To a Higher Degree: Addressing Disparities in College Access With Concurrent Enrollment

By

DAVID DELGADO ULATE
B.A. (University of California, Davis) 1996
M.A. (San José State University) 2004

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

EDUCATION

in the

OFFICE OF GRADUATE STUDIES

of the

UNIVERSITY OF CALIFORNIA
DAVIS

Approved:

_____
Dr. Michal Kurlaender, Chair

_____
Dr. Heather Rose

_____
Dr. Joel Vargas

Committee in Charge

2011

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

DEDICACIÓN

A mi madre y padre. No tengo palabras para expresar cuánto les agradezco todo lo que han hecho por mi. Gracias por su paciencia, su apoyo, y sus consejos a lo largo de este camino. Por fin hemos terminado y llegar a la meta ha sido tanto mérito mío como de Uds. Os quiero mucho.

ACKNOWLEDGMENTS

Six years ago, I began the doctoral program thinking this was going to be one of the most difficult things I will ever do and that it was going to take a herculean effort on my part to get to the end. Little did I realize the degree to which the culmination of this experience for me would be the result of the efforts of many, not just myself. The list of people I need to thank is long—far too long for all to be adequately acknowledged here. For those I leave out, please know that I truly appreciate your support. For those I include, please know that this brief acknowledgment is in no way representative of the depths of my appreciation.

I begin with my dissertation committee. Dr. Joel Vargas of Jobs for the Future was instrumental in not only my development as a scholar but as a professional as well. His guidance on my research and my professional work taught me how the worlds of research and policy can come together in support of schools. Dr. Heather Rose of the UC Davis School of Education showed me how complicated research need not be complicated in its communication. Through her teaching and guidance, I learned a great deal on how to frame research and discuss research in a way that is understandable to many and not just those involved in the project.

Dr. Michal Kurlaender of the UC Davis School of Education served as the chair of my dissertation committee and my primary advisor, and is a colleague and, most importantly, a friend. As advisor and committee chair, she continually taught me to be a better researcher and scholar, cheered me up when I was frustrated, and celebrated each of my accomplishments. As a colleague and friend, she was understanding and supportive of my need to balance life in graduate school with life outside graduate

school. What I learned from Dr. Kurlaender goes far beyond education research, and for that I am eternally grateful.

Outside of my dissertation committee, there are two other members of the UC Davis faculty/staff I want to acknowledge. Dr. Gloria Rodriguez of the School of Education served as my secondary advisor and chair of my qualifying exam committee, and is another valued colleague and friend. I am very grateful for the time she spent talking to me about how to think about research, how to develop a research agenda, and how to maintain one's sanity throughout the doctoral experience. Second, Mr. Hector Cuevas of the UC Davis Office of Graduate Studies was a great mentor and provided support when I most needed it in a way that I am very thankful.

Thank you to Patrick Perry and his staff at the California Community College Chancellor's Office for not only providing me with the data for my analysis, but for helping me understand the data and how to best use it for the dissertation. I hope the findings from my research serve you well in your work with the practice of concurrent enrollment in California.

As all doctoral students know, getting through to the end requires the support of your peers and I am fortunate to have had a wonderful group of friends help get me to where I am today. To Shannon, Lisa, and Brenda, thank you for your support, your counsel, and friendship. To Miguelito, Biag!, and JakeJackson, thank you for your help with my research and writing; thank you for helping me continually move forward even when things seemed to be moving backwards; and thank you for just being a wonderful group of guys. I am blessed to have gotten to know all of you.

Outside of the program, I am fortunate to have a close circle of people that I consider family and who have been there for me through the highs and lows of school and life. I thank RH, Shelby, Marcus, J-Dawg, Teeny One, Steve, La Pooja, and Ma & Pa Johnson for always making me feel part of something special and for never letting me lose focus on who I am and what I was about to accomplish. Thank you as well to Mak whose smile and positive energy helped her tito get through many a difficult time.

Finally, and most significantly, I thank my family. They have always been my greatest fans, advisors, and role models. From them I learned to work hard, stay focused, persevere when things are difficult, and always have fun in life. Without their love and support, graduate school would have been an impossible task. It goes without saying that they are a big reason for all I have accomplished.

In particular, a special thank you goes to my immediate family. In moments like this I wish I were an accomplished writer so that I could accurately describe in words my love and appreciation for these four individuals. My sister-in-law, brother, mother, and father are amazing people and never let me forget that I was doing something amazing. The strong bonds of my family have always been how I get through life and they were how I got through the dissertation and through graduate school. Without them, I don't know where I would be.

I am truly humbled to be surrounded by such wonderful people and share this accomplishment with each and every one of them.

ABSTRACT

Concurrent enrollment—defined as high school students enrolling in college coursework—is increasingly being used as strategy to improve the college readiness levels of underrepresented students and to reduce disparities in college-going rates. States have developed policy and analyzed data to evaluate the practice of concurrent enrollment. This study focuses on the extent to which CE is a viable pathway to postsecondary attainment, particularly for underrepresented groups.

Using data from the California Community College Chancellor's Office that span the 2002-2003 through 2006-2007 academic years, I analyze trends in concurrent enrollment participation and examine the college coursework experiences of students concurrently enrolled in a California Community College. To analyze participation trends, I describe the degree to which California high school students participate in concurrent enrollment, the race/ethnicity and gender of students, and the characteristics of their high schools. To examine the college coursework experiences, I discuss the number of courses students take and number of credits students earn in addition to the types of courses in which they enroll. I then disaggregate these analyses by race/ethnicity and use regression models to analyze the likelihood of students enrolling in college courses that lead to a college degree and to examine the grades students are likely to earn in those courses.

Findings from this analysis provide a foundation to understanding how concurrent enrollment functions in California. Such knowledge is essential in developing state policy dedicated to the use of concurrent enrollment as a strategy to help increase the rates at which underrepresented minority students pursue a postsecondary education.

Table of Contents

List of Tables

List of Figures

Chapter 1 - Introduction

Concurrent enrollment (CE), defined as a high school student enrolling in college coursework, provides high school students with a unique opportunity to enhance their academic experiences. Originally, CE was solely intended to provide high-achieving high school students with opportunities to enrich their education by enrolling in college courses. Recently, CE also has been seen as a promising strategy to improve the college readiness levels of underrepresented students, and to reduce disparities in college access (Bailey & Karp, 2003; Lerner & Brand, 2006). However, there is little research on CE or on underrepresented students who participate in CE. This study begins to address the lack of research by investigating trends in CE participation in California and the achievement levels of CE students in their postsecondary courses. In particular, I investigate disparities in these outcomes by race/ethnicity to provide a foundation for understanding the possible relationship between CE and the college-going rates of California high school students.

In this chapter, I provide context to my study. To do this, I first discuss one advantage to higher levels of education. Here I describe the financial benefits of attaining a college degree and the financial implications for differences in college-going rates and degree attainment rates. Second, I describe disparities in college access and degree attainment by race/ethnicity, and how CE is one of many strategies dedicated to increasing the likelihood of underrepresented students enrolling in college. Third, I describe the evolution of CE and the importance of understanding the specific college experiences of students. Finally, I discuss the significance of my study and the research questions that guide my analysis.

Financial benefits to education

There is a strong correlation between an individual's level of education and his/her income. Individuals with a high school diploma or equivalent earn, on average, $7,000 more per year than those without a high school diploma. Individuals with an associate's degree earn an average of $5,000 more per year than those with a high school diploma. The difference between an individual with a high school diploma versus a bachelor's degree is even larger, where the annual earnings difference for the average student is $14,000 (see Figure A-1 in Appendix A) (Planty, et al., 2008). Moreover, these average differences have increased over the last twenty years. In 1985, high school graduates earned $4,800 more than their counterparts without a high school diploma, and those with a bachelor's degree or higher earned $9,800 more than high school graduates (Planty, et al., 2008).[1]

When projecting how differences translate into lifetime earnings, the disparities are more compelling. As seen in Figure A-2 of Appendix A, the average difference between an individual with less than a high school education and one with a high school diploma is $200,000, and the difference between a high school graduate and someone with an associate's degree is $400,000 over a lifetime (Day & Newburger, 2002). Most notable is the difference between an individual with a high school diploma and one with a bachelor's degree. In terms of projected lifetime income, those with a bachelor's degree will earn $2.1 million dollars, which is nearly $1 million more than the projected earnings of those with a high school diploma or equivalent (Day & Newburger, 2002).

The financial benefits of higher levels of education make investigating any disparities in college enrollment and degree attainment important. In 1972, 49.2 percent

[1] Values are in constant 2006 dollars.

of high school graduates immediately enrolled in college; in 2006, 66 percent of high school graduates immediately enrolled in college (Planty, et al., 2008). However, this 16.8 percentage point increase in college-going rates is greater than the increase in bachelor's degree attainment rates over this same period. The number of 25- to 29-year-olds with a bachelor's degree or higher grew from 19 percent in 1972 to 29.6 percent in 2006, yielding an increase of only 10.6 percentage points (Planty, et al., 2008). These statistics demonstrate that although a greater percentage of students pursued postsecondary education and achieved bachelor's degrees between 1972 and 2006, 33 percent of students did not transition from high school to college, and 70 percent of high school students failed to attain a bachelor's degree.

Disparities in bachelor's degree attainment rates and accompanying financial benefits indicate a significant percentage of individuals, on average, earn $14,000 per year and $1 million over a lifetime less than if they had attained a bachelor's degree. However, the rates at which individuals *enroll* in college indicate that this difference is a result of individuals not even attempting a bachelor's degree. These disparities in college enrollment motivate my study. Specifically, I look to investigate how CE can serve as a mechanism to reduce college-going disparities by improving the college readiness level of students who have been historically underrepresented in postsecondary education.

Disparities in college enrollment based on race/ethnicity

There are racial/ethnic differences in college enrollment rates. In 1972, 49.7 percent of white high school graduates immediately enrolled in college. This was 4.7 percentage points higher than Hispanics and 5.1 percentage points higher that African-Americans (Figure A-3 in Appendix A). In 2006, 34 years later, the college enrollment

level of African-American students was 55.5 percent and 57.9 percent for Hispanics (Planty, et al., 2008). Despite the increases, these rates are 13 and 10.6 percentage points less than those for white students, respectively, and indicate a widening gap in college enrollment rates by race/ethnicity. Moreover, research examining college-going rates by race/ethnicity supports these trends.

It is well documented that students of color are less likely to pursue postsecondary education than white students (Akerhielm, Berger, Hooker, & Wise, 1998; Berkner & Chavez, 1997; Greene & Winters, 2005; Grodsky & Felts, 2008; Hauser, 1992; Horn & Kojaku, 2001; Kurlaender & Felts, 2008; Plank & Jordan, 2001; Venezia, Kirst, & Antonio, 2003). For instance, using data from the Current Population Survey to analyze trends in college entry for white, African-American, and Hispanic students from 1972-1988, Hauser (1992) finds that although differences in college enrollment rates for African-Americans, Hispanics, and whites change over time, African-Americans and Hispanics, in general, are less likely to attend college than whites.

Akerhielm et al. (1998) analyze data from the National Education Longitudinal Study (NELS) (a nationally representative dataset of the high school class of 1992), and looks at college entry for students from 1988 - 1994. Like Hauser, Akerhielm et al. (1998) find that African-Americans and Hispanics are less likely to enroll in a postsecondary institution than white students. Greene and Winters (2005) reach similar conclusions using data from the U.S. Department of Education's Common Core of Data. In fact, this entire body of research consistently demonstrates that African-Americans and Hispanics enroll in college at lower rates than whites, regardless of the data used.

In the present study, I define underrepresented groups as those who enroll in college at disproportionately lower levels than whites. African-Americans and Hispanics have consistently enrolled in postsecondary education at lower levels than their white counterparts and fall into this category. As I discuss in chapter 2, socioeconomic status (SES) is another strong predictor of college access, where students of lower SES are less likely to enroll in college (Adelman, 2006; Ellwood & Kane, 2000; Plank & Jordan, 2001). Students of low SES are also an underrepresented group in higher education. However, as I demonstrate in detail in chapter 2, race/ethnicity is strongly connected to the interpretation of how SES impacts enrolling in college. In particular, African-American and Hispanic students are more likely to have lower SES, which indicates they are less likely to enroll in college.

There are many strategies used to increase the number of underrepresented students who go to college. In addition to CE, external support programs such as Advancement Via Individual Determination (AVID), Upward Bound (UB), and Educational Talent Search (ETS) are designed to provide high school students with services and guidance they would otherwise not receive—with the goal of helping underrepresented students increase their likelihood of enrolling in college ("AVID - Decades of college dreams," 2006; *Guide to U.S. Department of Education programs*, 2008).

There are also programs that, like CE, allow students to earn college credits while still in high school, helping students to better prepare for a postsecondary education. Advanced Placement (AP) and International Baccalaureate (IB) are two such examples. In both cases, course curriculum is designed to help students pass an end-of-course

examination that earns them college credit. These courses are considered to be college-level and passing the exam indicates having achieved a level of proficiency in college-level academic work.

Tech Prep is an example of a different college credit-earning strategy. Students engage in vocational coursework in high school and may earn college credit for those courses through articulation agreements with the college. These agreements place college credit for the high school course in escrow until the student completes the corresponding required coursework at the college (Bailey & Karp, 2003). Concurrent enrollment builds on the premise of these strategies by providing students with opportunities to enroll in college courses while in high school, and to possibly earn college credit upon completion of those courses. While I use CE in my analysis to reference high school students enrolling in college courses, dual enrollment is another term found throughout the literature that often references the same opportunity for high school students. Dual credit is another term sometimes used to refer to CE experiences. However, this refers to a specific type of CE experience where the high school student earns college and high school credit for the college course. Earning credit at the secondary and postsecondary levels for the college course is not always the case for CE. In the next section, I describe how CE evolved into its current form and the importance of analyzing students' CE experiences.

Evolution of the CE experience

In 1974, Janet Lieberman created the first Middle College High School at LaGuardia Community College in New York City (Kisker, 2006; Lerner & Brand, 2006). The goals were to create a learning environment for disengaged high school students on a

community college (CC) campus and to use enrollment in CC courses to help motivate students to finish high school and enroll in college upon graduation (Lerner & Brand, 2006). In the mid 1980's, Lieberman received funds to create other middle colleges and by the year 2000 there were 30 middle colleges across the country (Kisker, 2006).

Many different schools and programs with a CE focus evolved since then (e.g. Early College High Schools and Tech Prep programs) and through the replication of the MCHS model and the development of other programs nationwide, participation in CE has grown significantly (Kisker, 2006; Lerner & Brand, 2006). During the 2002-2003 academic year, nearly three decades later, national estimates indicate that approximately five percent of all high school students (about 813,000 students) were concurrently enrolled in high school and college. Over 50 percent of all postsecondary institutions had CE students, with 77 percent of public, 4-year colleges having CE students and 98 percent of public, two-year colleges having CE students. Similarly, most CE students attended public, two-year colleges (77 percent) (Kleiner, Lewis, & Greene, 2005). One possible reason for such growth in CE participation over this 30-year period is a change in policy at the state level.

In 1985, Minnesota became the first state to develop a CE program (*Post-Secondary Enrollment Options Program*, 2001; *State policies and dual enrollment program variation*, 2003). Called the Postsecondary Enrollment Options (PSEO) Program, state policy provided high school students the opportunity to enroll in college coursework as a way to promote a rigorous academic experience (*Post-Secondary Enrollment Options Program*, 2001). Concurrent enrollment is now more prevalent across the country. There are 46 states that have statewide policies promoting CE and

four that delegate governance of CE to local districts ("State notes: Dual enrollment," 2008). Nevertheless, how CE functions within each of these state frameworks varies. Such variation results in different trends in CE participation.

Unlike the Middle College High School model, PSEO offers multiple ways for high school students to enroll in college courses and earn college credit. In addition to the traditional model of the high school student enrolling in a college course located on the college campus and taught by a college faculty member, some college courses are offered away from the college campus. For instance, in one model, a high school instructor teaches college courses on the high school campus with a college mentor. In another, a college faculty member teaches courses on the high school campus—sometimes as online courses (*Post-Secondary Enrollment Options Program*, 2001). In chapters 2 and 3 I discuss how each of these different structures provides different learning opportunities for CE students and how these differences relate to the interpretation of the findings in my analysis.

In addition to differences in where the college course is taught and who teaches the course, CE learning opportunities come in a variety of forms. Bailey and Karp (2003) developed a typology to describe CE programs. First, there is the singleton program. Students in this category typically are high-achieving high school students earning college credit as a way to get a "head start" on their college requirements. Therefore, students in singleton programs often enroll in very few college courses. The second category includes comprehensive programs. In these programs, college courses serve as the high school student's primary learning environment. Consequently, students enroll in multiple college courses. In the third and final category, enhanced comprehensive

programs, students use the college learning experience in much the same way as those in comprehensive programs. The difference between these two categories is that the latter provides additional services to help the student prepare for college. For example, CE students in enhanced comprehensive models may receive supplemental tutoring and/or mentoring, or may receive additional counseling to help them adapt to college life. These types of programs are more likely to focus on engaging middle- or low-achieving and/or economically disadvantaged students (i.e. underrepresented students) (Bailey & Karp, 2003).

Using a nationally representative sample of institutions, the National Center for Education Statistics reports that few postsecondary institutions with CE programs—only about five percent—explicitly focus on underrepresented students (Kleiner, et al., 2005). This translates into approximately 6,400 students enrolled in these programs. Given that the primary purpose of CE has been to provide high-achieving students with opportunities to accelerate their college preparation, having so few CE programs dedicated to working with underrepresented students is not surprising. However, recent strategies to improve college enrollment levels of underrepresented students focus on using CE as the mechanism to increase both their college preparation and their motivation to go to college (Bailey & Karp, 2003; Lerner & Brand, 2006; Wang Golann & Hughes, 2008).

In order to understand how all students, and underrepresented students in particular, may use CE to improve their college readiness levels, it is important for research to describe the characteristics of students' CE experiences and to discuss their implications for increasing students' college readiness levels and college-going rates. In

chapter 2, I discuss key factors in predicting the likelihood that a student will enroll in a postsecondary institution and explore how CE can positively impact the academic experiences of students in relation to these factors. For instance, the types of college courses students enroll in and how well students do in those courses are important factors of the CE experience. My research provides an in-depth analysis of the CE experiences of California high school students to understand CE participation and to identify differences between groups of students.

Significance of this study

Findings from this study will provide California policymakers with details on student participation in CE that will enable a more accurate evaluation of CE's impact on improving student academic achievement levels. In a time when CE is becoming a key element in pathways to college enrollment and degree attainment, it is important to understand the CE experiences of California high school students and what these experiences suggest about how California's students may be using CE to improve their college readiness and college enrollment levels. As chapter 2 describes in detail, research on CE is limited. In particular, there is little research that analyzes the CE experiences of California high school students and the CE experiences of underrepresented students.

My analysis uses statewide data from the California Community College Chancellor's Office (CCCCO) to describe the California high school students who participated in CE from 2002 through 2007, as well as their college coursework experiences. In addition, I collect publically available data to describe the secondary and postsecondary institutions CE students attend. Furthermore, my study disaggregates the analysis by student and high school characteristics, and predicts the types of courses

African-American, Asian, Hispanic and white CE students take and how well they do in those courses. The following research questions serve as the foundation for my analysis:

1. Who among California high school students enroll in community colleges through CE opportunities? Specifically, what have been the CE trends from 2002-2007? How do participation trends compare to high school graduation and college-going trends? Do trends differ by student and high school characteristics?

2. How are California high school students participating in CE and how well are they doing in their community college courses? In particular, what are the overall academic and non-academic course-taking patterns and what are the overall achievement trends for the different types of CC courses CE students take?

3. What are the race/ethnicity differences in CE participation, course taking, and achievement trends for California high school students? How do findings for African-American and Hispanic CE students compare to Asian and white students?

To answer these research questions, my dissertation is structured in the following manner. In chapter 2, I provide a review of the college readiness literature and concurrent enrollment literature. In particular, I present some of the key factors that predict college access and how CE research addresses these factors. In chapter 3 I discuss social and human capital and how they serve as the theoretical motivation for my research. In chapter 4 I describe the data sources I use to conduct my analysis. In chapters 5, 6, and 7 I answer each of the three research questions. Finally, in chapter 8 I summarize the findings of my research, discuss them using a social and human capital lens, and discuss their implications for CE being used as a mechanism to improve the college readiness and college access levels of underrepresented minority students.

Chapter 2 – Literature Review

The purpose of this chapter is to contextualize how CE programs can serve to enhance underrepresented students' college readiness. To accomplish this, I first review research identifying key determinants of college access. These determinants serve as the basis for college readiness strategies dedicated to improving the likelihood of an underrepresented student going to college. Second, I discuss alternative pathways for improving students' college readiness and how CE is situated within this context. Finally, I review how current CE participation trends indicate the degree to which this strategy addresses key determinants of college access and thus serves as a pathway to improving college access.

Determinants of college access

Much research has been dedicated to understanding what might explain a student's likelihood to pursue postsecondary education. In this section, I review three key indicators of postsecondary enrollment: prior academic achievement, demographic factors, and the high school context. With regard to prior academic achievement, I discuss how the level of coursework a student engages in while in high school and the student's achievement levels in high school courses are strong predictors of whether or not the student will go to college. The demographics discussion focuses specifically on how race/ethnicity and SES relate to educational attainment. Focusing on how schools impact the likelihood of a student going to college, the final section highlights the role of school counselors and peer culture.

Prior academic achievement as a predictor of college enrollment.

Students who have higher levels of academic achievement and who engage in rigorous coursework while in high school are more likely to go to college than those who do not (Adelman, 2006; Akerhielm, et al., 1998; Berkner & Chavez, 1997; Choy, 2002; Ellwood & Kane, 2000; Horn & Carroll, 1997; Horn & Kojaku, 2001; King, 1996; Plank & Jordan, 2001; Rosenbaum, 2001). The work of Clifford Adelman is probably the most well-known and commonly cited research regarding the impact of prior academic achievement. His seminal works, *The Toolbox* (Adelman, 1999) and *The Toolbox Revisited* (Adelman, 2006), provide a comprehensive analysis using NELS to investigate the academic factors and/or experiences associated with the likelihood of earning a bachelor's degree by the time a student reaches his or her mid-20s.

While my study uses college access as the outcome measure, Adelman's work focuses on bachelor's degree attainment. I review his work, first, for its significance to the college readiness literature, and, second, because it also provides context to understanding research focused on college enrollment. For instance, employing an academic resources composite variable consisting of curriculum level[2], class rank/GPA, and 12th-grade test score, Adelman's findings demonstrate that, together, these prior academic achievement indicators have a strong and positive relationship to a student's likelihood of attaining a bachelor's degree. Research using college access (i.e. enrolling in a postsecondary institution) as the measured outcome reaches the same conclusion. Specifically, high school students who engaged in rigorous courses, had a high class rank,

[2] Curriculum level refers to an aggregate variable consisting of the number of Carnegie units accumulated in English, math, science, foreign languages, history, and social studies; the highest level of math a student took; whether or not the student enrolled in remedial math or English courses; the number of advanced placement units; the number of computer science units; and total academic units.

and had strong test scores were more likely to enroll in college (Choy, 2002; Horn & Carroll, 1997; Horn, Nuñez, & Bobbitt, 2000).

Another important takeaway from the work of Adelman (2006) is his operationalization of prior academic achievement. His use of a composite variable consisting of multiple achievement indicators demonstrates how a combination of high school achievement factors is positively related to postsecondary success. Research that uses individual factors to measure the relationship between prior academic achievement and college access shows results that are consistent with Adelman's. For instance, test scores were found to have a positive relationship with going to college (Akerhielm, et al., 1998), as were course rigor (Choy, 2002) and mathematics achievement (Horn & Carroll, 1997; Horn, et al., 2000). In fact, the work of Horn, et al. (2000) confirms the positive relationship between academic achievement and college access using the same data that Adelman (2006) used, but with the highest level of mathematics completed in high school as the measure of academic achievement.

Using NELS data, the analysis by Horn, Nuñez, and Bobbitt (2000) explores factors relating to a student enrolling in a four-year or other type of postsecondary institution (primarily public two-year colleges). Findings indicate a significant relationship between academic preparation and college enrollment, even when controlling for factors such as parent education and income levels, discussing college plans with parents, college plans of peers, and type of high school (Horn, et al., 2000).[3] Specifically, students with low levels of high school academic achievement are 18 percent less likely to enroll in a four-year institution and 8 percent less likely to enroll in a public, two-year

[3] Authors used the highest level of mathematics completed in high school as the measure of academic achievement.

college than those with high levels of academic achievement. Students of average levels of academic achievement are 15 percent less likely to enroll in a four-year institution and 1 percent less likely to enroll in a public, two-year college than their high-achieving counterparts.

The findings with respect to a student's likelihood to enroll in a public, two-year college are of particular interest to CE. Public, two-year colleges have open admission policies and a vast array of curricular options (from academic to vocational). Students choose to attend these colleges for various reasons. Two possibilities are that students use the community college pathway to develop the academic preparation they "put off" while in high school, or they use the community college experience as an "experiment" to see if college is for them (Grubb, 1991; Rosenbaum, 2001). For example, the open admissions policies of community colleges mean that a student's academic performance while in high school has no bearing on whether or not they can enroll in a community college. Consequently, high school students may not place importance on their high school coursework because they will be able to enroll in college and can therefore worry about doing well academically at that time. Experimenting with college coursework refers to a student using the community college experience as a way to test whether or not they are a good fit for college. The student may take one or more courses that may or may not be academically rigorous and then evaluate the degree to which they feel comfortable in the college environment.

These motivations suggest that CE can be used as a way to keep students from putting off academic preparation and to motivate them to take the necessary coursework that will make them college-ready sooner rather than later. In addition, CE can provide

students the opportunity to explore the college experience, and provide resources that help them navigate the college experience. As discussed later in this chapter, as well as in chapter 3, such resources are particularly important to help underrepresented students understand the college experience.

For CE to be an effective strategy that improves the college readiness levels of students, the literature implies that students need opportunities to engage and be successful in rigorous coursework prior to college. Prior academic achievement, however, only provides part of the explanation as to why differences in college readiness exist. Adelman (2006), for instance, shows that in addition to prior academic achievement, a student's SES is a strong predictor of college readiness. The next section discusses research on how race/ethnicity, as well as SES, are important demographic factors to consider when developing effective strategies to improve the college access rates of underrepresented students.

Demographic factors as predictors of college enrollment.

Gaps in college access by race/ethnicity.

A good deal of research is dedicated to exploring the role of race/ethnicity in college enrollment, and this research consistently demonstrates that students of color are less likely to pursue postsecondary education than white students (Akerhielm, et al., 1998; Berkner & Chavez, 1997; Greene & Winters, 2005; Hauser, 1992; Horn & Kojaku, 2001; Plank & Jordan, 2001; Venezia, et al., 2003). For instance, Akerhielm et al. (1998) and Greene and Winters (2005) each use a different national data set spanning different periods of time. However, each find that African-American and Hispanic students enroll in college at lower rates than white students, as I discussed in chapter 1. Descriptive

analyses such as these are only able to provide a limited picture of the role of race/ethnicity in college enrollment. Therefore, researchers use multiple regression models to better understand the impact of race/ethnicity on postsecondary enrollment when other factors are taken into consideration.

One example of this is the work of Plank and Jordan (1997, 2001). Using NELS data, the descriptive analysis of four-year college enrollment rates disaggregated by race/ethnicity shows that African-Americans lag behind whites in college participation by 11.1 percentage points (38.6 versus 27.5 percent) and the difference between Hispanics and whites is 17.7 percentage points (38.6 versus 20.9 percent). However, when prior academic achievement and SES are accounted for, the research shows that African-American and Hispanic students are no longer *less* likely than whites to enroll in a four-year college. In fact, when controlling for these other factors, they become *more* likely than whites to enroll in a four-year institution (Plank & Jordan, 1997, 2001). The fact that the significance of race/ethnicity changes once SES and prior academic achievement are controlled for, demonstrates how these factors are inextricably linked to each other relative to the likelihood of enrolling in college.

Although Plank and Jordan (1997, 2001) use 10th-grade standardized math and reading test scores to measure difference in achievement, African-American and Hispanic students also score below Asian and white students on college entrance exams such as the SAT. In the 2008-2009 academic year, African-American and Hispanic students scored at least 59 points below Asian and white students in each of the three sections of the SAT exam (NCES, 2010a). In terms of SES, Plank and Jordan use parents' education, parents' occupational prestige, and family income to operationalize the variable. On average, at

least twice as many African-Americans and Hispanics as whites or Asians are below poverty (CPS, 2009). In addition, the number of African-American or Hispanic students who have a parent with a bachelor's degree or higher is at least 17 percentage points less than whites or Asians (NCES, 2010b). These relationships indicate how analyses controlling for student characteristics, such as prior academic achievement (e.g. test scores) and SES, account for African-American and Hispanic students' lower levels in each of these categories when compared to whites and Asians.

This research implies that in order for CE to be effective in reducing disparities in college access by race/ethnicity, African-American and Hispanic students need to be better represented than whites or Asians in these programs. The next section will further demonstrate how SES has a strong positive relationship with going to college.

The relationship between SES and going to college.

Students from families of high SES are more likely to go to college than those from families of low SES (Adelman, 2006; Ellwood & Kane, 2000; Hossler, Schmit, & Vesper, 1999; McDonough, 1997; Plank & Jordan, 2001; Rosenbaum, 2001). As discussed in the previous section, SES can be operationalized as a composite variable that includes both parent education and family income levels. When using SES as a composite variable, only 63 percent of high school graduates who are in the lowest SES quintile enroll in college, while 83 and 91 percent of graduates in the top two SES quintiles, respectively, enroll in college (Goldberger, 2007). This indicates that high school graduates of low SES are less likely than those of high SES to enroll in college by at least 20 percentage points. Similar trends are seen when SES is defined only by family income levels. In this instance, two percent of high-income students never enroll in

college, while 21 percent of low-income students never enroll in college—a difference of 19 percentage points (Kazis, 2004). Together, these statistics indicate the importance of including SES as a student characteristic in analyses looking at differences in college access.

Using data from the High School and Beyond (HS&B) national survey of the high school class of 1982, Rosenbaum (2001) finds that among the primary demographic background characteristics, SES has the strongest relationship with educational attainment. Students from high SES backgrounds are more likely to have higher levels of education than low SES students. When including prior academic achievement, the impact of SES decreases in strength but continues to be significantly connected to a student's level of education.

The qualitative analysis of McDonough (1997) provides a lens to understanding why differences in SES might have such a strong impact on college going. McDonough's study investigates how the social class of a student influences the college-going decision-making process. Her cross-case analysis looks at twelve students from four different California high schools where the majority of students in each high school are either high or low SES. In order to control for race, gender, and prior academic achievement, the twelve students selected were white, female, middle-range academic performing, college-bound seniors (three at each school), and the selected students reflected the SES level of the majority of students at their school.

Findings from McDonough (1997) indicate that college enrollment outcomes differ for students based on their SES. This difference is greatly due to the fact that students with higher SES approach the decision-making process in a way that makes the

transition to college seem much more "seamless" (McDonough, 1997). Specifically, going to college seems like a natural progression in the educational pathway for students with higher SES, as they typically come from environments (both home and school) that support and guide them in that direction. Students with lower SES, on the other hand, experience the college-going decision-making process with much higher levels of "conflict and challenge" (McDonough, 1997). This could be because the school and home environments of students with lower SES often have differing ideas about college and how the student should approach the college-going decision process—causing the student to be confused about how to best move forward in pursuing a postsecondary degree. One reason for such differences is that students with higher SES are more likely to have parents with first-hand knowledge of the college experience since they are more likely to be college educated, a factor that increases the students' likelihood to go to college (Ellwood & Kane, 2000).

Another possible reason for such differences is the environment of the school the student attends. In the next section, I discuss how schools—through the academic guidance they provide and the peer culture they create—can influence the college readiness levels of their students. Outside the school environment, there are two possible explanations for differences in college-going by SES. One is that students with high SES receive more college-going guidance at home, as their parents are more likely to be college graduates and be more engaged in their child's college readiness experiences (Choy, 2001, 2002). A second is that while families with high SES can afford a private school education or a private counselor to help with the transition to college, students

from families with low SES rely on the resources available to them in their public school (McDonough, 1997).

This is where CE programs can provide underrepresented students with the institutional resources they need to be college-ready. As described in chapter 1, CE programs can provide students with additional tutorial support and college-going guidance they may not otherwise have. Put differently, participating in CE programs provides underrepresented students with the opportunity to engage in a college-going institutional environment with more direct resources to help them with the secondary to postsecondary transition. As the next section demonstrates, such an institutional environment plays a significant role in students' levels of college readiness.

How schools influence going to college.

This section focuses on two ways in which high schools impact students' likelihood of college entry and success. First, I discuss how a school influences college entry through the academic guidance it provides. Second, I describe how the peer environment it fosters within the institution impacts a student's likelihood to go to college.

The impact of school guidance on college entry.

In order for African-American and Hispanic students to increase their college readiness levels through rigorous coursework, they not only need access to rigorous courses but must also understand the importance of taking them. This implies that schools must create an environment that both provides students with the opportunity to engage in higher levels of academic coursework and encourages them to take advantage of those opportunities.

Being aware of the academic opportunities available to students and the consequences for *not* taking advantage of them suggests that students receive the proper academic guidance. As Lee & Ekstrom (1987) and McDonough (1997) demonstrate, school counselors can positively impact a students' college-going expectations, as well as the support they receive to meet those expectations. Specifically, there are two primary factors related to how students are influenced by their counselors: the quantity of access to counselors (i.e. how much time with a counselor a student gets) and the quality of the counseling (i.e. what expectations a counselor has for the student). A student with increased levels of access and planning time with counselors who have college-going expectations for their students increases a student's academic preparation in high school, which, as I previously discussed, increases students' likelihood of going to college (McDonough, 1997).

The problem is that students of lower SES and students of color are less likely to have access to counselors at the beginning of their high school careers (Lee & Ekstrom, 1987). This limited access results in an increased chance for students to be placed in non-academic curricular tracks, and to enroll in fewer math courses; both of which have direct consequences in decreasing the likelihood of going to college (Lee & Ekstrom, 1987). McDonough (1997) through her interviews with college counselors at each high school has similar findings. For instance, she found that at a school of low SES, time spent with senior students was 45 minutes per student, while at a school of high SES it was 10 - 15 hours per student. In addition to these differences, college-going planning ranged from 50 percent of the counselor's work at a school of low SES to 100 percent at a school of high SES.

Furthermore, McDonough (1997) finds that different schools have different expectations for their college counselors and how they support their students. Consequently, school culture impacts the different levels of services counselors provide. For example, at the two schools with a high concentration of students of high SES, college-going expectations are high and counselors assume that students come to the high school already having college information. Therefore, counseling programs are dedicated to helping students use that knowledge to determine the best postsecondary option for them. At the two schools of low SES, students are not assumed to already posses such college knowledge. However, only the school with high college-going expectations dedicates resources to filling in this knowledge gap. The other school focuses on guiding students toward the community college option as a way to learn about college. Consequently, the college-going rate for the school of low SES with high college-going expectations is similar to those of the schools of high SES. In addition, the college-going rate for the school of low SES with low expectations is much lower than any of the other three schools. This demonstrates how the quality of college preparation information provided to students will mirror these expectations.

Concurrent enrollment, by definition, places students in a college environment and thus places students in an institutional setting that promotes going to college. However, CE experiences can vary, and this is where school guidance plays a role. In order for students to have a clear understanding of how to use their CE experience to better prepare themselves for college, their counselors must provide them with the necessary guidance. Not only will this help the individual become college-ready, but by providing all students in the school with this guidance, CE may also help encourage

college-going behavior among the individual's peers. This, too, is important because the school's peer environment also plays a role in students' college readiness development.

The impact of a school's peer environment on college entry.

The second component of a high school's ability to increase the likelihood of a student enrolling in college is the peer environment it creates for its students. Students whose peers plan to attend a four-year college are more likely to go to college than their counterparts without such peers, even when controlling for important college entry factors such as race/ethnicity, SES, and prior academic achievement (Horn & Carroll, 1997; Horn & Chen, 1998). In addition, research has demonstrated that schools themselves can take specific actions to facilitate students' access to a college-going peer environment (Gibson, Gandara, & Koyama, 2004; McDonough, 1997; Mehan, Villanueva, Hubbard, & Lintz, 1996).

McDonough (1997) argues that the college-going expectations a school sets for its students impacts their likelihood of postsecondary enrollment. One interpretation of this is that through these expectations, an institution creates a college-going culture among its students. This culture, in turn, helps create a peer learning environment where all students are focused on college readiness. Extant research discusses how students with opportunities to work in peer groups in which the norm is to work hard toward going to college are more likely to be college-ready (Mehan, et al., 1996; Oakes, 2003).

These peer groups provide underrepresented students with the opportunity to develop a college-going identity by, among other things, increasing their access to college-going resources (Gándara, O'Hara, & Gutiérrez, 2004). Lewis-Charp and colleagues note that providing students with opportunities to cross social and ethnic

divisions among their peers is important for schools (Lewis-Charp, Yu, & Friedlaender, 2004). This provides students with access to peers whose college-going expectations and experiences differ from their own. In particular, this potentially gives underrepresented students access to peers who are focused on going to college, the knowledge they have about college, and the resources they access to develop that knowledge. Having access to such a network of relationships is an important factor in increasing the likelihood of a student going to college (Hossler, et al., 1999; King, 1996; Plank & Jordan, 2001).[4]

By engaging students in a college learning environment, CE can help students develop their college-going identity by providing them with opportunities to interact with college-going peers. This, combined with CE's potential to provide students with additional academic guidance from school counselors and opportunities to complete a rigorous coursework curriculum, shows how CE can effectively increase the college-going rates of underrepresented students. As I describe in the subsequent section, such strategies have found some measure of success, and CE looks to build on those efforts by making the unique dimension of college coursework a focal point of its strategy.

Alternative pathways to increase college readiness and college access

Many alternative pathways focus on increasing underrepresented students' college readiness levels and the rates at which these students continue on to college. Specifically, I define alternative pathways as supplemental educational programs or non-traditional educational strategies options dedicated not only to improving the academic achievement and preparation of students, but also to creating a college-going environment for students that provides them with guidance on things such as how to apply to college and what

[4] Social capital is a theoretical framework that discusses how increased relationship networks help facilitate the actions of an individual. This theory serves as the motivation for my dissertation and is discussed in detail in chapter 3.

their postsecondary options are. In this section, I highlight three specific programs or strategies and describe the features that contribute to their effectiveness. I also discuss recent research questioning the effectiveness of such programs and how this indicates the need for further research.

AVID (Advancement Via Individual Determination) and Upward Bound are two examples of alternative pathway programs that provide supplemental services to high schools as a way to increase the college-going rates for students. Both programs are dedicated to improving the college readiness levels of students through academic counseling as well as coursework support. In AVID, students become college-ready by engaging in college-level coursework and are given academic support via an AVID elective class they take throughout their high school experience ("AVID - Decades of college dreams," 2006). This academic support involves tutorial support for coursework, as well as information dissemination on the necessary steps to going to college (e.g. test taking, application assistance) (Watt, Powell, Mendiola, & Cossio, 2006). Students in the Upward Bound program receive academic and counseling services to help prepare and motivate them to continue on to college (Vargas, 2003). As with AVID, Upward Bound students receive counseling on items such as college entrance and financial aid applications, and preparing for college entrance exams (*Guide to U.S. Department of Education programs*, 2008). Programs such as these that provide academic and counseling services have been found to have positive impacts on the college readiness of participating students (Horn & Chen, 1998; Mehan, et al., 1996; Vargas, 2003; Watt, et al., 2006).

A third alternative pathway program important to highlight here is the multiple pathways strategy, which California employs as a comprehensive program that provides underrepresented students with alternative ways to becoming college- and career-ready. The goal of the multiple pathways strategy is to provide opportunities for students to engage in learning that makes connections between the classroom and the real world, and to develop relationships with individuals that help them become college-ready (Rosin, Frey, Leichty, & Perry, 2009). Research suggests that participating in a multiple pathways program increases the likelihood of a student graduating high school and enrolling in college (Bradby, Malloy, Hanna, & Dayton, 2007; Howard & Wu, 2009; Stern & Stearns, 2006).

One of the more dominant programs in the multiple pathways framework is the California Partnership Academies (CPA) model (Howard & Wu, 2009). Described as small learning communities within high schools, CPAs are dedicated to increasing students' academic and occupational experiences as a way to prepare them for college and work after high school (Howard & Wu, 2009). A key component in the ability of each CPA to meet its goals is for students to earn college credit through CE (Bradby, et al., 2007). With the support of their CE experiences, CPA students not only graduate from high school at higher rates than state averages, but also satisfy UC/CSU eligibility requirements at higher rates (Bradby, et al., 2007).

While this body of research is encouraging, recent research paints a more sobering picture. Most recently, Domina (2009) finds that high school academic achievement levels and college enrollment levels for students participating in such programs are *not* significantly higher than those who do not participate. When

comparing high school students with high educational aspirations to those with low educational aspirations, the author finds that participation in outreach programs has a positive effect on college access—especially for students with low educational aspirations. However, findings are not statistically significant and therefore the effect cannot be attributed to program participation. Admittedly, the author cites as a limitation to the findings the fact that the level of student participation or the quality of participation in the college-going program is not well measured. Knowing how actively a student participates in an outreach program impacts the degree to which the program is successful in its goal (Wang, 2005). Therefore, knowing the level and quality of students' participation within an educational reform program is critical to understanding and interpreting the impact of that program.

Understanding CE students' participation levels is important because CE focuses on providing students with the opportunity to engage in rigorous coursework and learning experiences that will make them ready for college—like AVID, Upward Bound, and CPA do. For example, a student who takes only one non-academic college course is going to have a very different CE experience than one who takes multiple academic courses. The following sections discuss CE research and the differences found in student participation levels. Interpretations of these differences set an important context for understanding students' use of CE to improve their academic preparation, and how CE experiences may influence students' overall college awareness.

Concurrent enrollment and opportunities to engage in rigorous coursework

Type of college courses CE students typically take.

As an alternative pathway to college readiness, one of the goals of CE is to provide students—underrepresented students in particular—with opportunities to engage in rigorous coursework to increase their likelihood of going to college (Bailey & Karp, 2003; Lerner & Brand, 2006; Wang Golann & Hughes, 2008). However, because students experience CE in many different ways, the first step to understanding how CE may improve students' academic achievement levels is to understand their college coursework experiences. Are students actively participating in CE and taking multiple courses? Are students engaged in the academic courses that help them become college-ready? Answers to these questions provide valuable insight into how college coursework impacts high school students' college readiness levels by way of their academic achievement levels.

At the national level, research is imprecise with respect to the types of courses in which CE students enroll. Specifically, findings suggest that of the 1.1 million nationwide enrollments in dual credit courses, 64 percent were academic courses and 36 percent were career and vocational/technical courses (Waits, Setzer, Lewis, & Greene, 2005). However, because this research focused on dual credit enrollments, it includes students who are enrolled in Advanced Placement (AP) and International Baccalaureate (IB) programs.[5] AP and IB students are not CE students, as courses offered through those programs are *college-level* courses taught as part of the high school curriculum only and do not require students to be enrolled in a postsecondary institution. Therefore,

[5] Recall that dual credit means the high school student receives both college and high school credit for the college-level course.

including these students overestimates the percentage of high school students whose college coursework experiences are academic.

In addition, national research that focuses on the experiences of CE students shows that not all CE students are dual credit students and would thus be excluded from the dual credit analysis (Kleiner, et al., 2005). In fact, only 59 percent of CE programs identify themselves as those in which students earn dual credit (Kleiner, et al., 2005).[6] This, in combination with the overestimation of academic dual credit courses, demonstrates the difficulty in producing national estimates that accurately describe the types of course CE students take. Consequently, it cannot definitively be determined at the national level whether *CE* coursework experiences are more likely to be academic.

Along with studies at the national level, research focusing on CE participation *within states* does not provide any further clarity on the coursework experiences of CE students. In some states, such as Kentucky and Georgia, research shows that students use CE to engage in technical/vocational courses (Lynch, Harnish, Fletcher, Thornton, & Thompson, 2006; *"Dual enrollment in Kentucky"*, 2006). In other states, such as Ohio and Washington, students are more likely to engage in academic courses (Blanco, Prescott, & Taylor, 2007; *"Running start"*, 2008). Because engaging in academic coursework is a strong predictor of going to college, such differences in the types of CE courses students take suggest some CE students may be more likely to pursue a postsecondary education than others.

One possible reason for such differences in CE coursework experiences is the type of college in which students take their courses. For instance, in an analysis that

[6] Six percent identify themselves as college credit only, 21 percent vary, and 14 percent don't know if credit was earned at the high school level.

focuses on CE students in the state of Georgia, data includes high school students whose CE courses were taken at technical colleges in the state. Not surprisingly, students at these colleges take vocational/technical courses and not academic courses. However, findings are similar when students attend community colleges as well as technical colleges.

In Kentucky, CE almost doubled between the 2001-2002 and 2004-2005 academic years, and much of this growth took place in the Kentucky Community and Technical College System (KCTCS) (*"Dual enrollment in Kentucky"*, 2006). Based on enrollment data in Kentucky for the 2003-2004 academic year, the most common type of course taken (approximately 60 percent) was technical or occupational, while approximately 20 percent of courses were academic. Specifically, 64 percent of the courses taken through Kentucky's two-year public colleges were technical/occupational (15 percent were academic) while only two percent taken through four-year public colleges were technical/occupational (90 percent were academic) (*"Dual enrollment in Kentucky"*, 2006). This reinforces the notion that CE courses taken at two-year colleges are less likely to be academic.

Ohio, however, provides a counterexample to the notion that the type of college dictates the type of college courses CE students take. The Postsecondary Enrollment Options (PSEO) policy established in 1989 was designed to allow 11^{th-} and 12th-grade students the opportunity to enroll in college courses. In 1997, this policy was expanded to include 9th and 10th graders in an effort to provide those opportunities to a larger group of students (Blanco, et al., 2007). Students may enroll in college courses at either a community college or a four-year university. According to participation data for the

2004-2005 academic year, 83 percent enrolled in courses at two-year institutions (Blanco, et al., 2007). Given the research for Georgia and Kentucky, a logical conclusion would be that students in Ohio took a majority of non-academic courses. This is not the case. Based on enrollment by subject data for the 2005-2006 academic year, 37 percent of courses taken were in arts and humanities; 27 percent were in social and behavioral sciences; and 21 percent were in natural science and mathematics (Blanco, et al., 2007).

Another counterexample is the trend found in the state of Washington. In Washington, 11th- and 12th-grade students are given opportunities to take college courses at any of the state's 34 community and technical colleges, as well as at five four-year universities (*"Running start"*, 2008). Again, such a disproportionately greater opportunity for courses to be taken at community and technical colleges might suggest that courses would be of the technical/occupation type. Of the courses taken in Washington in the fall of 2007, 95 percent were academic (primarily social science, English, speech and humanities), while five percent were vocational (*"Running start"*, 2008). These findings, along with those of Ohio, imply that the type of college coursework a CE student experiences is not dependent on the type of postsecondary institution that offers the courses.

Another possible influencing factor to the types of college courses taken is if there are eligibility criteria to taking college courses. Nationally, 85 percent of postsecondary institutions with CE programs have academic eligibility requirements for high school students. Of those, 66 percent used grade point average, 45 percent used standardized test scores, 44 percent used college placement tests, and 16 percent used class rank (Kleiner, et al., 2005). This variation is supported in state analyses where GPA, placement tests,

age, or multiple criteria are used to determine whether or not high school students are deemed eligible for college courses (Blanco, et al., 2007; Karp, Calgano, Hughes, Jeong, & Bailey, 2007; Lynch, et al., 2006; *"Running start"*, 2008).

In the case of Florida, there are different eligibility requirements depending on the type of courses in which the student wishes to enroll. Students who wish to take courses that do not lead to an associate's degree must have a minimum unweighted GPA of 2.0 (on a 4-point scale), where the general policy states that high school students who want to take college courses must have an unweighted GPA of a minimum of 3.0 (Karp, et al., 2007). In addition, minimum scores on college placement tests required for enrollment in academic courses can also serve as another hurdle students must overcome in order to take non-vocational types of courses (Karp, et al., 2007). Together, placement tests and differences in GPA requirements impact whether or not CE students are able to take academic courses at the college level. Consequently, the more difficult these requirements make it for students to enroll in college courses, the fewer opportunities students will have to take courses. Therefore, eligibility requirements also impact the number of college courses students take.

Absent from these studies are analyses of the characteristics of the high school students and how those characteristics relate to the outcome measured. For instance, studies do not disaggregate postsecondary experiences by the race/ethnicity of the student or the academic achievement levels of the high schools CE students come from. This level of information would provide additional clarity to understanding how different types of students participate in concurrent and how student characteristics may be related to important CE outcomes.

Number of college courses CE students typically take.

Knowing the number of college courses a student takes provides a sense of the degree to which high school students participate in CE. However, research is not clear on the number of CE courses students take, in general, and how they may impact a student's likelihood of going to college. For instance, although national estimates show that 48 percent of CE programs say that students typically take one course per term and 23 percent say two or more courses are typically taken, 28 percent say there is no typical pattern (Kleiner, et al., 2005). Therefore the national estimates measuring the level of CE student participation are imprecise.

Among analyses performed at the state level, the number of courses they typically take defines CE students' level of participation. However, the analyses do not specify whether that number is for each term or for the students' entire CE experience. For instance, the aforementioned analyses for Georgia, Ohio, and Florida all indicate that students take more than one course during their CE experience (Blanco, et al., 2007; Karp, et al., 2007; Lynch, et al., 2006). These findings, in combination with the national estimates on number of courses CE students take per term, suggest that students may typically enroll in one course per term but remain in CE for multiple terms. Consequently, student participation is typically not a one-course experience and research is unclear as to how such participation levels impact college access.

In an attempt to understand how the number of college courses a CE student takes impacts their likelihood of enrolling in college, the work by Karp et al. (2007) focuses on the College Now CE program that the City University of New York runs. In this program, most CE students take only one course. However, they do find that students

who take multiple courses are more likely to go to college after graduating from high school than students who are not enrolled in the College Now program (Karp, et al., 2007).[7] This differs from an analysis of dual enrollment students in Florida, where enrollment in multiple courses yields no significant relationship to college access (Karp, et al., 2007). These mixed results make drawing any definitive conclusions regarding an intensity effect (i.e. number of college courses taken) difficult. Moreover, the results may not be generalized to other states. All of this indicates that trends in students' course-taking experiences can vary tremendously because of prerequisite requirements, enrollment in a two-year or a four-year college, academic or vocational courses, or in the quantity of courses taken.

Absent from this body of research is an investigation of the degree to which underrepresented students participate in CE. This is particularly critical if CE is to be used as a mechanism to improve the college readiness levels of underrepresented students.

Coursework experiences of underrepresented students.

Analysis of the characteristics of CE students is sparse. There is evidence that a majority of participating students are white (Blanco, et al., 2007; Karp, et al., 2007; Lynch, et al., 2006; *"Dual enrollment in Kentucky"*, 2006; Welsh, Brake, & Choi, 2005) and that students of low SES are underrepresented among CE students (*"Accelerated learning options"*, 2006; Karp, et al., 2007; Welsh, et al., 2005). Of the 48 percent of postsecondary institutions nationwide that have CE programs, approximately five percent

[7] In the regression analysis, variables controlled for were demographic (gender, race/ethnicity, cohort year, and age); college admissions average; SES (median household income of residents and proportion of residents with college or higher education); and high school-level variables (proportions of African-American, Hispanic, and free or reduced lunch students, and pupil-to-teacher ratio).

of them have programs explicitly for underrepresented students (Kleiner, et al., 2005). Of these five percent, more have a career/technical education focus than academic (39 percent vs. 34 percent, respectively; 21 percent say they have an equal focus on both), and more students take one course per term than two or more courses (40 percent vs. 22 percent, respectively; 38 percent say it varies) (Kleiner, et al., 2005). One important characteristic is that 60 percent of these programs provide extra services such as tutoring, academic advising, study skills workshops, and pre-college counseling to these students (Kleiner, et al., 2005). As discussed in detail later in the review, these types of services are particularly important for underrepresented students.

Only five percent of CE programs exist to explicitly help underrepresented students become college-ready. This implies that CE options for underrepresented students are limited to programs that may lack services important to their success and/or that have eligibility requirements they may not be able to meet. Later in this chapter, I discuss how preliminary findings show that underrepresented students particularly benefit from participating in CE programs (Glennie, Edmunds, Bernstein, & Purtell, 2009; Karp, et al., 2007). This implies that the barriers that keep underrepresented students from participating in CE limit these students' opportunities to benefit from a rigorous college course-taking experience.

Furthermore, analyses that specifically describe the coursework experiences of underrepresented students and that compare them with their white counterparts are absent from CE literature. Such knowledge will add clarity to understanding what opportunities students have to increase their college readiness levels through their college course-taking experiences, and will aid in closing the racial/ethnic gap in college enrollment.

Concurrent enrollment and opportunities to experience college

One of the key goals of CE programs is to provide students with the experience of being a college student while still in high school (Andrews & Marshall, 1991; Bailey & Karp, 2003; Cavalluzzo, Jordan, & Corallo, 2002; Johnstone & Del Genio, 2001; Lerner & Brand, 2006), which I previously mentioned is particularly necessary for underrepresented students. These experiences provide students with increased opportunities to engage in a college environment and develop first-hand knowledge regarding what it is like to be a college student and what academic behaviors/practices make students successful at the postsecondary level. Because these experiences are more dependent on the type of academic environment in which the student learns than on the content of the college course, it is important to understand what types of college environment experiences students have in CE programs.

Where CE students take college courses and who teaches them.

As described in chapter 1, the many characteristics of CE programs vary. One significant difference is if the college course is located on the college campus, as opposed to on the high school campus. Another is if the instructor is a college faculty member or a high school instructor. Nationally, 80 percent of postsecondary institutions with CE programs offer courses on the college campus, 55 percent offer courses on the high school campus, and twelve percent offer courses at another location (e.g. community centers and vocational/technical schools). When courses are taught at the high school, 26 percent of the programs are taught by college instructors, 32 percent are taught by a qualified high school instructor, and 42 percent are taught by both (Kleiner, et al., 2005).

Even though course location and course instructor may provide different CE learning environments, the fact remains that CE helps develop the college readiness levels of students. CE can provide students with real opportunities to learn college-level skills and habits whether the course is located at the college and taught by a college faculty member or not. For instance, having less "busy work" assignments and spreading out the term papers or midterm exams forces a student to manage their time outside of class in a way that will develop independent learning skills necessary for college (Cavalluzzo, et al., 2002). Having students create and work in study groups outside of class can help students develop different cognitive strategies in working through coursework (M. Nakkula & Foster, 2006). Having students engage in classroom discussions where more emphasis is on students developing their own ideas provides a sense of how individuals (instructor included) interact at the postsecondary level (M. Nakkula & Foster, 2006). Although having the college course located on the college campus provides students with a better opportunity to develop these college-ready skills (Karp, 2007), having a course that is authentic to the college environment, and thus exposes students to these types of college-skills and habits, is most important.

To provide insight on the impact that college courses taken on the high school campus can have on a student's college-ready experience in comparison to courses taken on a college campus, Burns and Lewis (2000) interview six CE students. Three take college courses on a community college campus and three take college courses on their high school campus. They are similar in age and academic achievement level, and interview questions focus on the location of their college course and the impact students feel it has on their college readiness experience. One of the students whose college

course is located at the college feels being on a college campus makes her a more independent and responsible student, as there are no bells to make sure she is on time and no teachers telling students where they need to be. Another student feels the exposure to an environment with regular college students provides him with insight on how college courses function, which will give him an edge when he attends college after graduation. Consequently, these students feel that being on the college campus is important in providing them with a highly valuable college preparatory experience (Burns & Lewis, 2000).

Nevertheless, those who take college courses at the high school also feel it is a beneficial experience. Students talk about how they take their college courses more seriously and feel responsible for their performance levels in their coursework. Even though they feel that being outside the comfortable environment of their high school would be of greater value, each student agrees that the CE experience is worthwhile and recommends it as a way to get a head start on college.

Karp (2007) delves more deeply into the quality of college courses taught on the high school campus and how they impact students' college readiness development. Her study involves an in-depth qualitative investigation of 26 students who participate in New York City's College Now program at two comprehensive high schools. More of the students are male (15) than female (11) and more are juniors in high school (20) than seniors (6). Asians are the most represented group in the sample (12) followed by Hispanics (7), whites (4), African-Americans (2), and multiethnic students (1). Only eight students speak English in their home. Participants are interviewed twice during the course of the semester and are asked questions about student perceptions of the norms,

expectations of a college student, and what parts of the CE experience impact those understandings. High school instructors teach all courses, and all courses meet at the high school.

At the beginning of the study, Karp finds that most students demonstrate little to no knowledge or very general ideas about the characteristics of a college student. For instance, when asked to describe a college student, one participant makes very general statements such as “they can go to class if they want” and “ they have to do their homework and the projects or whatever” (Karp, 2007, p. 19). By the end of the semester, twelve of the students have developed strong understandings of the role of a college student, and another five students increase their awareness to more realistic understandings. The same student quoted previously is now making statements about how college students are responsible for their learning (unlike in high school) and that if students need help, they must seek it out by talking to professors after class.

Based on the observed course structure, rigor, and classroom atmosphere, two of the courses are deemed comparable to what one would expect to find on a college campus (categorized as authentic), while the other three are less effective. Of the 15 students enrolled in the authentic courses, 12 increase their understanding of a college student, while only five of the 11 enrolled in an inauthentic course do (Karp, 2007). Change based on the students perceived authenticity of the course does not change the results very much. Twelve of the 17 who think their class is authentic increased their understanding, while five of the nine inauthentic course participants increased theirs (Karp, 2007).

One of the ways students increased their levels of understanding was through role rehearsal. Karp says role rehearsal means that students learn characteristics by practicing them (Karp, 2007). In CE, students learn what it means to be a college student by practicing the behavior. In the study, students talk about developing the need to self-monitor their academic work, to be more responsible for their learning, and to develop additional learning strategies. Highlighting this developmental process, one student goes from only having a general sense of what it means to be a college student—because she has never gone to college or known many people who have—to describing her experiences in a way that strongly identifies her as a college student.

Developing this sense of college identity is an important vehicle to a student pursuing a postsecondary degree. Nakkula and Foster (2007) demonstrate how psychosocial characteristics such as self-confidence, educational self-efficacy, and future orientation are important in a student's successful transition from high school to college. For instance, this identity prepares students for future academic challenges.

By developing this identity through participation in a comprehensive CE program, students begin to adopt a personal belief that they can succeed at the postsecondary level (M. Nakkula & Onaga, 2008). Because underrepresented students are more likely to come from homes with lower levels of formal education than whites or Asians, the CE environment plays a more integral role in this development. For these students, teachers and advisors play a significant role because they provide students with guidance on how to be successful college students (M. Nakkula & Onaga, 2008). Also, a student's CE peers play an integral role because students learn proper college classroom behavior and

forms of interaction, like how and when to speak to faculty members (Cavalluzzo, et al., 2002; M. Nakkula & Onaga, 2008).

Change in behaviors more reflective of a college student is an important benefit to the CE experience. One middle college high school administrator comments on how many students spend their free time studying in her office (Cavalluzzo, et al., 2002). Students credit much of this positive change to the freedom, respect, and responsibility they feel is given to them as college students. From this, they develop a much stronger sense of self-confidence with regard to their education and feel much more comfortable in seeing themselves as college students (Cavalluzzo, et al., 2002; M. Nakkula & Onaga, 2008).

This section shows that while college courses taken on the college campus provide students with a stronger college learning environment, this can also happen when courses are taken on the high school campus. Much of the impact on students depends on how the learning experience is structured, particularly the structure of the courses. Previous research suggests that CE experiences can help a student become college-ready when they engage in rigorous coursework in a setting authentic to the collegiate experience. This, however, does not imply that high school students can/should be placed in college coursework and left to fend for themselves. Students may need support to adjust to college-level learning expectations. As further discussed in the next section, underrepresented students are in particular need of this support.

Concurrent enrollment programs for underrepresented students

The majority of CE programs specifically targeted for working with underrepresented students have additional support mechanisms in place to help students

succeed. Sixty percent of postsecondary institutions with CE programs for underrepresented students provide extra services such as tutoring, academic advising, study skills workshops, and pre-college counseling (Kleiner, et al., 2005). Research cites Early College and Middle College High Schools (EC/MCs) as good examples of CE programs that provide such extra services (Bailey & Karp, 2003; Wang Golann & Hughes, 2008). In addition, preliminary research shows that these types of CE programs are having some success with their students (Bailey & Karp, 2003; Cavalluzzo, et al., 2002; Glennie, et al., 2009; M. Nakkula, Onaga, & Foster, 2007).

Using state assessment tests as the measure of academic achievement, research on students from two California middle college high schools compare scores from the two schools to those of students in their district and county. Findings show that more middle college high school students score at advanced, proficient, or basic levels than their district and county counterparts (Cavalluzzo, et al., 2002). However, because EC/MCs are voluntary programs where students apply and are accepted, there is always a question of how much self-selection is responsible for the impact on student achievement. For example, students who self-select into CE programs may be more motivated to do well academically. Moreover, the participating student may be a higher performing student academically. In the case of the two California middle college high schools, even though the focus of the institutions is on students with low levels of academic performance, students are selected based on demonstrated high levels of potential (measured by test scores and attendance records).

The work by Glennie et al. (2009) attempts to resolve the issue of selection bias by using random assignment of students in the early college high school (ECHS). In one

of the schools in their analysis, 80 students applied to enroll in the ECHS. The school then randomly accepted 41 applicants and set aside placements for two additional students. The 37 students who were not accepted to the ECHS enrolled in a non-ECHS public high school and comprised the control group. Because the ECHS is a new school, this is the first class to attend and analysis is only done with regard to students' 9th-grade performance.

Results from the analysis indicate that at the end of the 9th grade year, ECHS students are further along in the advanced curriculum than non-ECHS students, and differences are particularly large for economically disadvantaged students. Specifically, almost twice as many ECHS students have taken Geometry as non-ECHS students. Because the treatment group enters high school with lower Algebra 1 completion rates in 8th grade and lower average 8th-grade math exams, this indicates that students at the ECHS are able to catch up and surpass their non-ECHS counterparts. Extant research supports mathematics as being a predictor of college enrollment (Horn & Carroll, 1997). Therefore, these early findings suggest that the ECHS learning environment increases the likelihood of underrepresented students becoming college-ready.

Although this body of research is still in development, it provides preliminary evidence to suggest that CE experiences have a positive impact on the college readiness levels of underrepresented students. Such results suggest it is important that underrepresented students be given the opportunity to participate in CE, particularly those CE programs with additional support services in place. My dissertation focuses on analyzing these opportunities for California high school students and providing an understanding of how underrepresented students participate in CE. I ground my work in

theory to explain how I interpret differences in participation and in the next chapter, I discuss my understanding of how variations in CE participation may impact the college readiness levels of students.

Chapter 3 – Theoretical Framework

In chapter 2, I discussed how research demonstrates that students with low levels of prior academic achievement and/or students from families of low SES are less likely to enroll in college than students with high levels of academic achievement and/or students from families of high SES. I then presented alternative pathway programs dedicated to attenuating these college access disparities, with CE being one of them. The purpose of this chapter is to provide a theoretical lens to the investigation of CE participation as a mechanism to improve the college-ready experiences of students. Specifically, I apply social capital theory to show how CE can address the college readiness needs of underrepresented students, and whether or not current CE practices are meeting those needs.

Underrepresented students are less likely to engage in rigorous coursework while in high school and are less likely to have a clear understanding of what it means to be college-ready (Adelman, 2006; McDonough, 1997; Plank & Jordan, 1997; Venezia, et al., 2003). These realities indicate a need for underrepresented students to have adequate resources available to improve their college readiness levels. Such resources will not only help ensure that these students engage and are successful in rigorous coursework, but will also provide them with knowledge (informational and experiential) that demystifies the notion of going to college.

In the context of my research, I apply a social capital lens where resources are defined as individuals within a student's network of relationships. I contend that CE can provide additional resources for underrepresented students and thus help develop the knowledge and skills they need to be college-ready. Therefore, using the theoretical lens

of social and human capital theory, I believe that CE can provide underrepresented students with additional access to social capital that can help make them college-ready.

Human capital is defined as the knowledge and skills individuals acquire that increase their capacity to produce (Coleman, 1988; Schultz, 1961). In the context of this analysis, human capital refers to the skills and knowledge students acquire that make them college-ready and increase their likelihood of pursuing a postsecondary degree. For instance, students who acquire critical thinking skills and learn how to be independent learners are more likely to be college-ready (Cavalluzzo, et al., 2002; Conley, 2005, 2007). Social capital, on the other hand, is defined by its function. Specifically, social capital refers to the relationships between individuals and how these relationships facilitate an individual's achievements (Bourdieu, 1983; Coleman, 1988; Stanton-Salazar, 2004). In terms of college readiness, I operationalize social capital as students' relationships with a network of individuals that can help them become college-ready. Students with greater access to a network of individuals who can help them become college-ready have greater levels of social capital.

There are several ways in which social capital theory can be applied to the context of CE as a mechanism to improve the college readiness levels of students. One is the idea that greater levels of social capital increase the likelihood of students' participation in CE. This framework is not what motivates my study. Instead, what motivates my study is the way in which students accumulate social capital opportunities *while participating in* CE, and how this can impact opportunities that build college readiness.

The theoretical framework driving this analysis is that students who participate in CE have access to opportunities that build social capital, which enables them to develop

the human capital necessary to become college-ready. Thus, the social capital students access within the CE experience may ultimately increase their likelihood of pursuing a postsecondary degree. To explain this relationship between CE experiences and the social capital levels of students, this chapter is organized in the following way. First, I explain social and human capital and how access to information resources and a learning environment rich in college-going academic expectations impact the likelihood of a student being ready for, and ultimately going to, college. In this section, I distinguish between how students become college-ready through opportunities that build social capital, which are found in the college-learning environment as a whole, and the social capital specific to the courses in which they enroll. Second, I discuss CE within this social capital framework and how differences in college course-taking experiences implicate differences in college readiness opportunities. I specifically elaborate on using a social capital lens to understand how the CE experiences of underrepresented students can increase their opportunity to be college-ready. Finally, I briefly discuss the lack of CE research for students in California, and why social capital is a useful lens to use in investigating my research questions.

Using a social capital lens to understand college readiness

Many differences exist between the learning practices and expectations of secondary and postsecondary institutions, and the key to transitioning from high school to college is having the knowledge and abilities necessary to be a successful college student (Conley, 2007; *Learning and understanding*, 2002; Tierney, Bailey, Constantine, Finkelstein, & Hurd, 2009). While I define human capital as the knowledge and skills that enable individuals to become college-ready, my research focuses on social capital

and what opportunities individuals have to potentially build their college readiness human capital. Specifically, I use social capital to understand how differences in CE opportunities and experiences may influence students' opportunities to acquire college-ready knowledge and skills.

My work draws primarily from Coleman and his theory of social capital as a mechanism for building human capital (Coleman, 1988). In his work, he discusses three forms of social capital—obligations, expectations, and trustworthiness of structures; information channels; and norms and effective sanctions. As subsequently described, information channels and norms, and effective sanctions are the two forms of social capital used in my research because of how they relate to a student's learning environment and their level of college knowledge.

Information channels, the first form of Coleman's social capital framework that I use, serves as a foundation for action in that it helps guide an individual's thinking and/or reactions to a particular event (Coleman, 1988). In the context of college readiness, social capital is based on students having relationships with individuals who provide them with the knowledge necessary to facilitate the students' abilities to take actions that make them college-ready. Among other things, these individuals can provide students with guidance on courses to take to be college-ready, as well as information regarding fulfilling specific college application requirements. For instance, a high school student who wants to go to college, but is unaware what mathematics courses qualify him or her for admission or what college entrance exams to take, may not qualify for postsecondary education on the basis of lack of information. Social capital comes in the form of the network of relationships a student has with individuals that can provide them this kind of

information. And with access to channels that provide this information, students are more likely to take the necessary actions to be ready for college (King, 1996; Plank & Jordan, 1997, 2001).

The second form of Coleman's social capital that I use to ground my research, norms and effective sanctions, influences the behavior of individuals by creating a culture that promotes certain actions, while discouraging other actions. In some cases, the network of individuals internalizes the norms and an individual's actions occur out of a sense of custom—as if there is no alternative. In other cases, actions occur because the individual receives external recognition from others within their relationship network. In terms of college readiness, the difference between the two is in one community the actions of students reflect the college-ready expectations of the community, while in another they reflect extrinsic incentives to be college-ready.

For instance, when college readiness is a norm that the community internalizes, a student takes the necessary college entrance steps without any additional incentives. The student is intrinsically motivated to take these actions because they are clearly expected of the student. Where the community does not internalize the norm, the school may take it upon itself to implement a promotional campaign for college entrance preparation and reward students as they achieve different college readiness benchmarks (e.g. complete an advanced placement course or take the SAT exam). Here the student's actions are extrinsically motivated because the steps are not something that would otherwise be expected of them. In either case, social capital comes in the form of the individual's network of relationships that creates the norms and effective sanctions facilitating that individual's college readiness actions.

The end goal of these two forms of social capital is for individuals to gain knowledge and skills that help them take actions to be college-ready—i.e. gain the human capital necessary to be college-ready (Coleman, 1988; Schultz, 1961). By participating in a learning environment focused on being a successful college student and having access to more individuals with college readiness information, students increase the social capital that, in turn, can help them increase their levels of college-ready human capital.

Through partnerships with postsecondary institutions, CE programs potentially increase the social capital of students and foster the type of human capital development that leads to college readiness. This is particularly true for underrepresented students, who may not have access to the same college-going information or community norms as their peers from more advantaged backgrounds. As such, underrepresented students may benefit the most from increased opportunities to enroll in rigorous coursework, as well as becoming academically engaged in a college-level learning environment.

Social capital and college readiness information.

Important to a student's college readiness development is having the proper information about the different academic expectations and qualifications colleges have for their students. In general, underrepresented students are less likely to have access to such information (Conley, 2007; McDonough, 1997; Vargas, 2004; Venezia, et al., 2003). For instance, students need to know the different academic qualifications between community colleges and four-year universities, and public and private colleges. Also important is knowing how colleges expect students to work more independently than they did in high school and be more proactive in their learning (Conley, 2007; Lundell,

Higbee, Hipp, & Copeland, 2005). Social capital provides a lens to understand how differences in levels of access to this type of information lead to differences in levels of college readiness.

Access to information regarding the academic expectations and qualifications for being college-ready can come from various networks of relationships. For my work, I focus on networks found within the academic institution, as well as those within the student's home environment. Within the academic institution, students develop relationships with individuals both inside and outside the classroom. In the home environment, students develop relationships with parents, siblings, and other family members. Underrepresented students are less likely to come from home environments rich in information on the academic expectations and qualifications for being college-ready, and are therefore much more reliant on their schools and the relationship networks developed therein for this information (King, 1996; Tornatzky, Cutler, & Lee, 2002; Vargas, 2004; Venezia, et al., 2003).

The research by Venezia et al. (2003) shows that students with similar academic qualifications have different notions of what their college options are due to different levels of information regarding college. Such variation can lead to different college-going decision-making processes. For instance, students of higher SES approach the decision-making process in a more rationalized manner, making the transition to college a more seamless process (McDonough, 1997). Students of lower SES experience the process with much higher levels of conflict and challenge, trying to understand which college is the right fit for them (McDonough, 1997). This research demonstrates that because of the lack of informational networks at home, students of low SES are much

more reliant on schools to provide them with this form of capital. If schools do not provide this form of social capital to underrepresented students, these students will continue to have decreased levels of understanding regarding the academic qualifications and expectations of colleges.

In addition to a lack of information channels, underrepresented students are likely to lack social capital in the form of norms and customs with respect to college readiness. In his discussion regarding norms as a form of social capital, Coleman (1988) talks about how community norms that support academic achievements (such as going to college) and provide structures acknowledging such achievements can significantly facilitate the work of their schools. Extant research discusses how students living in communities of higher levels of SES are more likely to have high academic achievement levels. Thus, students living within such neighborhoods potentially have greater access to an overall climate that both supports and nurtures a positive academic experience (Ainsworth, 2002; Sampson & Groves, 1989; Woolley, et al., 2008).

In terms of college readiness, neighborhood support can come in many different ways. For instance, communities can develop academic counseling centers in the local public library (assuming one exists) or provide additional counseling services at the high school as a way to establish and support the norm of college readiness. However, communities of low SES may not have the capacity for such levels of social capital because they lack resources like public libraries. Therefore, the implication is that, as with information channels, underrepresented students are much more reliant on their school environment to provide the norms and customs form of social capital.

Social capital and course-specific college-ready skills and knowledge.

As mentioned in chapter 2, students who successfully engage in rigorous coursework while in high school are more likely to attend college than those who do not. In addition to the academic expectations and qualifications of being college-ready, engaging in rigorous courses can provide students with coursework-specific knowledge and skills that make them college-ready. Acquiring such knowledge and skills implies students having access to individuals who can provide them with this human capital. Since students from underrepresented groups are less likely to engage in rigorous coursework and develop relationships with individuals who can provide them with this type of information (Adelman, 2006; Plank & Jordan, 1997, 2001), they are in greater need of opportunities to develop their social capital in order to increase their college-ready human capital.

Conley (2005, 2007) goes into specific details as to what coursework-specific cognitive skills students need to increase their college readiness. For instance, he discusses how in English courses students develop the ability to read and understand a wide range of texts utilizing strategies of re-reading specific passages, underlining key terms, and identifying important parts of the text. In mathematics, students learn to extract the problem from its context, solve the problem using different mathematical strategies, and interpret the solution given the original context of the problem. While Conley also presents examples of college-ready skills found in science, social studies, world languages and more, the main takeaway is that a challenging academic curriculum provides students with the opportunity to develop the college-ready knowledge and skills that increase their ability to succeed at the collegiate level.

I contend that students learn such coursework-specific knowledge and skills from individuals who not only possess them, but who also teach them. Therefore, students who lack access to relationships with individuals who can teach them this type of information (i.e. teachers of rigorous courses) are limited in their ability to be college-ready. Because underrepresented students are less likely to engage in a rigorous curriculum, schools must develop strategies to increase their participation in these courses and improve access to these resources. Concurrent enrollment is one such strategy that presents an alternative pathway for underrepresented students to use increased levels of social capital as a way to be college-ready and improve their likelihood of going to college.

Increasing social capital and college readiness via concurrent enrollment

Driving my research is the idea that CE can serve as a mechanism to increase the college readiness levels of underrepresented students (and thus their college-going rates) by increasing their social capital. Through such an increase, students are given opportunities to develop networks of relationships with individuals who can help them develop the human capital necessary to be college-ready. As previously discussed, the human capital I focus on includes the academic expectations and qualifications of being a college student, as well as the coursework-specific knowledge and skills of successful college students.

One of the primary ways CE increases the social capital of students is by placing them in a college-learning environment. By definition, CE provides students with opportunities to engage in college coursework. Understanding the college course enrollment experiences of CE students clarifies the degree to which they are developing

their social capital and increasing their college readiness levels. Differences in the *types* of college courses a CE student takes gives a sense of how students are using CE to increase their course-specific knowledge and skills to make them college-ready. A student who engages in academically rigorous college courses will have different college-ready experiences than one who enrolls in non-academic courses. Differences in the *number* of college courses CE students take provides an idea of the degree to which they are engaged in the college environment, and thus gaining varying knowledge about the expectations and qualifications of a college-ready student. A student who takes multiple college courses and/or enrolls in multiple terms will have different college-ready experiences than one who enrolls in one course and/or only enrolls in one college term. Finally, I compare the CE college course grades of underrepresented students to their white and Asian counterparts. The comparison gives insight into how students—who are in most need of access to information channels and an environment rich with college-ready norms and expectations—may be successful in using increased levels of social capital to become college-ready and increase their likelihood of pursuing a postsecondary degree.

CE coursework and social capital.

As discussed previously, the coursework-specific knowledge and skills that make a student college-ready is most likely attained through enrollment in rigorous coursework. Therefore, CE students must enroll in academically rigorous college courses and establish relationship networks in those courses that will help build coursework-specific human capital and make them college-ready. In chapter 2, I discuss how national estimates suggest an academic focus on course-taking (Waits, et al., 2005), while

research for individual states indicates there can be an academic focus (Blanco, et al., 2007; *"Running start"*, 2008) or a technical/vocation focus (Lynch, et al., 2006; *"Dual enrollment in Kentucky"*, 2006). These findings demonstrate an inconsistency in how CE students are accessing opportunities that build social capital to develop this coursework-specific human capital. Consequently, knowing how CE students in California develop opportunities that build social capital through their college courses requires an analysis of the types of the college courses they take.

CE experiences and academic expectations.

Regardless of the type of college course a CE student takes, being in a college learning environment provides students with opportunities to learn more about the characteristics of college (e.g. classroom dynamics, using campus resources for academic help), how to be a successful college student (e.g. time management, independent learning), and how to qualify for college enrollment (e.g. college entrance exams, financial aid options) (Cavalluzzo, et al., 2002; M. Nakkula & Onaga, 2008). These opportunities come from the two forms of social capital highlighted in this chapter. Engaging in college-level coursework increases access to individuals with first-hand knowledge of how students qualify for college and what the expectations are once they matriculate. Moreover, CE provides students with access to a college-going environment where the norm is for students to be prepared for and to attend college.

Knowing the extent to which a CE student engages in the college environment (i.e. how many courses a student takes) gives a preliminary sense of the degree to which they are accessing social capital to become college-ready. CE students who take multiple college courses both increase the amount of access they have to individuals with college

readiness information and spend more time in an environment rich in expectations of going to college. Unfortunately, existing research provides little clarity with regard to the quantity of courses a typical CE student takes.

Various national and state-specific estimates suggest that students enroll in college for multiple terms but take, on average, one course per term (Blanco, et al., 2007; Karp, et al., 2007; Kleiner, et al., 2005; Lynch, et al., 2006). This implies that students typically have more than one opportunity (i.e. one term) to build their social capital through CE, but since they only take one course, the opportunity is somewhat limited. Taking one course suggests that the amount of time a student spends participating in the college environment is limited—unless the student spends additional time outside of class—at the student center, with college guidance counselors, or getting tutorial help from the college, for instance.

Types of relationship networks available.

In chapter 1, I describe how CE can take place on a college campus or on a high school campus, where the instructor is either a college professor who comes to the high school to teach the course or a high school teacher who is approved by the college to teach their course. In the case of the course being taught at the high school, students can still "feel" like college students if the course closely mirrors that of an authentic college course (Karp, 2007). The social capital implication is that the more authentic the college course feels to high school students, the greater understanding they have regarding the academic qualifications and expectations of a college student, and therefore, the more college-ready they become.

When courses are taken on the college campus and CE students are among college students and faculty members, this presents the greatest opportunity for college readiness development (Cavalluzzo, et al., 2002; Karp, 2007). This is when students have access to college counselors and tutorial centers to provide them with information about college qualifications and expectations. In addition, being on a college campus increases the level of college-going norms and expectations in the student's environment since everybody around them is focused on being a college student.

Underrepresented students and social capital through CE.

Because underrepresented students engage in CE programs at lower rates than their white counterparts (Blanco, et al., 2007; Karp, et al., 2007; Lynch, et al., 2006; Welsh, et al., 2005), they are less likely to access the potential early collegiate experiences and reap the potential social capital benefits. These disparities are particularly relevant for education reform strategies that use CE as the mechanism to improve the college-going rates of underrepresented students. These differences indicate that underrepresented students are less likely to benefit from the social capital available in CE programs that increases their levels of college readiness.

In the cases where research does show underrepresented students participating in CE programs, an analysis of what types of experiences they have is missing. Specifically, research does not discuss the types of college-level courses these students take, nor the extent to which they participate (i.e. how many courses they take). Consequently, underrepresented students may not only participate in CE at lower rates but may also engage in the college learning environment in a more limited capacity. In terms of social capital, this implies that underrepresented students have fewer

opportunities to access channels that are rich with information about the knowledge and skills necessary to become college-ready. These students also spend less time in an environment that not only fosters going to college, but has going to college as a norm embedded within its culture. Without access to building their social capital through CE, underrepresented students will continue to be denied the opportunities to become college-ready that are available to many others.

Concurrent enrollment research in California

To date there has been no comprehensive analysis of how students participate in CE in California. In 2003, the California Community College Chancellor's Office conducted an audit of CE throughout its system of colleges, but this report focused solely on overall enrollment numbers and did not disaggregate by types of courses, number of courses per student, or characteristics of the student (*Report to legislature*, 2003). In 2008, the James Irvine Foundation published a report submitted by the Community College Research Center that focused on dual enrollment in California. While the report does provide a brief glimpse regarding the scale to which California high school students take college courses, its primary focus is to describe and explain the various types of CE programs found throughout the state and the state policies that govern their function (Wang Golann & Hughes, 2008). Therefore, little attention is given to what types of students participate in CE and what the college-ready implications are for the students involved.

The purpose of this dissertation is to fill this need for research on CE in California. By analyzing the college course-taking patterns of California high school students who participate in CE, I provide clarity on who is taking advantage of this

opportunity and how they engage in CE. By applying a social capital lens, I am able to interpret these findings in a way that provides implications for improving the college readiness levels and, ultimately, the college access levels of students (underrepresented students in particular), and thus address the issue of whether or not trends in participation suggest that CE is serving as a mechanism to attenuate college access disparities.

Chapter 4 – Data Sources

This chapter describes the data I use in analyzing the CE experiences of California high school students. To begin with, I briefly provide context to my data by describing the California high school and community college landscape. I then describe the data sources used throughout my analysis and how I constructed my data samples. In this description I also provide a general sense of how I use the data in my analysis.

California high school and community college landscape

For this analysis, the population of students is every California high school student (defined as a student enrolled in grade 9, 10, 11, or 12) who enrolled in a California Community College course between and including the fall of 2002 and the spring of 2007.[8] In the 2006-2007 academic year, California reported having approximately 1.8 million students enrolled in its 1,182 high schools. However, approximately 2 million were identified as enrolled in grades 9-12 ("Ed-Data," 2009). Because enrollment in high schools was less than enrollment in grades 9-12, the population of CE students included in this analysis may have come from alternative, continuation, or some other type of school offering grades 9-12 in addition to traditional California high schools.

Concurrently enrolled students included in my research attend a California community college that is part of the largest system of higher education in the country, with 110 colleges in 72 districts serving more than 2.6 million students per year. Although community colleges are located throughout the state, most are found in southern California (58), while the San Francisco Bay Area, northern California, and

[8] Concurrent enrollment can be at a California State University (CSU) or University of California (UC), as well as at a California Community College (CC). My study focuses exclusively on those experiences at the community college from 2002-2007, as those are the students for whom I have student-level data.

central California regions have 22, 16, and 14 colleges, respectively. In addition to workforce training and personal enrichment, a mission of the community college system is to provide students with the opportunity to prepare themselves for transfer to a four-year university ("Community Colleges," 2009).

Data sources

Student-level data

The primary data used for this analysis consist of student-level data provided by the California Community College Chancellor's Office (CCCCO). Specifically, the CCCCO provided me with individual background data and college coursework data on every student identified as a special admit during the 2002-2003 through 2006-2007 academic years who, at the time, was also enrolled in K-12. Special admit is the term given to pupils granted permission to enroll in community college courses to advance their academic work.[9] Concurrent enrollment is the informal name given to those special admit students who are currently enrolled in a K-12 institution (*Fact Sheet*, 2004; *Report to legislature*, 2003). These data are not available to the public and are intended for restricted use only. As shown in Table 1, data reflect student characteristics such as race, gender, zip code of residence, and high school of origin as well as CC course information such as type of course taken, grade and credits earned. With this student-level data, I am

[9] "The governing board of a school district may determine which pupils would benefit from advanced scholastic or vocational work. …The governing board may authorize those pupils, upon recommendation of the principal of the pupil's school of attendance, and with parental consent, to attend a community college during any session or term as special part-time or full-time students and to undertake one or more courses of instruction offered at the community college level." California Education Code §48800(a).
"A parent or guardian of a pupil, regardless of the pupil's age or class level, may petition the governing board of the school district in which the pupil is enrolled to authorize the attendance of the pupil at a community college as a special full-time student on the ground that the pupil would benefit from advanced scholastic or vocational work that would thereby be available." California Education Code §48800.5(a).

able to describe the characteristics of high school students who participate in CE and analyze the college coursework experiences of CE students.

Table 1 – Data Sources

Data Source	Data Type	Measures	Year(s)	Data Level
California Community College Chancellor's Office – Restricted use data	Concurrent Enrollment Student	Age during term of CC enrollment	2002-2007	Student
		Gender	2002-2007	Student
		High school of origin	2002-2007	Student
		Race/ethnicity	2002-2007	Student
		Zip code of residence	2002-2007	Student
	Community College Course	Basic skills status	2002-2007	Student
		Degree applicability	2002-2007	Student
		Transferability	2002-2007	Student
		Grade earned	2002-2007	Student
		Credits earned	2002-2007	Student
California Community College Chancellor's Office Data Mart – Public data	Community College	Overall Enrollment number	2002-2007	Statewide
		Individual college enrollment numbers	2006-2007	College
		CC district identification	2006-2007	College
		CC geographic region	2006-2007	College
California Postsecondary Education Commission	Concurrent Enrollment	Number of CE students	1987-2007	Statewide
	High School (all data disaggregated by race and gender)	Number of students in grades 9-12	2002-2007	High School
		Number of graduates satisfying A-G requirements	2006-2007	High School
California Department of Education	High School (all data disaggregated by race and gender)	Annual Performance Index Score	2006-2007	High School
Common Core Data	High School (all data disaggregated by race and gender)	Number of students participating in the free or reduced lunch program	2006-2007	High School

To accurately describe the characteristics of CE students, I analyze the restricted-use data and exclude records for students who are not traditional high school students or students who do not have traditional CE experiences. Next I describe these students and my justification for their exclusion from this analysis.

No language in state policy specifically articulates that special admit students need to be of traditional high school age. Consequently, to focus on my target population of typical high school students who are concurrently enrolled in a CC, I only include records for which the age was reported as 13 and above but no greater than 19 during the term of enrollment. This accounts for approximately 94 percent of the 795,658 student observations in the data and reduces the number of student records to 751,279.

My research focuses on CE experiences at traditional community colleges. The special admit records in the restricted-use data include students enrolled in the five non-traditional community colleges.[10] Therefore, I did not include student records from these five colleges. This accounts for less than two percent of the remaining data and reduces the number of student records in my restricted-use student data file to 737,391.

In my analysis, I also exclude data from both winter and summer terms as they do not represent the type of CE experience that is the focus on my analysis. Data for winter sessions come only from the three colleges on the quarter system and the small number of colleges on the semester system that offer a winter intersession term. Enrollment in a winter intersession term represents a unique CC experience as they differ from the

[10] Data from the CCCCO Data Mart reflects students enrolling in one of the 110 community colleges in California. The restricted-use data given to me included data from 115 community colleges. The five colleges not included in the Data Mart data and considered non-traditional college are: San Francisco Community College Centers, Santa Barbara Continuing Education, Los Angeles ITV, North Orange Adult Division, and Rancho Santiago Continuing Education.

traditional fall and spring terms throughout the academic year. Consequently, I did not include them in my analysis. Enrollment in a winter quarter course is available only to a small number of students with access to one of the three colleges on the quarter system. I exclude these data from the analysis because they represent a small percent of student records (less than two percent), reflect a unique opportunity available to only a small number of students, and no group of students is systematically excluded by only including the fall and spring data from those colleges. Excluding data for students enrolled in a winter term reduces the number of student records from 737,391 to 714,695.

Summer terms also provide a potential unique CE experience. Even though summer enrollment at a CC enrollment is available to all students, high school enrollment is optional during this time and thus students may not be simultaneously enrolled in high school and college coursework despite being classified as a special admit student. To investigate the possibility of unique CE participation trends during the summer, I conducted an exploratory analysis to investigate whether enrollment trends varied between fall, spring and summer terms. This analysis showed that during summer terms, both CC enrollment and CE trends are very different than in the fall or spring. For instance, Figure D-1 in Appendix D shows that the percentage of community college students who are CE students was much greater in the summer terms than any other. Also, Figure D-2 in Appendix D shows that CE numbers by race/ethnicity are very different in the summer than in the fall or spring.

These differences along with the unique high school enrollment experience indicate a different type of CE experience for students during the summer. Consequently, a trend analysis that combines the academic year with the summer terms would

potentially produce a very different picture of CE—an issue I address in chapter 8. Therefore, I limit my study to high school students concurrently enrolled in a CC course during the traditional school year and exclude data from summer terms. Excluding data from summer terms results in a 33 percent reduction of my data from 714,695 to 480,418.

Finally, because my analysis is based on the CE experiences of individual students in a given term, I need to ensure that each student record within each term represents a unique student. Upon additional analysis, I find that within any given term, the number of duplicate student records is very small (less than 0.5 percent of student IDs in a term), and no duplicate record appears more than three times within a given term. Consequently, I only include one student record for each "group" of duplicate records for an individual student. This reduces the number of student records included in my restricted-use student data file by an additional 269 records (less than .1 percent of 480,418) to 480,149.

In summary, to create a population of traditional high school students who have traditional CE experiences, I exclude student observations from the restricted-use data file that are from the five non-traditional community colleges, from summer or winter terms, and from students who are 12 years old or younger, 20 years old or older, and/or have duplicate student records within a given term. These modifications reduce my student data observations by approximately 40 percent—beginning with 795,568 and ending with 480,149. This population will hereafter be referred to as my "CE student population" and is what I use to describe the students who participate in CE and analyze the college coursework experiences of these students.

Table B-1 and Figures B-1 through B-8 in Appendix B provide a complete numerical comparison between data in my original data set and the data in my CE population and show that, with one exception, the characteristics of CE students are similar for both groups. The one exception is that whites make up a greater percentage of CE students included in my CE population than in my original data set, while Asians make up a smaller percentage of CE students in my CE population than in my original data set. This is due to Asians comprising a greater percentage of the CE population during winter and summer terms, while whites comprise a smaller percentage of the CE population in those two terms. These differences for Asians and whites potentially bias my results relative to the overall CE experiences for these students (an issue I address in chapter 8). However, because my research focuses on the CE experiences of students during the traditional school year, these differences have little impact on my analysis of how Asian and white CE students participate in CE during the fall and spring terms of an academic year.

One particular subset of analyses I conduct to examine the students in my CE population is to describe the types of high schools they come from. In order to accurately discuss the characteristics of the high schools of origin of the students in my CE population, each student record must include a high school code that matches to the unique 14-digit unique County-District-School (CDS) code assigned to each school in California by the California Department of Education (CDE). Without such a code, I am unable to collect any data regarding the high school of the CE student. In my CE population, only 40 percent of the records have a high school of origin entry that can be matched to a valid CDS code.

In addition to a lack of CDS codes, my ability to describe the high school characteristics of CE students is limited in the following ways. First, only data on school characteristics for public high schools are available to me. Therefore, of the 40 percent of student observations for which I know the high school of origin, I am restricted to those that are public high schools. This results in having high school characteristics for approximately 36 percent of all student records in my CE student population.

Second, the rates at which community colleges record a valid CDS code for their concurrently enrolled students are very inconsistent. Some community colleges record a valid CDS code for none of their CE students, while others have valid entries for over 95 percent of their CE students. Because of such inconsistency in reporting, I create a subsample of CE students who attend a CC where at least 80 percent of its CE students have valid CDS codes for their high school of origin entries. Hereafter I will refer to this as "my CDS sample." Using this sample increases the likelihood that the high school characteristics of CE students represent those from all CE students who attend the community college and not only a select few for whom a CDS code is made available.

The tables and figures in Appendix C show that overall, data in my CDS sample is very similar to the data in my CE population. However, there are two notable differences between the two data sets. One is the geographic distribution of the high schools and community colleges. Figure 1 shows that high schools in my CDS sample are not distributed as evenly across the state as the known high schools in my CE population. Figure 2 shows that of the 26 community colleges represented in my CDS sample, five of the CCs are located in the Bay Area, two in central California, three in northern California, and 16 in southern California. Although this distribution is

comparable to the regional distribution of the 110 CCs throughout the state, with a slight overrepresentation from southern California and a slight underrepresentation from central and northern California, distribution is not even throughout the state.

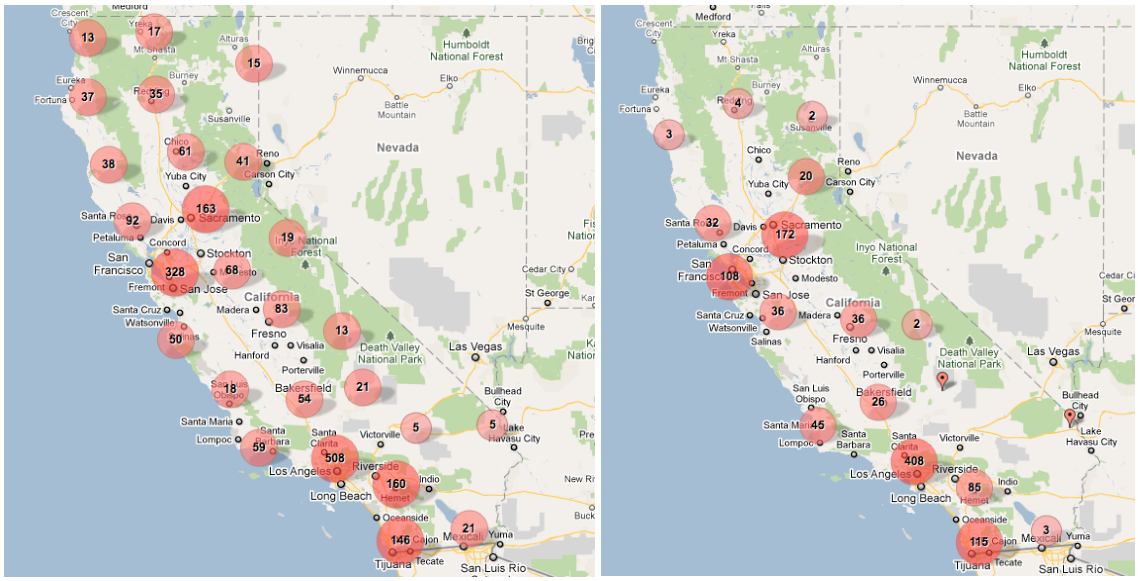

Figure 1 – Geographic distribution of high schools in my CE population (left) and high schools in my CDS sample (right).

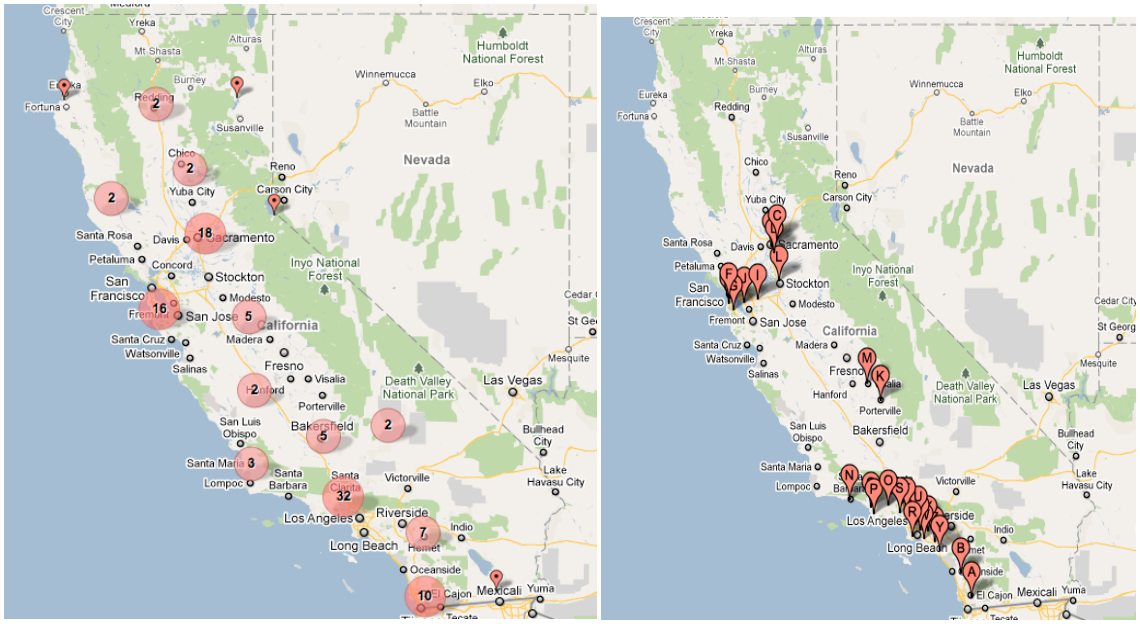

Figure 2 – Geographic distribution of community colleges in my CE population (left) and my CDS sample (right).

The second difference between my CDS sample and my CE population refers to the size of the community colleges CE students attend. Table 2 shows that students in my CDS sample attend larger community colleges with much more frequency than those in my CE population.

Table 2 – CE students by size of community college

# of CC Students	My CDS Sample	My CE Population
0-13,000	4%	13%
13,000-20,000	24%	24%
20,000-30,000	34%	23%
30,000 or more	37%	39%

These differences and the geographic distribution differences impact the interpretation of findings and I discuss this in subsequent chapters. Nevertheless, using data from my CDS sample for a particular subset of the analyses of my research allows me to describe the participation trends of CE students and analyze their college coursework experiences based on the high schools CE students come from.

In order to describe the characteristics of the high schools CE students come from and the CCs they attend, I also collect aggregate data specific to these institutions. In addition, I assemble statewide data for California high school and California community college students to make comparisons between CE students and their secondary and postsecondary peers. In the next section I describe these data sets.

Institutional and statewide data

To describe the colleges CE students attend, I collect data on the enrollment levels, CC district identification, and the geographic region of each CC for the 2006-2007 academic year. These data are publicly available from the CCCCO Data Mart. I also collect statewide CC enrollment data from the Data Mart from 2002 through 2007. This

allows me to compare the enrollment levels of CE students to overall CC enrollment levels across the state, over time.

From the California Postsecondary Education Commission (CPEC), I use statewide data for the number of students participating in CE from 1987 through 2007. These data allow me to analyze CE levels historically and to contextualize the participation trends described using my CE population. Additional data from CPEC that I include in my analysis are institutional level data describing the number of students enrolled in grades 9-12 and the number graduates satisfying A-G requirements in each school across California.[11,12] I collect enrollment data for the 2002 through 2007 academic years to describe the size of CE students' high schools and also aggregate the data to the state level in order to compare trends in high school enrollment levels to CE levels, over time. I collect data on A-G graduates for the 2006-2007 academic year and use this school-level data to describe the achievement levels of the high schools CE students come from.

Another measure to describe the achievement level of a California public high school is their API score.[13] The California Department of Education (CDE) keeps records of the API scores for all California public high schools and I assemble API scores for the 2006-2007 academic year. I use API in combination with A-G graduates to describe the achievement levels of CE students' high schools.

---

[11] A-G requirements are a way to measure a high school student's qualifications for enrollment at a UC or CSU. I use this as a measure of achievement by the school. A more in-depth discussion of the A-G requirements is described in chapter 5.

[12] CPEC data on high school enrollment levels and A-G graduates come from the California Department of Education. I choose to collect the data from CPEC because of its easily downloadable spreadsheet format.

[13] API refers to the Annual Performance Index, which is used by the state of California as a measure of achievement by the school. This index is also described in more detail in chapter 5.

Finally, I use data on the number of students participating in the free or reduced lunch program within the high school to serve as a proxy for the SES level of the high school. These school-level data come from Common Core of Data (CCD) and reflect the SES level of the high school during the 2006-2007 academic year.

Summary

The data sources described here are what I use to answer my research questions. I use student-level data from my CE population to describe CE participation trends and college coursework experiences. In the instances where my analysis includes the high school characteristics of students in my CE population, I employ data from my CDS sample. I also aggregate these student-level data to the high school, college, and state levels so as to compare them to the high school, college, and statewide data I collect. Together, these varying levels of analyses allow me to provide student-level findings within the larger institution and statewide contexts. Additional specifics on how I use my data are available in subsequent chapters where I answer each research question.

Chapter 5 – Who participates in CE?

Research Question 1:

1. Who among California high school students enroll in community colleges through CE opportunities? Specifically, what have been the CE trends from 2002-2007? How do participation trends compare to high school graduation and college-going trends? Do trends differ by student and high school characteristics?

To describe the trends for California high school students who participate in CE, this chapter is organized in the following manner. In the first section, I describe overall trends in CE and compare them to overall trends in high school enrollment. To determine how prevalent CE participation is in California, I compare CE levels to high school enrollment levels, over time. In the second section, I disaggregate enrollment trends by race/ethnicity and gender, and discuss how CE trends for these subgroups compare to their respective high school trends. This provides an additional dimension in understanding who is participating in CE. While the first two sections discuss who is participating in CE, the third section discusses where these students are going by looking at the characteristics of community colleges that receive CE students. Finally, in the fourth section, I describe where CE students are coming from by describing the types of high schools CE students attend.

In the conclusion, I summarize the findings from this chapter and discuss their implications for increasing students' college readiness levels. In particular, I discuss how CE can help underrepresented students increase their college readiness levels by providing them access to resources they may otherwise lack. I also discuss how analysis of the figures described in this chapter only provides a piece of the overall picture in understanding trends in CE participation.

Overall CE trends in California

Over the twenty-year period beginning in 1987 and ending in 2007, participation in CE increased, at times dramatically. As seen in Figure 3, the California Postsecondary Education Commission estimated that in the fall of 1987 there were 30,000 high school students concurrently enrolled in California community colleges. Enrollment levels decreased beginning in 1989 and did not reach their 1987 level again until 10 years later. Soon after 1997, CE experienced a dramatic increase and reached its highest level in 2001.[14]

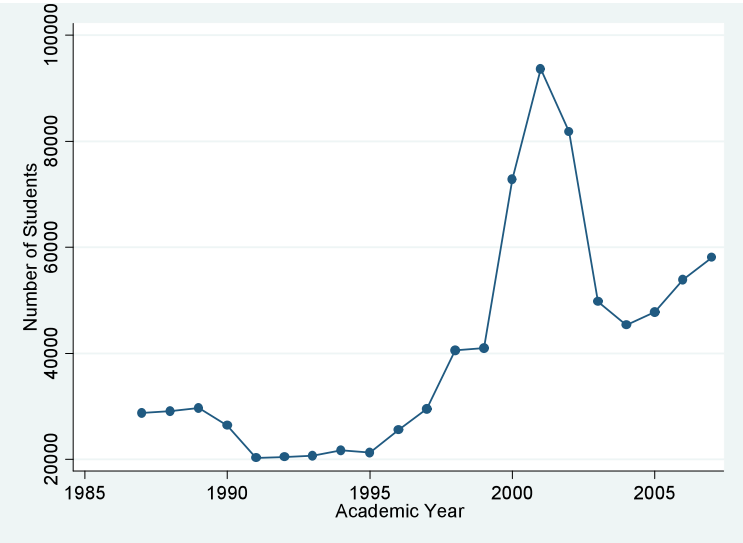

Figure 3 – Concurrent Enrollment levels from 1987 through 2007.
Source: California Postsecondary Education Commission (data reflect fall enrollment levels)

[14] Data for Figure 3 represent fall enrollment levels only and were not modified by any student characteristics. For example, included are students whose ages were recorded as under 13 or over 19. Consequently, the number of students included in the data is greater than the number of students I use in my analysis.

This increase, however, was discovered to be due to the unlawful practices of some community colleges that inflated these enrollment numbers.[15] The state legislature took action against the offending CCs, and began to regulate CE practices. Concurrent enrollment levels then dramatically decreased over the next two years, leveled off in 2004, and steadily increased from 2004 through 2007. The approximately 60,000 CE students in California in the fall of 2007 represent a 100 percent increase from the number of CE students in California in 1987.

This trend suggests that more students are taking advantage of CE opportunities and placing themselves in a college-learning environment prior to graduating from high school than they did in past years. One possible explanation for the increase in CE is simply that the population of high school students in California increased during this time. Therefore, the greater number of CE students seen in Figure 3 could simply be attributed to an increased number of high schools students who can participate in CE.

To inspect for this possibility, I compared high school and CE levels from 2002 through 2007. Students in my CE population represent California high school students who attend both public and private high schools and are enrolled in grade 9, 10, 11, or 12.[16] Figure 4 shows that statewide high school enrollment levels increased by approximately nine percent between the 2002-2003 and 2006-2007 academic years. Comparatively, CE experienced a slight decrease in the first couple of years before a steady increase over the last several years. When combining the fall and spring term CE

[15] In 2003, a report was submitted to the California Community College Chancellor's Office. This report concluded that of the 70 community college districts, 37 violated policies regulating the amount of financial support they receive from the state. Many of these violations came as a result of enrollments in Physical Education courses. As a result of this audit, many community college districts decreased course offerings, particularly physical education courses (*Report to legislature*, 2003).

[16] To review how I constructed my CE population to represent California high school students participating in CE, see chapter 4.

levels for each year, findings estimate an overall 21 percent increase in CE during this five-year period—outpacing the growth in the high school population by 12 percentage points.[17]

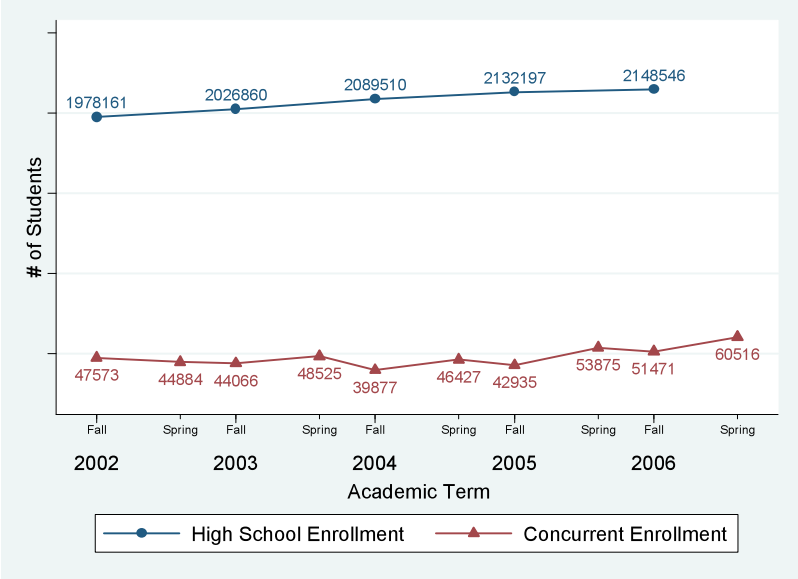

Figure 4 – High School and Concurrent Enrollment Levels from 2002 through 2006
Sources: California Postsecondary Education Commission
California Department of Education
California Community College Chancellor's Office

In conjunction with the increase in CE, this period also witnessed an increase in the proportion of high school students that enrolled in community colleges. In 2002, 4.7 percent of high school students concurrently enrolled in a community college course. That figure slightly decreased in 2003 to 4.6 percent and reached its low point of 4.1 percent in 2004. Similar to the trend seen in Figure 3, 2005 saw an increase in CE; and in the 2006 academic year, CE reached its highest level of 5.2 percent of the California high school enrollment. This latest figure of 5.2 percent reflects similar rates at the national level (where approximately five percent of all high school students were estimated to be

[17] Findings are a slight overestimation due to some CE students enrolling in both the fall and spring terms of an academic year (a point which I address in detail in chapters 6 and 7).

enrolled in dual enrollment programs) and other estimates for California (Kleiner, et al., 2005; Wang Golann & Hughes, 2008).[18] The trend in Figure 4 demonstrates that as high school enrollment in the state increased over this five-year period, so did the proportion of these high school students participating in CE—only at a slightly higher rate.

A potential reason for such an increase in the rate of CE participation is the proliferation of programs that include CE as a component of their design. More specifically, this may represent a proliferation of programs using CE as one strategy to increase the college readiness levels of students, and of underrepresented students in particular (Bailey & Karp, 2003; Lerner & Brand, 2006; Wang, 2005). Early College High Schools (ECHSs) are an example of one such effort. Because the majority of the nearly 40 ECHSs in California did not open until after 2003, their impact on overall CE trends would likely not be seen until 2004—when CE rates began to increase.

Testing for the presence of these types of programs is beyond the scope of my study. However, they do provide context and motivation for disaggregating participation trends by both individual and school attributes. An increase in the number of programs that include CE as part of their strategy for improving underrepresented students' college readiness levels may suggest an increase in the number of underrepresented students participating in CE. In the next section, I disaggregate enrollment data by race/ethnicity and gender to see if the overall trends described are consistent across student characteristics, and to clarify the degree to which underrepresented students are participating in CE.

---

[18] California estimates were based on CA *public* high school students serving as the student population from which the CE population was taken (Wang Golann & Hughes, 2008). My analysis includes both *public* and *private* as the overall student population.

Racial/ethnic and gender differences in CE

It is important to disaggregate CE trends by race and gender and compare them to high school enrollment trends because of their potential insight about existing disparities in postsecondary enrollment. In particular, my research focuses on the CE experiences of African-American, Asian, Hispanic, and white CE students. In the cases of Asian and Hispanic students, data in my CE population are disaggregated into subcategories. Therefore, I aggregate the data into the broader descriptors of Asian and Hispanic. Specifically, for my student-level data, Asian consisted of nine separate categories.[19] I combine these nine groups into one category and label it Asian. For Hispanics, I aggregate the five subcategories into one Hispanic category.[20] Therefore, in my analysis when I refer to disaggregating data by race/ethnicity, I am referring to disaggregating data into African-American, white, and the two respective aggregated Asian and Hispanic groups.[21]

Figure 5 and Figure 6 use enrollment data for the 2006-2007 academic year to provide a snapshot of these disparities for the most recent year of my CE population data. Because statewide enrollment data for private schools is not disaggregated by race or gender, California high school data for these figures and those in this section reflect

[19] The nine categories are: Asian; Chinese; Asian Indian; Japanese; Korean; Laotian; Cambodian; Vietnamese; Other Asian.
[20] The five categories are: Hispanic; Mexican, Mexican-American, Chicano; Central American; South American; Other Hispanic.
[21] Statewide enrollment data (from CDE and/or CPEC) for private high schools is not available by race/ethnicity. Therefore, analyses that disaggregate statewide high school enrollment data by race/ethnicity reflect public high schools only.

students enrolled in grades 9-12 attending California public schools.[22] Data for CE students reflect students enrolled in a high school of any type.

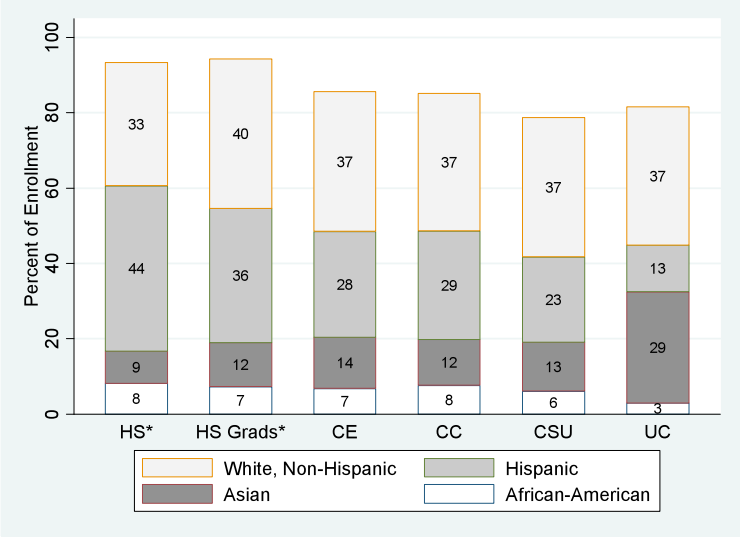

Figure 5 – Percent of enrollment across various sectors of education, by race, for 2006-2007 academic year.
** Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

Figure 5 highlights that African-American and Hispanic students participate in CE at lower rates than their respective high school enrollment levels, while the opposite is true for white and Asian students. The percentage of CE students who are white or Asian is greater than the percentage of high school students who are white or Asian. Figure 6 shows that females make up a higher proportion of the CE population than the high school population, while the opposite is true for males.

[22] The number of students in private high schools in 2006-2007 is estimated to be 7.4 percent of the total high school enrollment shown in Figure 2 ("Ed-Data," 2009). Thus, California enrollment levels disaggregated by race/ethnicity are slightly underestimated.

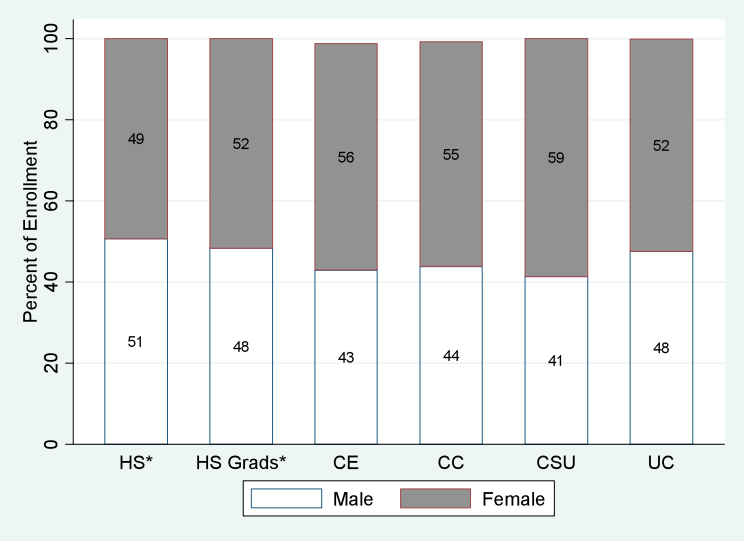

Figure 6 – Percent of enrollment across various sectors of education, by gender, for 2006-2007 academic year.
** Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

These findings demonstrate that African-American, Hispanic, and male students are underrepresented in their participation in CE when compared to their enrollment levels in California high schools. This indicates evidence of underrepresentation of subgroups of students in participating in a potential opportunity to engage in a college learning environment while still in high school. When compared to college enrollment rates, disparities by race/ethnicity are even more evident.

The percentage of UC and CSU students who are white or Asian is greater than the percent of high school students who are white or Asian. In fact, Asians comprise a much greater proportion of the UC population than they do in the California high school population. The percentage of UC and CSU students who are African-American or Hispanic is less than the percentage of high school students who are African-American or Hispanic. This is particularly evident in the difference seen between high school and UC

enrollment levels where the percentage point difference is five for African-Americans and 31 for Hispanics.

These differences are greater than those between high school enrollment levels and CE participation—especially for Hispanics. Approximately 28 percent of CE students are Hispanic while 44 percent of the high school population is Hispanic. This 16-percentage point difference is less than the 31-percentage point difference mentioned previously, and the 21-percentage point difference between high school enrollment and CSU enrollment for Hispanics. These trends provide context to one possible way that CE could help reduce college-going disparities. Specifically, higher CE participation rates compared to CSU and UC enrollment rates implies that greater proportions of African-American and Hispanic students are enrolling in CC courses and participating in opportunities with the potential to increase their college readiness levels, compared to the rates at which they are currently enrolled in college. This is particularly noteworthy as students often use the CC experience as a gateway to attaining a bachelor's degree (Grubb, 1991; Perry, Rosin, Woodward, & Bahr, 2010; Rosenbaum, 2001; Venezia, et al., 2003).

Concurrent enrollment rate comparisons for males and females are less straightforward. Figure 6 shows mixed results for males and females, and the differences that do exist are small. Thus, the role CE plays as a pathway to college readiness and college enrollment is less clear. The fact that CE levels are less than CSU levels for females and less than UC levels for males suggests that there is no significant difference when disaggregating trends by gender. Looking at CE trends prior to 2006 for each of

these groups (race and gender), I will next show whether or not the rates at which students participate in CE is consistent over time.

To describe the CE participation trends over time by race, I first compare rates between the four groups in two ways. First, I investigate how much participation rates vary for each group over time and compare these rates across the four groups. Second, I analyze whether differences in participation rates across the four groups are changing over time.

Figure 7 shows that rates at which African-American and Asian students participate in CE have held fairly steady over time. This is not the case for white and Hispanic students. The percentage of CE students who are Hispanic has increased at the same time that the percentage of CE students who are white has decreased.

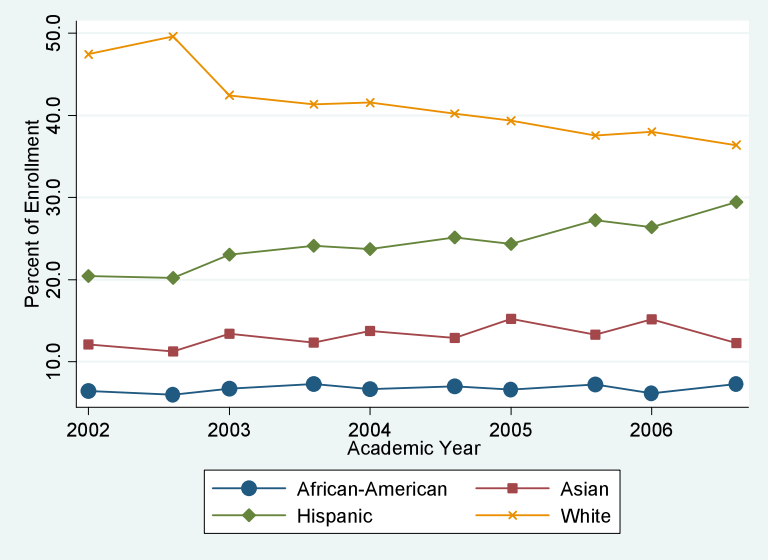

Figure 7 – Concurrent enrollment levels over time, by race
Source: California Community College Chancellor's Office

The fact that the CE participation rate for white students is steadily decreasing indicates that differences in CE participation between whites, Hispanics, and African-Americans are also decreasing. This is particularly true between Hispanics and whites, where the

difference in 2002 is over 20 percentage points but is less than 10 percentage points in 2007.

For a more comprehensive understanding of CE trends by race/ethnicity, I also compare the CE participation rates of each race/ethnic group to their respective enrollment rates in California public high schools. This helps clarify whether or not CE trends are simply a reflection of high school enrollment trends.

Figures 8-11 compare CE trends to California high school enrollment trends from 2002 through 2007 by race/ethnicity.

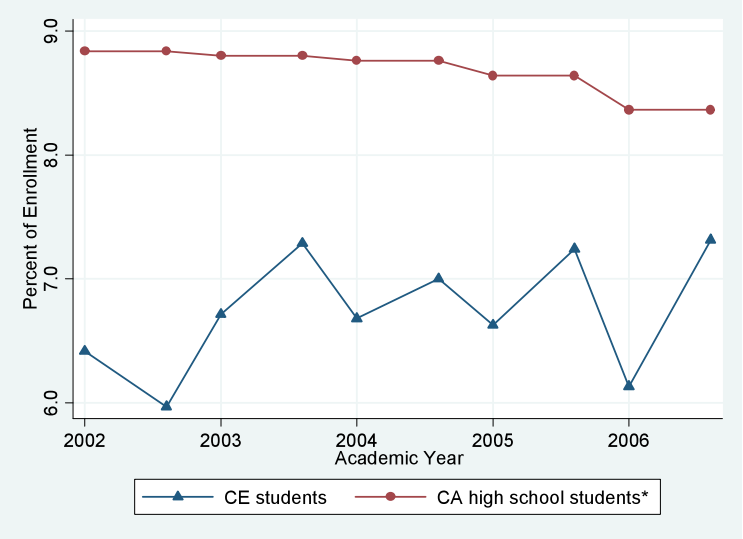

Figure 8 – Concurrent enrollment and California high school enrollment levels for African-American students, over time
** Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

Figure 8 displays the percentage of African-American students enrolled in California public high schools and the percentage of CE students who are African-American. The trends show that African-Americans are underrepresented among CE students, as they make up between eight and nine percent of the high school population, while they

constitute at most 7.4 percent of the CE population. There does appear to be a slight narrowing of this gap over time. However, this appears due to a slight decrease in the African-American high school population over time.

Figure 9 displays the trend for Hispanic students. Because the percentage of CE students who are Hispanic is never greater than the percentage of high school students who are Hispanic, these students are also underrepresented among the CE population. Although the percent enrollment for both the California high school population and CE levels increased over time for Hispanics, the gap between the two narrowed. Specifically, the difference between the percentage of high school students who are Hispanic and the percentage of CE students who are Hispanic decreased from 20 percentage points in 2002 to 15 in 2006.

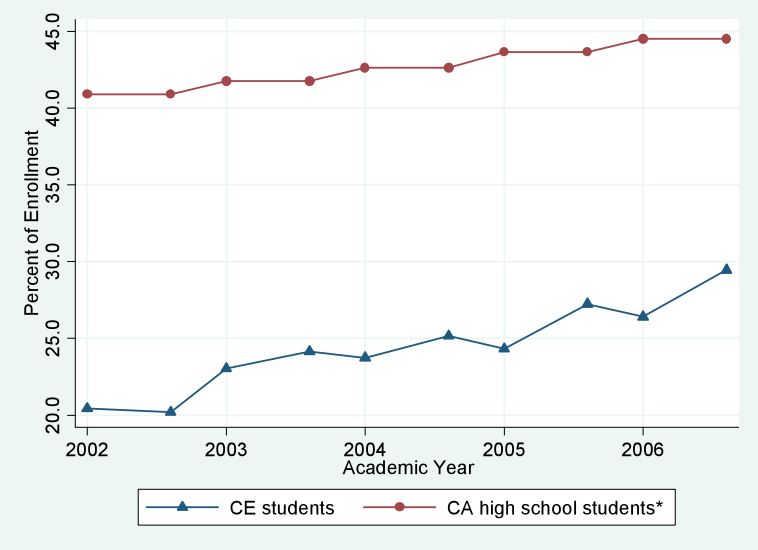

Figure 9 – Concurrent enrollment and California high school enrollment levels for Hispanic students, over time
** Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

Participation trends for Asian students show that Asians are overrepresented among the CE population. Figure 10 shows that Asian students make up approximately nine percent of the California high school population, and constitute anywhere from 11 to 15 percent of the CE population. Furthermore, there appears to be a slight increase in CE enrollment for Asians over time, demonstrating that Asian high school students continue to increase their presence among the CE population.

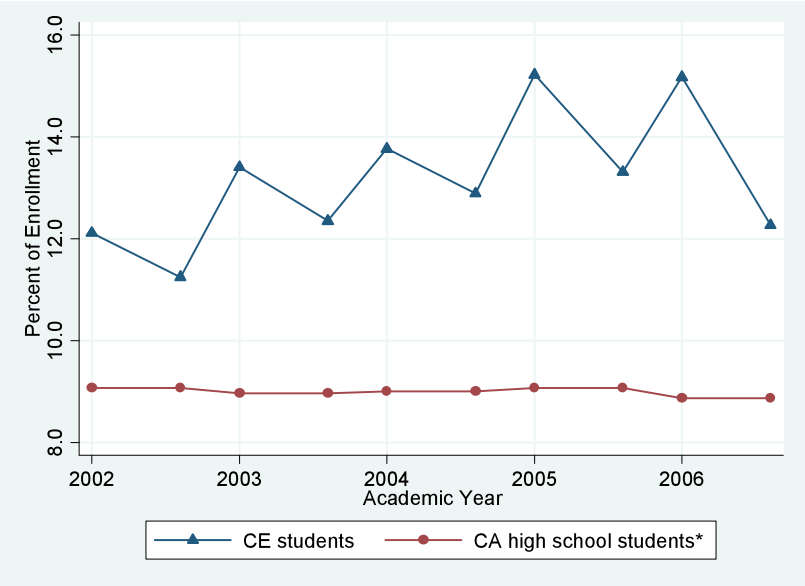

Figure 10 – Concurrent enrollment and California high school enrollment levels for Asian students, over time
** Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

When looking at the trends for white students, as seen in Figure 11, it becomes immediately evident that although whites are consistently overrepresented among CE students, CE participation and high school enrollment rates have steadily decreased over time. In the spring term of 2007, the percentage of CE students who are white was at its lowest figure—36 percent—as was the percent of high school students who are white—

32.1 percent. Moreover, the difference between these two gaps decreased over time from 10.8 percentage points in the fall of 2002 to 3.9 percentage points in the spring of 2007.

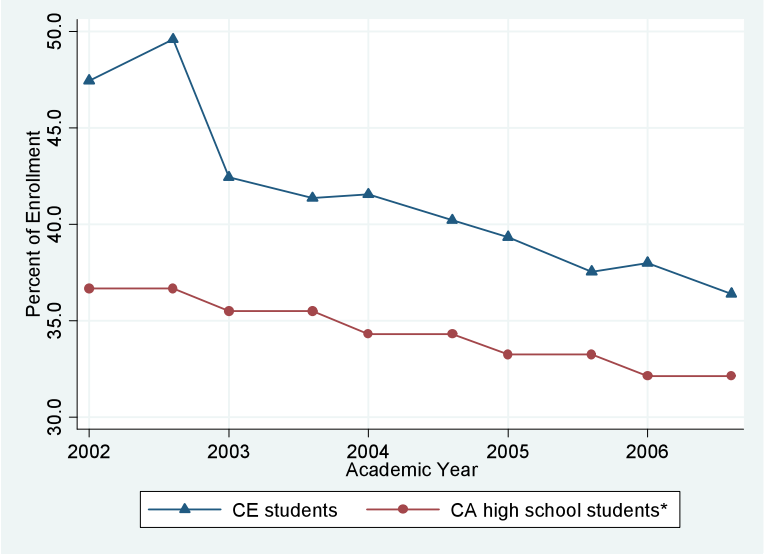

Figure 11 – Concurrent enrollment and California high school enrollment levels for white students, over time
* *Data reflect California public high school students only.*
Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

These trends reveal that African-Americans and Hispanics are consistently underrepresented among concurrently enrolled students. For both of these student groups, the percentage that constitutes the CE population is *less than* that which constitutes the high school population. This is not the case for whites and Asians, where their participation in CE is greater than their high school enrollment levels.

One possible reason for these trends is that high schools with high African-American and Hispanic student populations have low levels of CE participation by these students. Figure 12, however, indicates that this may not be the case. Each circle in Figure 12 represents a different high school in my CDS sample and its position indicates what percent of the high school population is African-American or Hispanic as well as what percent of the CE students from that high school are African-American or Hispanic.

The size of the circle represents the number of students from that high school that participated in CE during the fall of 2006—a bigger circle indicates a greater number of CE students from that high school. Based on these data, the percentage of a high school's African-American or Hispanic population that participates in CE is most likely to be less than 10 percent, regardless of the percentage of the overall high school population that is African-American or Hispanic. In addition, there seems to be no relationship between the number of underrepresented minority students from a high school who participate in CE and the percent of the high school's student population that is underrepresented minority. Because these findings come from data in my CDS sample, they reflect participation rates for students within a sample of California high schools. Nevertheless, these findings suggest that African-American and Hispanic students are underrepresented in CE because they participate in CE at low rates regardless of the race/ethnicity composition of their high school.

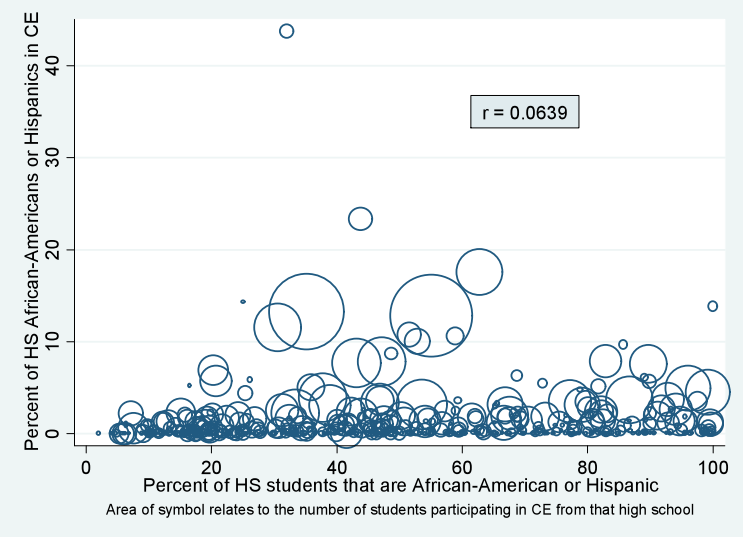

Figure 12 – Percent of minority students from high school that participate in CE – Fall 2006
Source: California Community College Chancellor's Office
California Postsecondary Education Commission

When disaggregating the data by gender, Figure 13 shows that enrollment levels for males and females are fairly consistent over time. The percentage of high school students who are male is consistently greater than the percentage of students who are female (by about 2.8 percentage points), yet the opposite is true for CE. Female participation in CE is consistently greater than male participation. In addition, beginning in 2003, the gap between the two groups is greater than 10 percentage points. This indicates that females are overrepresented among CE students and males are underrepresented among CE students when compared to their high school enrollment levels—a finding consistent with trends showing a growing female advantage in college access and degree completion (Buchman & DiPrete, 2006; Buchman, DiPrete, & McDaniel, 2008).

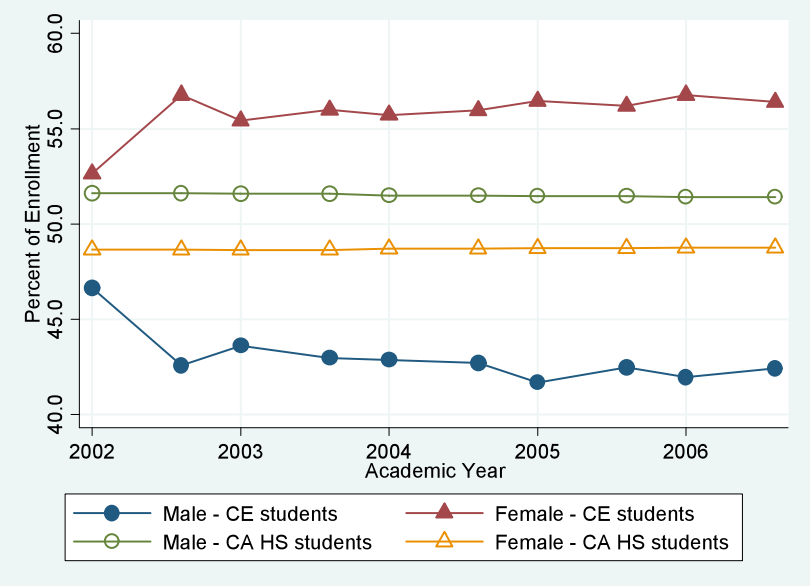

Figure 13 – Concurrent enrollment and California high school enrollment levels for male and female students, over time

Sources: California Postsecondary Education Commission
California Community College Chancellor's Office

One possible reason for existing differences in CE participation rates is that certain types of community colleges may provide more opportunities for high school students to enroll in college courses than others. In the next section, I turn to an investigation of where students choose to take advantage of their CE opportunities. Specifically, how is CE participation distributed across the California community college system?[23]

Where are CE students going?

If more CE students attend certain CCs, this would indicate that CE participation is not uniform throughout the state. Equal levels of participation, however, may not be the goal if, for example, some CCs in the state target high school students more directly for CE programs, or have particular relationships with neighboring high schools. Early and Middle College High Schools are good examples of this. In each case, the high school works closely with a CC to improve the educational experiences of underrepresented students (Lerner & Brand, 2006; Wang Golann & Hughes, 2008). In this context, we might expect higher participation rates in parts of the state where African-Americans and Hispanics are concentrated. Although analysis of the residential areas in which CE students live is beyond the scope of this study, this section describes the characteristics of the CCs that CE students attend. This provides a sense of whether or not California high school students are more likely to concurrently enroll in certain types of CCs.

[23] Recall that previous chapters discussed how CE courses do not always take place on the community college campus. Therefore, enrolling or attending a community college does not necessarily mean that the student's course(s) is physically located on the college campus. It does mean that the student is registered at the college as a community college student and engaged in a community college-level course.

Figure 14 describes the CE trend as it compares to the California community college population. This indicates the percentage of CC students across the state who are concurrently enrolled high school students, and what is the trend over time. There are two reasons this information is important. One is that it clarifies the degree to which the CC system is impacted with CE students, as current CE literature does not discuss such estimates at the national or state levels. Second, it sets the context for analyzing CE trends among subgroups of the CC system. For instance, if some CCs enroll CE students at a much higher rate than the state average, this indicates the possibility of a group of CCs creating a unique learning environment that may increase the likelihood that high school students participate in CE.

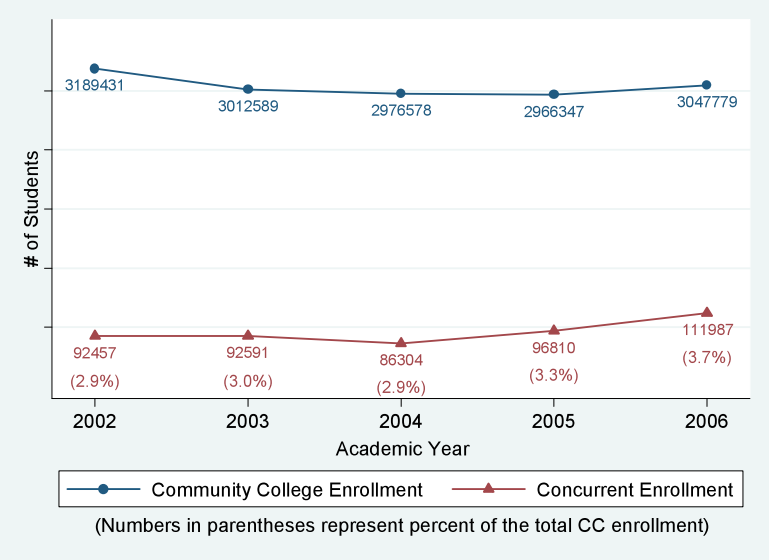

Figure 14 – Community college and CE levels over time
Source: California Community College Chancellor's Office

The trends in Figure 14 show that over time CE students account for a greater portion of the total CC population overall, though the increase has been at a relatively slow pace. In 2002, CE accounted for approximately 2.9 percent of the total CC population. Despite a slight decrease in 2004, the proportion of CC students who are CE

students continued to steadily increase, reaching its highest level of 3.7 percent in 2006. Although increases are incremental, they suggest a trend of CE students becoming more prominent throughout the CC system.[24]

Chapter 4 describes how the 110 community colleges located throughout California are broken down into four geographic regions, with the majority of colleges located in the southern region of the state. In 2006, approximately 57 percent of CE students attended CCs located in southern California, 23 percent of CE students were in the Bay Area, 13 percent in northern California, and 8 percent in central California. These distributions were fairly consistent between 2003 and 2006.

These trends suggest that CCs in southern California have higher rates of CE participation than other parts of the state. However, when analyzing trends at the CC district level, two of the top three CC districts with the largest percentage of the CE population are not in southern California. The Foothill/De Anza and Contra Costa Community College districts rank second and third, respectively, in the percentage of CE students across the state who enroll in their colleges.

The Los Angeles Community College district, with its 10 colleges, enrolls the largest portion of California's CE population—approximately 17 percent in 2006. The Foothill/DeAnza district, with its two colleges, and the Contra Costa district, with its three colleges, each enrolled just under five percent of the state's CE students. This is in contrast to the overall enrollment levels within each district. In 2006, the Los Angeles Community College District enrolled approximately nine percent of the state's CC enrollment, while the Foothill/DeAnza and Contra Costa districts enrolled three and two

[24] Data for both the CE and CC enrollment trend lines are based on combining fall and spring enrollment numbers. Therefore, the overestimation issue in Figure 4 is not an issue here since any duplicate record found in the CE data is also found in the CC data.

percent of the state's CC enrollment, respectively. Therefore, CE enrollment levels in each of these three districts are an overrepresentation of the CE population when compared to overall CC enrollment levels.

These trends demonstrate that while southern California enrolls a large part of the CE population, this is mostly due to the large numbers of colleges in the region—namely the large number of CCs in Los Angeles serving the largest school district in the state ("Ed-Data," 2009). When analyzing CE at the district level (and not including the Los Angeles Community College District), CC districts outside of southern California enroll just as many, if not more, CE students than the remaining southern California CC districts.

In fact, outside of Los Angeles, no CC district in the state enrolls more than five percent of the CE population. While there are districts that enroll a very small percentage of the CE population (i.e. less than one percent), the distribution across CC districts is somewhat uniform. This implies that CC districts in California are providing comparable opportunities for high schools students to use CE to engage in postsecondary study and potentially improve their college readiness levels. Nevertheless, differences do exist and understanding what factors may contribute to those differences can help specific colleges and college districts develop better strategies to improve CE rates and thus improve opportunities for high school students to become college-ready.

Nationally, estimates reveal that over three-quarters of concurrently enrolled high school students choose public, two-year institutions for CE (Kleiner, et al., 2005). However, there is no research on institutional characteristics that may serve as the basis for students choosing to take advantage of CE opportunities. For instance, factors such as

CE students' proximity to the CC may be important. If the CE course is located on the college campus, then having that campus close may facilitate CE participation, as it is easier for the student to get to the class. If the college course is offered on the high school campus itself, it may be the case that having the CC nearby increases the likelihood that the college and high school are willing to work together to offer such a course. This is of particular importance as many CE opportunities come through education programs where high school-college partnerships play a central role (Bailey & Karp, 2003; Lerner & Brand, 2006).[25]

To calculate the distance between a student's home and the community college they attend, I use the zip code of the student's residence in the student data file and the address of the community college they attend (found on the CCCCO's website).[26] All zip codes, however, were not California zip codes and thus I only include those found in California.[27] Distance values are grouped into quintiles: 0-5 miles, 5-10 miles, 10-20 miles, 20-30 miles, and over 30 miles.

Using these distance calculations, my analysis reveals that 46 percent of all California CE students attend a community college located at most 5 miles away. Another 27 percent are between five and 10 miles away from their college; 18 percent are between 10 and 20 miles away; and the remaining are 20 or more miles away. This shows that nearly three-quarters of all CE students are within 10 miles of the CC they attend. Additional analyses to show what institutional characteristics promote CE and

[25] Early College High School, Middle College High School, and Tech. Prep. programs are all excellent examples of secondary to postsecondary partnerships to facilitate CE. In each case, partners work collaboratively to create the structure under which high school students enroll in CC courses and earn credits for those courses.
[26] Distances were calculated using batchgeo (www.batchgeo.com). This website estimates distances between two geographic points using addresses and/or zip codes of the two locations.
[27] Less than three percent of the zip code entries in my CDS sample were not located in California.

secondary/postsecondary partnerships would shed important light on this understudied area of postsecondary schooling and the transition to college. Perhaps relationships between the high school and CC are easier to build for some campuses than others. In addition, high school counselors may be more effective in helping promote CE when the CC is close by and there is a working relationship between the two institutions (Cavalluzzo, et al., 2002; Cunningham & Matthews, 2007).

Another reason could be simply that CE is more prevalent at the large CCs and that these colleges are able to provide more opportunities to high school students to enroll in college courses. Using publicly available CC enrollment data from the CCCCO website, I group CC enrollment sizes into quartiles: 0-13,000 total students, 13,000-20,000, 20,000-30,000, and 30,000 students or more. Findings for my CE student population show that for the 2006 – 2007 academic year, these large CCs enrolled nearly 40 percent of all concurrently enrolled students. The top quartile of CCs, whose enrollment is 13,000 or less, only enrolled 13 percent of California's CE students. This implies that a concurrently enrolled student is more likely to attend a large CC than any other. However, this does not mean that at large CCs the percentage of students who are CE students is greater than at smaller CCs.

At most California CCs, CE students make up no more than 10 percent of the college's total student enrollment. Figure 15 shows that although CE students make up greater than 10 percent of the student population at some of the smaller CCs, the percent distribution of a college's student enrollment that represents CE students is fairly

consistent across the majority of CCs, regardless of their size.[28] In other words, most CCs allow for similar proportions of their student enrollment to be CE students whether they are large CCs or not.

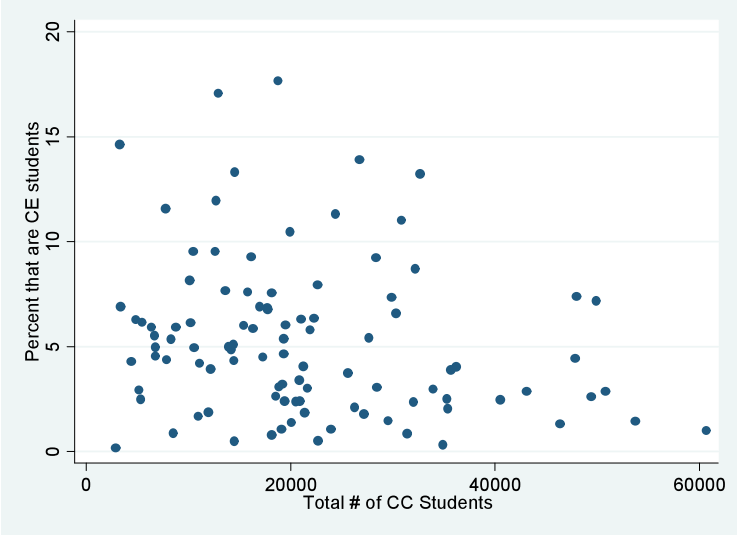

Figure 15 – Percent of students at a CC that are CE students, 2006-2007 academic year
Source: California Community College Chancellor's Office

In summary, findings from this section indicate that outside of Los Angeles, CC districts across the state enroll comparable proportions of the CE population. High school students are more likely to enroll in a CC that is located within 10 miles of their residence and has more than 13,000 students. Without knowing the specific motivators behind a student's participation in CE, it is difficult to surmise how CC characteristics impact CE levels. Nevertheless, such findings help clarify how certain CCs may provide increased opportunities for students to participate in CE and access the resources they need to become college-ready.

[28] The 11 colleges where CE makes up over 10 percent of the CC enrollment are: Ohlone (18%), LA Mission (17%), Feather River (15%), Santa Barbara (14%), LA Harbor (13%), Foothill (13%), LA Southwest (12%), Mendocino (12%), LA Trade (11%), LA Pierce (11%), and Ventura (10%).

Having a sense of which CCs may present greater opportunities for CE, and thus draw more high school students, only paints half the picture. Characteristics of the high schools CE students come from provide another important dimension to understanding trends in CE. In the next section, I analyze such characteristics and discuss the implications for how we evaluate CE.

Where are CE students coming from?

Knowing the characteristics of the high schools CE students attend is important because it provides a context for the learning environment CE students come from. Students from learning environments that promote a college-going culture are more likely to understand what it means to be college-ready and to take the necessary steps to increase their likelihood of going to college (e.g. enrolling in advanced level coursework) (Horn & Chen, 1998; McDonough, 1997; Watt, et al., 2006). For this analysis, I used data from my CDS sample based on the 2006-2007 academic year—the most recent academic year for which I have data on CE students. As I discuss in chapter 4, findings based on my CDS sample should be interpreted with caution because of differences between my CDS sample and my CE population. In this section, this pertains to my analyses that focus on the enrollment size, percentage of students participating in the free or reduced lunch program, API, and percentage of graduates who satisfied A-G requirements from each high school in my CDS sample. For each characteristic, Table 3 shows how I group data into quartiles to facilitate analysis and interpretation.

Table 3 – *Quartiles for high school characteristics*

Quartile	# of Students	% F/R Lunch	API	% AG Grads
1	0-600	0-25	200-400	0-25
2	601-1200	25-50	401-600	25-50
3	1201-1800	50-75	601-800	50-75
4	1800+	75-100	801-1000	75-100

The first high school characteristic I looked at was the size of the school. Do CE students come from large, average, or small high schools based on the total enrollment in grades 9 through 12? The bottom quartile of school size represents high schools with an enrollment size of 1,800 students or more. Of the CE students in this sample, over 70 percent attend large high schools. The remaining 30 percent are fairly evenly distributed throughout the remaining three quartiles of school size. However, even though most CE students come from large high schools, this does not mean that a relationship exists between the size of the high school and the percentage of students from that high school that participates in CE. In fact, no significant relationship exists between a high school's size and the rate of CE participation among their students.

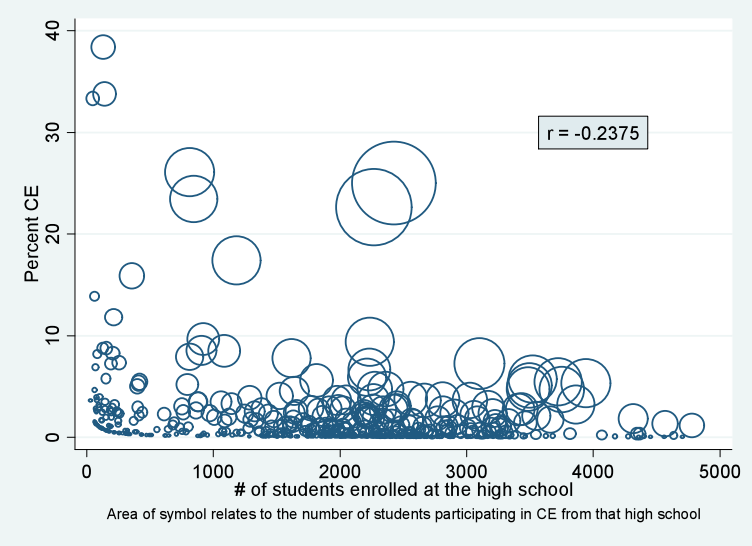

Figure 16 – Rate of CE participation – fall 2006, by size of high school

Source: California Community College Chancellor's Office
California Postsecondary Education Commission

In Figure 16, I compare the rate of participation for each high school in my CDS sample to the size of that school. The data show that for the vast majority of high schools, less than 10 percent of their students participate in concurrent enrollment—

regardless of the enrollment size of the high school. The larger circles in Figure 16 indicate that larger high schools send a greater number of students to CE. For example, a high school with 2,000 students and a CE participation rate of five percent means that 100 of its students participate in CE, while a high school with an equal rate of CE participation but an enrollment of 500 students only sends 25 students. Consequently, large high schools may not send a greater percentage of their students to CE, but they do send a greater *number* of students, which is why over 70 percent of CE students come from large high schools.

This trend is shown in Figure 17. Using data from my CDS sample for the fall term of 2006, I list all high schools in my sample that have at least 50 students participating in CE, and sort them by enrollment size of the high school.[29] This figure shows that of the 61 high schools that send at least 50 students to participate in CE, 49 of them (over 80 percent) are large schools (i.e. total enrollment of over 1,800 students).

[29] Two high schools were excluded from this figure: Middle College High and High School at Moorpark College. They represent small schools (enrollment of fewer than 400) where nearly 100 percent of students participate in CE. This represents a unique rate of CE participation among my sample of schools. Therefore, they were not included in this and subsequent figures describing CE participation rates by high school characteristics.

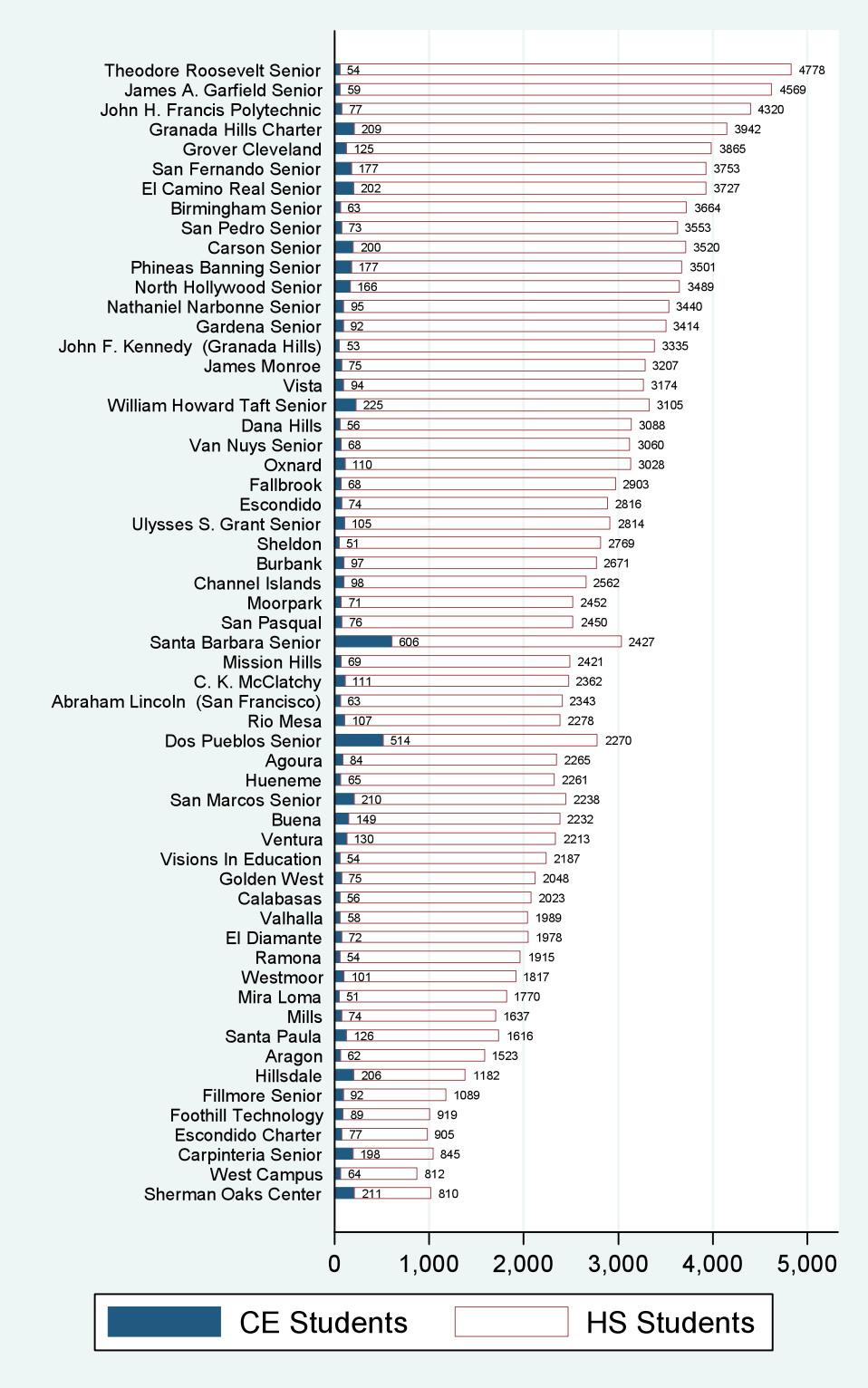

Figure 17 – Concurrent enrollment and high school enrollment levels for schools with at least 50 students participating in CE – fall 2006
Source: California Community College Chancellor's Office
California Postsecondary Education Commission

As students of low SES are, on average, less likely to be college-ready (Adelman, 2006; McDonough, 1997; Rosenbaum, 2001), the second high school characteristic I investigate is the overall SES level of the high school (as measured by the percentage of students in the free or reduced lunch program). Based on data from this sample, nearly three-quarters of CE students come from schools where *less than* 50 percent of students are of low SES. In fact, just over seven percent of CE students attend a high school where 75 percent or more of students are of low SES.

The *rate* at which students participate in CE, however, does not depend on the SES level of the high school. In Figure 18 I compare the percent of high school's student population that participates in CE to the percent of the school's students that are on the free or reduced lunch program. Again, the size of each circle references the number of students from the school who participate in CE. Findings indicate no relationship exists between the SES level of a high school and the percentage of students participating in CE.

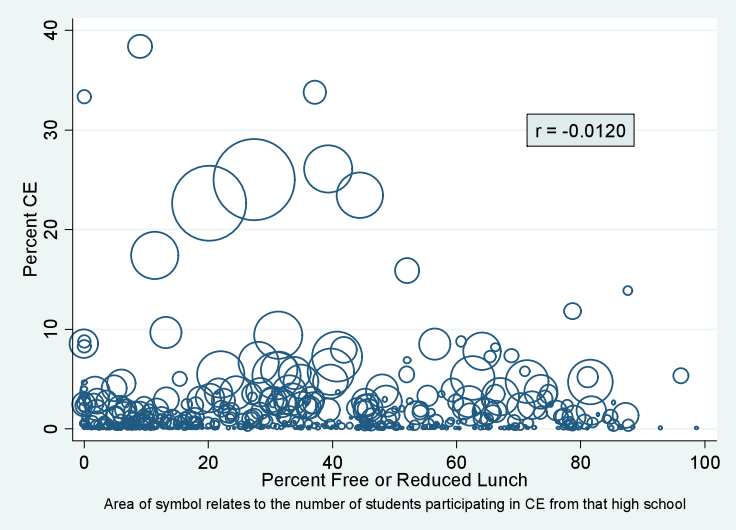

Figure 18 – Rate of CE participation – fall 2006, by high school SES level
Source: California Community College Chancellor's Office Common Core Data

In analyzing CE participation trends, another important high school characteristic to consider is the level of academic achievement of the high school. Students who attend high schools that promote a college-going culture and create a peer environment focused on college readiness are more likely to pursue a postsecondary degree (Gibson, et al., 2004; McDonough, 1997; Mehan, et al., 1996; Oakes, 2003). One important aspect of a school's college-going environment is the academic achievement level of students. Students with high levels of achievement in high school are more likely to attend college (Adelman, 2006; Horn, et al., 2000; Rosenbaum, 2001). This implies that CE students attending high schools whose students, on average, perform at high academic levels are more likely to come from an institutional academic environment with a college-going culture.

First, I use California's Annual Performance Index (API) score as a measure of school performance.[30] Based on this metric, nearly three-quarters of CE students come from high schools whose API is between 600 and 800, and almost 85 percent attend high schools with a score over 600. The median API of high schools in this sample is 723. The median API of high schools throughout the state is 679. Consequently, CE students come from high schools that perform above the state average.

A second way to measure the academic achievement levels of CE students' high schools is the degree to which high school graduates meet California's A-G requirements.[31] On average, 20 percent of graduates from high schools across California satisfy A-G requirements. Across the high schools in this CE sample, the average is 30

[30] API (Annual Performance Index) is a numeric index that California employs as an indicator of a school's performance level. The index is based on standardized test scores and ranges from 200 to 1,000. California's target for all schools is 800. ("Fact book 2007: Handbook of education information," 2007)
[31] A-G requirements represent a sequence of courses required to demonstrate minimum eligibility for admission to the University of California ("A-G guide,").

percent. In fact, nearly 75 percent of CE students attend high schools whose average completion of A-G requirements is higher than the state average. These findings along with those relative to the API measure of school achievement level suggest that CE students are more likely to come from above-average performing high schools.

As with high school size and high school SES levels, Figure 19 and Figure 20 display the relationship between the school characteristic and the percent of students from that high school that participate in CE. Results displayed in these two figures show that no systematic relationship exists between the aggregate academic achievement level and the rate of CE participation for the high school. Specifically, less than 10 percent of a high school's student enrollment participates in CE—regardless of its academic achievement level.

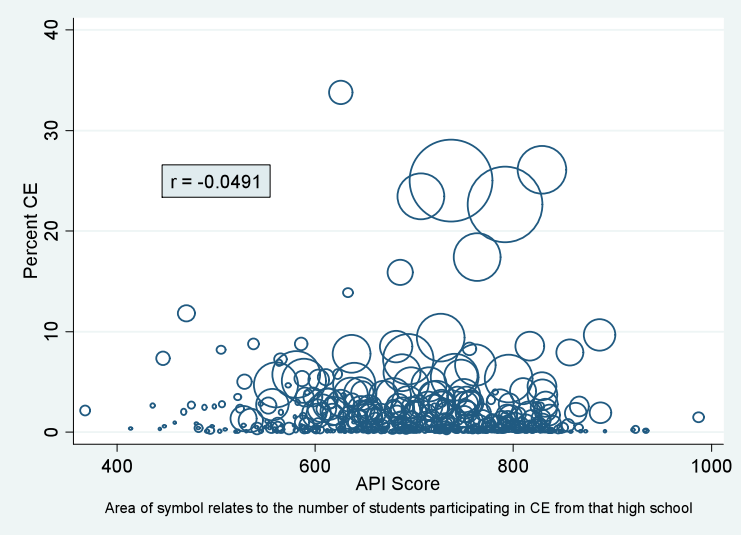

Figure 19 – Rate of CE participation – fall 2006, by high school API score

Source: California Community College Chancellor's Office
California Department of Education

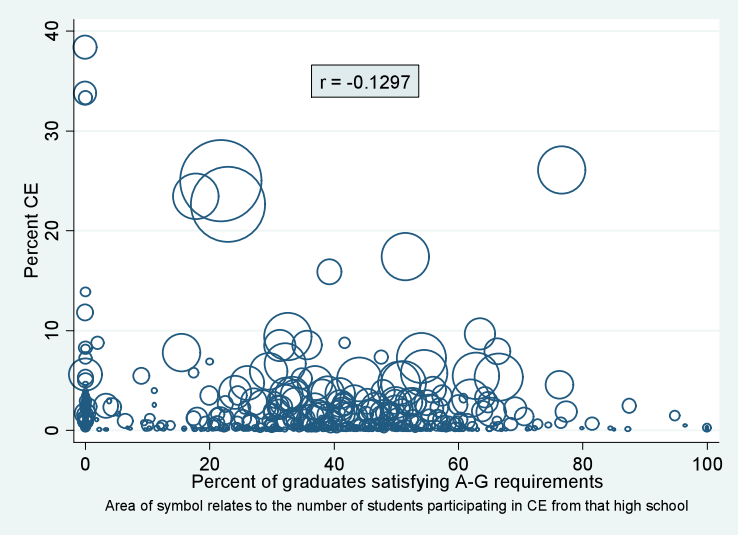

Figure 20 – Rate of CE participation – fall 2006, by percent of HS graduates satisfying A-G requirements
Source: California Community College Chancellor's Office
California Postsecondary Education Commission

Together with the findings on school size and SES, the overall picture leads to two important conclusions. One is that CE students, on average, are more likely to come from large, more affluent, and high-achieving high schools. The second conclusion is that large, more affluent, and high-achieving high schools send similar *percentages* of their students to participate in CE as high schools that are smaller, more affluent, and with higher achievement levels.

It is important to keep in mind that these findings are based on aggregate data and thus, interpretations at the individual student level may be misleading. For example, a student who attends a high school of high SES may come from a family of low SES, or a student who attends a high-performing high school may be a low-performing student. In both instances, it could be the case that the CE experience provides the student with access to college readiness resources he or she would otherwise lack—even though average high school characteristics suggests something different.

Nevertheless, the data do not paint that picture. CE students in California are most likely to come from high schools where most of the students are not of low SES and whose achievement levels are above state averages. This suggests that CE students come from secondary learning environments with adequate resource support. Whether through peer networks of students of high SES, or an institutional climate that fosters high levels of academic achievement, CE students, more often than not, have access to college readiness resources at their high schools. Thus, CE may simply be another path for advantaged students to enrich their already high levels of college readiness.

Conclusion

In summary, this chapter demonstrates that participation in CE has increased over time and that this increase reflects a greater proportion of high school students enrolling in CC courses. However, some students (specifically, African-American and Hispanic students) are underrepresented in CE, even though the percentage of CE students who are Hispanic is steadily increasing. In addition, CE students are most likely to come from schools that are, on average, higher performing, have larger enrollments, and higher SES levels. This final finding is based on data from my CDS sample and thus should be interpreted with caution. High schools in my CDS sample represent a sample of CE students and thus findings cannot be generalized to all students in my CE population. Nevertheless, the general findings based on high school characteristics are particularly noteworthy in that comparisons by race among CE students paint a different picture.

In order to discuss the possible college readiness implications of these findings, it is important to understand the relationship between school characteristics and race/ethnicity. Table 4 shows that when disaggregating the school characteristics data by

race/ethnicity, African-American and Hispanic CE students come from high schools who, on average, have lower API scores, higher enrollment levels, and lower SES levels than their Asian and white counterparts. For instance, African-American and Hispanic CE students attend high schools that, on average, have an API score below 700 while Asian and white CE students come from high schools that, on average, have an API score above 700. This indicates an important different difference between the high schools underrepresented minority students attend and Asian and white students.

Table 4 – School Averages, by Race & Gender*
2006 – 2007 Academic Year

	API		School Size		Free or Reduced Lunch		Percent A-G	
	CE	CA	CE	CA	CE	CA	CE	CA
African-American	672	629	2270	2148	43	46	40	33
Asian	743	713	2181	2218	34	30	45	44
Hispanic	663	636	2492	2294	49	50	37	32
White	744	714	2086	2001	26	25	36	37
Male	716	671	2220	2161	35	38	38	35
Female	708	673	2285	2171	37	38	39	35
Number of Schools	528	1804	547	1804	531	1804	547	1804

* *Note: CE values are based on high school averages for schools in my CDS sample while CA values are based on high school average for all schools in California.*

Differences between the high school characteristics of African-American and Hispanic students and Asian and white students exist for the students and their high schools in my CDS sample (columns labeled CE) as well as for all high school students in California (columns labeled CA). Moreover, the average African-American or Hispanic CE student attends a high school that has a lower API score and is of lower SES than the average Asian or white California high school student. For example, African-American and Hispanic CE students attend high schools where, on average, over 40

percent of students are on the free or reduced lunch program. Statewide, Asian and white students come from high schools where, on average, 30 percent or less of the students are on the free or reduced lunch program.

This relationship between race/ethnicity and high school characteristics impacts the interpretation of CE as a tool to increasing college readiness levels of underrepresented students in the following way. Low academic achievement and low SES are indicators of a student's likelihood to enroll in college, as discussed in chapter 2. These students often lack resources to help them prepare for college (McDonough, 1997; Plank & Jordan, 2001; Vargas, 2004). Therefore, programs dedicated to using CE to help underrepresented students prepare for and access college often include supplemental support services for students such as tutoring, academic advising, and study skills workshops to compensate for the educational resources they may lack (Bailey & Karp, 2003; Kleiner, et al., 2005).

One way of interpreting the impact this increase in resource support can have on a student's academic experience is through the social and human capital lenses discussed in chapter 3. Viewed through a social capital lens, CE programs can help high school students develop relationships with individuals who can provide them guidance on how to best navigate the college environment and how to adapt to the different types of learning experiences one has in college. Using a human capital lens, CE can provide additional opportunities for students to engage in rigorous academic coursework and learn course content-specific knowledge and skills that make them college-ready. Therefore, even though CE students come from high schools that, on average, are higher performing and have higher SES than state averages, the fact that African-American and

Hispanic students come from schools that are lower performing and lower in SES than the high schools Asian and white CE students attend suggests that underrepresented students may have less access to social and human capital-building opportunities than their concurrently enrolled Asian and white peers.

Knowing who participates in CE, where they enroll, and what types of high schools they come from allows for a very limited interpretation of how the CE experience can help reduce differences in college access. To further clarify how CE may be improving the college readiness levels of high school students, I next look at the overall coursework experiences and achievement levels in CC coursework.

Chapter 6 – How do students participate in CE and how well do they do in their CC courses?

Research Question 2:

2. How are California high school students participating in CE and how well are they doing in their community college courses? In particular, what are the overall academic and non-academic course-taking patterns and what are the overall achievement trends for the different types of CC courses CE students take?

To answer research question 2, this chapter is organized in the following manner. In the first section, I describe how California high school students participate in CE by focusing on two aspects of their CC course-taking experiences. I begin by describing how much students participate in CE by analyzing if CE students enroll in a CC for consecutive fall and spring terms, and the number of CC courses and credits they earn in each of those terms. I then discuss the academic focus of the CC courses taken by describing trends in the types of courses in which CE students enroll. Specifically, I analyze the data by the course type categories of basic skills status, degree applicability, and transferability to a four-year institution to see if CE students take courses that are part of a pathway to attaining a postsecondary degree. In addition, I describe the academic focus of their coursework experiences by analyzing the degree to which CE students enroll in math, English, science, foreign language, history courses, and other academic or non-academic subjects.

In the second section of the chapter, I discuss the overall achievement trends for CE students. Here I disaggregate college courses by the same typologies mentioned previously, and look at the grades earned in those courses during the fall term of 2006 and the spring term of 2007. In the concluding section, I summarize the findings from this chapter and discuss their implications for students increasing their college readiness

levels. Specifically, I discuss the CC coursework enrollment and achievement trends for CE students and how they relate to students' opportunities to use CE as a mechanism to become college-ready. This provides a context for the next chapter, where I disaggregate trends by race/ethnicity and predict the types of CE experiences different students may have.

Overall course-taking trends for all CE students

To analyze if CE students enroll in a CC for multiple terms during the academic year, I looked at whether or not a CE student is enrolled in both the fall and spring terms during any of the five academic years in my data. On average, 22 percent of CE students who enroll in a fall term also enroll in the subsequent spring term. Because my analysis does not follow cohorts of students, I cannot accurately track the full course-taking history of particular students. For example, I cannot determine whether or not a CE student who enrolls in a CC course during the spring term of 2006 also enrolls in a CC course in the fall of 2008. My findings do show that over 75 percent of CE students are not likely to enroll in a CC for multiple terms during an academic year.[32]

During their term(s) of enrollment, the majority of CE students enroll in one college course during any given term. Specifically, Table 5 shows that at least 64 percent of students enroll in one course and at least 82% enroll in no more than 2 courses. Additionally, the percentages for students enrolling in only one course are always less in the fall when compared to the subsequent spring and enrollment in only one course consistently increase beginning with the fall of 2003. This indicates that a CE student is

[32] At least 89 percent of CE students who enroll in a spring term do not enroll in the following fall term indicating that consecutive terms of enrollment is even less likely from spring to fall of the following academic year.

more likely to enroll in more courses during the fall term than in the spring term, and that since the fall of 2003, students are less likely to enroll in multiple courses.

Table 5 – Percent of students who enroll in 1, 2, 3, or more than 3 courses in a given term

	1 course	2 courses	3 courses	More than 3 courses
Fall 2002	68%	19%	7%	7%
Spring 2003	72%	17%	6%	4%
Fall 2003	64%	18%	8%	10%
Spring 2004	70%	17%	6%	6%
Fall 2004	66%	18%	8%	8%
Spring 2005	72%	17%	6%	5%
Fall 2005	69%	18%	7%	6%
Spring 2006	73%	17%	5%	5%
Fall 2006	71%	18%	6%	5%
Spring 2007	73%	17%	6%	4%

Table 6 – Percent of students earning varying numbers of units in a given term

	1 or less than 1 unit	Between 1 and 2 units	Between 2 and 3 units	More than 3 units
Fall 2002	28%	13%	26%	33%
Spring 2003	28%	11%	30%	31%
Fall 2003	18%	10%	28%	45%
Spring 2004	22%	10%	32%	36%
Fall 2004	19%	10%	30%	41%
Spring 2005	24%	10%	32%	34%
Fall 2005	20%	10%	31%	39%
Spring 2006	25%	9%	33%	32%
Fall 2006	22%	7%	33%	39%
Spring 2007	25%	8%	35%	32%

During those terms, students are more likely to earn 2 or more units than they are less than two units (Table 6). Moreover, a greater percentage of students earn 3 or more units during the fall terms than during the spring terms. This may be related to the fact that CE students are more likely to enroll in more than one course during the fall terms. However, because the changes in percentages in Table 6 over time are different than those in Table 5, a more likely explanation is that the number of units CE students earn

depends more on the types of courses students take than the number of courses in which they enroll.

Whether or not factors such as the number of CC courses CE students take influence the likelihood of a student going to college is unclear (Karp, et al., 2007). Consequently, I am unable to draw conclusions on how my findings for California CE students may impact the degree to which they enroll in college. There is evidence, however, that the types of college courses CE students take does impact their college readiness levels (Grubb, 1991; Karp, 2007; Moore & Shulock, 2009; Moore, Shulock, & Offenstein, 2009; M. Nakkula & Foster, 2006). One important characteristic of the college courses CE students take is whether the course is part of a prescribed pathway that will either lead to a student earning an associate's degree or will facilitate a student's transfer to a UC and/or CSU. Enrolling in such courses not only helps build college readiness skills for students, but also increases their likelihood of earning a bachelor's degree (Grubb, 1991; Moore & Shulock, 2009; Moore, et al., 2009).

Earning college credits—while in high school—that are applicable to a postsecondary degree suggests that CE students will not have to take as many courses when they do enroll in college, and therefore the time and cost required to earn a degree decrease. This makes the process of earning a postsecondary degree much more efficient, which increases the likelihood of going to college and earning a degree (Moore, et al., 2009). Therefore, the CE student may see the transition to college as something they have a head start on and attaining a college degree as something realistically within reach.

To determine the pathway status of the CC courses in which students in my CE population enroll (i.e. whether courses are applicable to a college degree or not), I use the course category typology created by the CCCCO. The three CCCCO categories in my analysis are: basic skills status, degree applicability, and transferability. A basic skills course is one that a CC district designates as not necessarily applicable toward an associate's degree but serves to help prepare students for success in degree-applicable courses ("California Code of Regulations; Data Element Dictionary,"). A course can be a basic skills course and be applicable to an associate's degree. For instance, Basic Reading and Elementary Algebra are two courses that are both a basic skills course and are applicable to an associate's degree. Such overlap does not happen often. In fact, less than two percent of the enrollment records for the students in my CE population overlap the two categories where 95 percent of the non-basic skills courses are degree applicable.

There relationship between degree applicability and transferability courses is much different. Here there is much overlap between courses that are applicable to an associate's degree and courses that are transferable to a UC and/or CSU. Over half of the degree applicable courses in my data are transferable to a UC and/or CSU while all courses that are transferable are applicable to an associate's degree.

From 2002 through 2007, data from my analysis consistently show that for any given term, over 80 percent of the courses CE students enroll in are *not* basic skills courses. In fact, during the last four terms of my data the percentage of courses that are not basic skills is over 90 percent. While these findings imply that an overwhelming majority of the CC courses taken are part of a prescribed pathway, I next analyze if they are degree-applicable to verify this implication.

About 83 to 89 percent of CC courses CE students take in any given term are applicable to an associate's degree. This indicates that more often than not, CE students use their CC coursework experience to engage in coursework that is directly connected to a CC degree—regardless of the intention to continue enrollment at the CC after graduating from high school.

Community college courses deemed transferable to the University of California (UC) and/or the California State University (CSU) also represent those of a prescribed pathway, as they are applicable to earning a bachelor's degree. As Figure 21 demonstrates, most of the CC courses CE students take are transferable to either a UC and/or a CSU. Specifically, at least 72 percent of courses taken in any given term are transferable, with at least 55 percent being transferable to both a UC and CSU. These findings provide evidence of a focus among CE students to enroll in CC courses that earn credits toward a postsecondary degree.

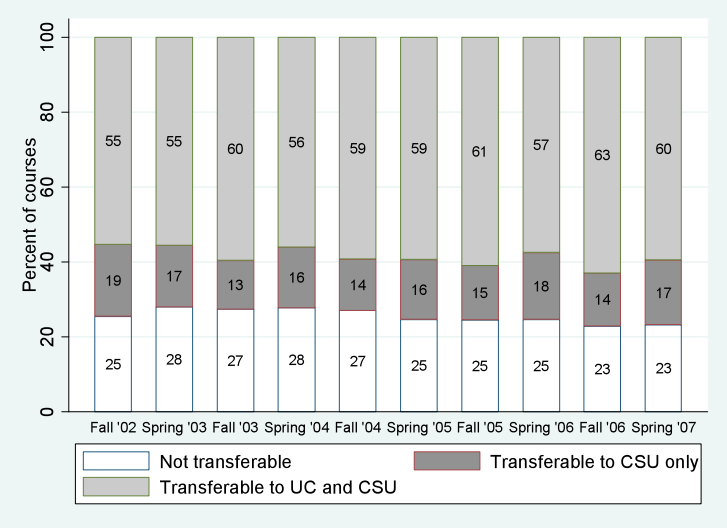

Figure 21 – Percentage of courses transferable to a UC and/or CSU
Source: California Community College Chancellor's Office

A second benefit to enrolling in courses that are part of a prescribed pathway is that this can increase the likelihood that students engage key gateway courses early on in their postsecondary experience. In particular, certain courses like English and mathematics are related to both going to college and earning a college degree (Horn, et al., 2000). Therefore, I next discuss the degree to which these types of courses are among the pathway courses CE students take.

In his work on identifying what high school courses are positively related to a student enrolling in college, Adelman (2006) identifies five as particularly important: English, math, science, history, and foreign language. The implication is that CE students who enroll in these types of courses at a CC are taking courses that can help them become college-ready—especially if the courses are English or math.

On average, 25 percent of CC courses that CE students take are English, math, science, history, or foreign language. When disaggregating the findings by the three categories of courses used previously, results are similar. Approximately 28 percent of non-basic skills courses and courses that are transferable to a UC and/or CSU are among these types of courses, as are 27 percent of degree-applicable courses. When disaggregating the data further, I find 36 different courses that qualify as math, English, science, foreign language, or history. Of these, the five that appear most often are general mathematics (27 percent), English (20 percent), Spanish (13 percent), history (11 percent), and general biology (5 percent).[33] For the 75 percent of courses that are not English, math, science, history, or foreign language, there are many *different* courses: 331. Of the 331, the top six are physical education (10 percent), music (8 percent),

[33] See Figure A-4 in Appendix A for a breakdown of the English, math, science, history, or foreign language courses with the most frequent enrollment.

general psychology (5 percent), supervised tutoring (4 percent), dramatic arts (4 percent), and career guidance and orientation (4 percent).

Enrolling in courses that are not English, math, science, history, and foreign language does not mean there are no benefits to college readiness and college access. For instance, college courses such as general psychology, introduction to sociology, and introduction to political science present CE students with opportunities to engage in college courses directly connected to a college degree that are not likely to be available to them through their high school. Figure 22 shows that in addition to these, students often enroll in college courses connected to a college degree that are not English, math science, history, and foreign language.[34]

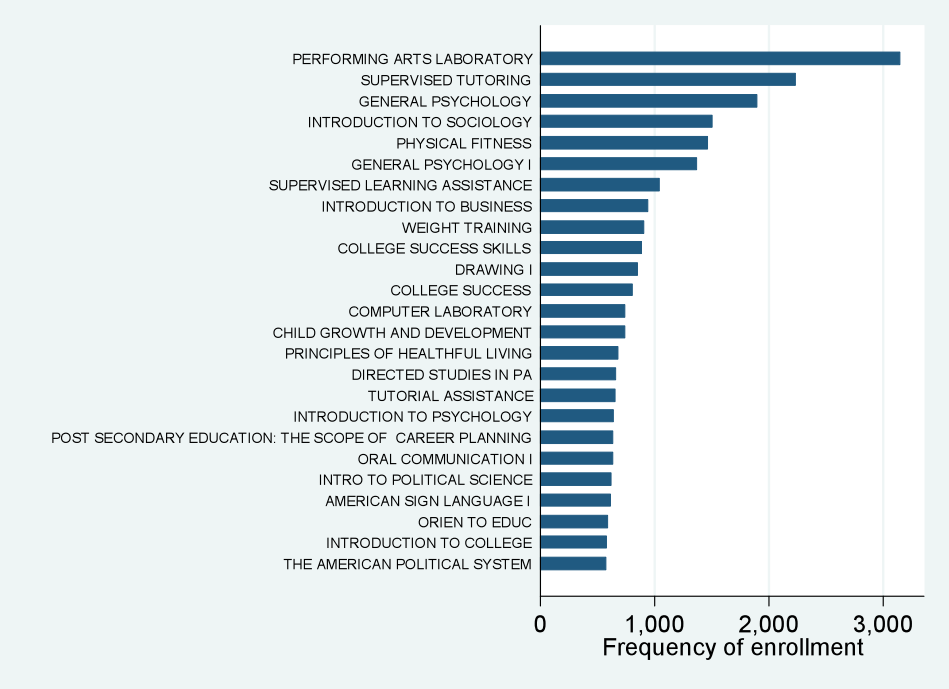

Figure 22 – Top CC courses CE students take that are not English, math, science, history, or foreign language
Source: California Community College Chancellor's Office

[34] See Figure A-5 in Appendix A for a breakdown of these types of courses with the most frequent enrollment.

In addition to enrolling in these types of courses, if the quality of the course is authentically representative of a college course, CE students potentially build such skills as cognitive strategies, study skills, and time management that make them college-ready and increase their likelihood of going to college (Cavalluzzo, et al., 2002; Karp, 2007). A qualitative evaluation of the college courses CE students take that determines if these skills are developed is beyond the scope of my study, and therefore these implications are speculative. However, students who enroll in courses that provide some type of orientation to being a college student also have a positive relationship to attaining a college degree (Moore, et al., 2009). Because CE students enroll in courses that potentially provide such orientation (e.g. the career guidance and orientation types of courses), this suggests that for some CE students their college coursework experiences outside of English, math, science, history, and foreign language courses may increase their likelihood of going to college and attaining a postsecondary degree.

In addition to knowing how students participate in CE, knowing how well CE students perform in their college courses provides additional clarity to understanding the quality of the CE experience. In the next section, I describe the overall achievement levels of CE students, for each of the various types of college courses they take.

Overall achievement levels in CC courses for all CE students

It is important to understand how well CE students do in their college coursework. Students with higher academic achievement levels while in high school are more likely to go to college (Adelman, 2006; Akerhielm, et al., 1998; Horn & Carroll, 1997). In particular, a student's grade point average is positively related to their likelihood of going to college (Adelman, 2006; Horn & Carroll, 1997). To measure the achievement levels

of CE students, I look at the specific grades earned in the CC courses CE students take. Originally, data for grades were coded into one of 31 categories.[35] For ease of interpretation, I aggregate the data into one of 10 categories: A, B, C, D, F, Pass, No Pass, Drop/Withdraw, Incomplete, and Unknown/Ungraded. I consider grades of A, B, C, and pass to reflect satisfactory levels of achievement, while grades of D, F, no pass, drop/withdraw, and incomplete reflect unsatisfactory levels of achievement. The ambiguous grade category of unknown/ungraded does not lend itself to interpretation one way or the other and therefore is interpreted as neither satisfactory nor unsatisfactory.

Basic skills, not degree-applicable, and not transferable courses.

For courses that are basic skills or are not applicable to an associate's degree, Table 7 shows that at least 60 percent of course grades earned in each category are recorded as unknown/ungraded. The next largest grade category is pass, where 11 percent of basic skills courses and 13 percent of non-degree-applicable courses receive this grade. Grades for courses that are not transferable are slightly different. For these courses, only 32 percent of grades earned are unknown/ungraded, while 21 percent earn a pass.

Table 7 – Grades CE students earned, by course type

	Basic Skills	Not Degree Applicable	Not transferable
A	4%	4%	11%
B	4%	4%	9%
C	4%	3%	7%
Pass	11%	13%	21%
D	2%	1%	3%
F	3%	2%	5%
No Pass	6%	5%	3%
Drop/Withdrawal	7%	5%	7%
Incomplete	0%	0%	1%
Unknown/Ungraded	60%	62%	32%

[35] See Table A-1 in Appendix A for all 31 categories.

Together, these findings suggest that overall it is difficult to get a sense of how much emphasis CE students enrolled in these courses place on building the college readiness skills and knowledge that depend on course content. Because so many grades earned are unknown/ungraded, it may be the case that these CE students look to the general college learning environment to help them increase their college readiness levels. This is particularly not surprising for basic skills courses or those not applicable to an associate's degree in that these courses, by definition, are more preparatory in nature and are what students take in order to be ready for a college course.[36] For instance, many of the courses taken in each of these three categories were supervised tutoring courses for specific subject matter (e.g. math tutoring). Therefore, students may be more apt to enroll in these courses for the college experience than for the specific course content, which may make students less likely to be concerned with the grade they earn in the course.

Greater differences are seen when looking at the percentage of courses in which students earn a grade of C or better. For basic skills and non-degree-applicable courses, 12 and 11 percent of grades earned, respectively, are C or above. For non-transferable courses, 27 percent of grades earned are C or above. This implies that even though the course is not transferable to a UC and/or CSU, CE students achieve at higher levels than in basic skills and non-degree-applicable courses. Consequently, CE students may be more focused on the content-specific college knowledge and skills in non-transferable courses than in basic skills and non-degree-applicable courses. One possible explanation for these differences is that many more courses are categorized as not transferable than

[36] California Code of Regulations, Title 5: Section 55035

basic skills or not degree-applicable.[37] Therefore, many courses that are *not* basic skills and *are* applicable to an associate's degree are not transferable to a UC and/or CSU.

These trends indicate that for CE students who are enrolled in basic skills or non-degree-applicable courses, it is difficult to measure students' achievement levels because of the high percentage of grades earned that are unknown/ungraded. Based on the percentage of grades that are pass or C or above, there is evidence that some CE students are achieving at satisfactory levels. However, because the majority of grades earned for these two types of courses are unknown/ungraded, I cannot make general conclusions regarding how successful CE students are in these courses.

Concurrent enrollment students enrolled in non-transferable courses, however, do appear to be doing well in their courses, as many students earn a grade of pass or C or better. This level of achievement may be shared with students enrolled in courses that are degree-applicable and not basic skills. Consequently, it is important to understand the trends in grades earned for courses that are not basic skills, are degree-applicable, or are transferable to a UC and/or CSU.

Not basic skills, degree applicable, and transferable to a UC and/or CSU courses.

The majority of CE students receive satisfactory grades in courses that are not basic skills, applicable to an associate's degree, or transferable to a UC and/or CSU. Specifically, at least 59 percent of grades earned in each of the three course categories mentioned previously are C or better with an additional 4 - 7 percent earning a pass. This

[37] In the 2006-2007 academic year, approximately 42,000 courses were not transferable, while 19,000 were not degree-applicable and 12,000 were basic skills.

means that nearly two-thirds of the grades earned for each category represent satisfactory levels of achievement for CE students.

Table 8 – Grades breakdown by type of course

	Not Basic Skills	Degree Applicable	Transferable to a UC and/or CSU	Transferable to a UC and CSU
A	30%	31%	33%	34%
B	17%	18%	18%	19%
C	12%	12%	12%	13%
Pass	7%	7%	4%	1%
D	4%	4%	4%	4%
F	8%	8%	8%	8%
No Pass	1%	1%	1%	1%
Drop/Withdrawal	10%	10%	10%	10%
Incomplete	2%	2%	2%	3%
Unknown/Ungraded	9%	7%	7%	6%

When CE students enroll in courses that are not basic skills or are degree applicable, grades earned are very similar. Much of this is because 95 percent of courses that are not basic skills are degree applicable. For courses that are not basic skills, Table 8 shows that 59 percent of grades earned are C or above, while for degree applicable courses the rate is 61 percent. In both categories, seven percent of grades earned are recorded as a pass. Unlike the previous section, differences in grades between these two categories and courses that are transferable are small. Grades earned in courses that are transferable to a UC and/or CSU are C or above 64 percent of the time (with four percent of grades recorded as a pass), and courses that are transferable to a UC and CSU are C or above 67 percent of the time (with one percent recorded as a pass). These findings show how CE students, in general, earn similar grades in all three course categories.

Additional evidence of parity in student achievement across course types is the percentage of students who receive grades of D, F, or no pass. In all four categories—this includes the two transferable categories—13 percent of students earn grades of D, F,

or no pass. This reflects a low percentage of CE students with poor performance in their college coursework.

Conclusion

Results from the analysis in this chapter show that CE students, on average, do not enroll in both the fall and spring term of the academic year; enroll in one course during that term that earns them between two and three credits; and, on average, earn satisfactory grades in their college courses. When looking at the courses CE students take, findings show that students do engage in academic pathway courses, key academic gateway courses, as well as orientation courses that help increase their likelihood to enroll in college and earn a postsecondary degree. However, the specific percentages show that CE students are less likely to enroll in identified key academic courses—English, math, science, history, and foreign language.

This is not to say that students who do not enroll in these courses cannot increase their college readiness levels through their CE participation. By participating in coursework at the postsecondary level, CE students are choosing to participate in a college-level learning environment. And through that environment, they may have the opportunity to build college knowledge and skills regardless of the types of courses in which they enroll.

One way in which CE students may build their college knowledge and skills and thus become college-ready is through the relationships they develop during their CE experiences. Applying the social capital theory lens that motivates this study, participating in CE and enrolling in CC courses may increase students' opportunities to develop relationships with individuals who can help build their college readiness levels.

For example, through access to CC counselors and members of the faculty and staff, CE students have access to a network of people who can help them develop important college readiness human capital, such as being an independent learner (Cavalluzzo, et al., 2002), how to develop their own ideas through writing, and how to use study groups to help develop problem-solving strategies (M. Nakkula & Foster, 2006).

As discussed throughout this chapter, the degree to which students participate in CE, the types of courses students take, and the level of achievement in CC courses are all important characteristics that contribute to the quality of the CE experience. Therefore, to understand the CE experiences of underrepresented students, it is important to analyze these types of outcomes by race/ethnicity. In the next chapter, I analyze the participation trends and achievement levels for African-American, Asian, Hispanic, and white CE students.

Chapter 7 – How do CE trends differ by race/ethnicity?

Research Question 3:

3. What are the race/ethnicity differences in CE participation, course taking, and achievement trends for California high school students? How do findings for African-American and Hispanic CE students compare to Asian and white students?

To disaggregate CE participation trends and achievement levels by race/ethnicity, this chapter is organized in the following way. In the first section, I focus on participation trends for African-American, Asian, Hispanic, and white CE students. The participation trends I analyze are the rate at which students enroll in a CC course for both the fall and spring terms of an academic year, the number of CC courses in which students enroll in a given term, and the number of units CE students earn per term. In the second section, I look at the types of courses in which students are likely to enroll. Here I fit a series of regression models to predict how likely CE students are to enroll in a basic skills course or a CC course that is transferable to a UC and/or CSU, based on their race/ethnicity.[38]

In the third section, I focus on achievement levels for African-American, Asian, Hispanic, and white CE students. Here I fit a similar series of regression models to predict the grade point average (GPA) earned in each of the three types of courses analyzed in the previous section. As discussed in chapter 6, courses that are not basic skills or are transferable to a UC and/or CSU help build the college readiness skills that increase a student's likelihood of enrolling in college and earning a bachelor's degree (Grubb, 1991; Moore & Shulock, 2006; Moore, et al., 2009). Consequently, I fit regression models to predict the average grade point earned in each of these types of CC

[38] In chapter 6, I included degree-applicable courses in my analysis. I did not include them in this chapter, as all degree-applicable courses are non-basic skills courses.

courses. Finally, based on findings from the regression models, I summarize the GPA for each of the four race/ethnicity groups in both types of courses.

Participation trends for CE students, by race

Findings for the percentage of students who enroll in the fall and in the subsequent spring term of the academic year, by race/ethnicity, are similar to the overall trends discussed in chapter 6. Specifically, CE students who enroll in a CC course in the fall term are not likely to continue in the spring term, regardless of race. However, there are important differences for the specific rates of continuous enrollment for each of the four race/ethnicity groups. As detailed in Table 9, less than 20 percent of Asian CE students in the fall of 2002 enroll in a CC course during the subsequent spring term. In the fall of 2006, 30 percent of Asian CE students who enroll in the fall term of 2006 also enroll in the spring term of 2007. Despite the increase of 11 percentage points over time, findings show that the majority of Asian CE students do not enroll in both the fall and spring terms of a single academic year.

Trends for white CE students are similar. The percentage of white CE students who enroll in the fall and subsequent spring term of an academic year increases over time and has a rate of 27 percent in 2006. Moreover, like Asians this also demonstrates that white CE students are not likely to enroll in both the fall and spring terms of an academic year.

Table 9 - Fall to spring enrollment for CE students, by race/ethnicity

		Fall 2002	Fall 2003	Fall 2004	Fall 2005	Fall 2006
Asian CE Students	Total number of students enrolled	9,071	9,397	8,911	10,649	11,716
	Percent of fall students who enrolled in the subsequent spring term	19.2%	26.7%	28.8%	28.7%	30.0%
White CE Students	Total number of students enrolled	36,945	31,304	9,151	29,745	32,753
	Percent of fall students who enrolled in the subsequent spring term	21.4%	23.9%	76.8%	24.8%	27.0%
African-American CE Students	Total number of students enrolled	5,117	5,541	5,003	5,772	6,442
	Percent of fall students who enrolled in the subsequent spring term	12.0%	17.2%	18.2%	16.9%	17.7%
Hispanic CE Students	Total number of students enrolled	16,465	18,576	18,015	21,323	26,580
	Percent of fall students who enrolled in the subsequent spring term	14.1%	17.8%	17.4%	17.8%	18.2%

Although the trends for African-American and Hispanic CE students are similar to Asians and white—in that they increase over time—Table 9 shows that the overall percentage of students who enroll in both the fall and spring term of an academic year is much lower. In 2006, less than 18 percent of African-American CE students who enroll in a fall CC course also enroll in a spring CC course. For Hispanic CE students, the rate is just over 18 percent in 2006. These rates are noticeably lower than those for Asian and white CE students. Therefore, findings demonstrate that while all students are not likely to enroll in both the fall and spring terms of an academic year, underrepresented students are less likely than whites and Asians to continue their CE participation from fall to spring.

When investigating the number of courses students enroll in per term, two findings stand out from Table 10. First, on average, the majority of students enroll in one course for any given term, regardless of race. Moreover, for all races the percentages decrease as the number of courses increase except for the final category where there is a slight increase in the percentage of students who enroll in more than three courses when

compared to the percentage of students who enroll in three courses. Second, Asian CE students, on average, enroll in fewer courses than their counterparts. Approximately 71 percent of Asian CE students enroll in only one course, which is at least nine percentage points higher than any of their peer groups. In each of the three remaining categories, the percent of Asian students is less than any of their peers. Together, these findings indicate that although most CE students enroll in only one course, Asian students, on average, enroll in fewer courses than African-American, Hispanic, or White CE students.

Table 10 – Average percentage of students enrolling in 1 of more courses and earning 1 or more units, by race over time.*

	African-American	Asian	Hispanic	White
1 course	58%	71%	61%	62%
2 courses	22%	16%	19%	20%
3 courses	9%	6%	8%	8%
More than 3 courses	11%	8%	11%	11%
1 unit or less	28%	22%	28%	20%
Between 1 and 2 units	9%	13%	9%	9%
Between 2 and 3 units	30%	26%	33%	31%
More than 3 units	32%	39%	31%	39%

* Percentages represent averages over the 10 terms included in my analysis.

When analyzing the number of credits they earn through their college coursework, findings indicate that overall, the majority of students are likely to earn two or more units for their college coursework, regardless of race. However, Asian and white CE students are at least seven percentage points more likely than African-American and Hispanic CE students to earn over three units. In addition to this, Asian and white CE students are less likely to earn one or fewer units in a given term of their college coursework experience. These averages show that although all four groups average two or more units during any given term, Asian and whites, on average, earn more credits than African-Americans and Hispanics.

Community college course-taking trends, by race/ethnicity

Using data from my CE population, I fit a series of regression models to predict the likelihood of an African-American, Asian, Hispanic, or white CE student enrolling in a certain type of college course. To determine their likelihood of enrolling in a basic skills course, versus enrolling in a non-basic skills course, I first fit the following logistic regression model:

$$\Pr(basic_i) = f(\beta_0 + \beta_1(African\_American_i) + \beta_2(Asian_i) + \beta_3(Hispanic_i) + \beta_4(female_i) + \varepsilon_i)$$

$$\text{where } f(x) = (1+e^{-(x)})^{-1} \qquad (1)$$

where $\Pr(basic_i)$ represents the probability that student *i* enrolls in a basic skills course. Model (1) uses the logit link function f(x) because the outcome is binary—whether the student enrolls in a basic skills course or a non-basic skills course—and $e^{-(x)}$ generates the odds ratio value I use to interpret findings.

Because white males are the omitted reference group, all odds ratio values reflect how likely the student is to enroll in a basic skills course relative to their white male peers. I control for gender because of the growing female advantage in college enrollment and degree completion; women now enroll in college right after high school at higher rates than men and earn a college degree at higher rates than men (Buchman & DiPrete, 2006; Buchman, et al., 2008). In the context of my study, this suggests that women who participate in CE are more likely than males to enroll in college courses, such as non-basic skills courses, which help them earn a postsecondary degree. Therefore, I need to control for this gender effect in my models to account for the possible relationship between gender and race/ethnicity with respect to the outcome measured.

The values for β_1 through β_3 in model (1) are of primary interest to me, as these represent the differences in the likelihood of the student enrolling in a basic skills course, based on their race/ethnicity, when compared to whites and controlling for gender. Using data from my CE population,[39] the results for model 1 in Table 11 show that although there is not a statistically significant difference between Asians and whites, African-Americans and Hispanics, respectively, are on average more likely to enroll in a basic skills course than whites.

Table 11 – Logit model of enrollment in basic skills courses (coefficients and odds ratios)

	Model 1	Model 2	Model 3	Model 4	Model 5
African-American	0.738*** (2.093)	0.475*** (1.608)	0.530** (1.699)	0.404^{+} (1.498)	0.402^{+} (1.495)
Asian	-0.032 (0.969)	0.162** (1.176)	0.390** (1.477)	0.404** (1.498)	0.388* (1.473)
Hispanic	0.728*** (2.070)	0.411*** (1.508)	0.350** (1.420)	0.280* (1.324)	0.244^{+} (1.277)
Female	-0.070* (0.932)	-0.050 (0.952)	-0.246** (0.782)	-0.210* (0.810)	-0.213* (0.808)
Intercept	-2.646***	-6.136***	-6.251***	-19.026***	-20.012***
CC fixed effects (# of CCs)		X (108)	X (26)		X (26)
HS fixed effects (# of High Schools)				X (436)	X (436)
Sample	CE population	CE population	CDS sample	CDS sample	CDS sample
Goodness of fit statistics					
Log Likelihood	-13592.7	-11783.7	-1755.5	-1480.9	-1466.9
Pseudo R^2	0.0182	0.1432	0.2079	0.2380	0.2439
N	46,906	45,920	9,850	6,477	6,440

$^{+}p<.1$. *$p<.05$. **$p<.01$. ***$p<.001$

Interpreting the odds-ratio suggests that both African-American and Hispanic CE students are twice as likely as whites to enroll in a basic skills course. However, this

[39] Recall from chapter 4 that in constructing my CE population I excluded student observations from the restricted-use student data file that are from the five non-traditional CCs, from summer or winter terms, of students who are 12 years old or younger, 20 years old or older, and/or have duplicate student records within a given term.

model does not account for any institutional effects—of the CC these students attend or of the high school they come from.

I need to account for both CC and/or high school effects for empirical reasons. That is, students are clustered within CCs and high schools, and therefore share a host of observable and unobservable experiences. Moreover, in answering my research question, I want to understand the relationship between the institution the CE student attends (the CC) and/or comes from (the high school), and the outcomes in question. For instance, does the type of high school Hispanic CE students come from or the CC they attend help explain variation in participation and achievement levels in their CC coursework? If it does, this would impact how being Hispanic predicts enrollment in certain types of CC courses. Accounting for these institutional experiences helps clarify the role race/ethnicity plays in determining the types of courses in which CE students enroll.

In model 2 of Table 11, I fit the general model described previously but add CC fixed effects. Model 3 includes the same variables as model 2 but instead uses data from my CDS sample, which restricts the number of CCs included, but allows me to subsequently include high school fixed effects.[40] I fit the same model with two different samples to test for differences between controlling for CC effects using data from my CE population and controlling for CC effects using a sample of CCs found in my CDS sample.

Findings from models 2 and 3 show that when controlling for the CC a CE student attends, the race/ethnicity effects on enrolling in a basic skills course decrease in comparison to model 1 for African-American and Hispanic CE students. This is

[40] Recall from chapter 4 that much variation existed in the degree to which CCs recorded the CDS code of the high school CE students attended. In order to account for possible bias in recording, I restricted data in my CDS sample to those CCs who had valid CDS codes for at least 80 percent of their CE population.

particularly true for model 3, which suggests the relationship between race/ethnicity and the CC when predicting enrollment in a basic skills course is different for students in my CDS sample than in my CE population. Furthermore, when controlling for the effects of the CC attended, Asians are now significantly different from whites in their likelihood to enroll in a basic skills. In model 3, results show that Asians are more likely than whites to enroll in a basic skills course within the 26 CCs included in my CDS sample than within the 108 CCs included in my CE population.

Overall, these results indicate that predicting enrollment in basic skills courses by African-American, Asian, Hispanic, and white CE students changes when analyzing these groups within each CC they attend. Consequently, the role race/ethnicity plays in predicting enrollment in a basic skills course is mediated by the postsecondary institution they attend. This indicates that students in my CDS sample may not be representative of students in the overall CE population and that there may be important institutional differences at play.

In model 4, I fit the same general model and use data from my CDS sample to control for the high school students come from. Findings show that when accounting for high school effects, there is little difference in the outcome for Asians in comparison to model 3. However, African-Americans show a slight decrease in their likelihood to enroll in a basic skills course in comparison to whites. Specifically, Table 11 shows that African-Americans go from being 1.7 times as likely as whites to enroll in a basic skills course in model 3 to 1.5 times as likely in model 4. Findings are similar for Hispanic students where their likelihood to enroll in a basic skills course decreases from 1.4 times as likely as whites in model 3 to 1.3 times as likely in model 4. Furthermore, the

statistical significance of the findings for African-American and Hispanic CE students decreases, suggesting that the race of the student and the high school the student comes from are related in predicting whether or not they enroll in a basic skills course.

In model 5, I fit the same general model, but now account for both the CC and high school the concurrently enrolled student attends. Two findings stand out for model 5. The first is that of the five models in Table 11, the pseudo R^2 and log likelihood statistics suggest that there is not much difference between this model and model 4. The second important finding is that when accounting for both the CC and high school effects, the significance for all three races decreases even further as does the likelihood of enrolling in a basic skills course when compared to white students. Comparing model 1 to both models 4 and 5 shows that African-American CE students go from being twice as likely as whites to enroll in a basic skills course to under 1.5 times as likely, and Hispanics go from being two times as likely to 1.3 times. In both cases, the significance of the race variable noticeably decreases. All of this suggests that in addition to CC institutional differences, the high school of origin may play an important influence in predicting type of course enrollment by race/ethnicity.

Finally, there is an overall gender effect, where females are less likely than males to enroll in a basic skills course. Although the finding is significant when controlling for CC and high school effects, the odds ratio value shows that females are only slightly less likely to enroll in a basic skills course than males. Moreover, I fit regression models that include interaction terms to investigate whether gender is related to any of the individual race/ethnicity groups and their relationship to course enrollment. For example, I test differences in the gender effect between African-American male and African-American

female CE students with respect to predicting course enrollment. Results from these models show no significant differences with respect to predicting course enrollment between males and females across the four race/ethnicity groups I analyze. One possible explanation for this is that self-selecting for participation in CE may operate differently in the educational attainment process. Because of the lack of significant gender effects by race, I do not report these models. I focus solely on participation and achievement differences between African-American, Asian, Hispanic, and white CE students, while controlling for the main effect of gender.

To predict the likelihood of African-American, Asian, Hispanic, or white CE students enrolling in a course that is transferable or not transferable to a UC and/or CSU, I fit the same types of logistic regression models as presented for the basic skills course outcome and use the same analytic samples. The analysis shows similar results for predicting enrollment in transferable courses as for enrollment in basic skills courses.

In particular, three similarities stand out in Table 12. First, model 1 shows that African-American and Hispanic CE students are less likely than whites to enroll in a transferable course. Second, accounting for the high schools CE students come from or accounting for both the high school and CC students attend provides the best picture of how likely African-American, Asian, Hispanic, or white students are to enroll in a course that is transferable to a UC and/or CSU, based on their race/ethnicity. Last, there is a modest gender effect that persists across all five models.

Table 12 – Logit model of enrollment in a course transferable to a UC and/or CSU (coefficients and odds ratios)

	Model 1	Model 2	Model 3	Model 4	Model 5
African-American	-0.310*** (0.734)	-0.368*** (0.692)	-0.161 (0.852)	-0.039 (0.962)	-0.049 (0.953)
Asian	-0.554*** (0.575)	-0.195*** (0.823)	-0.033 (.0967)	-0.146 (0.864)	-0.144 (0.866)
Hispanic	-0.336*** (0.715)	-0.290*** (0.748)	-0.127^{+} (0.880)	-0.146 (0.864)	-0.141 (0.869)
Female	0.081*** (1.085)	0.132*** (1.141)	0.233*** (1.262)	0.221** (1.247)	.223** (1.250)
Intercept	1.315***	2.754***	3.055***	5.222***	5.219***
CC fixed effects (# of CCs)		X (108)	X (26)		X (26)
HS fixed effects (# of High Schools)				X (436)	X (436)
Sample	CE population	CE population	CDS sample	CDS sample	CDS sample
Goodness of fit statistics					
Log Likelihood	-27264.2	-22694.9	-3954.8	-3230.1	-3210.2
Pseudo R^2	0.0078	0.1741	0.0945	0.2128	0.2173
N	49,386	49,386	10,573	9,194	9,193

$^{+}p<.1$. $*p<.05$. $**p<.01$. $***p<.001$

In addition to these similarities, there are important differences between the models that predict enrollment in basic skills courses and the models that predict enrollment in transferable courses. First, how likely students are to enroll in a transferable course is less clear when comparing student groups within each CC. When controlling for all 108 CCs, as in model 2, the significant difference between African-American, Hispanic, or Asian CE student persists. When controlling for the 26 CCs in my CDS sample (model 3), these differences are no longer significant. This indicates a strong relationship between race/ethnicity and the 26 CCs in my CDS sample in terms of predicting course enrollment; but it is important to keep in mind that this relationship is based on a small sample of colleges. Moreover, these differences suggest that the data in

model 3 may not be representative of the data in model 2 when predicting enrollment in a transferable course.

One possible reason for this is that students in my CDS sample may be more likely to be participants in a CE program that is dedicated to improving the college-going rates of students (e.g. Middle College and Early College High Schools). Such programs strongly focus on enrolling in courses that are transferable to a UC and/or CSU. Furthermore, these programs may be the result of high school and CC partnerships, where the CC more accurately records the high school of origin of the CE student, which would include the students in my CDS sample.

The second important difference is that when controlling for high school or CC and high school effects—models 4 and 5—being an African-American, Asian, or Hispanic CE student loses its statistical significance in predicting enrollment in a transferable course. This demonstrates that the institutions CE students attend have a particularly strong relationship to race/ethnicity when predicting enrollment in a transferable course. Specifically, this suggests that the CC and high school African-American, Asian, or Hispanic CE students attend are related to their enrollment in a course transferable to a UC and/or CSU.

Findings from this section suggest that, overall, African-American, Asians and Hispanic CE students are less likely than whites to enroll in CC courses that are *not* basic skills or are transferable to a UC and/or CSU. Furthermore, the CC CE students attend and the high school they come from are strongly related to predicting the type of CC course. For all three race/ethnicity groups, this finding persists across both of the outcomes measured. Specifically, the CCs and high schools they attend change the

degree to which African-American, Asian and Hispanic CE students are likely to enroll in these courses in comparison to whites, and also change the level of significance of the relationship between race/ethnicity and enrollment.

Enrolling in the course provides some sense of the CE experience of the student, but it does not give the full picture. For instance, if a student enrolls in a mathematics course but receives a failing grade, this indicates they did not master the course material that would help them build the college-ready human capital specific to the content of the course. Thus, in the next section I analyze achievement levels by race, and again control for the CCs and high schools students attend.

Achievement levels in CC courses, by race/ethnicity

To analyze the achievement levels of African-American, Asian, Hispanic, and white CE students, I focus on the grades they earn in the two different types of CC courses: non-basic skills and transferable to a UC and/or CSU. The outcome measures I use are grades earned for the CC course. Grades and the grade point given to each grade are shown in Table 13. Unlike the previous section, these outcomes are not binary. Thus, I fit a series of ordinary least squares (OLS) regression models.

Table 13 – Grading Scale

Grade	Point Value
A+	4.33
A	4.00
A-	3.67
B+	3.33
B	3.00
B-	2.67
C+	2.33
C	2.00
C-	1.67
D+	1.33
D	1.00
D-	.67
F	0

To predict the grade point average that CE students enrolled in non-basic skills courses earn, I fit the following general OLS model:

$$grade\_Nb_i = \beta_0 + \beta_1(African\_American_i) + \beta_2(Asian_i) + \beta_3(Hispanic_i) + \beta_4(female_i) + \varepsilon_i \quad (1)$$

where $grade\_Nb_i$ represents the grade for student *i* in a non-basic skills course. In all models I control for gender to account for the female advantage, and white males are the omitted reference. Consequently, model coefficients represent differences with respect to white male peers.

The values of primary interest to me in model (1) are β_1 through β_3, as these represent the differences in grades earned by students enrolled in a non-basic skills course, based on their race/ethnicity. Using data from my CE population, findings for model 1 in Table 14 show that African-American and Hispanic CE students, on average, earn lower grades than their white counterparts in non-basic skills courses. Asians, on the other hand, earn higher grades than whites. Using the same data and controlling for CC effects, model 2 shows similar findings to model 1.

As in the previous section, model 3 in Table 14 is the same as model 2, only it uses data from my CDS sample. Again, this is done to test for irregularities between the two data sets. As seen in Table 14, the only difference between models 2 and 3 is that being Asian is not as significant a factor when controlling for the effects of the 26 CCs in my CDS sample. The significance of being an Asian CE student is lost in model 4, which uses data from my CDS sample but controls for the high school CE students come from. Together, this indicates a relationship between Asian CE students, the high schools they come from, the CCs included in my CDS sample, and the grades they earn in non-basic skills courses. This is not the case for African-American or Hispanic CE students,

as these factors remain significant when controlling for high school effects. These findings are also true in the final model, model 5, which controls for both the CC students attend and the high school students come from.

Table 14 – Ordinary least squares model of grades for non- basic skills courses (coefficients and standard errors)

	Model 1	Model 2	Model 3	Model 4	Model 5
African-American	-0.391*** (0.021)	-0.404*** (0.023)	-0.477*** (0.055)	-0.461*** (0.058)	-0.452*** (0.058)
Asian	0.116*** (0.016)	0.096*** (0.017)	0.059^{+} (0.033)	0.014 (0.037)	0.022 (0.037)
Hispanic	-0.275*** (0.012)	-0.272*** (0.014)	-0.264*** (0.029)	-0.210*** (0.033)	-0.208*** (0.033)
Female	0.097*** (0.010)	0.102*** (0.011)	0.136*** (0.023)	0.135*** (0.023)	0.134*** (0.023)
Intercept	3.142***	3.038***	2.979***	2.843***	2.842***
CC fixed effects (# of CCs)		X (108)	X (26)		X (26)
HS fixed effects (# of High Schools)				X (409)	X (409)
Sample	CE population	CE population	CDS sample	CDS sample	CDS sample
R^2	0.0332	0.0621	0.0587	0.1465	0.1518
N	29,517	29,517	6,643	6,555	6,555

$^{+}p<.1$. *$p<.05$. **$p<.01$. ***$p<.001$

Because of the changes to significance of being Asian between models 2 and 3, this indicates that Asian students in my CDS sample may not be representative of those in my CE population. Consequently, analyses that use data from my CDS sample to describe the relationship between being Asian and the grades they earn in non-basic skills courses should be interpreted with caution.

As with African-American and Hispanic CE students, the effect of being female is also significant throughout all models. And based on the R^2 values of each model, models 4 and 5, which control for high school and both CC and high school effects, best

describe the differences in achievement between each of the four race/ethnicity groups when controlling for gender.[41] Therefore, this demonstrates that African-Americans and Hispanics, on average, earning lower grades than whites is consistent when controlling for the CC they attend or when controlling for CC and high school effects. It is only for Asian CE students that the effect is no longer significant when controlling for the CC and high school they attend. In addition, findings demonstrate that although controlling for CC and high school effects does not change the significance being an African-American and Hispanic CE students has on their predicted levels of achievement, it does impact the degree to which race plays a role. Specifically, the difference in the average grade earned in a non-basic skills course between African-American and white CE students *increased* when controlling for CC and high school effects, while the difference between Hispanic and white CE students slightly *decreased*.

To estimate the achievement levels of CE students, by race/ethnicity, in courses that are transferable to a UC and/or CSU, I fit the same regression models as for non-basic skills courses and used the same analytic data sets for each model. Findings in Table 15 show that the conclusions for grades earned in non-basic skills courses are the same for grades earned in courses transferable to a UC and/or CSU. To begin with, model 1 shows that being female is significant and that females earn slightly higher grades than males—a finding that persists across all models.

[41] For each of the five models, I also ran models that included interaction terms to test for a gender effect within each race/ethnicity. Like in the previous section, I found no differences between males and females across racial/ethnic groups and therefore did not include the results in this section.

Table 15 – Ordinary least squares model of grades for courses transferable to a UC and/or CSU (coefficients and standard errors)

	Model 1	Model 2	Model 3	Model 4	Model 5
African-American	-0.393*** (0.022)	-0.416*** (0.024)	-0.480*** (0.056)	-0.457*** (0.059)	-0.449*** (0.059)
Asian	0.109*** (0.016)	0.084*** (0.017)	0.042 (.034)	0.007 (0.037)	0.020 (0.038)
Hispanic	-0.273*** (0.013)	-0.272*** (0.014)	-0.281*** (0.030)	-0.216*** (0.034)	-0.214*** (0.034)
Female	0.097*** (0.011)	0.100*** (0.011)	0.128*** (0.024)	0.125*** (0.024)	0.124*** (0.024)
Intercept	3.160***	3.050***	2.988***	2.860***	2.858***
CC fixed effects (# of CCs)		X (108)	X (26)		X (26)
HS fixed effects (# of High Schools)				X (408)	X (408)
Sample	CE population	CE population	CDS sample	CDS sample	CDS sample
R^2	0.0325	0.062	0.0631	0.1537	0.1610
N	27,300	27,300	6,188	6,107	6,107

$^{+}p<.1$. $*p<.05$. $**p<.01$. $***p<.001$

Model 1 also shows that while African-American and Hispanic CE students, on average, earn lower grades in transferable courses than their white peers when controlling for gender, Asians earn higher grades, on average. When controlling for the effects of the CCs students attend and the high schools they come from, the significance of each factor is the same as it is for a non-basic skills course (with Asians being the one). This supports the previous finding that in my CDS sample, being an Asian CE student is related to the CCs included in my CDS sample and the high schools they come from relative to predicting the grades they earn in their college courses. Furthermore, the models that best describe the relationship between race/ethnicity and grades earned are the same and the coefficients of each factor are nearly the same. This last finding demonstrates that African-American and Hispanic students, on average, earn the same

lower grades than whites in transferable courses as they do in non-basic skills courses, and Asians earn the same higher grades than whites across the two types of courses.

Overall, findings from this section suggest that African-American and Hispanic CE students, on average, earn lower grades than white CE students, while Asian CE students earn higher grades than white CE students—regardless of the type of CC course they take. To illustrate the magnitude of these differences, I calculate the predicted GPA for each race/ethnicity, when controlling for gender, in each of the types of courses based on the grade scale point system shown previously in Table 13.

Figures 23 and 24 show the average grades African-American, Asian, Hispanic, and white CE students earn in non-basic skills courses and courses that are transferable to a UC and/or CSU. The first bar in each figure represents findings when controlling for gender only and the second bar represents findings when controlling for gender, the CC the CE student attends and the high school the CE students comes from.[42]

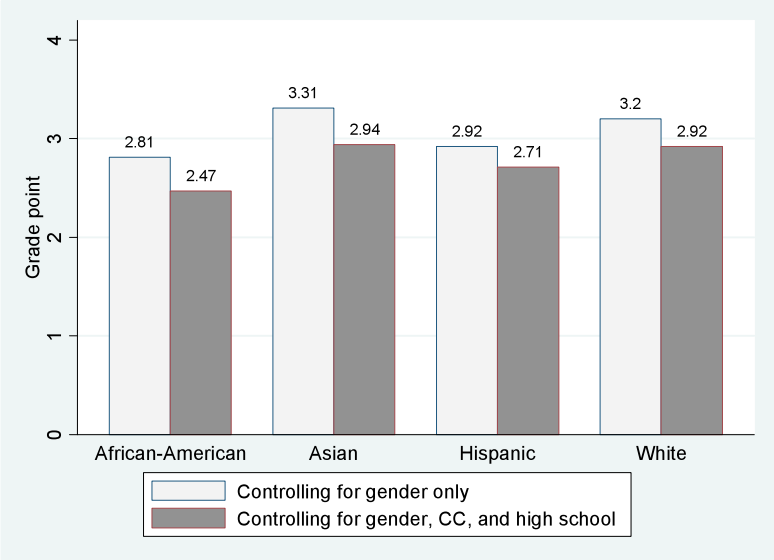

Figure 23 – Average grades earned in non-basic skills courses, by race/ethnicity.

[42] My control for gender represents the average student enrolled in a non-basic skills course or a course transferable to a UC and/or CSU who is 60 percent likely to be female.

Findings in both figures demonstrate that when controlling only for gender, Asians earn at least a grade of B-, and earn grades slightly higher than whites. Hispanics earn grades that are nearly one-third of a grade less than whites and African-Americans earn grades that are over one-third of a grade less than whites.

When adding controls for CC and high school effects, some of the same relationships hold. Asians, on average, continue to earn grades of at least a B- across both course types, but the difference between Asians and whites decreases. African-American and Hispanic CE students, on average, continue to earn lower grades than white CE students. Differences between whites and African-Americans, however, are now greater for each course type than when controlling for gender only. For whites and Hispanics, differences decrease between the two models. This supports the findings discussed previously: when race stays significant throughout the models, the CC and high school students attend impacts the differences in grades earned by race/ethnicity.

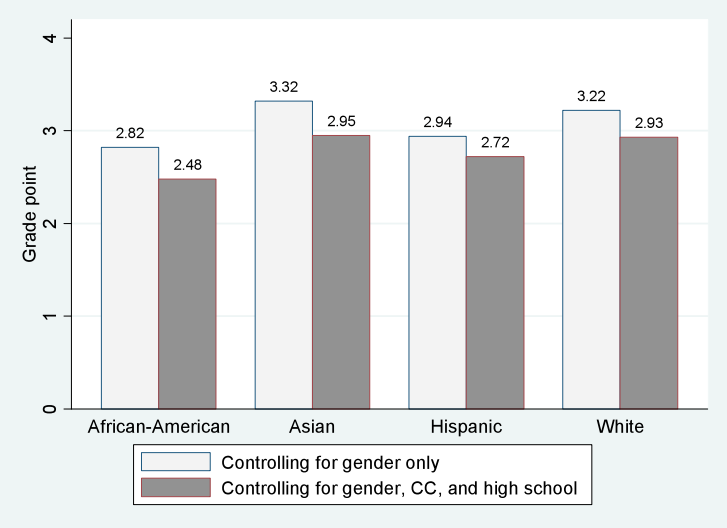

Figure 24 – Average grades earned in courses transferable to a UC and/or CSU.

Conclusion

In summary, this chapter demonstrates that even though African-American and Hispanic CE students enroll in similar numbers of courses during any one term, when compared to white and Asian CE students they earn fewer units for their courses and are less likely to enroll in both the fall and spring terms of an academic year. Furthermore, when compared to whites, African-Americans and Hispanics are less likely to enroll in non-basic skill courses or courses that are transferable to a UC and/or CSU and, on average, earn lower grades in those courses than whites and Asians.

In terms of college readiness, these last results imply that underrepresented students are less likely to enroll in a college course that will earn them a postsecondary degree, and are less successful at increasing their college readiness levels than Asian and white CE students. Despite the existence of such disparities, it is equally important to recall that, overall, underrepresented students are performing adequately in their CC coursework experiences by earning grades of at least a C+, and are thus successful in using CE to build their college readiness levels. It is only when comparing their achievement levels to white and Asian CE students that African-American and Hispanic students are underperforming. In the next chapter, I combine these findings with those of chapters 5 and 6 to provide a comprehensive perspective on how California high school students participate in CE and how this relates to using CE as a strategy to increase the college readiness levels of underrepresented students.

Chapter 8 – Conclusions and Implications

To summarize the findings of this study and discuss their implications for improving the college readiness levels of underrepresented students in California, I organize this chapter in the following way. In the first section, I combine the findings described at the end of chapters 5, 6, and 7. This provides a more comprehensive description of participation trends and achievement levels in CE. In the second section, I take these findings and discuss their college readiness implications. Specifically, I apply a social capital lens to describe one potential interpretation of the differences found throughout my analysis. In the third section, I describe the possible policy implications of my findings for CE programs in California. With CE used more often as a mechanism for decreasing disparities in college access, I discuss the current CE education policy framework in California and how my research offers ways policy could better address students' needs. In the last section, I discuss the limitations of my study and how additional research can further inform policy by continuing to provide important evidence regarding the impact CE has on underrepresented students pursuing a college degree.

Summary

Findings from this analysis show that over time, California high school students who enroll in CC courses represent a greater proportion of the high school and CC populations. Disaggregating the data by student characteristics, however, reveals notable differences. African-American and Hispanic students are underrepresented in CE, while Asians and whites are overrepresented among CE students when compared to high school enrollment levels. African-American and Hispanic CE students, on average, come from

schools that are lower in SES and have lower API scores than Asian and white CE students.

For students who do participate in CE, the number of terms in which they enroll in a CC and the number of courses they take within that term are fairly consistent. Furthermore, the majority of students enroll in one term during the academic year and in one course during that term, regardless of their race/ethnicity. Differences are seen in the types of college courses the CE students take. Although the majority of courses CE students take are part of a pathway leading to a postsecondary degree, most courses are not English, math, science, history, and foreign language. Moreover, underrepresented students are less likely to enroll in college degree pathway courses than their Asian and white counterparts. However, the type of high school CE students come from and the CC they attend plays a critical role in predicting the types of courses in which CE students enroll.

The type of high school CE students come from and the CC they attend for their college course plays a critical role in predicting the grades earned in college. Specifically, differences between underrepresented students and whites are attenuated when accounting for institutional effects. Despite these changes, African-American and Hispanic students, on average, earn lower grades than whites and Asians, regardless of the secondary and postsecondary institutions they attend. All four race/ethnicity groups earn, on average, passing grades that indicate successful CC classroom experiences, but the levels of success for underrepresented students is, less than that of their Asian and white CE peers.

Together, these findings indicate that, in general, underrepresented students are participating in CE in greater numbers than in past years and having a successful experience in their CC courses. Findings are less encouraging when their participation trends and achievement levels are compared to Asian and white CE students. In comparison, underrepresented students participate in CE in smaller proportions, enroll in fewer courses, enroll in more courses that are *not* part of a degree-earning pathway courses, and have lower levels of success than Asian and white students. These differences are significant within the context of using CE as a mechanism to reduce disparities in college readiness and college access. To accomplish a compensatory goal of reducing racial disparities in education attainment, I would expect to see CE outcomes for underrepresented students at the same high levels of Asian and white students, if not higher. I now discuss how disparities in CE participation may result in differences in the degree to which African-Americans and Hispanics access opportunities to develop college-ready skills and knowledge when compared to whites and Asians.

Implications

In chapter 3, I discussed the theory of social capital as a way to develop the skills and knowledge necessary to be college-ready. Specifically, I discussed how participation in CE could build human capital by increasing a high school student's network of relationships to include more individuals who can help them become college-ready. I apply this lens to the overall findings of my study to provide the following interpretation.

First, African-American and Hispanic students are underrepresented in CE, which indicates that they access opportunities to engage in a college-level learning environment at disproportionately lower rates when compared to their high school enrollment rates.

Therefore, their level of access to a network of relationships within a college-learning environment is potentially less than Asians and whites, who are overrepresented in CE. This does not mean that underrepresented students do not have *any* opportunity to increase the social capital that will help them build college-ready human capital. It suggests that underrepresented students have proportionally fewer opportunities to use *CE* as a pathway that increases their social capital in a way that increases their likelihood of enrolling in college.

Second, African-American and Hispanic students are less likely to enroll in courses that lead to a postsecondary degree. This suggests that when they do participate in CE, underrepresented students potentially limit their opportunities to build certain types of human capital—specifically, opportunities like using the CE experience as a way to access individuals who can help them build content-specific college readiness human capital. Asian and white CE students, however, are more likely to enroll in these courses, which suggests that they access these college readiness-building opportunities to a greater degree.

African-American and Hispanic students, in general, are more in need of such opportunities, as they are less likely to come from home environments that can help them develop the knowledge and skills to be college-ready (King, 1996; Tornatzky, et al., 2002; Vargas, 2004; Venezia, et al., 2003). Therefore, I would expect to see equal—if not greater—opportunities to build such human capital across all four race/ethnicity groups, if CE were to be used as a mechanism to reduce college access disparities. In other words, if one purpose of CE is to help increase the rates at which African-American and Hispanic students enroll in a four-year postsecondary institution, I would expect to

see these students have equal opportunities to interact with individuals at the CC level who can help them become college-ready. Unfortunately, this is not the case and therefore the CE pathway appears to *not* be breaking the trends of disparities in college access by race/ethnicity.

Third, and perhaps most significant, is that when students do take advantage of such opportunities, it is important that those experiences are successful. In order to maximize the degree to which the CE experience can help a student increase their college readiness levels, students not only need access to the social capital that can provide them this human capital, they must also successfully learn the college-ready skills and knowledge the individuals in their relationship networks can teach them. Therefore, underrepresented students' lower levels of achievement suggest that their CE experiences could be more productive in building their college readiness levels. By participating in CE in proportionally lower levels, enrolling in fewer degree-earning courses, and having lower levels of success in their college coursework than whites and Asians, underrepresented students are potentially decreasing the degree to which they successfully use CE as a pathway to increase college access levels.

Finally, it is important to note the importance of the high school CE students come from and colleges they attend. Because the findings from chapter 7 show that these institutions play an important role in predicting outcomes for CE students, this suggests that the high school and/or college can potentially provide students with greater access to social capital that will help them become college ready. Therefore, the relationships between the CE student and their high school and their college as well as the relationships between the high schools and colleges themselves are additional areas in

which social capital can be cultivated to help improve the academic experiences of underrepresented students.

California has a long political history of striving for equal access to quality, public education (Kemerer, Sansom, & Kemerer, 2005). Consequently, in the next section, I discuss how the findings from this study and their college-ready implications may impact state policy. In particular, I briefly describe existing state policy regarding CE and possible changes that can impact the way students—underrepresented students in particular—participate in CE.

California state policy implications

In the last 15 years, there have been important changes to the California Education Code regarding CE. First, in 1996, Senate Bill 292 created a policy stating that school districts can claim full funding from the state for high school students who are concurrently enrolled in a CC—as long as they are in attendance at the high school for at least 240 minutes a day.[43] This relieved districts from a worry that they would lose state funding for high school students who also enrolled in CC coursework. However, as I mentioned in chapter 5, abuse in the practice of CE led to policy violations, and served as the motivation behind Senate Bill 338 in 2003. This bill regulates enrollment levels in physical education courses as well as the number of students allowed to participate in CE from any one high school during the summer. Together, the two bills provide a sense of financial security to school districts for allowing high school students to concurrently enroll in a CC course, but they also provide limitations on the number of students who can participate in CE.

[43] Senate Bill 292 was chaptered into California law in 1996, and amended section §46146 and added section §76002 of the California Education Code.

Neither of these two bills, however, mentions CE as a way to bridge the connection between secondary and postsecondary education. In 2005, Senate Bill 967 did that by including language on CE state policy that specifically noted how the CE experience would also serve as a way to help students' transition from high school to college. This language was important for the paradigm shift of CE being solely used to enrich the academic experience of high school overachievers to also serving as an opportunity to help students build college readiness skills. As mentioned in chapters 2 and 3, access to such opportunities is particularly needed for underrepresented students.

Under this state policy framework for CE, findings from this analysis indicate that although underrepresented students are participating in CE in ways that may increase college readiness levels, when compared to white and Asian students, participation and levels of achievement are disproportionally low. This means that if CE in California is to serve as an alternative pathway for underrepresented students to improve their college readiness levels and attenuate differences in going to college, additional changes to state policy may be necessary.

For instance, much discussion has been given to the need to strengthen the relationships between secondary and postsecondary institutions to become more connected in the academic experiences of students, both in what is taught (i.e. curriculum) and how it is taught (i.e. student expectations) (Hoffman, Vargas, Venezia, & Miller, 2007; Kazis, Vargas, & Hoffman, 2004). Policies that create such coherence with respect to building college-ready skills could help facilitate an increase in underrepresented students' CE participation and increase the likelihood that their CE experience is successful.

Another possibility is to create policies to support a positive CE experience for students in specific courses. Certain courses at CCs can serve as a gateway to a successful college experience (Goldrick-Rab, 2010; Grubb, 1991; Moore & Shulock, 2009; Moore, et al., 2009). State policies that would facilitate collaboration and provide resource support to CE students enrolled in gateway courses could help improve students' CE experiences. Moreover, this could create a more inviting educational environment for underrepresented students who might otherwise decide not to participate for fear of failing at the college experience.

To have a better sense of how state policies could be modified to facilitate the use of CE as an alternative pathway to college readiness and college enrollment, more research is needed regarding the role of the CE experience. In the next section, I discuss how future research could build on the findings of my study and thus create a more effective framework for CE to improve the achievement levels of students.

Future research

The limitations of my study provide a framework for further research on CE. Specifically, background characteristics of CE students, as well as details on the CE experience itself, need further research. With regard to the background of CE students, knowing details on their high school academic achievement levels would help understand the relationship between the CE students' secondary and postsecondary experiences. Because a student's academic performance in high school is strongly related to their enrolling in college (Adelman, 2006; Berkner & Chavez, 1997; Ellwood & Kane, 2000; Rosenbaum, 2001), understanding how secondary and postsecondary coursework experiences compare for CE students would provide additional clarity on how students

may use CE. For example, if a CE student were successful in a rigorous high school curriculum while also enrolling in a rigorous CC course, this would suggest that the CE experience is more likely to serve as a supplement to their high school education—a form of academic enrichment. If the CE student is struggling in their high school coursework, but enrolls in college preparatory courses at a CC, this implies a different type of CE experience. It suggests that the CE student may be using CE as an alternative pathway to college readiness.

Another background characteristic to include in future research is the level of education of the CE students' parent(s) or guardian(s). Students with college-educated parents are more likely to be in a home environment rich in information about going to college, which increases their likelihood of going to college (Choy, 2001, 2002). Therefore, if CE students come from a home environment that lacks such information, this could imply that students use the CE experience to access such resources and build college-going knowledge.

To understand if CE students are using the CC experience to build college readiness knowledge, further research needs to evaluate the details of the CE experience. One such detail is whether the courses may are taught on the CC or high school campus and if the instructor(s) are college faculty members and/or high school instructors. Another is the college course's level of rigor and if it has been adjusted in any way to accommodate CE students. Last, it is important to understand the relationships between the student and the institutions and between the institutions themselves since they may impact students' CE experiences. Future CE research that examines details such as these would provide critical levels of understanding the role of CE.

Additionally, a thorough analysis of CE participation trends and achievement levels during the summer terms is important. My analysis did not include students' CE experiences during the summer, as I focused on the CE experiences during the traditional academic year and my exploratory analysis showed significant variation in trends in the summer when compared to the fall and spring terms. Comparing outcomes for students during the summer to those during the fall and spring provides additional knowledge of how students may be using CE as a way to improve their college readiness levels. For instance, if CE students are more likely to enroll in English, math, science, history, and foreign language courses in the summer than in the fall or spring, this would suggest that students use the summer term to engage in key academic courses that build college readiness levels.

Such findings have particular policy implications for California as state policy allows for more CE students from any one high school to enroll in transferable courses than other CC courses. Specifically, section 48800 of the California education code mentions a limit to the number of students from a high school that may participate in CE during the summer *but* that this limit does not apply to students who enroll in courses that are transferable to a UC and/or CSU. Consequently, state policy seems to be attempting to influence the type of CE experience students have during summer terms. Comparing my academic year findings to research that focuses on summer participation outcomes would contribute important knowledge on how students in California use CE to potentially increase their college readiness levels.

Finally, CE research lacks empirical work that uses a control group to make comparisons, and thus has been unable to account for students self-selecting into CE

opportunities. The study being done by Glennie et al. (2009) on how Early College High Schools relate to college access uses an experimental design to randomly assign students to an Early College High School in North Carolina. This type of design is unique in the field of CE and, while experimental designs are understandably difficult to do, alternative methods can be used to make comparisons between CE students and non-CE students of similar backgrounds. For this type of research to be possible, a complete secondary and postsecondary data set for individual students is needed.

The type of analysis such as the one presented in this dissertation makes and important contribution to CE research. Having a strong foundational sense of any and every CE program—be it at a local, state, or national level—is vital to understanding how the practices of CE programs may be meeting CE goals. Accordingly, this dissertation provides a fundamental idea of how California high school students participate in CE, and serves as the basis for further research and discussion regarding the structure of CE policies in the state.

References

Accelerated learning options: moving the needle on access and success. (2006). Boulder, CO: Western Interstate Commission for Higher Education.

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, D.C.: U.S. Department of Education.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, D.C.: U.S. Department of Education.

Ainsworth, J. W. (2002). Why does it take a village? The mediation of neighborhood effects on educational achievement. *Social Forces, 81*(1), 117-152.

Akerhielm, K., Berger, J., Hooker, M., & Wise, D. (1998). *Factors related to college enrollment. Final report.* Washington, DC: U. S. Department of Education. Office of the Under Secretary.

Andrews, H. A., & Marshall, R. P. (1991). Challenging high school honor students with community college courses. *Community College Review, 19*(1), 47-51.

AVID - Decades of college dreams (2006, 2006). Retrieved May 19, 2009, 2009, from http://www.avidonline.org/

Bailey, T. R., & Karp, M. M. (2003). *Promoting college access and success: A review of credit-based transition programs*. New York, NY: Community College Research Center.

Berkner, L., & Chavez, L. (1997). *Access to postsecondary education for the 1992 high school graduates*. Washington, DC: National Center for Education Statistics.

Blanco, C. D., Prescott, B., & Taylor, N. (2007). *The promise of dual enrollment: Assessing Ohio's early college access policy*. Cincinnati, OH: Knowledge Works Foundation.

Bourdieu, P. (1983). The forms of capital Retrieved June 19, 2009, from http://www9.georgetown.edu/faculty/irvinem/theory/Bourdieu-Forms_of_Capital.html

Bradby, D., Malloy, A., Hanna, T., & Dayton, C. (2007). *A profile of The California Partnership Academies 2004-2005*. Berkeley, CA: University of California, Berkeley.

Buchman, C., & DiPrete, T. A. (2006). The growing female advantage in college completion: The role of family background and academic achievement. *American Sociological Review, 71*(4), 515-541.

Buchman, C., DiPrete, T. A., & McDaniel, A. (2008). Gender inequalities in education. *Annual Review of Sociology, 34*, 319-337.

Burns, H., & Lewis, B. (2000). Dual-enrolled students' perceptions of the effect of classroom environment on educational experience. *The Qualitative Report, 4*(1&2).

California Code of Regulations. Retrieved August 20, 2010, from Westlaw: http://ccr.oal.ca.gov

Cavalluzzo, L., Jordan, W. J., & Corallo, C. (2002). *Case studies of high schools on college campuses: An alternative approach to the traditional high school program*. Charleston, WV: AEL.

Choy, S. P. (2001). *Students whose parents did not go to college: Postsecondary access, persistence, and attainment.* Washington DC: U.S. Department of Education, National Center for Educational Statistics.

Choy, S. P. (2002). *Access & persistence: Findings from 10 years of longitudinal research on students*. Washington D.C.: American Council on Education.

Coleman, J. S. (1988). Social capital in the creation of human capital. *The American Journal of Sociology, 94*(Supplement: Organizations and institutions: Sociological and economic approaches to the analysis of social structure), S95-S120.

Community Colleges (2009). Retrieved March 15, 2009, 2009, from http://www.cccco.edu/CommunityColleges/tabid/830/Default.aspx

Conley, D. T. (2005). *College knowledge: What it really takes for students to succeed and what we can do to get them ready*. San Francisco, CA: Jossey-Bass.

Conley, D. T. (2007). *Toward a more comprehensive conception of college readiness*. Eugene, OR: Educational Policy Improvement Center.

CPS (2009). People and families in poverty by selected characteristics: 2007 and 2008 Washington, DC: U.S. Census Bureau - Current Population Survey.

Cunningham, C., & Matthews, R. S. (2007). Lessons from the field: A tale of two early college high schools. In N. Hoffman, J. Vargas, A. Venezia & M. S. Miller (Eds.), *Minding the gap: Why integrating high school and college makes sense and how to do it.* Cambridge, MA: Harvard Education Press.

Data Element Dictionary. Retrieved August 20, 2010, from California Community College Chancellor's Office:

http://www.cccco.edu/SystemOffice/Divisions/TechResearchInfo/MIS/DED/tabid/266/Default.aspx

Day, J. C., & Newburger, E. C. (2002). *The big payoff: Educational attaiment and synthetic estimates of work-life earnings*. Washington DC: U.S. Census Bureau.

Domina, T. (2009). What works in college outreach: Assessing targeted and schoolwide interventions for disadvantaged students. *Educational Evaluation and Policy Analysis, 31*(2), 127-152.

Ed-Data (2009). Retrieved March 15, 2009, 2009, from http://www.ed-data.k12.ca.us/welcome.asp

Ellwood, D. T., & Kane, T. J. (2000). Who is getting a college education? Family background and the growing gaps in enrollment. In S. Danziger & J. Waldfogel (Eds.), *Secruing the future. Investing in children from birth to college.* New York, NY: Russell Sage Foundation.

Fact book 2007: Handbook of education information (2007). California Department of Education.

Fact sheet on special-admit students in the community colleges (2004). (Brief). Sacramento, CA: California Community Colleges Chancellor's Office.

First report to the legislature on status of systemwide investigation of college/high school concurrent enrollment (2003). (Report). Sacramento, CA: California Community Colleges Chancellor's Office.

Gándara, P., O'Hara, S., & Gutiérrez, D. (2004). The changing shape of aspirations: Peer influence on achievement behavior. In M. A. Gibson, P. Gandara & J. P. Koyama

(Eds.), *School Connections, U.S. Mexican Youth, Peers, and School Achievement* (pp. 39-62). New York: Teachers College Press.

Gibson, M. A., Gandara, P., & Koyama, J. P. (Eds.). (2004). *School Connections, U.S. Mexican Youth, Peers, and School Achievement*. New York: Teachers College Press.

Glennie, E., Edmunds, J., Bernstein, L., & Purtell, K. (2009). *Preliminary outcomes in an early college high school: Results from a pilot study.* Paper presented at the American Education Research Association.

Goldberger, S. (2007). Doing the math: What it means to double the numbers of low-income college graduates. In N. Hoffman, J. Vargas, A. Venezia & M. S. Miller (Eds.), *Minding the gap: Why integrating high school and college makes sense and how to do it.* Cambridge, MA: Harvard Education Press.

Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research, 80*(3), 437-469.

Greene, J. P., & Winters, M. A. (2005). *Public high school graduation and college-readiness rates: 1991-2002*. New York, NY: Center for Civic Innovation.

Grodsky, E., & Felts, E. (2008). Social stratificatin in higher education. Univeristy of California, Davis.

Grubb, W. N. (1991). The decline of community college transfer rates: Evidence from national longitudinal surveys. *The Journal of Higher Education, 62*(2), 194-222.

Guide to U.S. Department of Education programs (2008). Washington DC: U.S. Department of Education.

Hauser, R. M. (1992). *Trends in college entry among Whites, Blacks, and Hispanics, 1972-1988.* Madison, WI: Institute for Research on Poverty.

Hoffman, N., Vargas, J., Venezia, A., & Miller, M. S. (Eds.). (2007). *Minding the gap: Why integrating high school with college makes sense and how to do it*. Cambridge, MA: Harvard Education Press.

Horn, L. J., & Carroll, C. D. (1997). *Confronting the odds: Students at risk and the pipeline to higher education*. Washington, DC: National Center for Education Statistics.

Horn, L. J., & Chen, X. (1998). *Toward resiliency; At-Risk students who make it to college*. Washington, DC: U.S. Department of Education Office of Educational Research and Improvement.

Horn, L. J., & Kojaku, L. (2001). *High school academic curriculum and the persistence path through college*. Washington, DC: National Center for Education Statistics.

Horn, L. J., Nuñez, A.-M., & Bobbitt, L. (2000). *Mapping the road to college: First-Generation students' math track, planning strategies, and context of support.* Washington, DC: National Center for Education Statistics.

Hossler, D., Schmit, J., & Vesper, N. (1999). *Going to college: How social, economic, and educational factors influence the decisions students make*. Baltimore, MD: The Johns Hopkins University Press.

Howard, D., & Wu, P. (2009). *Assessing California's multiple pathways field: Preparing youth for success in college and career*. San Francisco, CA: James Irivine Foundation.

Johnstone, D. B., & Del Genio, B. (2001). *College-level learning in high school: Purposes, policies, and practical implications. The academy in transition.* (Report). Washington DC: Association of American Colleges and Universities.

Karp, M. M. (2007). *Learning about the role of college student through dual enrollment participation*. New York, NY: Community Colleges Research Center.

Karp, M. M., Calgano, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states.* New York, NY: Community College Research Center.

Kazis, R. (2004). Introduction. In R. Kazis, J. Vargas & N. Hoffman (Eds.), *Double the numbers: Increasing postsecondary credentials for underrepresented youth*. Cambridge, MA: Harvard Education Press.

Kazis, R., Vargas, J., & Hoffman, N. (Eds.). (2004). *Double the numbers: Increasing postsecondary credentials for underrepresented youth*. Cambridge, MA: Harvard Education Press.

Kemerer, F., Sansom, P., & Kemerer, J. (2005). *California school law*. Stanford, California: Stanford University Press.

King, J. E. (1996). *The decision to go to college: Attitudes and experiences associated with college attendance among low-income students.* Washington, DC: College Board.

Kisker, C. B. (2006). Integrating high school and the community college. Previous efforts and current possibilities. *Community College Review, 34*(1), 68-86.

Kleiner, B., Lewis, L., & Greene, B. (2005). *Dual enrollment of high school students at postsecondary institutions: 2002-03*. Washington D.C.: National Center for Education Statistics.

Kurlaender, M., & Felts, E. (2008). Bakke beyond college access. Investigating racial/ethnic differences in college completion. In P. Marin & C. L. Horn (Eds.), *Realizaing Bakke's legacy*. Sterling, VA: Stylus Publishing.

Learning and understanding: Improving advanced study of mathematics and science in U.S. High schools. (2002). Washington, DC: National Academy Press.

Lee, V. E., & Ekstrom, R. B. (1987). Student access to guidance counseling in high school. *American Educational Research Journal, 24*(2), 287-310.

Lerner, J. B., & Brand, B. (2006). *The college ladder: Linking secondary and postsecondary education for success for all students*. Washington D.C.: American Youth Policy Forum.

Lewis-Charp, H., Yu, H. C., & Friedlaender, D. (2004). The influence of intergroup relations on school engagement: Two cases. In M. A. Gibson, P. Gandara & J. P. Koyama (Eds.), *School Connections, U.S. Mexican Youth, Peers, and School Achievement* (pp. 107-128). New York: Teachers College Press.

Lundell, D. B., Higbee, J. L., Hipp, S., & Copeland, R. (2005). *Building bridges for access and success from high school to college: Proceedings of the metropolitan higher educatin consortium's developmental education initiative*. Minneapolis, MN: Developmental Education and Urban Literacy, University of Minnesota-Twin Cities.

Lynch, R. L., Harnish, D., Fletcher, G., Thornton, G., & Thompson, J. (2006). *Dual enrollment in high schools and technical colleges of Georgia* (Executive Summary). Athens, GA: Occupational Research Group - University of Georgia.

McDonough, P. M. (1997). *Choosing colleges: how social class and schools structure opportunity.* Albany, NY: State University of New York Press.

Mehan, H., Villanueva, I., Hubbard, L., & Lintz, A. (1996). *Constructing school success: The consequences of untracking low-achieving students*. New York, NY: Cambridge University Press.

Moore, C., & Shulock, N. (2006). *State of decline?* Sacramento: Institute for higher education, leadership, & policy.

Moore, C., & Shulock, N. (2009). *The grades are in - 2008: Is California higher education measuring up?* Sacramento: Institute for higher education, leadership, & policy.

Moore, C., Shulock, N., & Offenstein, J. (2009). *Steps to success: Analyzing milestone achievement to improve community college student outcomes*. Sacramento: Institute for higher education, leadership, & policy.

Nakkula, M., & Foster, K. C. (2006). Growth and growing pains: Second-year findings from a longitudinal study of two early college high schools. Harvard Graduate School of Education.

Nakkula, M., & Onaga, M. (2008). Transitioning to college: Year four of the early college high school study. Harvard Graduate School of Education.

Nakkula, M., Onaga, M., & Foster, K. C. (2007). Breakthrough and redirection: Year three of the early college high school study. Harvard Graduate School of Education.

Nakkula, M. J., & Foster, K. C. (2007). Academic identity development: Student experiences in two early college high schools. In N. Hoffman, J. Vargas, A. Venezia & M. S. Miller (Eds.), *Minding the gap: Why integrating high school and college makes sense and how to do it.* Cambridge, MA: Harvard Education Press.

NCES (2010a). Average SAT scores for the 12th-grade SAT test-taking population, by race/ethnicity and subject: Selected years, 1998–2008. Washington, DC: National Center for Education Statistics.

NCES (2010b). Percentage of children ages 6 to 18, by parent's highest level of educational attainment and child's race/ethnicity: 2008. Washington, DC: National Center for Education Statistics.

Oakes, J. (2003). *Critical conditions for equity and diversity in college access: Informing policy and monitoring results*. Los Angeles, CA: UC/ACCORD.

Perry, M., Rosin, M., Woodward, K. M., & Bahr, P. (2010). *Something's got to give: California can't improve college completions without rethinking developmental education at its community colleges.* (Report). Mountain View, CA: EdSource.

Plank, S. B., & Jordan, W. J. (1997). *Reducing talent loss: The impact of information, guidance, and actions on postsecondary enrollment.*: Johns Hopkins University.

Plank, S. B., & Jordan, W. J. (2001). Effects of information, guidance, and actions on postsecondary destinations: A study of talent loss. *American Educational Research Journal, 38*(4), 947-979.

Planty, M., Hussar, W., Snyder, T., Provasnik, S., Kena, G., Dinkes, R., et al. (2008). *The condition of education 2008*. Washington, DC: Institute for Education Sciences.

Post-Secondary Enrollment Options Program (2001). (Report). Saint Paul, MN: Minnesota State Colleges and Universities.

Rosenbaum, J. E. (2001). *Beyond college for all: Career paths for the forgotten half*. New York, NY: Russell Sage Foundation.

Rosin, M., Frey, S., Leichty, J., & Perry, M. (2009). *Multiple pathways in California: An emergin option for high school reform*. Mountain View, CA: EdSource.

Running start: 2006-07 Annual progress report (2008). Olympia, WA: Washington State Board for Community & Technical Colleges.

Sampson, R. J., & Groves, W. B. (1989). Community structure and crime: Testing social-disorganization theory. *The American Journal of Sociology, 94*(4), 774-802.

Schultz, T. W. (1961). Investment in human capital. In R. Arum & I. R. Beattie (Eds.), *The Structure of Schooling: Readings in the Sociology of Education* (pp. 46-55). New York, New York: McGraw-Hill.

Stanton-Salazar, R. D. (2004). Social capital among working-class minority students. In M. A. Gibson, P. Gándara & J. P. Koyama (Eds.), *School Connections, U.S. Mexican Youth, Peers, and School Achievement* (pp. 18-38). New York: Teachers College Press.

State notes: Dual enrollment (2008). Retrieved July 15, 2009, 2009, from http://mb2.ecs.org/reports/Report.aspx?id=950

State policies and dual enrollment program variation (2003). (Brief). Washington DC: Office of Vocational and Adult Education - Department of Education.

Stern, D., & Stearns, R. (2006). *Combining academic and career-technical courses to make college an option for more students: evidence and challenges.*

The dual enrollment of high school students in postsecondary education in Kentucky, 2001-02 to 2004-05 (2006). Kentucky Council on Postsecondary Education.

Tierney, W. G., Bailey, T., Constantine, J., Finkelstein, N., & Hurd, N. F. (2009). *Helping students navigate the path to college: What high schools can do: A practice guide*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences.

Tornatzky, L. G., Cutler, R., & Lee, J. (2002). *College knowledge: What latino parents need to know and why they don't know it.*: Tomas Rivera Policy Institute.

University of California. *a-g guide* Retrieved August 17, 2010, 2010, from http://www.ucop.edu/a-gGuide/ag/a-g/a-g_reqs.html

Vargas, J. (2003). *Interactions between college access programs and high schools: Sorting out the role of individualization in students' access to courses.*, Harvard University, Cambridge, MA.

Vargas, J. (2004). *College knowledge: Addressing information barriers to college*. Boston, MA: The Education Resources Institute.

Venezia, A., Kirst, M. W., & Antonio, A. L. (2003). *Betraying the college dream: How disconnected K-12 postsecondary education systems undermine student aspirations*. Stanford, CA: Stanford University.

Waits, T., Setzer, J. C., Lewis, L., & Greene, B. (2005). *Dual credit and exam-based courses in U.S. public high schools: 2002-03*. Washington D.C.: National Center for Education Statistics.

Wang Golann, J., & Hughes, K. L. (2008). *Dual enrollment policies and practices: Earning college credit in California high schools.* New York, NY: Community College Research Center.

Wang, W. W. (2005). *How outreach programs are implemented affects students academic achievement*. Los Angeles, CA: UC/ACCORD.

Watt, K. M., Powell, C. A., Mendiola, I. D., & Cossio, G. (2006). Schoolwide impact and AVID: How have selected Texas high schools addressed the new accountability measures? *Journal of Education for Students Placed at Risk 11*(1), 57-73.

Welsh, J. F., Brake, N., & Choi, N. (2005). Student participation and performance in dual-credit courses in a reform environment. *Community College Journal of Research and Practice, 29*(3), 199-213.

Woolley, M. E., Grogan-Kaylor, A., Gilster, M. E., Karb, R. A., Gant, L. M., Reischl, T. M., et al. (2008). Neighborhood social capital, poor physical conditions, and school achievement. *Children & Schools, 30*(3), 133-145.

Appendix A

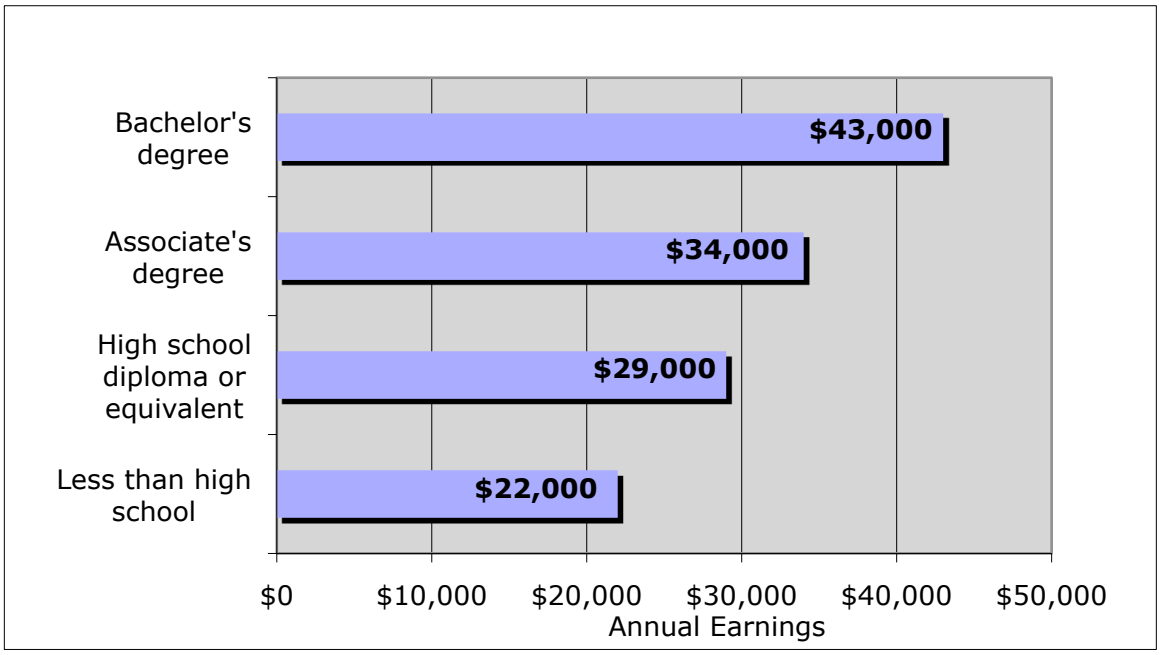

Figure A-1 – Annual earnings (in 2006 dollars) by educational attainment levels
(Planty, et al., 2008, p. 128)
Source: Current Population Survey Data

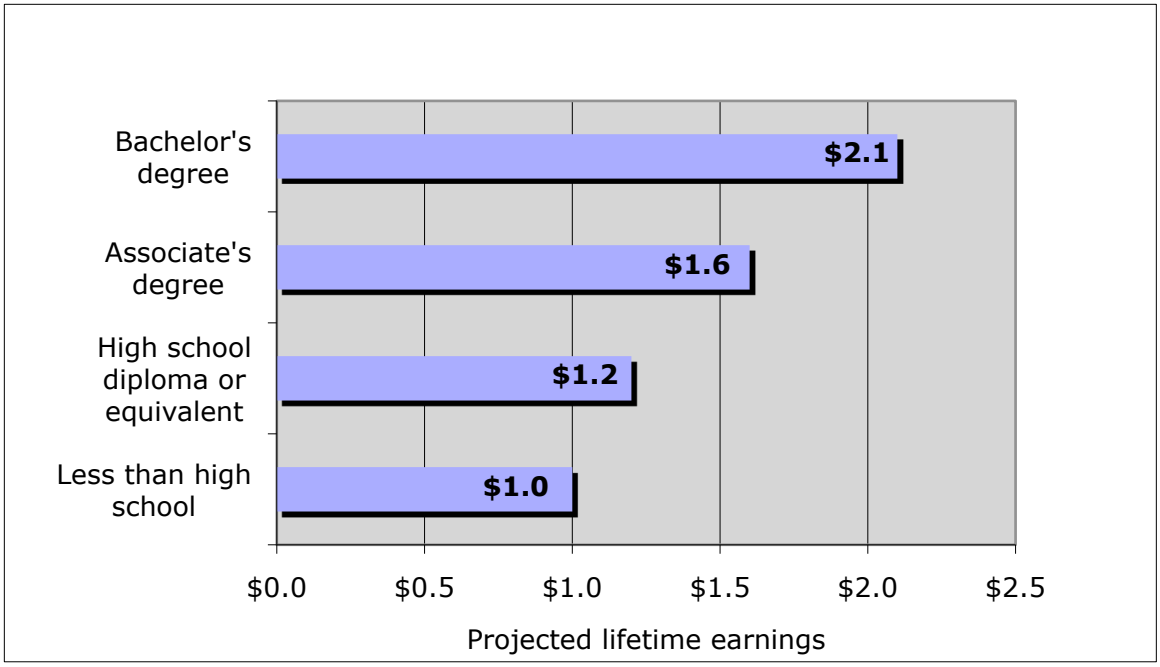

Figure A-2 – Projected lifetime earnings (in millions of 1999 dollars) by educational attainment levels
(Day & Newburger, 2002, p. 4)
Source: Current Population Survey Data

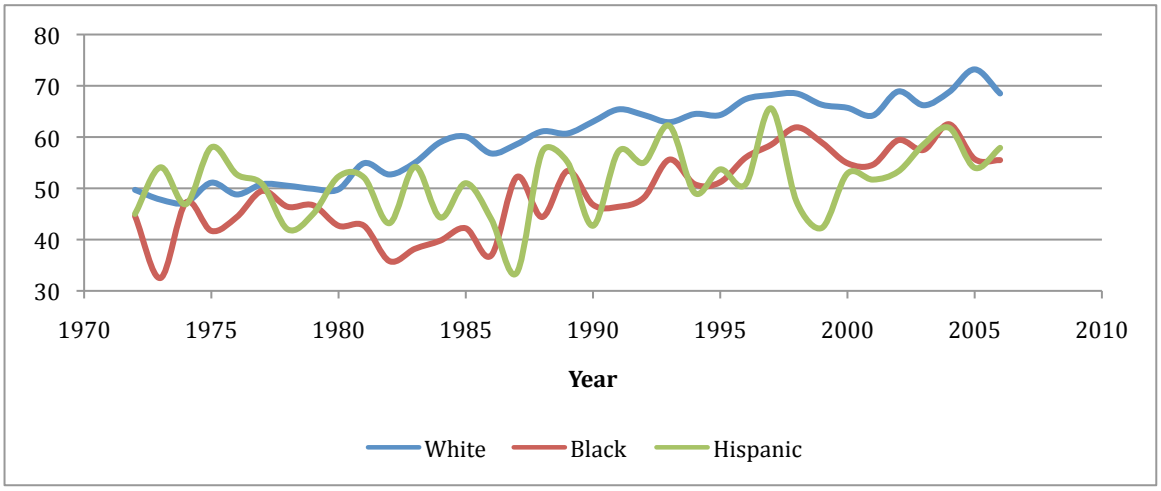

Figure A-3 – Percent of students immediately enrolling in college, by race/ethnicity
(Planty, et al., 2008)
Source: Current Population Survey Data

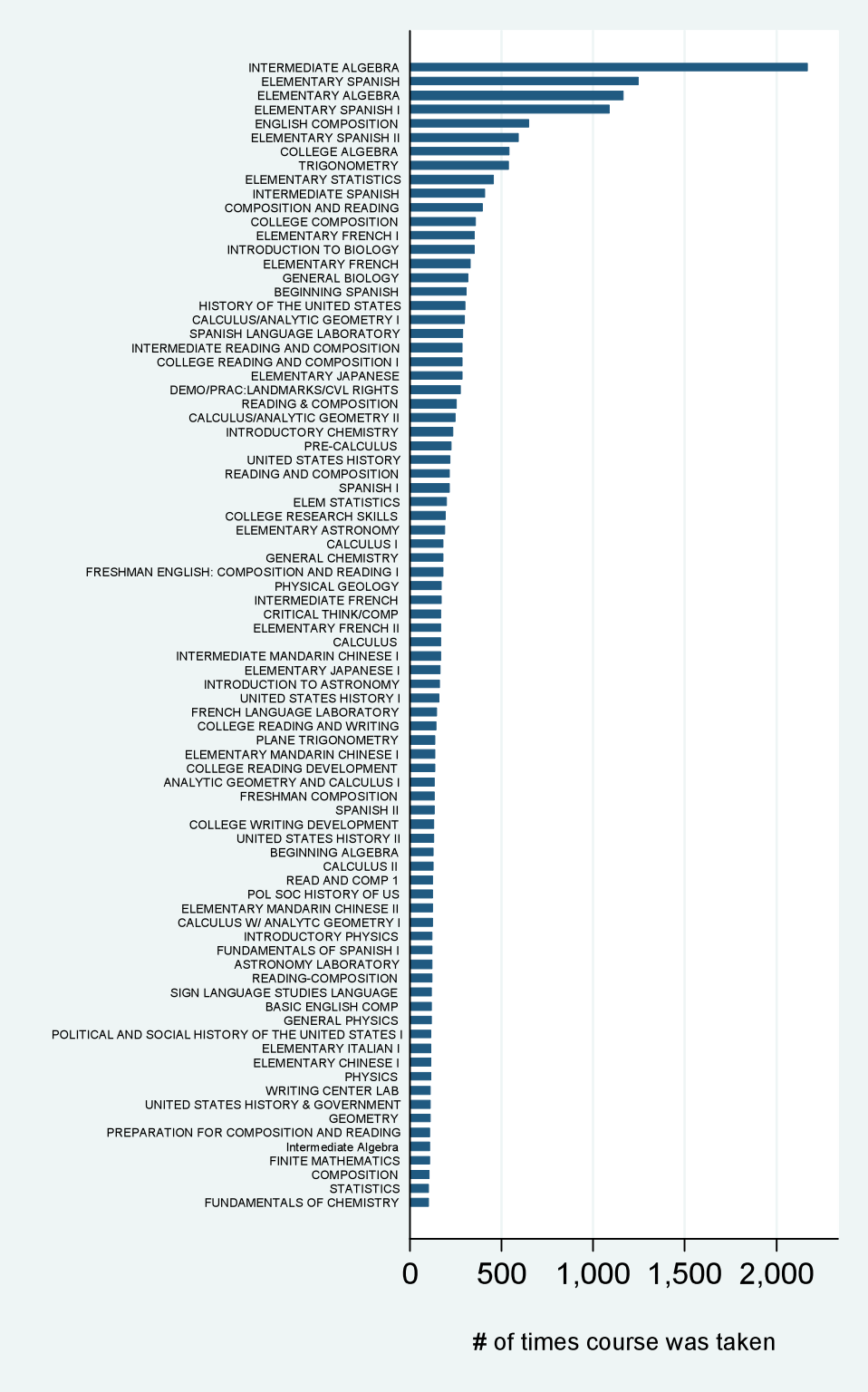

Figure A-4 – Most frequently taken English, math, science, history, and foreign language course during the 2006-2007 academic year
Source: California Community College Chancellor's Office

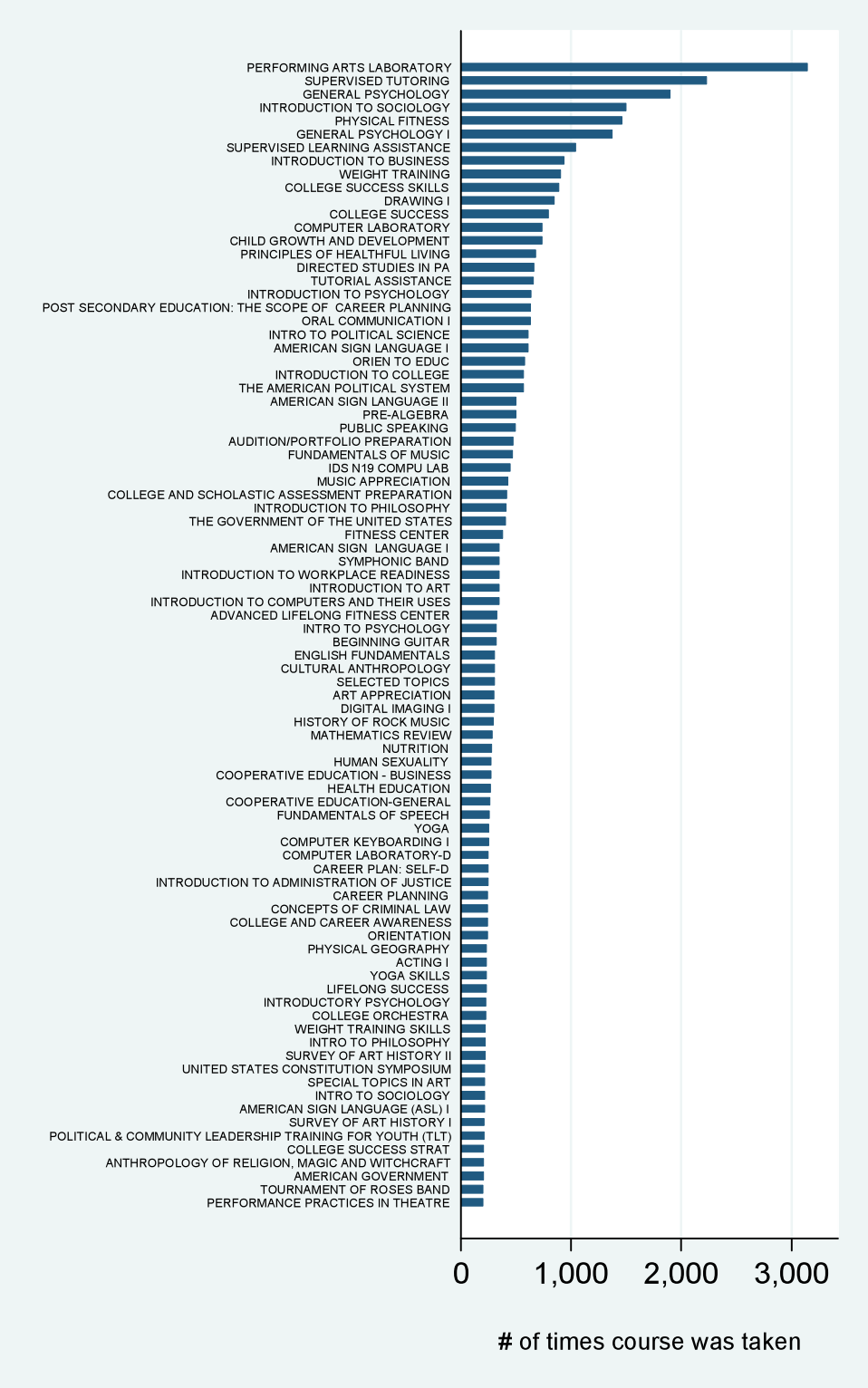

Figure A-5 – Most frequently taken courses that are *not* English, math, science, history, or foreign language during the 2006-2007 academic year. *Source: California Community College Chancellor's Office*

Table A-1
Original and aggregate grade labels

Original Grade Label	Aggregate Grade Label
A+	A
A	
A-	
B+	B
B	
B-	
C+	C
C	
D+	D
D	
D-	
F	F
Drop	Drop/Withdraw
Withdrawn without permission and no final passing grade	
Military withdrawal	
Withdrew	
Incomplete with grade A	Incomplete
Incomplete with grade B	
Incomplete with grade C	
Incomplete with grade D	
Incomplete with grade F	
Incomplete no pass	
Incomplete pass	
Incomplete with unknown grade	
In progress	
No pass	No pass
Pass	Pass
Report delayed	Unknown/Ungraded
Ungraded dependent	
Ungraded (non-credit)	
Unknown	

Appendix B

The data in Table B-1 compare the race/ethnicity, gender, and distance to college for students in my original data set and in my CE population. This demonstrates that the characteristics of students in both data sets are similar with the exception of the percentage of students that are Asian and the percentage of students that are white. I discuss this discrepancy in chapter 4.

Table B-1 also provides the breakdown for students enrolled in winter or summer terms. I also discuss these findings in chapter 4.

I did not include the age of the student during their term of enrollment because the original data set includes values that I purposefully excluded from each of the three other data sets. Specifically, I excluded students younger than 13 and older than 20. Therefore, comparing the age distributions of all four data sets does not make sense.

Table B-1
Percent of students in my original data set, my CE population, winter terms, and summer terms by race/ethnicity, gender, and distance to college.

	Original Data	My CE Population	Winter	Summer
Race/Ethnicity				
African-American	7%	7%	7%	8%
American Indian/Alaskan Native	1%	1%	0%	1%
Asian	17%	13%	24%	24%
Filipino	3%	3%	2%	3%
Hispanic	25%	25%	29%	23%
Other Non-White	2%	2%	2%	2%
Pacific Islander	1%	1%	0%	1%
Unknown/Non-Respondent	8%	8%	13%	8%
White Non-Hispanic	36%	41%	23%	29%
Gender				
Female	55%	56%	56%	54%
Male	43%	43%	42%	44%
Unknown	1%	1%	2%	2%
Distance to CC				
30 or more miles away	6%	7%	7%	5%
Within 30 miles	94%	93%	93%	95%

Figures B-1 through B-8 compare the high school characteristics of students in my original data set to the high school characteristics of students in my CE population. Comparisons are made across the four high school characteristics used in this analysis to show that the characteristics of the high schools in my CE population are representative of those in my original data set.

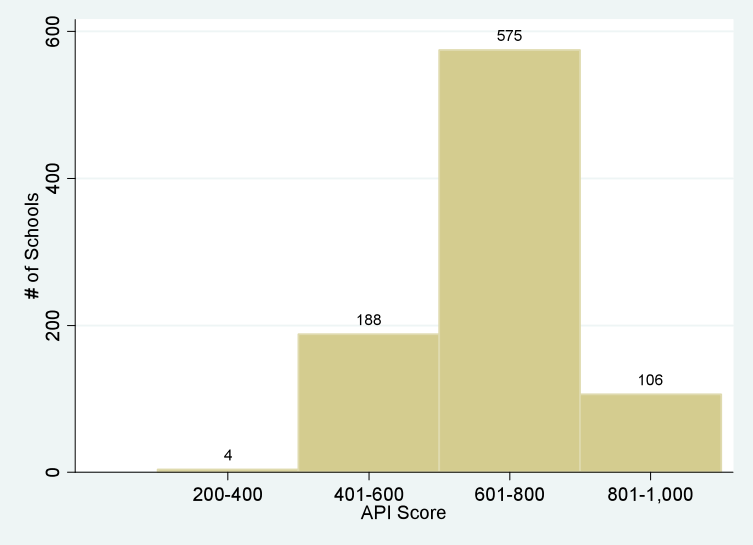

Figure B-1: API quartile rank for schools in my original data set, 2006-2007 academic year

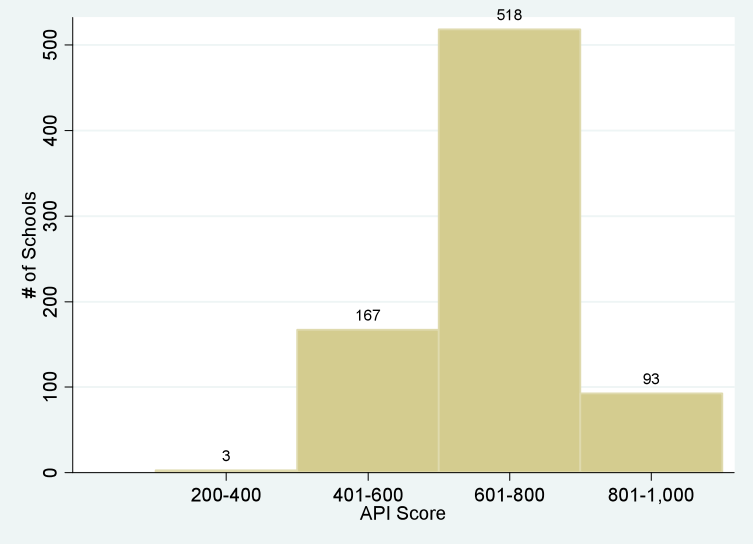

Figure B-2: API quartile rank for schools in my CE population, 2006-2007 academic year

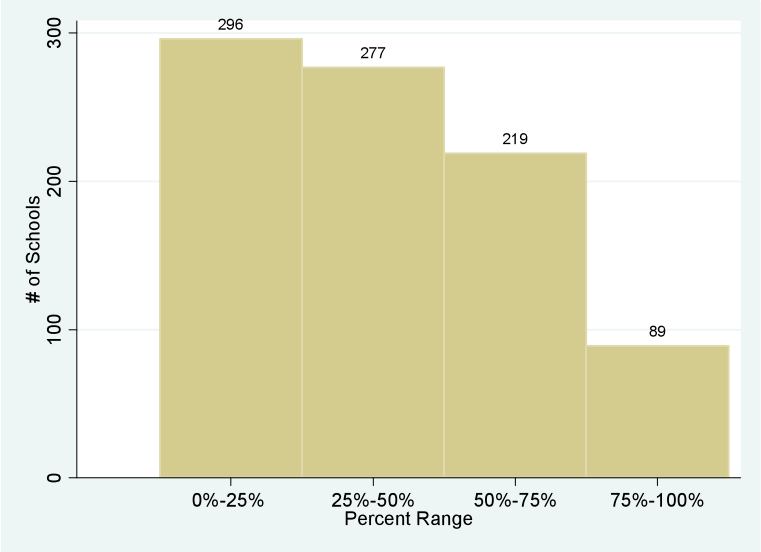

Figure B-3: Percent of students on free or reduced lunch for schools in my original data set, 2006-2007 academic year

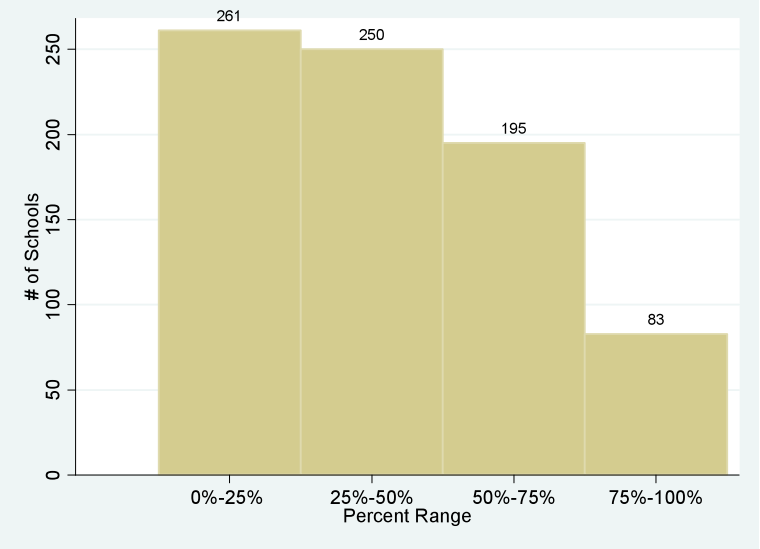

Figure B-4: Percent of students on free or reduced lunch for schools in my CE population, 2006-2007 academic year

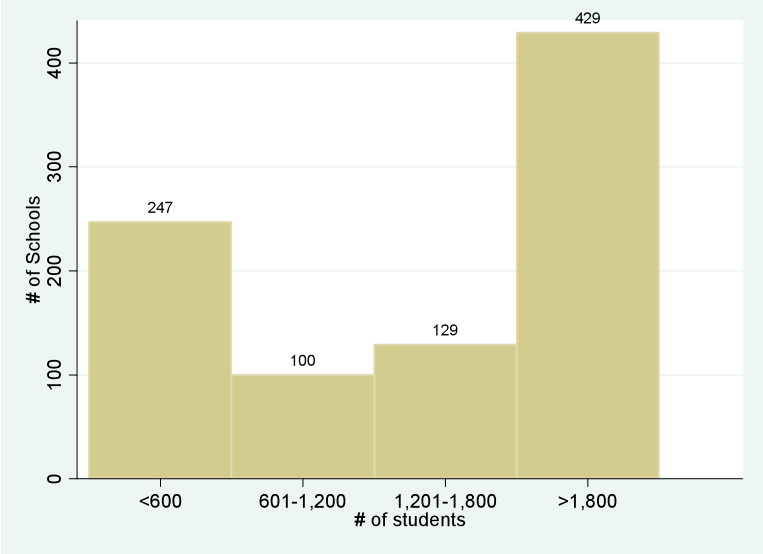

Figure B-5: Total enrollment in grades 9-12 for schools in my original data set, 2006-2007 academic year

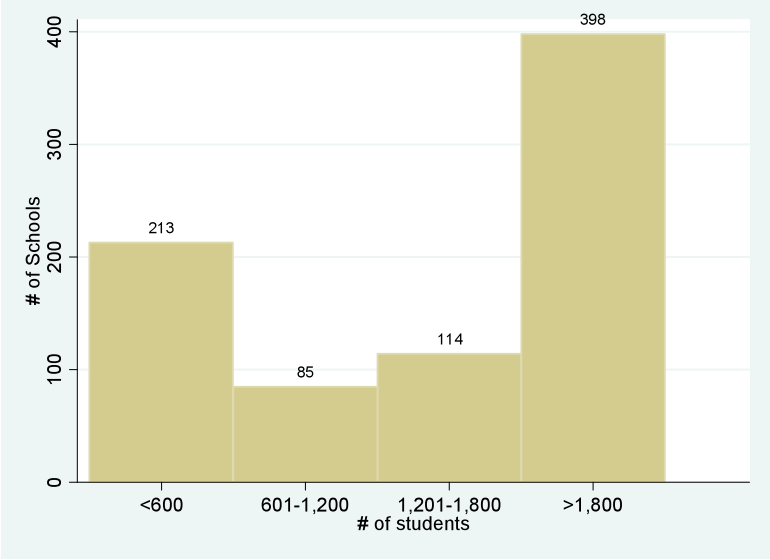

Figure B-6: Total enrollment in grades 9-12 for schools in my CE population, 2006-2007 academic year

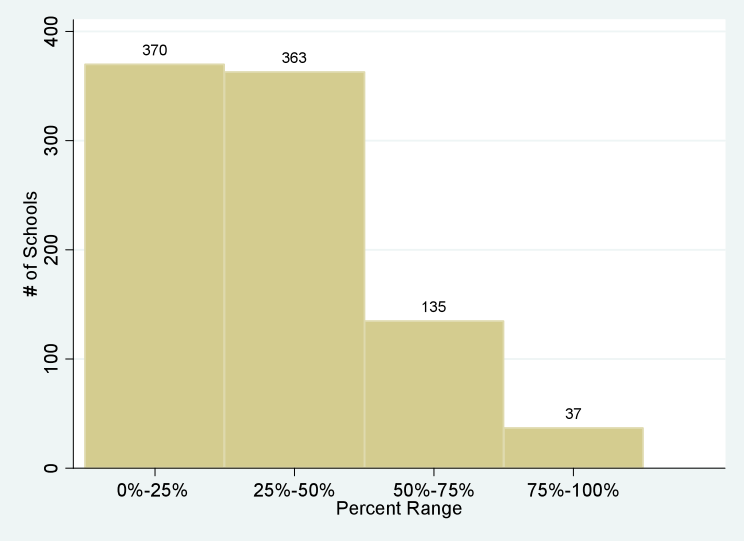

Figure B-7: Percent of graduates at schools in my original data set satisfying A-G requirement, 2006-2007 academic year

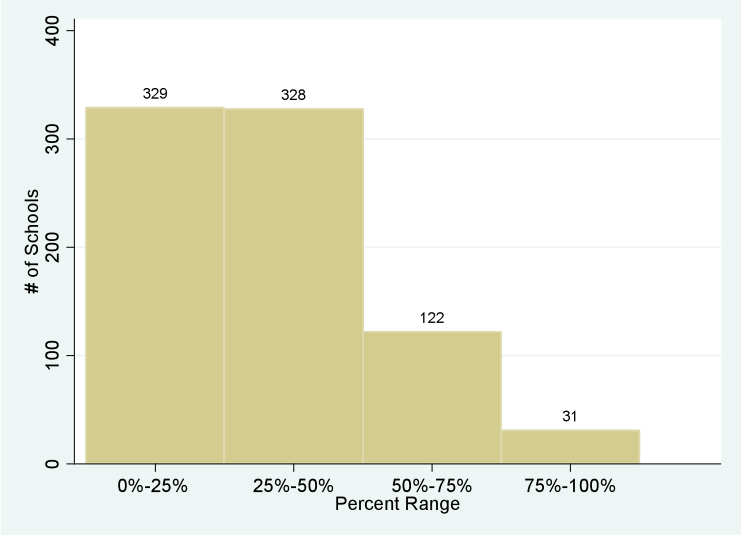

Figure B-8: Percent of graduates at schools in my CE population satisfying A-G requirement, 2006-2007 academic year

Appendix C

Table C-1 – Community colleges not included in my CDS sample

Allan Hancock College	El Camino College	Mt. San Jacinto College
Antelope Valley College	Evergreen Valley College	Napa College
Bakersfield College	Feather River College	Ohlone College
Barstow College	Folsom Lake College	Orange Coast College
Berkeley City College	Foothill College	Palo Verde College
Butte College	Fresno City College	Pasadena College
Cabrillo College	Gavilan College	Reedley College
Canada College	Glendale College	Rio Hondo College
Cerro Coso College	Grossmont College	Riverside College
Chaffey College	Hartnell College	San Bernardino College
Citrus College	Imperial College	San Diego City College
Coalinga West Hills College	Lake Tahoe College	San Diego Mesa College
Coastline College	Laney College	San Diego Miramar College
College of Alameda	Lassen College	San Jose City College
College of Marin	Lemoore West Hills College	Santa Ana College
College of the Canyons	Long Beach College	Santa Monica College
College of the Desert	Los Angeles City College	Santa Rosa College
College of the Redwoods	Los Angeles Mission College	Santiago Canyon College
College of the Siskiyous	Los Angeles Southwest College	Shasta College
Columbia College	Los Angeles Trade-Tech College	Sierra College
Compton College	Los Medanos College	Solano College
Contra Costa College	Mendocino College	Southwestern College
Copper Mountain College	Merced College	Taft College
Crafton Hills College	Merritt College	Victor Valley College
Cuesta College	Mission College	West Los Angeles College
Cypress College	Modesto Junior College	West Valley College
DeAnza College	Monterey College	Yuba College
Diablo Valley College	Mt. San Antonio College	

Table C-2 provides a numerical comparison between the student records in my CE population and the student records in my CDS sample. Comparisons are made across the four student characteristics used in this analysis.

Table C-2 – *Percent breakdown of student records for my CE population and my CDS sample*

	My CE Population	My CDS Sample
Race		
African-American	7%	5%
American Indian/Alaskan Native	1%	1%
Asian	13%	13%
Filipino	3%	3%
Hispanic	25%	26%
Other Non-White	2%	2%
Pacific Islander	1%	1%
Unknown/Non-Respondent	8%	7%
White Non-Hispanic	41%	43%
Gender		
Female	56%	57%
Male	43%	43%
Unknown/Non-Respondent	1%	1%
Age at term of enrollment		
13	2%	1%
14	6%	5%
15	12%	12%
16	25%	25%
17	38%	40%
18	13%	14%
19	3%	3%
Unknown	1%	0%
Distance to community college		
0-5 miles	45%	48%
5-10 miles	27%	29%
10-20 miles	17%	15%
20-30 miles	5%	5%
30+ miles	6%	3%

Figures C-1 through C-8 compare the high school characteristics of students in my CE population to the high school characteristics of students in my CDS sample. Comparisons are made across the four high school characteristics used in this analysis.

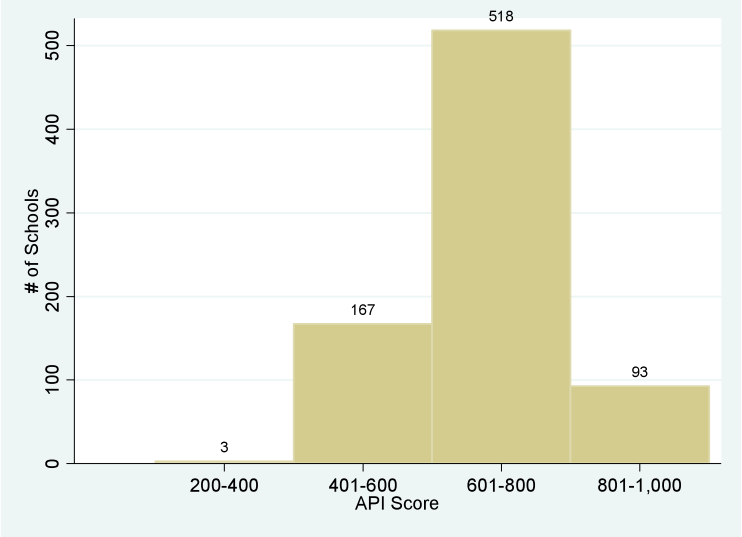

Figure C-1: API quartile rank for schools in my CE population, 2006-2007 academic year

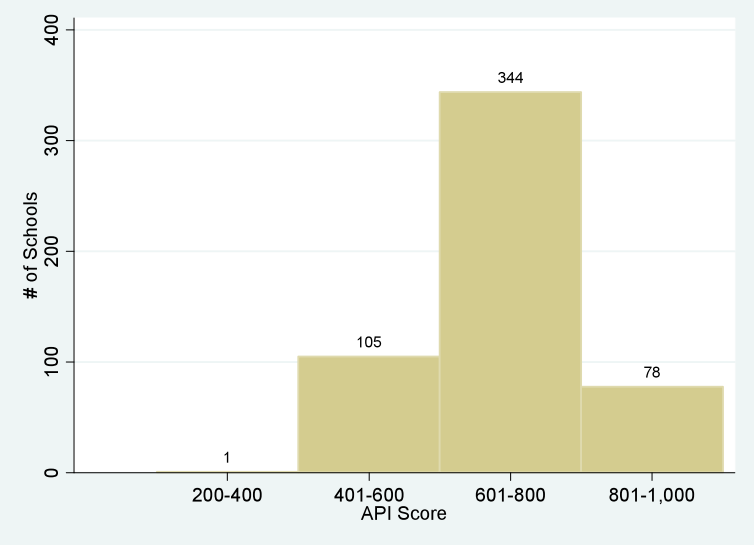

Figure C-2: API quartile rank for schools in my CDS sample, 2006-2007 academic year

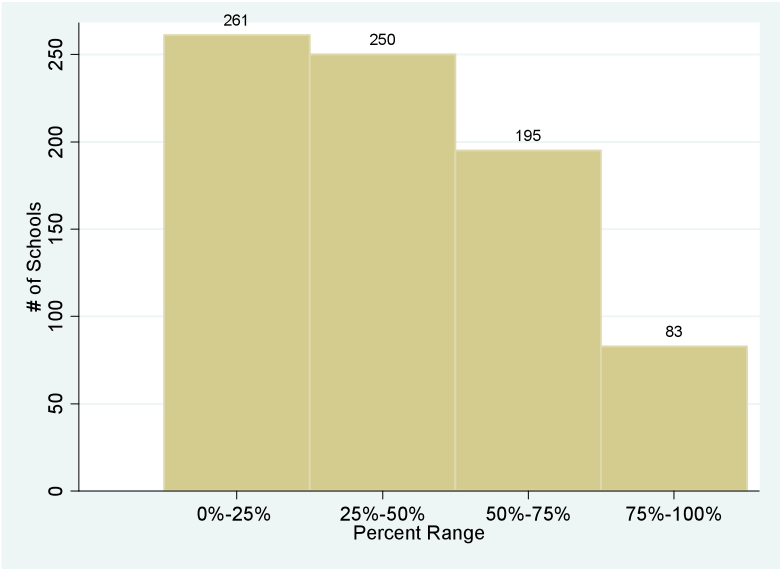

Figure C-3: Percent of students on free or reduced lunch for schools in my CE population, 2006-2007 academic year

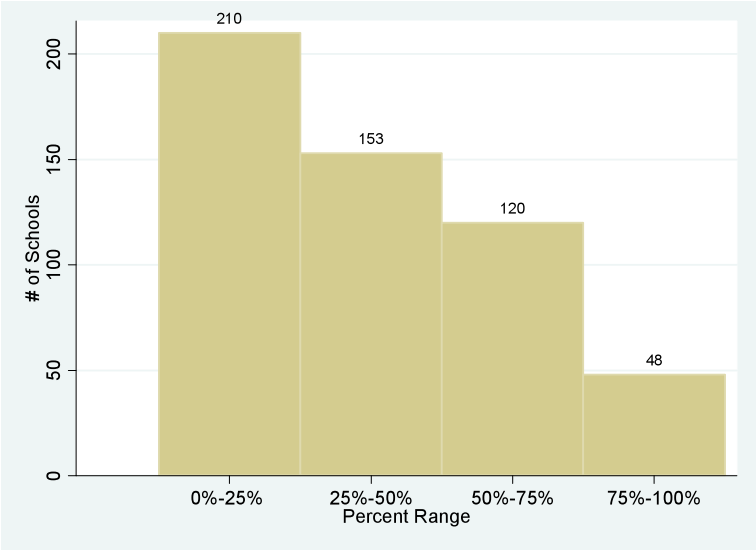

Figure C-4: Percent of students on free or reduced lunch for schools in my CDS sample, 2006-2007 academic year

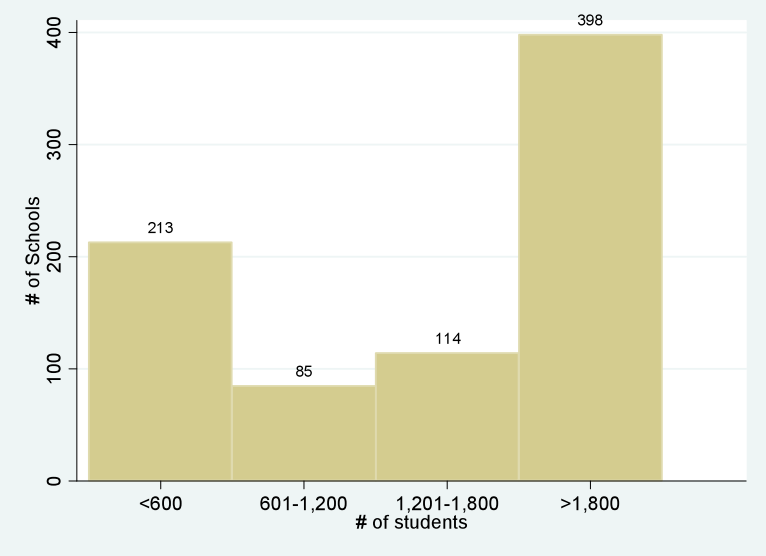

Figure C-5: Total enrollment in grades 9-12 for schools in my CE population, 2006-2007 academic year

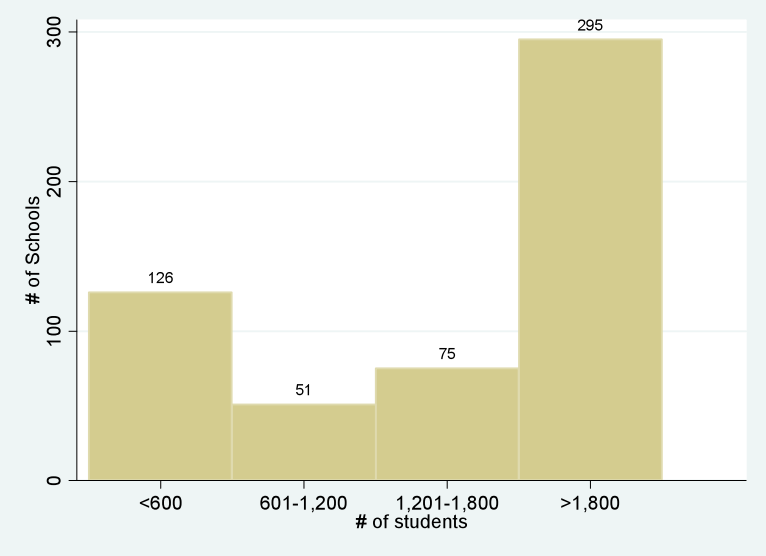

Figure C-6: Total enrollment in grades 9-12 for schools in my CDS sample, 2006-2007 academic year

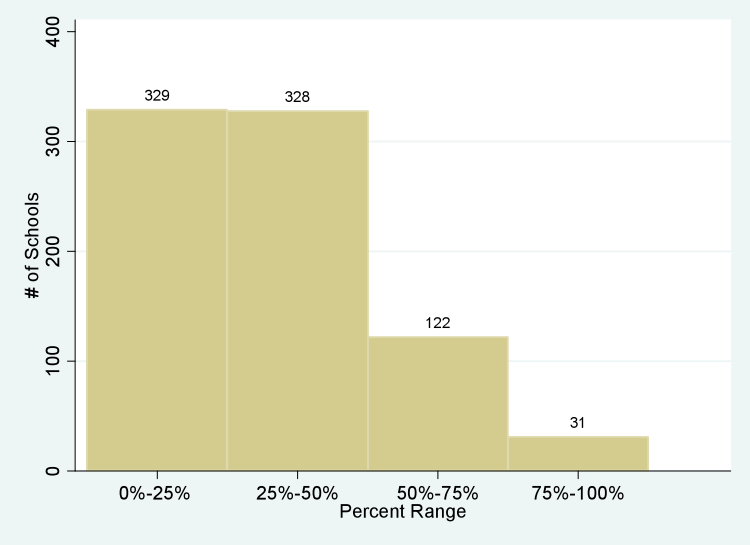

Figure C-7: Percent of graduates at schools in my CE population satisfying A-G requirement, 2006-2007 academic year

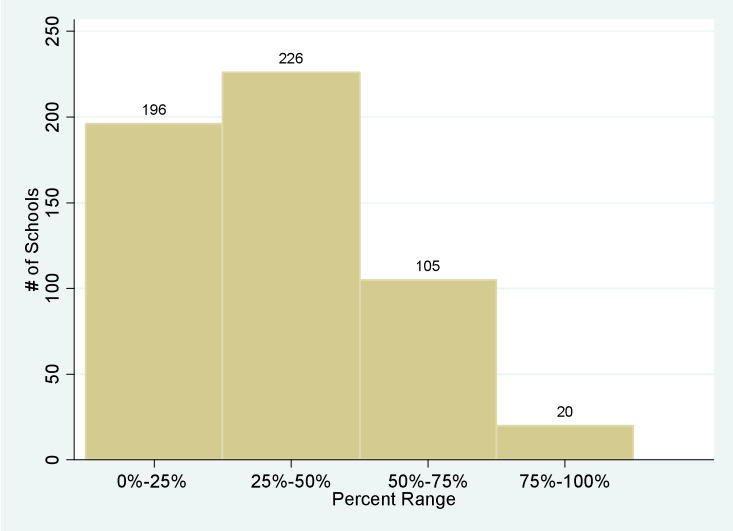

Figure C-8: Percent of graduates at schools in my CDS sample satisfying A-G requirement, 2006-2007 academic year

Appendix D

These figures show CE participation trends for fall, spring, and summer terms. They show that CE participation levels are very different during the summer when compared to fall and spring terms.

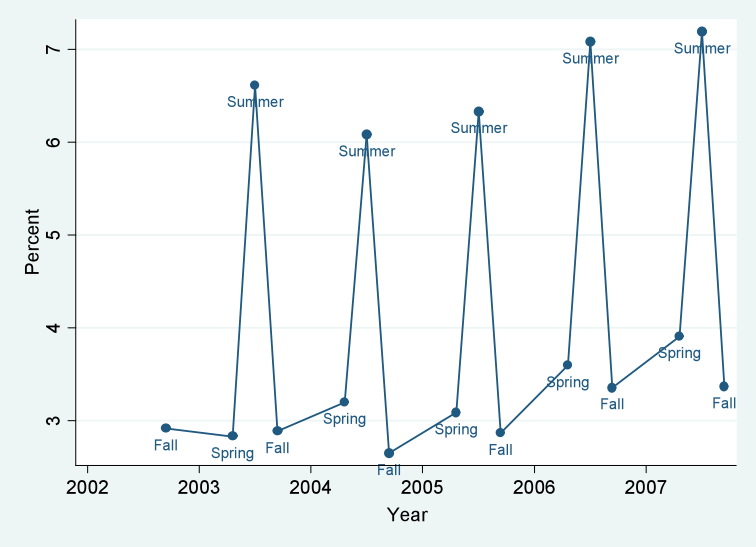

Figure D-1: Percent of CC enrollments that are CE students
Source: California Community College Chancellor's Office

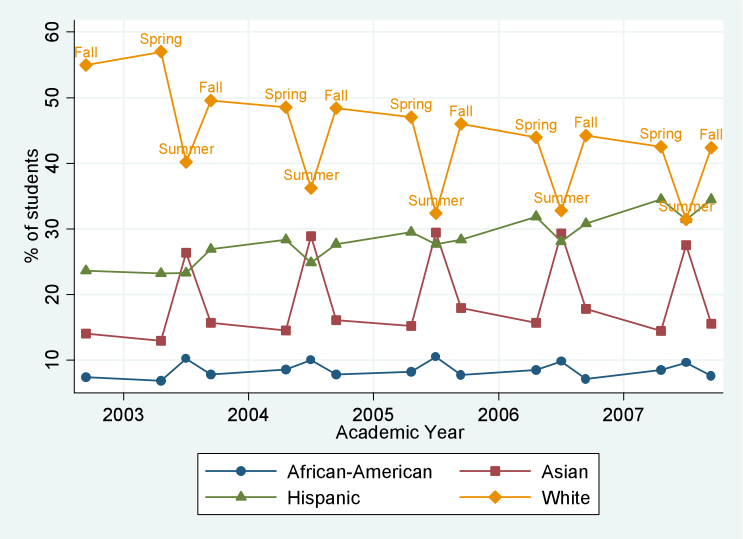

Figure D-2: Percent of students participating in CE over time, by race/ethnicity
Source: California Community College Chancellor's Office