards in math and data sharing.

## CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

To describe the partnership between City Community College (CCC) and local high schools and its college math readiness program, a descriptive mixed methods case study research design was conducted. This chapter restates the purpose of the study and the research questions found in Chapter 1, and describes the research design methodology, the setting and participants, data collection procedures, including procedures for maintaining the confidentiality of participants, data analysis, and the role of the researcher.

The purpose of the study was to describe how the historical context of the partnership between an urban community college and seven high schools was described from its inception by key stakeholders, including the purpose of the college math readiness program designed to prepare high school seniors to take college-level math courses, in order to better understand a community college and high school partnership. The historical context included factors relevant to the development and establishment of the partnership and its college math readiness program, student demographic background, retention, persistence, academic performance on placement test and subsequent math courses, and stakeholders' perceptions.

This study is driven by the following research questions:

1. How would the historical contexts of an urban community college and high school college math readiness program designed to prepare high school

seniors for college level math courses be described from its inception by key stakeholders, including its purpose?

2. What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

### Research Design and Method

Based on the purpose of this study and the two research questions, a descriptive mixed methods case study was the research design deemed suitable. In general, the case study is a specific method that provides an opportunity to understand the interaction of people in real situations (Cohen et al., 2005). A descriptive mixed methods case study combines qualitative and quantitative data to provide an in-depth understanding of a program, person, or event, and it is a common research design in the fields of medicine, education, and psychology (Leedy & Ormrod, 2010). With regard to qualitative study, Creswell states:

Qualitative research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging question and procedures, data typically collected in the participants' setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. (Creswell, 2009, p. 4)

Other common types of case studies include explanatory, exploratory, interpretative, and evaluative (Cohen et al., 2005). The explanatory case study is a method mainly used to answer or explain theories, while exploratory case study focuses on testing hypotheses or theories. The interpretative or ethnographic case study provides in-depth study of cultures or people, while the main purpose of an evaluative case study is to explain and assess the findings of a case. The purpose of a descriptive mixed methods case study is to observe and provide qualitative and quantitative information on a person, program, or event, without altering any of the existing conditions (Cohen et al., 2005).

#### Research Setting and Participants

This study was based on a four-year-old college math readiness program between 2011-2015 operating under the collaborative effort between the City Community College (CCC) and seven comprehensive high schools from two school districts in the area. This program was an academic-year long intermediate algebra course designed to prepare high school seniors to transition into a college-level math course at CCC. The participants in study included CCC math faculty, CCC administrators and staff, CCC students, and high school math teachers and administrators who were involved in the partnership and the college math readiness program. CCC students were students who participated in the college math readiness program at their respective high schools and transferred to CCC for their post-secondary education.

## Data Collection

The researcher requested permission to collect data pertaining to the college math readiness program from the community college outreach department. With the assistance of the staff at the outreach department, the following data were collected: archival documents and records, student demographics, and student academic performances. Some of the documents and records were photocopied for further analysis; however, other confidential documents were analyzed by going through the archival documents at the outreach department. The documents and records were in the form of agendas, handouts, minutes, reports, and MOUs.

Students' demographics and academic performance data were collected electronically and stored securely at the researcher's work office located within the participating community college campus. Additional reports related to the college math readiness program were simply retrieved from the community college website and other public websites such as the Bill and Melinda Gates Foundation and the National League of Cities.

Data pertaining to the region, city, community college, school districts, and individual high schools were collected from different public databases, which included the U.S. Census Bureau, the California Department of Education (CDE), Ed-Data, the community college website, district and high school websites and other published reports from the Bill & Melinda Gates Foundation, The National League of Cities, and a local university.



## Participants

Using the researcher's local knowledge, the participants were purposefully recruited due to their association with the college math readiness program. The participants interviewed included college math faculty, high school math teachers, administrators and staff, and college students. The administrators and staff were composed of CCC president, staff, and high school administrators. The CCC students contacted were former participants in the college math readiness program and believed to be attending CCC.

Two recruitment processes were used, one for students and another for non-students. For students, a mass e-mail was sent out multiple times to 200 college students through the CCC outreach department and the office of admissions and records, inviting students to be interviewed. Similarly, using the researcher's local knowledge, an invitation was sent out to non-students, inviting non-students to be interviewed. The e-mail contained the letters of support (Appendix A and Appendix B), the informed consent form (Appendix C) and the research questions (Appendix D). To those who replied and agreed to participate in the interview, a follow-up e-mail was sent to schedule the location, day, and time for the interview.

The location of the interviews from community college faculty, high school math teachers, community college and high school administrators and staff took place in their offices or classrooms at their corresponding site locations. The researcher drove to the designated locations for the interviews. For

convenience, the interview with one math faculty, one staff, and one high school teacher took place at the researcher's office.

The majority of the interviews with students took place in the study rooms located at the community college library. When study rooms were all occupied, the librarian found an alternative quiet location within the library for the interview. One student was interviewed in the math department conference room when the librarian was unable to find a location suitable for the interview, and only one student was interviewed at the researcher's office.

For each interview, participants signed the informed consent before the interview and a digital voice recorder was used to record the entire interview session. Each interview lasted between 10 and 40 minutes. The semi-structured interview questions, which had been developed by the researcher, were broken into four sections: basic interviewee's background questions, historical knowledge of the college math readiness program, students' performance in the college math readiness program, faculty or students' perspective of the college math readiness program. The interview questions were asked in the order they appeared on the interview form, and probing questions were included for clarification or additional information.

For all interviews, an Olympus VN-722 digital voice recorder was used. There was no penalty whatsoever if the participant decided to opt-out during the interview, in which case, the interview session ended and any collected data were destroyed. A \$10 Starbucks gift card was given to the participant for his/her

time and participation. All interviews were transcribed and printed out by the researcher, deleting any personal identifiers from the data.

### Data Analysis

First, the archival documents and records included official reports, memoranda of understanding (MOU), meeting minutes, articles, and any legal documents related to the development and establishment of the partnership. These archival documents and records were printed out and organized in chronological order, starting with the earliest recorded document. Second, all of the transcribed data were printed out and organized by groups, administrators, staff, math faculty, math teachers, and students. Third, the student demographics and academic achievement data were input into an Excel spreadsheet, and divided the students by cohorts: assigning the first group of students in the college math readiness program as Cohort 1, the second group as Cohort 2, the third group as Cohort 3, and the fourth group as Cohort 4.

Then, all collected data were organized in terms of the historical context of the CCC and high schools partnership, purpose of the CCC and high schools partnership, benefits of the CCC and high schools partnership, high school student recruitment process, student performance results, participants' perspective of the CCC and high schools partnership, as indicated in Figure 4. This concept map helped organize all collected data.



Figure 4. Concept Map for Data Organization.

Data triangulation is a common method used to analyze data from multiple sources such as archival documents and records and interviews (Yin, 2009). The specific techniques used in this study came from Tyan and Bernard (2003) who stated that themes can be generated from archival documents, data, transcribed interviews and other texts by looking for similarities, differences, and repetitions. In this study, themes were generated by finding similarities, differences, and repetitions by cross referencing between the responses from the interviews, the content of the archival documents, and students' performance

data on historical context, purpose of the partnership, students' recruitment process, and participants' perspective as seen in Figure 5.

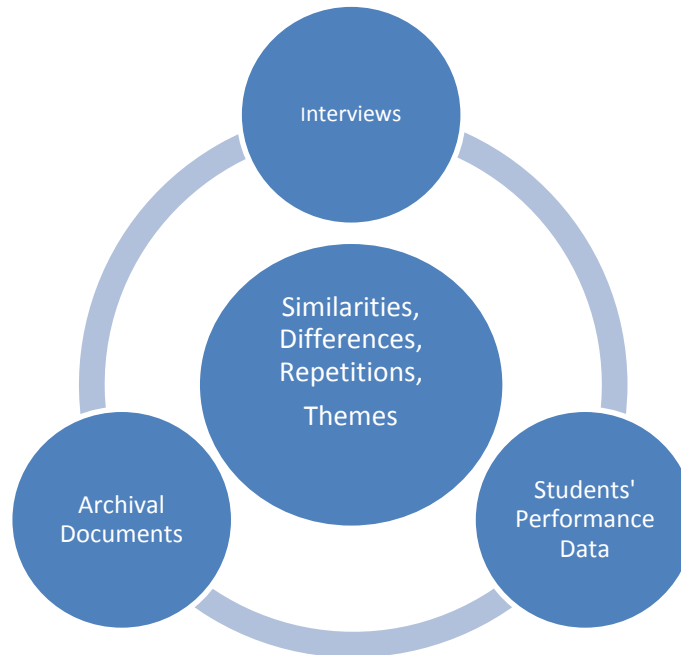


Figure 5. Theme Development Process Diagram.

The analysis of all collected data for similarities, differences, and repetitions began by first printing out all the documents and read multiple times. With each reading, similarities, differences, and repetitions on historical context, purpose of the partnership, students' recruitment process, and participants' perspective were highlighted in the document by using four different colors; green, yellow, blue, and pink. For example, by comparing the interview

responses from CCC and high school participants to information in the archival documents and students' performance data, similarities and differences were highlighted and recorded to generate themes on the historical context of the partnership between CCC and high schools. This process was repeated for the purpose of the partnership, students' recruitment process, and participants' perspective. Furthermore, Ryan and Bernard (2003) stated that "repetition is one of the easiest ways to identify themes" (p. 89). In addition to reading the documents, Microsoft Word and the basic functions of TextStat software helped identify words with high frequency that occurred in the archival and transcribed documents. Finding words with high frequency provided a better understanding of the collected data.

### Validity

Validity measures the credibility and quality of the research design (Cohen et al., 2005). There are many types of validity in both qualitative and quantitative research studies; however, the most common types of validity are construct validity, internal validity, external validity, and reliability (Yin, 2009). Following the recommendation by Cohen et. al (2005), one of the techniques used to increase the validity of the research design is data triangulation. Data triangulation uses multiple sources of data to validate findings.

## Role of the Researcher

The researcher is an associate math professor at the community college described in this study and has been the liaison between the community college math department and the seven high schools for the past three years. The role of the researcher is to meet with high school math teachers regarding the college math readiness program, work in conjunction with college outreach department, and provide reports to the math department.

According to Cresswell (2009), there are more advantages than disadvantages when the researcher has previous experiences or knowledge of a specific subject being studied. With the researcher's previous experiences and knowledge, the researcher can access information that can provide an in-depth understanding of a particular phenomenon being studied. It is also possible that previous experiences or knowledge may contribute to biased interpretation.

As recommended by Cohen et. al (2005), the researcher set aside all preconceived ideas and understanding during the study, especially during the interviews. The researchers studied the responses through the lenses of the participants without formulating any conclusion based on previous knowledge. By using data triangulation, the researcher was able to use data from different sources to generate themes and conclusions.

## Summary

This was a descriptive mixed methods case study, a common research design used in the field of education. The three main sources of data were

archival documents and records, interviews, students' demographics and academic performance in their subsequent math courses at the community college. Data triangulation helped generate themes in this study by finding similarities, differences, and repetitions. The following chapter provides the results and analysis of all collected data in terms of themes.



## CHAPTER FOUR:

### RESULTS

The purpose of the study was to describe how the historical context of the partnership between an urban community college and seven high schools was described from its inception by stakeholders, in order to better understand a community college and high school partnership. The historical context included the purpose of the partnership and its college math readiness program, student demographic background, retention, persistence, academic performance on placement test and subsequent math courses, and stakeholders' perceptions.

This study will help show how an urban community college and high schools joined forces to combat the influx of high school students in need of remedial math courses and low completion rates. The two guiding research questions are provided below:

#### Research Questions

1. How would the historical contexts of an urban community college and high school college math readiness program designed to prepare high school seniors for college level math courses be described from its inception by key stakeholders, including its purpose?
2. What are the characteristics and performance of the participants in the urban community college and high school college math

readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

In order to answer the research questions, the researcher employed a descriptive mixed methods case study, collected qualitative and quantitative data such as face-to-face interviews and archival documents and records which included students' performance data in the college math readiness program. The participants interviewed were CCC math faculty, CCC administrators and staff, including high school administrators and math teachers associated with the partnership between CCC and high schools. Archival records and documents included several binders with official reports, memoranda of understanding (MOU), meeting minutes, articles, and legal documents related to the development and establishment of the partnership, and students characteristics and performance scores. Other documents were obtained from the CCC, Bill and Melinda Gates foundation, and National League of Cities websites.

Furthermore, the researcher used data triangulation and specific techniques described by Ryan and Bernard (2003) to generate themes, looking for similarities, differences, and repetitions. The similarities and differences were obtained by reading and highlighting the collected documents and interview transcriptions. Microsoft Word and basic functions of TextStat software helped identify the repetitive words and their locations in the documents. Seventy-six high-frequency words that occurred more than twenty times were recorded, excluding grammatical words such as a, an, the, I, me, etc., see Table 2.

Table 2. High-Frequency Words

Math (683)	Counselor (62)	Learning (36)
Community College (670)	Degree(s) (61)	Development (35)
School(s) (562)	Enroll(ed) (59)	Pathways (35)
Program (556)	Track/Tracked (59)	Opportunity/Opportunities (32)
Students (455)	District (59)	Curriculum (32)
Ready/Readiness (203)	Requirements (58)	Juniors (31)
Algebra (207)	Participate/Participation (58)	Sustainable (30)
Teachers/Teach (204)	Improve (57)	Calculus (30)
Successful/Success (170)	Placement/Placed(57)	Prepared (30)
Need/Needs (133)	Involved (56)	Together (30)
Test(s)/Exam (127)	Collaboration (51)	Increase (28)
College-Level (123)	Purpose (50)	Institutionalize(d) (27)
Help(s) (111)	Teaching (50)	Below (26)
Pass/Passed (102)	Offer/Offered (50)	Support (25)
Intermediate (82)	Grant (49)	Transfer (24)
Institutions (82)	Education (47)	Access (24)
Goal(s) (81)	Funded/Funding (47)	Major (24)
Senior(s) (81)	Believe (47)	Organization(s) (23)
Priority (78)	Assessment (44)	Measure(s) (23)
Registration (76)	Four-year university (44)	Results (23)
Data (75)	Recruit/Recruited (82)	Money (22)
Credit(s) (72)	Contract (42)	Information (22)
Completion (71)	Graduate (41)	Evaluated (21)
Precalculus (70)	Grade(s) (40)	Job(s) (21)
Partnership (66)	Meeting(s) (39)	
Services (65)	Mission (37)	

The high-frequency words were then merged with the findings obtained by looking for similarities and differences in the collected, to help generate a set of themes. The process used to generate themes is presented in Table 3. This

process was repeated over the collected data and generated the following themes: not recruiting the targeted students; having difficulties transitioning to CCC; faculty were not receiving student data; teachers were not receiving data; students cannot be tracked after high school; all students were successful; faculty-teacher collaboration was valuable; and success to students was to pass the class. These themes were further grouped into three higher order themes listed in Figure 6.

Table 3. Theme Developing Process

Responses	Theme
Faculty D: “we never, never got the data”	
Faculty B: “we didn’t have anything because we were missing data”	Faculty were not receiving student data
Faculty A: “I don’t know what happen to the others”	

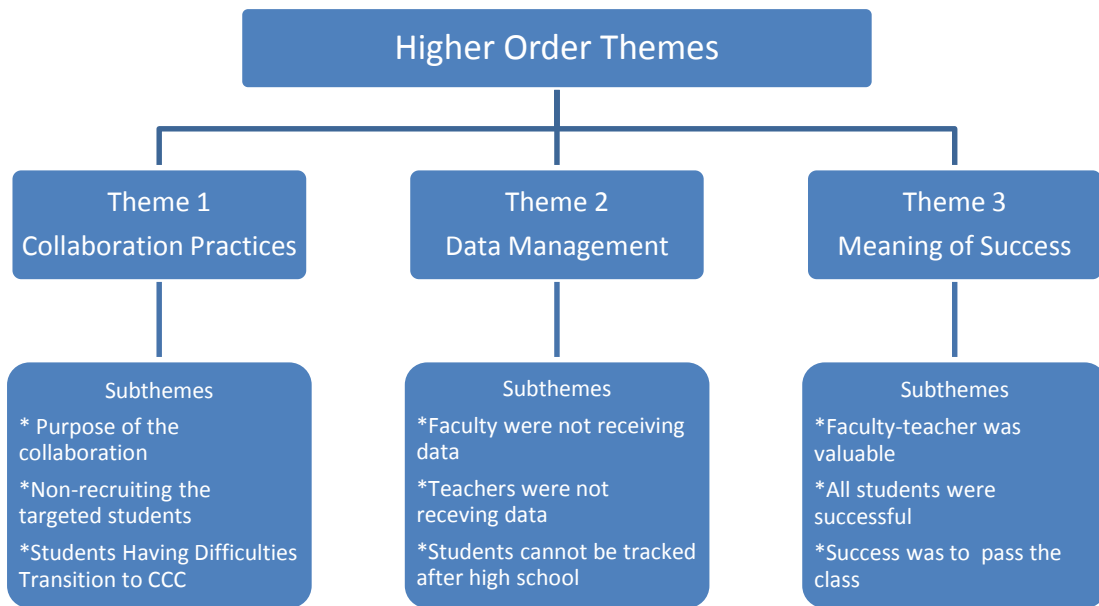


Figure 6. Higher Order Themes Chart

A total of 33 individuals participated in the structured interview which included four college math faculty, five high school math teachers, nine administrators and staff, and 15 CCC students. The nine administrators and staff included the CCC president, two CCC staff, one high school assistant principal, one high school principal, one district level specialist for secondary mathematics, one district assistant superintendent, one district executive director, and one district director for post-secondary education. Faculty, teachers, administrators, and staff were coded based on their positions; the years of participation in the partnership were also included, see Table 4. Students were coded in increasing order, starting with the first student as Student 1; district attended and highest

math taken were also included, see Table 5. This strategy was used to maintain participants' anonymity and as a reference during the data analysis.

Table 4. List of Codes for Participants

Participant Code	Position	Years of Participation
Faculty A	CCC Math faculty	2
Faculty B	CCC Math faculty	4
Faculty C	CCC Math Faculty	5
Faculty D	CCC Math Faculty	4
Teacher A	High School Math Teacher	3
Teacher B	High School Math Teacher	3
Teacher C	High School Math Teacher	5
Teacher D	High School Math Teacher	5
Teacher E	High School Math Teacher	3
College Administrator	CCC administrator	5
College Staff A	CCC Staff	3
College Staff B	CCC Staff	4
District Administrator A	High School Administrator	3
District Administrator B	District Administrator	3
District Administrator C	District Administrator	2
District Administrator D	District Administrator	5
District Administrator E	District Administrator	1
District Administrator F	High School Administrator	3

Table 5. List of Codes for Students

Participants	District Attended	Highest Math Taken in High School
Student 1	District A	Precalculus
Student 2	District A	Algebra II
Student 3	District A	Algebra II
Student 4	District A	Algebra II
Student 5	District A	Algebra II
Student 6	District A	Precalculus
Student 7	District B	Precalculus
Student 8	District A	Precalculus
Student 9	District A	Precalculus
Student 10	District A	Precalculus
Student 11	District B	Precalculus
Student 12	District A	Precalculus
Student 13	District B	Algebra II
Student 14	District A	Algebra II
Student 15	District A	Algebra II

The three higher order themes address the first research question: how would the historical contexts of the partnership and the college math readiness program were described by stakeholders? Data pertaining to students' characteristics and performance during 2011-2015 are also reported at the end of this chapter.

Before reporting the findings, it is important to note the responses from interviews quoted in this study may contain grammatical errors made by the interviewees and not the researcher.

### Theme 1: Collaboration Practices

Collaboration practices emerged as a higher order theme from official documents and responses provided by stakeholders regarding the official

purpose of the partnership, student recruitment process for the college math readiness program, and students' transition to CCC.

Purpose of the Collaboration. Common phrases faculty, teachers, administrators, staff, and students provided when asked about the purpose of the partnership and the college math readiness program were “increase completion rates”; “finish in two years”; “help high school students”; “go to four-year institutions”; “finish their program”; “more college ready”; “graduate”; “educated workforce”; “critical thinkers”; “money”; and “economic grow.” The official purpose of the partnership is provided in the following statement:

Through [partnership name], [city name] will align expectations between high school and college, strengthen data systems and coordinate students' services. With increased completion rates as the key focus, [partnership name] is focused on systemic change and has developed plans to create clear pathways to effectively connect our youth to degrees and certificates with value in the marketplace. (City Council Memorandum: Completion Counts, 2011)

The specific measurable goals of the citywide partnership were to increase CCC completion rates from 14% to 20% by 2013, 30% by 2015, and 46% by 2020. To achieve such goals, CCC and local high schools were called to work collaboratively, as stated in the following statement. The result of aligning expectations between high school and CCC was the college math readiness program. The college math readiness program was a course similar in content to



an existing CCC intermediate algebra course, which is one level below a college-level math at CCC. Additionally, the college math readiness program was taught by high school math teachers at their respective school sites and students who successfully completed the program qualified to transition into a college-level math course at CCC.

The college math readiness program was directly associated with the need to produce skilled workforce to undertake future jobs. District Administrator D stated:

The fact of the matter is most of the research on what is required for the emerging workforce is that 70 plus percent would require some form of additional training outside of high school. If you haven't made it through high school, the prospects are not looking that great. (District Administrator D, personal communication, September 29, 2015)

However, those who recently joined the partnership knew very little of the scope of this partnership. The following statement provided by Administrator B gave a general sense of what the rest of the participants who had recently joined the partnership knew about the program:

I joined this collaboration after it was already established so I was not part of the initial establishing process. Once I took this position, I kind just picked up where we left off. So, I am not sure who initiated, if it was coming from K-12 or it was coming from higher education. But I just kind

joined in since it was already established. (Administrator B, personal communication, September 3, 2015)

It is unclear whether knowing the history and magnitude of the collaboration that led to the development of the college math readiness program has any effect on how high school math teachers and administrators promote the offering of this program at their high school campus. However, it is important to note that only one math teacher has been part of this program since its inception.

Not Recruiting the Targeted Student. When faculty, teachers, and administrators were asked about the student recruitment and selection process, common phrases provided were “independence”; “had to fill out classes”; “local considerations”; “[students] still have no idea”; “my friend told me”; and “need to fill the class.” The recruitment and selection process was not uniform across the seven schools. While some schools struggled to get students to sign up for the college math readiness program, other schools were offering seven sections of the college math readiness program that included seniors and juniors. The involvement of CCC representative during the student recruitment process was not reported; instead, each school followed its own set of recruitment procedures. Faculty B, who was part of a development team during the program’s inception, described how the students were selected for the college math readiness program in the following statement:

I think the schools had a little bit of independence on how they were choosing. I think most of them aligned with the initial way...but some

schools had to fill out classes...there were some students that were not exactly fitting the profile that we wanted because there were some other local considerations. (Faculty B, personal communication, September 10, 2015)

It was also reported that some students who did not have the minimum requirements for the program were simply enrolled in the course due to low enrollment and the possibility of cancelling the course. District Administrator F stated:

A lot of times we have to put kids there because we need to fill the class, otherwise, we would not be able to offer it. It seems to me that we should already, really, have been informative to where students already know when they sit down with their counselor. (District Administrator F, personal communication, October 6, 2015)

Other reasons high schools were having difficulties recruiting students for the college math readiness program were due to registration dates and students' lack of educational plan during the senior year in high school. District Administrator B explained:

Maybe we could do a better job in promoting the course and recruiting more students to it because registration starts like in February or March, and their 11th graders enroll for the senior years. A lot of them at that point do not know what direction they are going. Are they going to [CCC]? Are they going to four-year institution? Are they going to join the military?

All of them still have no idea and so it is hard for us to say, "Hey, you are the right student because you are going to a community college and this will be perfect for you." So it is hard for us to make that judgment so early, it is hard to narrow our recruitment efforts. Maybe we could just increase the promotion of the course and the program. (District Administrator B, personal communication, September 3, 2015)

While four high schools continued to offer one section of the college math readiness program per school, two high schools increased their offering to two sections per school. However, one high school from District A made a major modification of the program; half of the students enrolled in the program were juniors who were taking the course to better prepare them for their high school precalculus course. The reason for this change is provided by Teacher B.

We realize that sending students who hardly or barely pass Algebra II into precalculus is a failure. So putting them in this program gives them a chance to review the concepts that they did not master so that when they next go to precalculus they will be more qualified. (Teacher B, personal communication, August 24, 2015)

Another important observation made from the collected data was that half of the 15 students interviewed reported they had taken a precalculus course prior to taking the college math readiness program. It is unknown how many students with a precalculus background actually enrolled in the college math readiness

program. The reason for this practice was described by a district administrator with the following statement:

Recently the district has increased from a two math requirement to a three math requirement. So some students are now struggling to get through precalculus. If they took geometry as freshman and Algebra II as a sophomore they may be struggling to get through precalculus. So, this is an option, some (principals) are looking this as an option. When I was a teacher and I would sell this to my students to recruit them for this program, it was either like 'I am in Algebra II or I am in precal, I am not done but I am not taking calculus, I am not taking the next level.' So I encouraged them to take the math so to maintain their skills. (District Administrator B, personal communication, September 3, 2015)

One student reported discontentment with allowing juniors and seniors in the same course. Student 9 who took the course with juniors voiced his/her objection to this practice with the following statement:

At [my school], they opened it to all grades. I think I would only, if I was in charge of [my school] kids, offer it to seniors. This way the seniors who actually need the class can get into the class. (Student 9, personal communication, September 30, 2015)

The student recruitment and selection process varied across the seven high schools, and based on the interviews, the representatives from CCC did not play any role during this process.

Having Difficulties Transitioning to CCC. This theme emerged from the responses provided by CCC students who participated in the college math readiness program. Common phrases used to describe their experiences during the transition period to CCC were “I could not get into a math course”; “I registered too late”; “explain what is going on”; “I wish I could've been, how do I do it?”; and “I tried enrolling for the intermediate algebra.”

The archival documents and minutes stated CCC would create an information center or community center to help students in the college math readiness program navigate the system (Completion Counts, 2010). This information center was housed under the CCC outreach department; however, College Staff B acknowledged the outreach department was not disseminating the information needed to students in the college math readiness program at the high schools. College Staff B explained:

I would like a person for this program; it needs its own department. How nice would be to be able to go to each of those classes in the high school? Those math classes, say, ‘hey, you know, you guys are doing great and fabulous. Do you know you get these benefits? Do you know that if you come to the community college first and do your two years, you can go anywhere? Why take that math class at another university when you already have it here? You pass that, right?’ And also explain the contract and that they get early registration. I do not know they even know that, there is no contact from the community college to that particular math

class to tell them about it. I am leaving it up to the instructors. (College Staff B, personal communication, August 21, 2015)

The lack of collaboration between the CCC outreach department and the teachers assigned to the courses was reported to have caused some students interviewed in this study to miss their early registration deadline and the enrollment of a math course at CCC. It is unknown why many other students who qualified for a college-level math course failed to enroll in a math course at CCC; however, students interviewed in this study described their experiences when they transitioned to CCC.

Student 2 described the attempts to communicate with a staff at the outreach department in the following statement:

I am actually not taking a math course right now because I could not get into a math course, because I registered too late for it. But I did try to get a hold of the [staff] and she told that I was actually enrolled in a class, but I really wasn't. So, it was kind of, what? She had told that I was ready for it but I wasn't actually enrolled in the class. (Student 2, personal communication, September 10, 2015)

Student 3 talked about the need for a more structured procedures in place to guide the student during the transition to CCC in the following statement:

"I would be more, ask to be sure what the next steps would be...I wish I could've been, how do I do it? How do I do it to go to the next step? How

do I take advantage of register early?” (Student 3, personal communication, September 10, 2015)

Student 3 also acknowledged a level of responsibility, “more than anything it would be me, but also for them to advise me on what the next steps.”

Other students suggested the need for a CCC representative to visit their classrooms and inform them about the college math readiness program, as Student 1 and Student 9 reported in the following statements:

Well, I guess maybe have a [CCC] representative that actually go into the class and tell them like “you are taking this class; this is what you can get out of it if you do well. And if you do well, like, you do this and that to get the priority registration.” (Student 9, personal communication, September 30, 2015)

Maybe having someone from [CCC] come in, maybe every once in a while, looking at a lesson. Also, explain what is going on, too. When it came time during assessment test rolling around, set aside a certain time for us. It would be cool if they can come and talk to us, too. (Student 1, personal communication, September 10, 2015)

Student 9 reported a pre-requisite issue during the class registration period at CCC, “it kept telling me that I needed, I think, certain prerequisites or that I needed to be in the [certain] program. It would not let me go through.”

Furthermore, Student 9 explained the decision to wait until the following semester to register for a math course at CCC took place in the statement below:



So I figure to not give myself too much stress on this because it seems everybody here is really busy. I tried calling and see what was going on with the [other college] program, I didn't get any information back. So, it was just kind of like, 'Okay, let's wait for the next semester and see if things clear up more'. (Student 9, personal communication, September 30, 2015)

The critical need for communication between the CCC outreach department staff and students in the college math readiness program at all seven high schools were evident in the students' responses.

### Theme 2: Data Management

The second theme that emerged from all participants, except students, was the data management of the students who participating in the college math readiness program. Based on archival documents, one of the focused areas was to "increase capacity to share and use data to drive change and publically report progress" (Completion Counts, 2010). In fact, a committee was formed to include representatives from CCC and school districts to ensure data pertaining to students in the college math readiness program was disseminated to all stakeholders. Additionally, this data committee received training to facilitate the data sharing process. However, CCC math faculty, high school teachers, and administrators from CCC and high schools reported not having information on students after they graduate from high school. This theme describes what stakeholders reported actually happened during the past five years.

Faculty Were Not Receiving Student Data. At CCC the information on all students who attend CCC was housed at one main department, the institutional research office. Since the CCC outreach department oversaw the college math readiness program, student information was also available at this department. However, Faculty D noted, “At the beginning we had, everybody laughs about this here because we had...asked for data...we never, never got the data to see how our high school kids were doing.” Also, Faculty B explained, “We were having trouble collecting data, having trouble receiving data from the institutional research.” Attempts were made to collect student data from the CCC institutional research office without success.

The lack of student data was a major concern voiced by faculty; they wanted to know how *all* of the students who participated in the college math readiness program were performing in their subsequent math courses at CCC. Faculty D indicated:

I want to see, you know, the students that we get here at the community college from those high schools, how much math are they taking? What are they required to take? Sometimes it changes...I think we can invite more district [people] so we can collect more data to see if this program is working. (Faculty D, personal communication, September 18, 2015)

One College Staff B at the CCC outreach department explained what the past practices have been with regards to data collection for students in the college math readiness program. College Staff B explained:

So, I, if there are 30 students and 10 students passed, I only know of those 10 students. I only track the 10 and I do not know where or what happen to the other 20. Then of the 10, how many did the CCC application? If only 5, then I am only tracking five. (College Staff B, personal communication, August 21, 2015)

Data sharing among the institutional research office, math department and the outreach department at CCC was reported to be very limited.

Teachers Were Not Receiving Student Data. When teachers were asked if they or their respective institutions had data on how students were doing at CCC, their responses were similar to those provided by CCC math faculty, “we don’t really know”; “we do not have that ability”; “No, we do not track student”; “Let’s track them”; “more information” and “I have no idea.” Information about student performance in math courses at CCC was reported to be important to teachers. Teacher D and Teacher E pointed out.

One thing that would have helped us, and again, tracking the students' progress. Obviously the data is huge. I think the entire group as a whole were really solidified where we had that plan, you know, let us track these guys. I think if we had tracked them, I think it could've showed us a little bit more [information] if we were on the right track. (Teacher D, personal communication, September 2, 2015)

Oh no, we really don't have the ability, I mean, I can follow some students that I am close to and stuff. I have one student who is doing well at CCC

because his mom works here so I am like "how is [name] doing? How is [name] doing?" (Teacher E, personal communication, September 1, 2015)

To teachers, the lack of student performance data prevented them from assessing and determining whether their joint effort with CCC faculty was effective.

We Cannot Track Students. School district administrators described student data collection as "a lot of work"; "cannot release data"; "privacy issue" and "rub of the data information". District Administrator E provided additional information why tracking students was a difficult task, "the simple fact of the matter is, once they leave us, they have their own rights rather than telling us anything." Archival documents revealed that Cal-Pass Plus, a California statewide data system, was one of the entities listed to assist school districts and CCC to track students. However, District Administrator E pointed out, "The big promise has been Cal Pass Plus would knock that out and be able to help us out and it hasn't returned as of yet." Student privacy was another reason data was not easily shared between high schools and CCC. "Community college wants the data from all of us regarding kids so they can better prepare. Well, they are minor and we cannot release their data", District Administrator E pointed out.

Other district people who joined the partnership two or three years later after the college math readiness program was established were not aware of any student data collection. "I know we have not collected any data on our end" and

“We don't really know what happens after they [leave]”, District Administrator B and District Administrator A stated, respectively.

The lack of information on *all* students who have participated in the college math readiness program had become, to some faculty and teachers, an impediment to carrying out a meaningful discussion about the participants. With the assistance of school districts personnel and CCC outreach department, the researcher was able to find information on students who have participated in the college math readiness program. A total of 843 high school students have participated in the program at the respective high schools from District A and District B. Approximately 222 (26%) of the students passed the program final exam and 621 (74%) failed it. Of those 222 (26%), 180 (81.1%) students registered at CCC. The CCC outreach department only kept track of the 180 students who passed the college readiness final exam with a 70% or better and registered at CCC.

The information on the remaining 663 students became an enigma. As pointed out by District Administrator E, once the students leave high school, there was simply no method to track what they do next, unless someone literally visits every single student in person. Some of these were probably attending CCC, others might have transferred to other community colleges or four-year institutions, moved out of state, joined the military, or simply joined the local workforce. One of the fundamental principles of the partnership and the college math readiness program was the ability to share student data.

### Theme 3: Meaning of Success

Despite the lack of information on students' performance in math at CCC, all stakeholders viewed the partnership and the college math readiness program as a success. Theme 3 encompasses the various meanings of the word success as reported by administrators, teachers, faculty, and students.

All Students Were Successful. Even though a small number of students were successful in the college math readiness program, the program was viewed as an opportunity for students to experience a college-level course. District Administrator F provided the following statement:

You know what? I do, just because it gets students, even if all they are doing is just going through the experience of taking the assessment test, you know, taking the college level course, even though it is remedial at the [city community college]. To me, no student is going to be worse off for it. If anything, they are going to be better off for having done that. (District Administrator F, personal communication, September 29, 2015)

Teacher D shared a similar point of view, "I think it gave, even the kids that were not successful on the final, I think it gave them an insight as to when go to college, what is expected." Faculty A and Faculty C viewed this success as a preventative measure for some students. Faculty A explained that without the college math readiness program, "the student might've had to go back to pre-algebra, beginning algebra or intermediate algebra" and Faculty C added, "if they didn't participate in this program, very likely they would've started lower...I think it

is very successful, I think the program is accomplishing its goals in that way.” By similar reasons provided by Faculty A and Faculty C, Faculty D also stated, “I rather see three or four students that can make it than none at all.”

Faculty-Teacher Collaboration Was Valuable Although most faculty and teachers viewed success in terms of getting students ready for college-level courses, faculty, teachers, and administrator also used phrases such as “help me grow”; “a lot of value in that”; “positive indicator”; “more collaboration” and “classroom shadowing” to describe the the faculty and teacher collaboration.

The opportunity to work with CCC faculty provided a positive experience for Teacher D who viewed the faculty and teacher collaboration as a success.

Teacher D stated.

As for a teacher's perspective, working with [math faculty], seeing things from a different perspective, looking at things more outside of my perspective. It really helped me grow as a teacher so. Beyond the test scores, I think there were some good results. (Teacher D, personal communication, September 2, 2015)

A district-level administrator also described the existence of the partnership between CCC and high school as a success in the following statement.

The fact that we have maintained the same teachers teaching the course, so they have not been burned out of it, that's a positive indicator...the fact

that [CCC] have continued the collaboration meetings. (District Administrator C, personal communication, September 29, 2015)

Others faculty and teachers expressed the need for more collaborative activities between the faculty and teacher to make it more successful. Faculty B pointed out, “I think one thing that was valuable was to have the instructors shadowing each other...I think there was a lot value in that.” Similarly, Teacher C pointed out, “I think we still need to keep looking at, watch each other teach, shadowing...making a commitment that at least once in a while, watching the college class.” Teacher E provided a more concrete example that could be discussed collaboratively:

I would suggest that they get together and collaborate on the curriculum and the requirements of the curriculum. Every year have like an intro meeting where everybody introduces new teachers...here are the requirements, this is what we would like to see happening from [CCC]. (Teacher E, personal communication, September 1, 2015)

Classroom shadowing was also mentioned by several faculty and teachers. However, schedule conflict was regarded as the main obstacle for more collaborative efforts, “there is always a couple that came all the time and then there are others. It was so hard to find the time when everyone can meet and get together” Faculty A stated.

Success to Students Was to Pass the Class Students who participated in the interview were asked to provide their perspectives on what success in the



college math readiness program meant to them. The following phrases, “pass the final exam”; “knowing math”; “wake-up call”; and “understand the concept”, were the common responses stated by students. Some students understood the importance and implications of passing the college math readiness program final exam. For example, Student 6 and Student 14 stated:

To be successful in this program, my answer would be to actually pass the final exam. Because the final exam does play a huge part in what you want to do when you come into college. (Students 6, personal communication, September 16, 2015)

It means that you understand, not only understand the concept, but you could refer back to the material and like explain it in your own words because that's what we did in class. We had to like, when we had a test... we review in class and had to show an example how we did the work. (Students 14, personal communication, October 2, 2015)

Student 15 explained how the college math readiness program was an opportunity to “get out of community college because there is a stigma that you are stuck here forever. Whatever chance I get to get out faster, I'll take it.” In general, there was no ambiguity in what success meant to students- to pass the college math readiness program and transition to college-level math at CCC.

#### Students' Demographics and Performances Data

The students' demographics who participated in the college math readiness program are provided below in Table 7. It is important to note 3.3% of

the 180 students who qualified for a college-level math courses were African American students. It is unclear why African American students were underrepresented in the program.

Table 7. Students' Demographics (n=180)

Gender	Frequency	Percent
Male	73	40.6
Female	107	59.4
Race/Ethnicity		
Latinos	112	62.2
White	44	24.4
African American	6	3.3
Filipino	2	1.1
Korean	3	1.7
Vietnamese	2	1.1
American Native	2	1.1
Pacific Islander	2	1.1
Other Asians	3	1.7
Other	4	2.2
Socioeconomic		
socioeconomically disadvantaged	122	67.8
not socioeconomically disadvantaged	58	32.2
English Learners		
Non-English Learners	31	17.5
English Learners	149	82.5

When the partnership between CCC and high schools was established, the goals of the partnership was to increase students' completion of a certificate, associate degree, and transfer rates from 14% to 20% by 2013, 30% by 2015, and 46% by 2020 (Completion Counts, 2010). During 2011-2015, 180 students qualified to take a college-level math course at CCC, however, only 75 (42%)

took a math course during fall semester in the year of completion. Of these 75 students, 53 took a college-level math and 22 took a remedial math course even though they qualified for a college-level math. However, during the 2011-2015, the percentage of high school students who successfully completed the college math readiness program was 26.3%, but only 8.9% of all high school seniors actually took a college-level math course at CCC, as displayed in Table 8.

Table 8. Students' Performance

Students in the college math readiness program	Frequency	Percent
Total number of students (N=843)		
Passers	222	26.3
Passers registered at CCC	180	21.4
Non-passers	621	73.7
Cohort 1 (n=102)		
Passers	17	16.7
Passers registered at CCC	17	16.7
Non-passers	85	83.3
Cohort 2 (n=207)		
Passers	34	16.4
Passers registered at CCC	34	16.4
Non-passers	173	83.6
Cohort 3 (n=213)		
Passers	74	34.7
Passers registered at CCC	60	28.2
Non-passers	139	65.3
Cohort 4 (n=321)		
Passers	97	30.2
Passers registered at CCC	69	21.5
Non-passers	224	69.8
Placement level due to CCC entrance exam (n=180)		
College Level	16	8.8
Intermediate Algebra	114	63.3
Beginning Algebra	6	3.3
Arithmetic and Pre-algebra	2	1.1
No placement score	43	23.8

Table 8. Students' Performance (cont.)

Actual math courses taken due to the college math readiness program (n=180)		
College Algebra	55	30.5
Statistics	13	7.2
Trigonometric & Geometry	7	3.8
Intermediate Algebra	31	17.2
Beginning Algebra	5	2.7
No math courses	69	38.3
Actual math courses taken due to the college math readiness program (n=180)		
College Algebra	55	30.5
Statistics	13	7.2
Trigonometric & Geometry	7	3.8
Intermediate Algebra	31	17.2
Beginning Algebra	5	2.7
No math courses	69	38.3
Performance in the college-level math courses (n=53)		
Average GPA	2.62	
Students who received a C grade or better	34	64.2
Students who did not receive a C grade or better	19	35.8
Performance in CCC remedial course (n=22)		
Average GPA	2.51	
Students who received a C grade or better	15	68.2
Students who did not received a C grade or better	7	31.8

### Summary

The analysis of archival documents and records, which included current students' demographic information and academic performances, and the responses from the structured interviews with math faculty, math teachers, administrators, and staff provided the answers to the two research questions in this study.

## CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSIONS

### Overview

The disconnect between community colleges and high schools has resulted in two different sets of math standards; high school math graduation requirements do not prepare students for college-level math courses at community colleges (Bown & Niemi, 2009; Conley, 2005; Kirst & Venezia, 2006). With more than 75% of students admitted to community colleges being referred to remedial math courses, only 25% of them complete a college-level math within six years (Scott, 2011). Collaboration between community colleges and high schools to establish common standards in math has been promoted as a strategy to address the influx of high school students placing in remedial math courses and their low completion rates (Bown & Niemi, 2009; Conley, 2005; Kirst & Venezia, 2006).

The purpose of the study was to describe how the historical context of the partnership between an urban community college and seven high schools was described from its inception by stakeholders. The study sought to answer two research questions:

1. How would the historical contexts of an urban community college and high school college math readiness program designed to prepare high school seniors for college level math courses be

described from its inception by key stakeholders, including its purpose?

2. What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

This was a descriptive mixed methods case study and data collected included archival documents, interviews, and students' performance records. Using data triangulation and techniques described by Ryan and Bernard (2003) helped generate themes by looking for similarities, differences, and repetitions in the collected data.

#### Non-uniform Selection Process

The student recruitment and selection process for the college math readiness program was found to be inconsistent across the seven high schools. Although there was an agreement on the prerequisites for the college math readiness program, each high school followed its own student recruitment and selection process for the college math readiness program. As stated by Faculty B, "Some schools had to fill out classes...there were some students that were not exactly fitting the profile that we wanted because there were some other local considerations." Due to low enrollment, other schools admitted students who did not have the prerequisites for the college math readiness program. As District

Administrator F stated, “A lot of times we have to put kids there because we need to fill the class, otherwise, we would be able to offer it.”

A possible explanation for low enrollment might be attributed to the fact that the college math readiness program was a college-specific program. Even though CCC was part of a multi-college district, successful participants could not enroll in a college-level math course at the sister colleges. Additionally, the college math readiness program did not satisfy the math requirements for UC or CSU system.

African Americans make up 9% of the city population but only 3.3% African American students participated in the college math readiness program. College Staff A noted, “If you look at the demographic data that we have put together, you will notice that in the first year we did this program, we only had one African American...I just could not figure it out.” It is unclear what contributed to the low representation of African American students in the college math readiness program. Historically, African American students have been underrepresented in college-level math courses (Bailey et al., 2010). At CCC, 1% of African American students and 4.5% of Latinos were college ready in math. The low representation of African Americans in the college readiness program revealed the continued struggle to increase the representations of African American students in post-secondary institutions.

## Data Management

A major component of the college math readiness program was to track students' progress as they transition from high school to CCC. However, the lack of student data sharing and availability was a systemic problem in the past five years. High school teachers were the most disadvantaged group when it came to data sharing; they depended solely on data provided by CCC math faculty. Teacher E stated, "Oh no, we really don't have the ability, I mean, I can follow some students that I am close to and stuff. I have one student who is doing well at CCC because his mom works here."

On the other hand, CCC math faculty claimed the college office of institution of effectiveness promised them data which were never delivered. Faculty D reported, "Everybody laughs about this because...we never got the data to see how our high school kids were doing." The college math readiness program was under the CCC outreach department, however, College Staff B noted, "If there are 30 students and 10 students passed, I only know of those 10 students. I only track the 10 and I do not know where or what happen to the other 20." The CCC outreach department only had the records of 21% of all students who had participated in the college math readiness program. The 21% represented the students who were successful in the college readiness program, received a college identification number, and registered for a math course. All other students were not tracked.



In order to track students at CCC, the CCC outreach department required students' full name, date of birth, and home address. Then, the information had to be entered manually to determine whether the student was registered at CCC. However, school districts do not send this information to the CCC outreach department. Even if all students' information were provided to CCC, it would be a time-consuming task. District Administrator D pointed out, "that is going to take a lot work for someone to follow up." District Administrator E cited student privacy as the main reason high school district cannot share students' information to community college or four-year institutions.

According to Venezia (2005), state databases do not have the capacity track students as they transition from high school to community college or four-year institutions, making it difficult to assess joint educational programs. This is why the K-16 partnership movement calls for a single data systems to track students' progress across the educational pipeline (Domina & Ruzek, 2012; Hoffman et al., 2007; Kirst & Venezia, 2001). This study showed that high school and community college continue to lack an effective mechanism to ensure all high school students can be tracked efficiently as they transition to community college.

Post-secondary institutions have the responsibility to provide high schools the information regarding students' performance at post-secondary initiations (Matlock, 1990). The ability to track students' progress as they transition to community college is imperative. Otherwise, the lack of student

assessment could potentially discourage the established relationship between faculty and teachers and, even worse, the possible termination of the program.

#### Request For More Collaboration

The CCC math faculty and high school math teachers were asked how they would improve the partnership and the college math readiness program. They collectively called for more meaningful collaboration on topics ranging from curriculum, classroom shadowing, new faculty and teacher orientation day, practical methods of communication, and the desire to partner with other disciplines. With regard to curriculum, Teacher E stated, "I would suggest that they get together and collaborate on the curriculum and the requirements of the curriculum." A similar request was made by Faculty B stated "I think one thing that was valuable was to have the instructors shadowing each other....I think there was a lot value in that." However, Faculty C pointed out, "It was so hard to find the time where everyone can meet and get together" and Faculty B added "I think one of the biggest problems we always had was with scheduling, how we are going to schedule meetings? If we schedule it at this time, these people can make, these people can't make it."

These findings were consistent with the findings made by Berry (2003) who determined the logistics of a partnership, such as scheduling conflict among educators from a community college and high schools, were of greater impediment than the participants' level of commitment. Matlock (1990) and Nielse and McCarthy (2009) stated that in order for partnership between

community colleges and high schools to be effective, there needs to be a consistent and regular face-to-face collaboration among all stakeholders.

Community colleges and high schools are dynamic systems that are constantly changing. During the writing of this dissertation, the participating high schools were implementing CCSS and CCC had plans to use different placement criteria for incoming high school students called multiple measures. There needs to be more frequent meetings to discuss how these changes could affect the college math readiness program and the partnership; additionally, key administrators from high schools and community college must be present to lead and incentivize the collaboration between the two institutions.

### Meaning of Success

When all students who have participated in the college readiness program in the past five years are taken into account, including students who were successful in the program but never attended CCC, only 8.9% enrolled into a college-level math course at CCC. Yet, 90% of participants interviewed reported the partnership between CCC faculty and high school teachers a success based on a) collaboration opportunities, b) students passing the program, and c) the college experience.

The different responses on success reported in this study showed that when partnerships are formed, success encompasses more than numerical outcomes. In a case study, Frost et al. (2009) found collaboration between post-secondary faculty and K-12 teachers provided an opportunity to build trust and

respect as they assessed their teaching experiences. As teacher D explained “Working with [CCC faculty], seeing things from a different perspective, looking at things more outside of my perspective. It really helped me grow as a teacher.” Or as Faculty B reported on high school classroom shadowing, “I think one thing that was valuable was to have the instructors shadowing each other... I think there was a lot value in that.”

Post-secondary institutions are often quick to blame K-12 system for students’ low performance in college-level courses (Ponessa, 1996). However, Matlock (1990) found that when members of two different institutions realize they face a common problem, the perspective is changed. As implied in Faculty A’s response, “Well, it turns out that their success rate is exactly the same level or very close to the same level of success that students who take [the intermediate algebra] on campus experience.” Based on archival documents and responses from the interviews, faculty and teachers have developed a mutual respect for one another. District Administrator C stated, “To me the signs of success would be that it has not gone away... [t]he fact that we have maintain the same teachers teaching the course, so they have not been burned out of it, that’s a positive indicator.”

In addition to passing the intermediate algebra program and placing into a college-level math course at CCC, students defined success as the ability to conceptually understand mathematics. “It means that you understand, not only understand the concept, but you could refer back to the material and like explain

it in your own words because that's what we did in class", Student 13 explained. Students were thankful to have experience college-level work through the college math readiness program. Although the overall number of students transitioning to CCC had only been 8.9%, the actual experience itself the students reported in this program were considered a success. "To me, no student is going to be worse off for it. If anything, they are going to be better off for having done that", said District Administrator C. Faculty D added, "I rather see three or four students that can make than none at all."

The responses from faculty, teachers, staff, and administrators showed their high level of commitment and respect to help students succeed in math. However, they believed top administrators from CCC and high schools needed to provide additional support to continue strengthening the partnership and the college math readiness program.

#### Lack of Information to Students

Students who finished the college math readiness program were 64.2% successful in their subsequent college-level math courses. Despite the potential time and cost saving benefits to participants in the college math readiness program, there was a low transitioning rate of these successful students to CCC. Of the 222 students who were successful in the college math readiness program, 42 (19.1%) students did not transfer to CCC. Of the 180 successful students who transferred to CCC, 69 (38%) did not take any math and 36 (20%) retook an intermediate algebra course. Several students attributed registration deadline

and computer issues as the problem. Student 2 stated, “I am actually not taking a math course right now because I could not get into a math courses because I registered too later for it.”

Over 60% of the students interviewed said they wished more information about the benefits of the college math readiness program was provided before and after high school graduation. Other students stated the need for a face-to-face meeting with the CCC representatives. Student 9 explained, “Well, I guess maybe have a CCC representative that actually go into the class and tell them like ‘you are taking this class; this is what you can get out of it if you do well.’” Student 5 also provided a similar request, “I think we definitely need workshops...just to give us a reminder of why we are in the class.” Even College Staff B acknowledged the CCC outreach department was not providing any information to high school students in the college math readiness program. College B states, “How nice would be to be able to go to each of those classes in the high school...and explain the contract and that they get early registration.”

Goldrick-Rab (2010) reported that 17% of high school students with plans to attend community college wait eight months to enroll in a course. However, the consequences of not taking a math course can be a life-changing decision. Studies have shown students who delay taking a math course after their graduation lose practice of their computational skills and are less likely to complete a certificate or an associate degree (Cooper et al., 1996; Goldrick-Rab, 2010). There were legitimate reasons for students to delay their transition to a

community. District Administrator B explained, “A lot of them at that point do not know what direction they are going. Are they going to CCC? Are they going to four-year institution? Are they going to join the military?” It is difficult to determine all the reasons for the low student transition rates to CCC, since neither the participating high schools nor the community college had any data on students who were not part of the 180 students reported in this study. The following set of recommendations provided by the researcher should be considered to ensure more students do transfer to a college-level math at CCC.

#### Recommendation for Educational Reform

The specific measurable goals of the partnership between CCC and seven high schools and its college math readiness program were to increase CCC completion rates from 14% to 20% by 2013, 30% by 2015, and 46% by 2020. However, the findings in this study revealed that 26.3% of all high school seniors who enrolled in the college math readiness program during 2011-2015 passed the program’s final exam and were eligible for college-level math courses at CCC, but only 8.9% of all high school seniors who participated in the program during 2011-2015 actually took a college-level math course at CCC.

The low student success and transition rates were clear indicators the college math readiness program was not meeting its measurable goals established during inception of the partnership between CCC and high schools. The difficulties with the college math readiness program reported by faculty,

teachers, administrators, staff, and students were related to student recruitment, student data sharing and availability, and faculty and teachers collaborations.

The following set of recommendations provide specific action items stakeholders from CCC and high schools can implement to potentially improve students' performance in the college math readiness program and their transition rates to CCC college-level math courses, in order to meet the partnership measurable goals.

#### Recommendation 1: Student Recruitment

To ensure students who enroll in the college math readiness program meet the established criteria, the following action items are recommended. First, the CCC outreach department and high school counselors need to work collaboratively so that all participating high school counselors are fully informed about the purpose of college math readiness program and the student participation requirements.

Second, it is recommended high school counselors work in conjunction with their respective school data directors to identify and e-mail potential students who meet the program requirements one or two weeks before the high school course registration period. This measure will help prevent the enrollment of students who either do not want to be in the program, have no plans to attend CCC, and/or do not have the minimum requirements for the college math readiness program.



Third, CCC needs to make its presence known at the participating high schools campus by hiring a full-time staff dedicated to visit and specifically promote the college math readiness program. Furthermore, high school websites can be a platform to frequently advertise the college math readiness program to increase student awareness of the program, and brochures and flyers containing the goal and benefits of the program need to be available and accessible at each high school campus information center.

Fourth, it is recommended that CCC outreach department partners with several entities within the CCC and the participating high schools. For example, students in the CCC African American programs can serve as ambassadors to assist with the recruitment of African Americans at the participating high schools. Additionally, educational booths during the college and career days can be used as opportunities to create awareness of the college math readiness program. Moreover, recruitment strategies for African American students for the program should be introduced and discussed at the high school math department meetings. Given that Algebra II is one of the requirements for the college math readiness program, Algebra II teachers can be instrumental in recruiting African American students enrolled in their classes. Lastly, high school counselors need to work collaboratively with data managers at their respective school sites to identify African American students who meet the requirements for this program. Then, an official letter can be sent out to students' parents, informing them about the potential benefits of the program.

Fifth, the CCC lead math faculty needs to take the initiative to fully inform all participating high school math teachers about the college math readiness program by preparing a document that describes the program and teachers' role. Sixth, once students are recruited and selected for the college math readiness program, either a CCC representative or the teacher assigned to teach the college math readiness program need to take the time to follow up and fully inform students about the purpose of the program during week two of the semester. Then, an agreement form should be signed by each participating student, indicating the student understands the purpose of the program.

#### Recommendation 2: Data Management

The following action items are recommended to improve student data sharing and availability. First, it is recommended that both school districts provide the information about the students participating in the college math readiness program to CCC outreach department two times, one at beginning and another at the end of the academic year. The information needs to include student names, date of birth, address, zip code, race, gender, GPA, math courses taken, and CASHEE score. This information can be used by the CCC outreach department to prepare longitudinal reports on students who attend CCC, whether they pass the college math readiness program final exam or not.

Second, it is recommended that three brief summary reports be prepared by the CCC outreach department. One should be available at the beginning and the second at the end of the school year, and a third report after students finish

their first semester at CCC. The first report should include the characteristics of the students initially enrolled in the program. The second report at the end of the school year should include the characteristics of the students, students' performance in the college math readiness program, students' score on the final exam, retention rates, and drop-out rates. The third report should provide student transition rates and their performance in the subsequent math courses at CCC. These reports can then be disseminated to all stakeholders to inform and direct program improvement.

Third, it is also recommended that student performance scores on the college math readiness program final exam be collected at the end of each academic year to assess students' performance. This is an opportunity for high school math teachers and CCC math faculty to meet and analyze students' answers to the final exam questions. During this meeting, CCC math faculty and math teachers need to discuss and share best practices on specific math topics students struggle with; a set of practical techniques out of these shared best practices sessions should be provided to all participating math teachers. A written report on the set of recommendations needs to be prepared by the CCC lead faculty to be disseminated to all stakeholders. Meetings to discuss students' performances on the final exam needs to occur continuously.

### Recommendation 3: Lack of Information to Students

The following action items are a set of recommendations aimed at improving the low transition rates of students who successfully completed the

college math readiness program but failed to enroll in a college-level course at CCC. These set of recommendations are equally applicable to all other students in the program as well.

First, CCC and both school districts need to collaborate to ensure students in the college math readiness foster a college-minded culture, as stated in the MOU, by shuttling students to CCC campus one or two months before the end of the academic year. During this visit, arrangements can be made for a representative from the CCC outreach department to provide a guided tour, emphasizing the important steps students need to take in preparation for their transition to CCC. The locations of the CCC outreach department, admission and records, student resource centers, and math department should be visited as well.

Second, there needs to be a workshop for students in the program to help them understand the importance of choosing a major and the math level that is associated with it. This workshop should take place toward the end of the semester for all students in the program and led by a collaborative effort between CCC outreach department and high school counselors. An easy-to-read CCC math flowchart should be provided to all students to increase awareness about the different college- and remedial-level courses available at CCC, including the course titles and names.

Third, rather than a small number of students applying to CCC, all participating students in the college math readiness program should be required

to apply to CCC. Even if all participating students do not end up attending CCC, it will make student tracking at CCC an easier task. The application to CCC is already done online and it is free.

Fourth, students who successfully complete the college math readiness program should be provided with a certificate of completion along with a to-do list to remind students of the priority registration at CCC and class registration deadlines. Although some students reported to have received e-mails regarding their priority registration at CCC, the use of voicemail or text message might perhaps be a more effective method for communication with today's texting oriented generation.

#### Recommendation 4: Improving Collaboration

CCC faculty and high school teachers reported schedule conflict to be an obstacle to carry out collaborative activities, including meetings, peer classroom observation, and job shadowing, as stated in the MOU. The following action items are recommendations to ensure collaborations are held throughout the year.

First, it is recommended that CCC math faculty and high school teachers meet at the beginning of the semester to plan the meetings and activities during the entire academic year in order to make all stakeholders aware of the meetings. The CCC administrators, high school principals, and district-level administrators should be notified of any activities scheduled. The dates, locations, and times should be incorporated into the college and school district

master calendars with automatic reminders set. By scheduling meeting times in advance, it will help minimize any future schedule conflict for the participating faculty, teachers, staff, and administrators. Alternatively, free online software such as Google Scheduler can be used to schedule meetings if meeting times cannot be incorporated in the school master calendar.

Second, for any of the meetings or activities scheduled, there should always be a college and/or district administrator present to provide the participants important information about the program. This is also an opportunity for administrators to update faculty and teachers of any upcoming curriculum or policy changes related to community colleges and high schools at the local, district, or state level. For instance, high school administrators should inform faculty and teachers of the most recent developments in the implementation of the math common core standards.

Third, it is also highly recommended for CCC administrators to fund and organize an end-of-year luncheon where all participating math faculty, teachers, and staff are recognized for their efforts. During this event, administrators from CCC and school district should take the time to legitimize past efforts and reaffirm the commitment and support for the college math readiness program and the partnership between CCC and high schools. Former students who participated in the program should be included in this event, as well.

### Recommendation 5: Parents Involvement

There are a number of practical steps CCC and high schools, counselors, teachers, and CCC can take to promote students' parents involvement. The following actions items can be implemented at the high schools to get parents involved in helping their kids be successful in the college math readiness program.

First, it is recommended that representatives from CCC and high schools work collaboratively to design a college math readiness program flyer with CCC and school districts' official logos. This flyer should highlight the time and cost-saving opportunities to students in the program. Given the large Latino population in the geographical area, this flyer should be in both Spanish and English. Once potential students who could benefit from the program are identified, this flyer can be mailed to their parents. This action item can potentially help with the high school student recruitment and selection process.

Second, teachers should take advantage of back-to-school night to promote and inform the importance of the college math readiness program to parents. Additionally, it is recommended that teachers work collaboratively with counselors to hold open forum sessions for parents whose children are in the program. During these open forum sessions, counselors should provide practical information to parent on how they can help their children during the college math readiness program and their transition to CCC. Furthermore, an official letter or reminder postcard can be mailed to parents during the summer break to help

remind their children about registering for a math course at CCC. This letter or postcard must contain contact information for further inquiries.

Third, if schools cannot provide transportation for students to visit CCC campus, then CCC and school administrators should provide information to parent on how they can take their children to visit the CCC campus. For instance, parent should be encouraged to visit CCC campus a month before the college math readiness program ends. During this visit, parents should visit the outreach department, office of admission and records, and other student support centers.

#### Recommendations for Future Research

This descriptive mixed methods case study looked at an existing partnership between a urban community college and high schools and its college math readiness program. This study paved the way for a quantitative research design to answer questions such as, is there a relationship between students who participate in the program compared to those do not participate in the program? What effect, if any, does the program have on students' associate degree or certificate completion rate? The quantitative studies are crucial in determining the true effect of the program.

#### Limitations of Study

With regard to the interview data from students, findings cannot be generalized to all students who have participated in the college math readiness



program. Since a small number of students were interviewed, their responses do not reflect the opinions of all participating high school students who participated in the program. Also, the community college simply does not track all students who participated in the program between 2011 and 2015; data pertaining to students' academic performance at CCC described in this study were based on students who were successful in the college math readiness program and attended CCC. There was also a lack of comparative data for students who participated in the college math readiness program.

### Conclusion

Community colleges and high schools have been urged to partner and establish common academic standards and expectations to help students to transition seamlessly into college-level math (Hoffman, Varga, Venezia and Miller (2007, p. 81). In theory, Hodara (2013), Kirst and Venezia (2001) and Kirst and Venezia (2006) believed that partnerships between community colleges and high schools can provide a clear message about what math skills are expected in community colleges, reduce the need for remedial programs at the community colleges, increase completion rates, improve workforce development and economic development, and bridge the two educational systems that have worked in isolation for so many years

This descriptive mixed methods case study was an opportunity to understand how the existing partnership between an urban community college and seven high schools was described from its inception by college math faculty,

college administrators and staff, high school math teachers and administrators. The stakeholders' responses provided a better understanding of a community college and high school partnership in action. While challenges need to be addressed, the responses from the representatives from the community college and high schools partnership and the students in the college math readiness program showed their willingness to collaborate to achieve a common goal: students' success in math.

APPENDIX A:  
LETTER OF SUPPORT AND INSTITUTIONAL  
REVIEW BOARD APPROVAL

Appendix A  
Letter of Support

Institutional Review Board  
California State University, San Bernardino  
5500 University Parkway  
San Bernardino, CA 92407

I have reviewed and discussed the research questions (see below) with Mr. Ernesto Reyes, who is currently a doctoral student in the Ed.D program at California State University, San Bernardino (CSUSB), and in the process of completing his dissertation in order to receive his degree.

- What are the historical contexts for the development of an urban community college and high school college math readiness program designed to prepare high school seniors to take college-level math courses?
- What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

I would like to inform you that I fully support Mr. Reyes' research study at this institution regarding the current partnership between Riverside City College (RCC) and high schools from Riverside Unified School District (RUSD) and Alvorad Unified School District (AUSD) called Completion Counts in math.

I am granting Mr. Reyes permission to collect data that will help answer the proposed research questions. I am aware that data will be in the form of existing demographic and student performance data through the RCC Outreach office and the Assessment Center, archival documents and records such as memorandum of understanding, CAL-Pass data, and meeting minutes. I am also granting Mr. Reyes permission to interview administrators, staff, math faculty, and students involved in the Completion Counts program on the RCC campus.

I believe the objectives of the research questions are important and consistent with the mission of RCC: To improve college math readiness.

  
RCC Dean, Institutional Effectiveness & IRB Chair

  
Date

909.537.5651 • fax: 909.537.7056 • <http://edd.csusb.edu>

5500 UNIVERSITY PARKWAY, SAN BERNARDINO, CA 92407-2393

June 30, 2015

Ernesto Reyes and Prof. Donna Schnorr  
Department of Education  
California State University, San Bernardino  
5500 University Parkway  
San Bernardino, California 92407

**CSUSB  
INSTITUTIONAL  
REVIEW BOARD**  
Expedited Review  
IRB# 14095  
Status  
**APPROVED**

Dear Mr. Reyes and Prof. Schnorr:

Your application to use human subjects, titled "Community College and High School College Math Readiness Program" has been reviewed and approved by the Institutional Review Board (IRB). The attached informed consent document has been stamped and signed by the IRB chairperson. All subsequent copies used must be this officially approved version. A change in your informed consent (no matter how minor the change) requires resubmission of your protocol as amended. **Your application is approved for one year from June 25, 2015 through June 24, 2016. One month prior to the approval end date you need to file for a renewal if you have not completed your research. See additional requirements (Items 1 – 4) of your approval below.**

Your responsibilities as the researcher/investigator reporting to the IRB Committee include the following 4 requirements as mandated by the Code of Federal Regulations 45 CFR 46 listed below. Please note that the protocol change form and renewal form are located on the IRB website under the forms menu. Failure to notify the IRB of the above may result in disciplinary action. You are required to keep copies of the informed consent forms and data for at least three years. Please notify the IRB Research Compliance Officer for any of the following:

- 1) **Submit a protocol change form if any changes (no matter how minor) are proposed in your research protocol for review and approval of the IRB before implemented in your research,**
- 2) **If any unanticipated/adverse events are experienced by subjects during your research,**
- 3) **To apply for renewal and continuing review of your protocol one month prior to the protocols end date,**
- 4) **When your project has ended by emailing the IRB Research Compliance Officer.**

The CSUSB IRB has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval notice does not replace any departmental or additional approvals which may be required.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, the IRB Compliance Officer. Mr. Michael Gillespie can be reached by phone at (909) 537-7588, by fax at (909) 537-7028, or by email at [mgillesp@csusb.edu](mailto:mgillesp@csusb.edu). Please include your application approval identification number (listed at the top) in all correspondence.

Best of luck with your research.

Sincerely,

*Judy Sylva*

Judy Sylva, Ph.D., Chair  
Institutional Review Board

JS/MG

909.537.7588 • fax: 909.537.7028 • <http://irb.csusb.edu/>  
5500 UNIVERSITY PARKWAY, SAN BERNARDINO, CA 92407-2393

APPENDIX B:  
SCHOOL DISTRICTS LETTERS OF SUPPORT

College of Education  
Office of Doctoral Studies

Appendix B  
Letter of Support

Institutional Review Board  
California State University, San Bernardino  
5500 University Parkway  
San Bernardino, CA 92407

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- What are the historical contexts for the development of an urban community college and high school college math readiness program designed to prepare high school seniors to take college-level math courses?
- What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

I would like to inform you that I fully support Mr. Reyes' research study at this institution regarding the current partnership between Riverside City College (RCC) and high schools from Riverside Unified School District (RUSD) and Alvord Unified School District (AUSD) called Completion Counts in math.

I am granting Mr. Reyes permission to interview high school math teachers and administrators involved in the Completion Counts program on the high school campuses in AUSD.

I believe the objectives of the research questions are important and consistent with the vision of AUSD: All students will realize their unlimited potential.

*Rid Salazar, EdD*  
AUSD Superintendent

7/15/15  
Date

909.537.5651 • fax: 909.537.7056 • <http://edd.csusb.edu>

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Appendix B  
Letter of Support

Institutional Review Board  
California State University, San Bernardino  
5500 University Parkway  
San Bernardino, CA 92407


I have reviewed and discussed the research questions (see below) with Mr. Ernesto Reyes, who is currently a doctoral student in the Ed.D program at California State University, San Bernardino (CSUSB), and in the process of completing his dissertation in order to receive his degree.

- What are the historical contexts for the development of an urban community college and high school college math readiness program designed to prepare high school seniors to take college-level math courses?
- What are the characteristics and performance of the participants in the urban community college and high school college math readiness program designed to prepare high school seniors to take college-level courses at an urban community college?

I would like to inform you that I fully support Mr. Reyes' research study at this institution regarding the current partnership between Riverside City College (RCC) and high schools from Riverside Unified School District (RUSD) and Alford Unified School District (AUSD) called Completion Counts in math.

I am granting Mr. Reyes permission to interview high school math teachers and administrators involved in the Completion Counts program on the high school campuses in RUSD.

I believe the objectives of the research questions are important and consistent with the mission of RUSD: To improve college math readiness.

  
RUSD Superintendent

7/28/2015  
Date

909.537.5651 • fax: 909.537.7056 • <http://edd.csusb.edu>

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APPENDIX C:  
INFORMED CONSENT



College of Education  
Office of Doctoral Studies

California State University, San Bernardino  
Institutional Review Board Committee  
APPROVED 06/13/15 VOID AFTER 06/29/16  
IRB# 14095 CHAIR Judy Silverberg, Ph.D.

Appendix C  
Informed Consent

Dear Participant,

I am a doctoral student in the Ed.D program at California State University, San Bernardino. I am in the process of completing my research project in order to receive my degree. I have been granted permission by the Institutional Review Board of California State University, San Bernardino, the President of Riverside City College (RCC), and the superintendents from Alford Unified School District (AUSD) and Riverside Unified School District (RUSD) to interview individuals who have been part of a partnership between RCC and high schools from AUSD and RUSD called Completion Counts partnership. I am interested in describing the characteristics of the Completion Counts partnership and the students who have participated in this partnership.

As someone who has been part of the Completion Counts program, you are invited to participate in a structured interview that will last between 20 to 40 minutes. For faculty, teachers, staff, and administrators, the interview can take place in your office, or an alternative location within your school campus that is convenient to you to minimize disruption to your schedule. For RCC students, the interview will take place at the RCC digital library study room. The day and time will be scheduled according to your availability. The interview questions will be on the Completion Counts partnership in math and the interview will be recorded using a digital recorder.

Your participation is invaluable as it will help further the understanding of this collaborative effort between RCC and high schools from RUSD and AUSD. However, your participation is voluntary. You are free to choose whether or not to participate in this study and you have the right to withdraw at any time without any penalty. Should you choose to participate in the interview, you will receive a \$10 Starbucks gift card.

The risks in participating in this interview may have social implications. For this reason, the researcher has taken several steps to ensure your anonymity and confidentiality. All collected data from this interview will be stored and locked in the cabinets located in the researcher's work office and the audio recording file will be password protected. You will be assigned a code, an alternative identifier that will be used in the research notes or documents to protect your identity and the confidentiality of your answers provided to the researcher. All data will be deleted permanently and shredded three years after the study is completed.

If you have further questions regarding your participation in this study, do not hesitate to contact the researcher for more information. Attached you will find the interview questions and the letter of consent. If you choose to be interviewed for this study, please reply to this e-mail and provide the best

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College of Education  
Office of Doctoral Studies

way I can reach you by phone to set up a time and date most convenient for you. Please sign, date and provide your initials in the attached informed consent document, and bring it with you to the interview. Thank you for your time.

➤ With my signature below, I have read and understand the information provided in this informed consent letter and agree to be interviewed for this study.

\_\_\_\_\_  
Name Signature Date

➤ With my initials \_\_\_\_\_, I give permission to audio record this interview.

Sincerely,

Ernesto Reyes  
Associate Professor  
ernesto.reyes@rcc.edu  
(760) 617-8058

California State University, San Bernardino  
Institutional Review Board Committee  
APPROVED 06/30/15 VOID AFTER 06/29/16  
IRB# 14095 CHAIR Judy Sylvia by [signature]

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APPENDIX D:  
RESEARCH QUESTIONS

Interview Questions:  
CCC faculty, CCC staff, CCC administrators,  
High school math teachers and administrators.

1. Participant background

- a) What is your current position?
- b) What degrees do you hold?
- c) How long have you been employed by this institution?
- d) How long have you been involved with the community college and high school partnership collaborative model?

2. Historical contexts of the partnership and the college math readiness program.

- a) How did the collaboration between the community college and the high schools and the college math readiness program get established?
- b) Who were the institutions, organizations, and stakeholders involved in the development of the college and high school partnership?
- c) What is the purpose of the partnership between the community college and high schools?
- d) What specific services does the partnership provide?
- e) What is the goal and mission of the partnership?

3. Students in the college math readiness program.

- a) How are students recruited for the college math readiness program?
- b) How are students selected for the college math readiness program?
- c) Who determines the student eligibility for the college math readiness program?
- d) How many students are participating in the college math readiness program?
- e) Why are more/less students participating in the college math readiness program?
- f) What specific benefits do students receive for participating in the college math readiness program?
- g) Is the college math readiness program institutionalized? If so, how is it funded?
- h) Is it a sustainable program? If so, how?

Developed by Ernest Reyes (2016)

#### 4. Results

- a) Has the institution evaluated the college math readiness program? If so, what are the results?
- b) How successful is the college math readiness program? How do you measure success?
- c) Why do think the college math readiness program is successful or not successful?
- d) Do you believe the college math readiness program is accomplishing its goals?
- e) Do you track the students who participate in the college math readiness program?
- f) Has the college math readiness program changed since it was established? In what ways?
- g) What are the long term goals for the college math readiness program?

#### 5. Improvement

How would you improve the partnership and the college math readiness program?

## Student Interview Questions

1. Participant Background
  - a) Which high school did you attend?
  - b) What was the highest math you had in high school?
  - c) As a high school student, were you planning to attend a community college or a four-year institution?
  - d) What is your current major?
  
2. Student's Perspective of the college math readiness program
  - a) Tell me about the college math readiness program at your school.
  - b) What do you think the purpose of the college math readiness program is?
  - c) How were you selected to participate in the college math readiness program?
  - d) Why did you decide to enroll in the college math readiness program?
  - e) What specific services did you receive while enrolled in this program?
  - f) What were the differences or similarities between the college math readiness program and other math courses you had in high school?
  - g) What do you think about the college readiness program?
  
3. Results
  - a) Were you successful in the college math readiness program?
  - b) What does it mean to be successful in the program?
  - c) Do you believe the program prepared you for a college-level math course at the community college? If so, explain?
  - d) What math course did you end up placing into at the community college?
  - e) Would you recommend the college math readiness program to other high school students? If so, why?
  
4. Improvement

How would you improve the college math readiness program?

Developed by Ernesto Oscar Reyes (2016)

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