

Short-term success of former dual enrolled career and technical education students at College of
the Desert

by

Kurt Struwe

BS, The Art Institute of California, 2005
MBA, Southwest Minnesota State University, 2010

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF EDUCATION

Department of Educational Leadership
College of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2021

Abstract

This study explores the associations among community college student perceptions and short-term success in college. Guiding the study are two research questions: (1) what is the association between participation in dual enrollment and subsequent college success for CTE students formerly enrolled in dual credit secondary programs and those who were not, and (2) how do CTE students' perceptions of their college experiences differ between CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs? Study participants were students who were formerly enrolled in dual credit programs at the secondary school and those who were not. Previous literature indicates that students who participate in career and technical education (CTE) programs offered in high school are more motivated and successful in college CTE programs than those who were not. Dual enrollment isn't only for high-achieving students; it also can benefit first-generation students, minority students, and low-income students. This study examined associations among variables in the intervention and comparison groups. Data were gathered from an online survey and the Student Information System (SIS) at College of the Desert to examine students' experiences, perspectives, and motivation in college. These data were then analyzed using chi-square and t-test analyses. The intervention group had higher course completion rates than the comparison group, the only statistically significant difference among all associations that were tested. The intervention group had higher rates of intention to transfer to a four-year college than the comparison group but these differences were only marginally significant. Differences in low-income status and first-generation status were observed between the intervention and comparison groups but these differences also were only marginally significant.

Short-term success of former dual enrolled career and technical education students at College of
the Desert

by

Kurt Struwe

BS, The Art Institute of California, 2005
MBA, Southwest Minnesota State University, 2010

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF EDUCATION

Department of Educational Leadership
College of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2021

Approved by:

Major Professor
Richard A Voorhees, Ph.D.

Copyright

© Kurt Struwe 2021

Abstract

This study explores the associations among community college student perceptions and short-term success in college. Guiding the study are two research questions: (1) what is the association between participation in dual enrollment and subsequent college success for CTE students formerly enrolled in dual credit secondary programs and those who were not, and (2) how do CTE students' perceptions of their college experiences differ between CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs? Study participants were students who were formerly enrolled in dual credit programs at the secondary school and those who were not. Previous literature indicates that students who participate in career and technical education (CTE) programs offered in high school are more motivated and successful in college CTE programs than those who were not. Dual enrollment isn't only for high-achieving students; it also can benefit first-generation students, minority students, and low-income students. This study examined associations among variables in the intervention and comparison groups. Data were gathered from an online survey and the Student Information System (SIS) at College of the Desert to examine students' experiences, perspectives, and motivation in college. These data were then analyzed using chi-square and t-test analyses. The intervention group was found to have higher course completion rates than the comparison group, the only statistically significant difference among all associations that were tested. The intervention group had higher intentions to transfer to a four-year college than the comparison group but these differences were only marginally significant. Differences in low-income status and first-generation status were observed between the intervention and comparison groups but these differences were only marginally significant.

Table of Contents

List of Figures	x
List of Tables	xi
Acknowledgements	xii
Dedication	xiii
Chapter 1 - Introduction.....	1
Statement of the Problem.....	2
Background of the Problem	3
<i>Benefits and Barriers</i>	3
Purpose of the Study	5
Primary Research Questions	6
Research Methodology	6
Delimitations and Assumptions	7
Significance of the Study	7
<i>Key Terminology</i>	8
Chapter One Summary.....	9
Organization of the Dissertation	9
Chapter 2 - Literature Review.....	10
Introduction.....	10
Overview	12
Types of Dual Enrollment Programming.....	12
<i>Career and Technical Education</i>	14
State and Local Government's Influence on Dual Enrollment Programs.....	15
Workforce Development and Dual Credit Programming	15
<i>Middle-skilled Jobs</i>	15
<i>Skills Strategies for the Workforce</i>	16
College Readiness	19
Developing and Implementing Dual Enrollment Programs	20
<i>K-through-16 Relationships</i>	21
<i>Performance Funding and Dual Credit Programs</i>	23

Impacts of Dual Enrollment Programs on Institutions	25
Barriers for Students	26
<i>Staff and Faculty Perceptions of Dual Enrollment</i>	26
Impacts of Dual Enrollment on Subsequent College Experiences	27
<i>Successful Completion of First-Term College Courses</i>	28
<i>Completion of all Courses with a Grade of “C” or better</i>	28
<i>Persistence from One Term to Another</i>	29
<i>Goal Achievement</i>	30
<i>Success in College</i>	30
Non-Academic Influences on Success in College.	31
Dual Enrollment’s Association with Success in College.....	32
Theoretical Framework.....	32
Further Research	34
Chapter 3 - Methodology	35
<i>Dependent Variables</i>	35
<i>Independent Variables</i>	36
<i>Research Questions and Hypotheses</i>	38
Research Design	39
<i>Study Setting</i>	39
<i>Population and Sample</i>	40
Figure 2.	41
<i>Data Collection and Data Sources</i>	41
<i>Data Analysis</i>	42
<i>Internal and External Validity</i>	42
<i>Ethical Considerations</i>	42
<i>Limitations</i>	43
Summary	43
Chapter 4 - Analysis and Findings.....	44
<i>The Sample</i>	45
Survey Findings	46
<i>Survey Findings of Sample Students’ Experiences and Perspectives</i>	47

Satisfaction with your college experience.	47
Motivation to finish.....	48
Do you plan to transfer?.....	48
Did you enroll in advanced placement?.....	49
Did you Enroll in Dual Credit?.....	49
Former Dual Credit Participant Survey Findings	50
Who or what played a role?	50
How did Dual Enrollment Credits Help?.....	51
Dual Enrollment and Their Career Path.....	51
High School Dual Enrollment Experience.....	52
Dual Enrollment and Success in College.....	52
Which Adults Helped You Participate?	53
<i>Differences in Experiences and Perspectives Between Dual Credit Participants and Non-Participants</i>	54
Broad Area of College Coursework Interest While in High School.....	54
Satisfaction with the Education Experience at College of the Desert.	55
Dual Credit Enrollment and Plan to Transfer.	55
Dual Credit Enrollment and Motivation to Finish College.....	56
Enrollment in Advanced Placement.....	57
Student Information System (SIS) Data Findings	57
First Generation Status, Fall 2020	57
First Generation Status, Spring 2021.	58
Low-Income Status, Fall 2020.....	59
<i>T-Tests: GPA, Units Attempted, and Units Earned</i>	59
Fall 2020 Grade Point Average.....	59
Spring 2021 Grade Point Average.	60
Fall 2020 Units Attempted.....	60
Fall 2020 Units Earned.	60
Spring 2021 Units Attempted.	60
Spring 2021 Units Earned.....	61
Short-Term Success in College of Formerly Dual Credit CTE Students	61

Higher Course Completion Rates.	61
Complete all courses with “C” or better.	62
Persistence.....	62
Goals Achieved.....	62
Summary.....	63
Chapter 5 - Conclusions and Recommendations	65
Implications of the Findings	65
<i>Motivation in College</i>	65
The Association of Dual Enrollment and Short-Term Success in College.....	65
Dual-Enrolled Students’ Perceptions.....	66
Low-Income and First-Generation Status.....	66
Recommendations, Future Research.....	68
Probability levels.	69
Concluding Remarks.....	70
References.....	71
Appendix A - Survey Email Invitation	82
Appendix B - Student Survey	83
Appendix C - A Logic Model for Implementing Dual Credit Programs.....	86
Appendix D - Major Choices within the Sample and Population.....	90

List of Figures

Figure 1: Astin’s I-E-O Model.....	33
Figure 2: Population and Sample.....	41
Figure 3: How Satisfied are You with Your Education Experience at College of the Desert?	47
Figure 4: Which Best Describes Your Current Motivation to Finish College?	48
Figure 5: Did You Enroll in Advanced Placement (AP) in High School?	48
Figure 6: Did You Enroll in Advanced Placement (AP) in High School?	49
Figure 7: Did You Enroll in a Dual Enrollment Program when You were in High School?	50
Figure 8: Who or What Played a Role in Your Decision to Enroll in Dual Credit Classes?	51
Figure 9: How did the College Credits Earned in High School through the Dual Enrollment Program help You?	51
Figure 10: Did the Dual Enrollment Program help You Decide on Your Current Career Path? .	52
Figure 11: Overall, how Satisfied are You with Your Dual Enrollment Experience while in High School?.....	52
Figure 12: Did Your Participation in Dual Enrollment Courses Prepare You for Success in Your College Courses?	53
Figure 13: Which Adults Helped You as You Participated in the Dual Enrollment Program?....	53

List of Tables

Table 1: Variables in the Study and Their Relationship to the Study Design	36
Table 2: Gender, Age, and Race/Ethnicity	46
Table 3: Chi-Square Results for Students' Interest in a Broad Area of College Coursework while in High School	54
Table 4: Chi-Square Results for Students' Satisfaction with the Educational Experience at COD	55
Table 5: Chi-Square Results for Plan to Transfer to a Four-Year Institution	56
Table 6: Chi-Square Results for Motivation to Finish College	56
Table 7: Chi-Square Results for Student's Enrolled in Advanced Placement in High School.....	57
Table 8: Chi-Square Results for Students' First-Generation Status, Fall 2020	58
Table 9: Chi-Square Results for Students' Low-Income Status, Fall 2020	58
Table 10: Chi-Square Results for Students' Low-income Status, Spring 2021.....	59
Table 11: Chi-Square Results for Dual Credit Students' Higher Course Completion Rates.....	62
Table 12: Chi-Square Results for Students' Educational Goal Status, Spring 2021	63
Table 13: Logic Model for Developing a Dual Enrollment Program	88
Table 14: Majors Chosen More Often within the Sample and Population	90

Acknowledgements

Thank you to my chair, Dr. Voorhees, for his guidance and support during this dissertation journey. Thank you to my dissertation committee and to Dr. Mathis for the continued support.

Dedication

This work is dedicated to my mother for all of her support and love through the years.

Chapter 1 - Introduction

This study focused on the perceptions and subsequent short-term success of College of the Desert (COD) career and technical education (CTE) students who were formerly enrolled in dual credit secondary programs offered by the college. Previous research focused on dual enrollment and post-secondary success holds that college students who participated in dual enrollment programs may earn credentials faster and experience increased retention and completion rates (Martinez, 2018). Dual credit programs are intended to shorten participants' paths to a degree or credential. Martinez (2018) states that when community college students are prepared for college, their grade point averages (GPA) improve, completion time decreases, and graduation rates increase (Martinez, 2018). A lack of educational aptitude among high school seniors and decreasing college success have led to growing condemnation of the education system and concerns with the educational process inspiring states to focus on better ways to lead the transition between high school and community college (Mokher & McLendon, 2009). A primary focus of this study is the association between dual credit enrollment, perceptions, and short-term success in a community college for CTE students.

This study uses a variation of the Achieving the Dream criteria for institutions to measure student success (Achieving the Dream, n.d.). The researcher did not consider remedial course completion as it is not required in California. The study also does not include completion of degrees or certificates. Rather it focuses on goal achievement. Due to the one-year study time period, the researcher measured goal achievement as units attempted and units earned in spring 2021 using data retrieved from the College of the Desert Student Information System (SIS). Accordingly, four criteria were used to quantify short-term student success in this study:

1. Enrollment and completion rates in first-term college courses. These courses include basic skills and college-level courses.
2. Completion of all courses with a grade of “C” or better.
3. Persistence from one term to the next.
4. Goal achievement.

Students may enter dual enrollment programs with four-year college ambitions and may see themselves on an academic track to do just that. On the other hand, it’s likely that some students are seeking skills advancement that can lead directly to employment. Community colleges, government agencies, and employers to better understand labor markets and employers' needs can target skills gaps and promote skills-based credentials (AACC, 2014, p. 20).

Achievement gaps are expanding skills gaps in the American workforce and California is projecting a shortage of workers. The American Association of Community Colleges (AACC) argued that America needs to close the skills gap by focusing on teaching knowledge and skills in career and technical education (CTE) for jobs in the current and future economies (AACC, 2014, p. 14).

Statement of the Problem

O'Banion (2019) discussed the importance of “eliminating the gap between high school and college” (Vargas et al., 2019, p. 191). A high school diploma is no longer sufficient to make a good living. A post-secondary degree or credential is necessary for an individual’s economic sustainability whether it leads to a community college for skill training or to prepare for transfer. Helping CTE community college students to transfer to a four-year college or learn skills that are in high demand can help them achieve positive results in the workforce. Other opportunities include entry to a middle-skill occupation.

Background of the Problem

Dual enrolled students are high school students who can register for and participate in college-level courses. There is evidence that dual enrollment can positively influence college readiness, persistence, and completion, though more study is needed (Fink et al., 2017). Students can earn a degree in less time and at less cost as they are better prepared for college coursework with additional self-confidence and financial motivation (Cassidy, 2010). Students who participate in dual enrollment programs may be better acclimated to college's rigorous expectations and may be better prepared to succeed academically in college (Mokher & McLendon, 2009). This condition suggests that high school involvement is connected to college expectations and that both institutions would benefit from working together to enhance student success (Karp et al., 2005).

Benefits and Barriers

Some critics warn that dual enrollment programs may not be sufficiently rigorous and may lower college classroom standards (Andrews, 2000). Others warned that students enrolled in dual enrollment might detract from their participation in high school classes and other activities. Some state policies include a specified limit of dual enrollment classes in which high school students can enroll. States consider tuition, textbooks, placement test, and lab fees when determining which of these is funded by the state, the district, the institution, or students (Cassidy, 2010). Funding these programs is also controversial. Simultaneously funding high school attendance and college full-time-equivalent (FTE) are critical decisions for states (Boswell, 2000). Areas of focus in developing a dual enrollment program for program directors, staff, and faculty are high school articulation agreements, partnerships, funding, and student support services (Cassidy, 2010).

Stakeholders should consider many factors before deciding to include dual enrollment courses into the curricula and accept dual credits. Gray and Lewis (2018) provided insights about the benefits of and barriers to career and technical education (CTE) programs offered to high school students, employers' involvement, students' participation in CTE programs, and the factors that influence a district's decisions to offer CTE program. The authors conducted a survey of school districts by mailing a questionnaire to be completed by the most knowledgeable person about CTE programs for high school students in each school within each of 1,800 school districts. In the 2016-17 school year, they found that CTE programs were offered to high school-level students in 98% of public-school districts. Districts reported that the program costs, student enrollment interest, and facilities played roles in whether to phase out or add a program.

In *Empowering Community Colleges to Build the Nation's Future* (2014), the AACCC discussed ways of reducing the number of underprepared students entering college. Four actions to increase college preparation are intended to address this issue:

- define and measure college readiness
- establish and support community partnerships
- participate in the implementation of the Common Core State Standards (CCSS) or their equivalent in non-CCSS states, and
- collaborate with K-12 partners

To address aligning curricula, early intervention and assessment, early college and dual enrollment with high school and college, areas of engagement include:

- expanding early college opportunities,
- create seamless pathways from high school to college,

- design cross-sector faculty development, support early interventions such as skill-building,
- create opportunities for students to earn college credits while still in high school,
- share evaluating methods between institutions,
- work together to develop college readiness predictors, and
- assess the cost and efficacy of the programs (AACC, 2014).

The AACC vision of success is an economy and democracy that works for everyone.

Their Implementation Guide calls for institutions to reimagine 21st-century education, restructure their students' experiences, and listen to students' ideas (AACC, 2014). Success in college can be gauged in many ways. The AACC (2014) plan to increase completion rates by 50% by 2020 offers six strategies to enhance quality, preserve access, and eradicate attainment gaps with gender, ethnicity, race, and income. The strategies include:

- a public commitment to completion,
- development of pathways to completion,
- award credit for prior learning,
- improve outcomes in entry-level classes,
- guarantee seamless transfers of credentials, and
- ensure transfer students are awarded community college credits toward their four-year degree (AACC, 2014).

Purpose of the Study

The purpose of this research was to explore the association among community college CTE student perceptions and short-term success in college between students who were formerly enrolled in dual credit programs at the secondary school and those who were not. For the

purposes of this study, short-term success in college is guided by the researchers' modified version of Achieving the Dream's five indicators to determine students' short-term success (AtD, n.d.).

Primary Research Questions

RQ 1. What is the association between participation in dual enrollment and subsequent college success as defined by researcher-modified Achieving the Dream success criteria for CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

RQ 2. How do CTE students' perceptions of their college experiences differ between CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

Research Methodology

This study used Campbell & Stanley's (1963) Design 3, the static comparison group quasi-experimental design (p. 12) to compare the associations linking students' perceptions and short-term success between students who were formerly enrolled in dual credit programs at the secondary school and those who were not. The researcher examined academic records of students who were formerly enrolled in dual credit and students who were not enrolled in dual credit. Students' historical and survey data were examined to determine whether an association exists among these students and success in community college. An online survey was administered and used to examine students' college readiness, persistence, and goal achievement in college.

Delimitations and Assumptions

Campbell & Stanley (1963, p. 5), hold that “external validity asks the question of generalizability,” the ability to replicate experimental treatment variables, settings, population, and any other variables. Threats to the internal validity of this study included: (a) history of progress during the study period, (b) maturation of students’ motivation during the study period, (c) sample size, (d) chi-square and t-test instrumentation used to analyze data, and (e) biases related to participant selection (Campbell & Stanley, 1963).

Delimitations allow the researcher control within the narrow scope of what is included in this study (Roberts, 2010). This study used secondary and primary data from first-year dual-enrolled students and non-dual enrolled students at a community college in Southern California. The study sampled eight formerly dual-enrolled and 38 non-dual credit students who graduated from high school within the same year of enrolling in college.

Assumptions are what the researcher assumes or takes for granted during the study (Roberts, 2010). It is assumed that the college will have sufficient dual-enrolled first-year students, and that requested secondary data will be available for analysis during the study. The researcher assumes that all survey questions will be answered accurately.

Significance of the Study

A study's significance can be measured by posing the question “why” and how it fills gaps in current knowledge (Roberts, 2010, pp. 137-138). It is intended that this study would produce knowledge that expands understanding of dual enrollment's importance to the nation's middle-skilled workforce and the success of CTE students. Dual enrollment helps to build middle-skilled opportunities for students to the workforce (Shanholtz, 2019). Finally, the goal is

to contribute to the national workforce by supporting and improving community college student success and dual enrollment outcomes.

Key Terminology

The terminology presented here defines those terms necessary to understand the research questions.

Career and Technical Education: A program of study that provides students a pathway to careers. (California Department of Education, n.d.)

Dual enrollment: A way to earn college credits while still in high school. (CCCCO, n.d.)

Concurrent enrollment and early college: Also known as dual enrollment. (CCCCO, n.d.)

Grade C: The standard scale in most colleges and many high schools for C- is 70-72 (1.7 GPA), C is 73-76 (2.0 GPA), and C+ is 77-79 (2.3 GPA) (College board, 2021).

Grade Point Average: Colleges delineate grade point average (GPA) on a 4.0 scale. The top grade or A equals 4.0 (College board, 2021.).

Persistence: This study uses the term persistence as the percentage of students who return to the same college for their next term. The National Student Clearinghouse's definition of persistence is the percentage of students who return to any institution for their second year. (National Student Clearinghouse, 2018)

Post-secondary success: The opportunity for all students to complete a post-secondary education that leads to a career. (Gates Foundation, n.d.)

Retention: The percentage of students who return to the same college for their next year (National Student Clearinghouse, 2018)

Success in college: This study focusses on the short-term success, conducted within one-academic year, by employing the modified Achieving the Dream criteria as found above.

Workforce development: To prepare students to be work ready, world ready, and for the future of work (CCCCO, n.d.).

Chapter One Summary

This chapter is an overview of this dual enrollment study, the problem to be addressed, the purpose of the dual enrollment research questions, methodological approach, the significance to education and the workforce, and the introduction of a theoretical framework. Astin's *Theory of Involvement* (1984) is the study's guiding framework. Research delimitations, assumptions, methodological approaches, and terminology are discussed and used to guide the study.

Organization of the Dissertation

Chapter One introduces the study's subject, describes the problem, explains the background of the problem, and introduces the purpose, research questions, framework, methodology, and significance of the study. This chapter defines the topic and explains the scope of the work. Chapter Two establishes the justification and background of the research. The literature review consists of sources used to investigate, understand, research, and obtain opposing views for the study. The literature review exposes gaps in previous and current research into the success of community college students who were formerly enrolled in secondary dual enrollment programs. Chapter Three explains the research methodology, the data collected, and the methods of analysis. Chapter Four presents the analysis of data collected. Chapter Five presents the findings, conclusions, and recommendations for action and future studies. This conclusion of the study summarizes the problem addressed, the purpose, research questions, methodology, and findings compared to the literature. It concludes with the author's analysis, closing summary, and recommendations for future studies.

Chapter 2 - Literature Review

Introduction

This study examines the association between dual enrollment, community college student perceptions of their experiences, and short-term success. This literature review explores the broad area of dual credit students enrolled in community colleges in general and the perceptions and subsequent short-term success of those students where available in the literature. Research indicates that dual enrolled students are more likely to finish high school, enroll in college, and experience post-secondary success than non-dual enrolled students (Bailey et al., 2005; Irwin, 2018; Jones, 2014; Zinth & Barnett, 2018).

The transition from high school to college can be challenging (O'Banion, 2019). A growing populace of students under 18 years of age seeks productive careers in the American workforce (Juszkiewicz, 2017). Dual enrollment programs in high school can build a foundation of technical skills and enrich students with practical experience benefiting post-secondary education and career pursuits (Keily, 2019). Dual enrollment contributes to decreasing the need for academic remediation, help with college transition, positively impact in motivation and performance, and completion for students. Changes in California law increase the potential for dual enrollment to be a strategy for equity, grow college access, increase enrollment, and support student success. California's goal is to track community college students' experiences, how dual enrollment prepared them for college, their successful attainment of certificate/degree completion, and workforce readiness (Fink, 2017).

To enhance cooperation, programs that facilitate high school to college transition benefits both entities when they work together. A collaboration developed through an articulation agreement process is typically facilitated by state policy intended to increase dual credit

enrollment(Vargas, J. et al., 2019, p. 193). For example, the California Community Colleges Chancellor's Office (CCCCO) Assembly Bill 288 (AB 288) (CCCCO, 2016, p. 1) in California allows community college districts to enter into a College and Career Access Pathway (CCAP) partnership by reducing barriers and penalties that may discourage dual enrollment opportunities with a public-school district to expand dual enrollment (California Department of Education, 2016).

Underrepresented groups can be helped to succeed in college with dual enrollment. Shapiro et al. (2010) addressed achievement gaps in college completion rates by race and ethnicity to be about fifteen-to-twenty percent, with minority students achieving at rates lower than White students. Lower socio-economic participants also exhibit lower completion rates in college (An, 2013; Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). The authors found that dual enrollment can increase completion rates of students from disadvantaged backgrounds with monitoring and by inspecting disaggregated data to look for gaps (Fink et al., 2017).

Martinez (2018) conducted ten institutional case studies in collaboration with the American Association of Collegiate Registrars and Admissions Officers (AACRAO, 2016) in a report exploring how dual enrollment is used to increase affordability, access, and meet college enrollment goals. High school dual enrolled students typically pay less for dual college credits. The CCCCCO AB 288 (Dual Enrollment) statute prohibits charging or assessing fees to high school pupils enrolled in courses through the CCAP, including textbooks and registration. State funds are credited to the community college district (CCCCO, 2016). California is implementing a new funding formula similar to K-12 that reduces equity gaps and helps underserved students enrolled in dual enrollment programs (CCCCO, 2016).

Overview

Success in college is plausibly the intended goal of dual enrollment programs; consequently, this study focuses on college success defined as a student's own experience of being prepared for community college, succeeding in community college work, and achieving goals. States (ACTE, 2017) and organizations (AACC, 2014) advise the creation of strong partnerships to consider work-based training strategies for dual enrollment and college success to fill skills gaps. Therefore, these categories are researched in the literature review with a focus on the state of California.

The researcher found literature that examines the subsequent success in community colleges of dual enrolled secondary students. There is an abundance of studies focused on the effectiveness of dual enrollment. A bounty of investigated literature equates dual enrollment and success with completion. Literature focusing on dual enrollment in relation with a student's own experience of success needs further investigation.

Types of Dual Enrollment Programming

The terms dual enrollment and concurrent enrollment are used interchangeably in California (CCCCO, n.d.) and are courses in an accelerated learning program typically taken in normal high school work with the intention of positively influencing subsequent college performance, persistence, and completion for students. Dual enrollment programs are collaborations among high schools and higher education institutions in which high school students are able to enroll in college classes and typically earn college credits. Concurrent enrollment may refer to programs that allow secondary students to earn both high school and college credit concurrently (Karp, Calcagno, Hughes, Jeong & Bailey, 2007; Hughes, Karp, Bunting, & Friedel, 2005). The National Alliance for Concurrent Enrollment Programs (NACEP)

developed a noncompulsory national accreditation program to define concurrent enrollment partnerships (CEPs) (NACEP 2009). The NACEP summarizes that in concurrent enrollment programs, high school instructors teach college courses during the normal school day. Fink et al. (2017) explains that other types of accelerated programs to increase college readiness include: summer learning or summer bridge programs, accelerated courses such as advanced placement, and other initiatives are linked to college readiness and improved student outcomes.

Early College High Schools (ECHS) are dual or concurrent partnerships between public or charter schools and a community college within the same district. Middle College High Schools (MCHS) are secondary schools situated on the college campus, offering an opportunity to be concurrently enrolled in college classes (CDE, 2019). According to Cassidy (2010), dual enrollment is a partnership agreement between a local higher education institution and a district or school allowing high school students to earn college credits while attending high school.

Dual enrollment and advanced placement are different. Advanced Placement (AP) is offered to accomplished high school students to complete entry-level college coursework (Dounay, 2006). Though policies vary, most colleges and universities will accept a score of three out of five on an AP exam to award college credit for the course. Students may attend the year-long class or opt to take the exam without sitting in the class. "Dual enrollment would be beneficial for all students, not just those who are high-achieving" (Myers & Myers, 2017). Many community college students are first-generation, retention rates will be lower than non-first-generation students, and their parents' level of education varies. Community colleges enroll more minorities than white students in California, their student populations are typically older, they offer students easier access and lower tuition, and enroll many students on a part-time basis (Cohen et al., 2014; Fike, 2008).

More school districts offer dual enrollment programming than offer Advanced Placement in public high schools in the United States with about one-third of all students taking some sort of dual credit during high school. Seventy-eight percent of dual enrollment in the United States is more often funded by the district, school, or state (Taie & Lewis, 2020). Some states have designed dual enrollment to increase equity and access for underrepresented students to participate at no cost while there is a cost to participate associated in other states. Females participate in dual enrollment at higher rates than males. Current research focuses on who participates, who benefits, and who has access (Gagnon et al., 2021; Rivera et al., 2019).

Career and Technical Education

Focusing on career and technical education (CTE) and academic dual credit students' retention and success rates, Sorensen (2019) found that CTE students who participated in dual credit had increased fourth-semester GPA as well as increased retention and completion rates compared to those students who were not formerly enrolled as dual credit students. Further, all students who earned dual credits (academic and CTE students) had increased first-semester GPA. Martinez (2018) found that CTE dual enrollment programs in high school can build a foundation of technical skills and enrich students with practical experience benefiting post-secondary education and skills training.

Research suggests support throughout California among college administrators to improve college readiness, career-readiness, and CTE programs. CTE programs vary due to the resources and support that are allocated. Quintero (2018) used a Likert scale to measure data from 27 districts in southern California to determine: the role of district administrators in both career-readiness and development of CTE programs; which CTE programs they have supported; resources allocated by the districts; and types of CTE programs that have been the most effective in improving college readiness. The author's findings can be used to identify CTE program

effectiveness and determine the allocation of resources and support systems for college success. Effective CTE programs can prepare students for middle-skilled jobs in the workforce. Students may achieve certificates, degrees, or their version of persistence or completion to be competitive in the workforce.

State and Local Government's Influence on Dual Enrollment Programs. States and local governments affect dual enrollment policies and play a role in discouraging or encouraging program enrollment. Seventy-four percent of dual enrollment courses are taught at the high school campus (Barnett & Stamm, 2010). Costs to provide college courses at a high school are significantly lower and typically taught by a high school teacher. Some dual enrollment classes are taught at a college allowing the student to experience the college campus environment but at a higher cost. Lastly, online delivery options are increasing ease of dual enrollment participation (Barnett & Stamm, 2010).

Higher education institutions and school districts decide the criterion for the dual enrollment agreements (Speroni, 2011) and state policies dictate the limiting factors for student eligibility to participate in the dual enrollment program (American Association of State Colleges and Universities [AASCU], 2002; Education Commission of the States, 2015). The most common gauges for participation are a students' grade level and grade point average (Western Interstate Commission for Higher Education, 2006).

Workforce Development and Dual Credit Programming

Middle-skilled Jobs

In 2009, 38% of California's workers were trained for 47% of middle-skill jobs, those jobs that have need of more than a high school education but do not require a four-year college degree (Christenson et al., 2012). California expected 200,000 middle-skilled jobs were open

annually through 2018, totaling around 2.2 million new or replacing jobs, but too few workers will be trained for those jobs. The number of middle-skilled jobs, requiring more than a high school education but not necessarily a four-year degree (ECS, 2020) will grow 50% faster than jobs for high school dropouts. Three out of five Californians required education beyond high school by 2018 to fill the skills gap (Warner et al., 2012). Shanholtz (2019) advanced a model to rethink middle-skill opportunities between "either no college or a full four-year degree" (Shanholtz, 2019). The nation foresees a shortage of educated workers and a need for increased CTE workforce development in high school and college (Public Policy Institute, 2011).

Skills Strategies for the Workforce

There is a strong demand for educated workers in California, and up to 40% of jobs will require a bachelor's degree by 2030 (Public Policy Institute, 2011). The Public Policy Institute (2011) posited there is likely to be a shortage of workers with a post-secondary education with less than a bachelor's degree by 2025. To stimulate the economy, California needs to fill this gap by training associate degree and technical certificate holders (Public Policy Institute, 2011). Aligned with the AACC student success competency of consistency between the college's operation and a student-focused agenda, a big challenge nationally is workforce development. The California funding formula is designed to stimulate economic growth, economic and infrastructure development by increasing workforce development funding. Funding for California career education increased by at least 20% for students who acquire associate degrees and increased by at least 35% for students transferring to an institution in the University of California or California State University systems (Barr & McClellan, 2012/2018). The outcomes of CTE dual enrollment programs to enhance college readiness, success, and preparation for the workforce is an area that deserves further study given low community college completion rates and shortages of talent in the workforce.

The California Edge Coalition reported in the *Skills Gap in California* (2018) that there would be a shortfall of or a need for around 1.1 million workers in California with bachelor's degrees and 1 million associate's degrees by 2020, a need for 1 million more middle-skilled credentials by 2028, 2.3 million degrees and certificates by 2025, and 60% of California adults will need a credential by 2025 (California Edge Coalition, 2018). California is falling behind (Warner et al., 2012) and may benefit from spending education funds on workforce skills that businesses need. Similar to dual enrollment partnerships, school districts could implement Linked Learning in high schools. Linked Learning is work-based learning opportunities that bring employers and students together for job-shadowing, internships, mentorships, relevant learning experiences to use in their careers. Linked Learning integrates academics, career and technical education, and work-based learning supported by community partners and industry. The report pinpointed some required skills and traits needed for manufacturing: (a) troubleshooting, logic, and mechanical reasoning, (b) communication and personal flexibility, (c) independence, persistence, and initiative, (d) dependability, self-control, and attention to detail, and (e) competent using computers (Warner et al., 2012). Joseph Czyzyk, Chairman & CEO of Mercury Air Group, Inc., stated, "if we do not address this problem now through career-focused education, we can expect this skills gap to widen" (Warner et al., 2012, p. 3). Likewise, the Public Policy Institute of California reported that California's education system is not producing enough educated workers to keep up with the demands of the state's economy and will face a scarcity of skilled workers by 2025. Only 35% will have a bachelor's degree, yet 41% of the jobs will require a bachelor's degree, about one million college graduates. Suppose California stakeholders do not fund new programs to produce better educational outcomes. In that case, tax revenue will be lower, more residents will depend on social services, and the economy will be less productive (Public Policy Institute, 2011).

Gray et al. (2018) advocated in a study conducted by The National Center for Education Statistics (NCES) that a CTE program in high school is "a sequence of courses at the high school level that provides students with the academic and technical knowledge and skills needed to prepare for further education and careers" (Gray et al., 2018, pg. 1). The report provided information gathered from a 2016-17 national survey career and technical education programs in public school districts and supplied national data for CTE programs. The survey examined high school CTE programs within districts, which institutions provide the programs, work-based learning activities, employer participation in the program, and any barriers to student participation or the district offering the programs (Gray et al., 2018). In their findings, 98% of public-school districts provided CTE programs at a high school level, and 73% could earn high school and college credit. Seventy-seven percent of the districts reported that their programs include practicums, internships, on-the-job training, and clinical experiences (Gray et al., 2018). Most advanced academically are CTE students in dual enrollment programs (Zinth & Barnett, 2018).

Keily (2019) examined the skills gap of the current workforce and what employers need from prospective employees to fill positions. The nation foresees a shortage of educated workers and a need for increased workforce development in high school and college. In 2017, the Education Commission of the States discussed CTE and workforce development with governors from 24 states and elevated CTE as a policy priority (Association for Career and Technical Education [ACTE], 2017). Governors addressed five policy areas: funding workforce development, data reporting, industry-recognized credentials, articulation, and industry partnerships (ACTE, 2017). By 2017, funding had increased in at least 44 states to address the skills gap and increase workforce-ready CTE education (ACTE, 2017). Research suggests that interest is expanding dual enrollment to better prepare students for the workforce. The National

Center for Education Statistics (NCES) conducted a study in 2002-2003 demonstrating that at least 87% of American public high schools offered college credit opportunities. Some standards have become less demanding for students participating in dual enrollment to expand access for “middle-and low-achieving students,” and low-income students (AASCU, 2002). The trend in states recently is to boost dual enrollment opportunities for ethnically diverse and low-income populations (Barnett & Stamm, 2010).

College Readiness

College readiness is a measure of student preparation for college-level work without needing academic remediation. The student can transition to college prepared for social engagement and have the motivation to complete with a certificate or degree (Zinth & Barnett, 2018). Research into college readiness and the efficacy of dual enrollment programs is explored from different lenses. Academic achievement in high school dual enrollment and non-academic support services increase motivation. Rankin-Gonzalez (2018) used qualitative data collected from a sampling of 15 participants enrolled in at least one dual enrollment course to determine whether dual enrollment influences students' college readiness, persistence, and completion. The author found that dual enrollment did increase college readiness and motivation for most participants, though some believed it lacked rigor, did not increase readiness, and felt detachment or isolation. The findings support previous research (An & Taylor, 2015) concluding that dual enrollment increases readiness and success (An, 2013; Bailey et al., 2005; Irwin, 2018; Karp et al., 2007), primarily if the appropriate support services are provided and accessed. Although barriers may exist in implementing quality dual enrollment programs, a body of research suggests that dual enrollment increases college readiness and success (Cassidy, 2010).

Various methods are used to measure college readiness. An and Taylor (2015) used existing data from a longitudinal study of first-year, full-time undergraduate students from Wabash National Study of Liberal Arts Education to test their hypothesis that dual enrolled students are more college-ready than nonparticipants. They found that collegiate liberal arts students who participated in dual enrollment were more college-ready than non-dual enrolled students. Using existing data may be more reliable and eliminates personal feelings in the study (An & Taylor, 2015).

Developing and Implementing Dual Enrollment Programs

State and federal policies influence the development of dual enrollment programs in three prominent ways: (a) creation of the program, (b) providing funding, and (c) regulations that may incentivize or obstruct development. States such as California are realizing the benefits of dual enrollment programs. In California, EC Section 76004, College and Career Access Pathways Partnerships (CCAP), reduces policy barriers and financial penalties that would otherwise discourage dual enrollment opportunities. The statute provides opportunities for districts to enter into partnerships with public and charter schools for dual enrollment to underrepresented students in higher education for career and technical education or help achieve college readiness (CDE, 2019).

CTE programs provide vocational training for middle-skilled jobs intended to fill the skills gap. Introducing and implementing a dual enrollment program initiative at a community college requires buy-in from faculty, staff, and administration. Myers (2018) suggested that stakeholders themselves could present barriers to dual enrollment programs. The author used a qualitative case study to test how stakeholders perceive the benefits and barriers of dual enrollment within career and technical education. A sampling of 42 community college

educators identified benefits to college and career readiness and barriers to the program. Though benefits and barriers were identified, Myers (2018) identified stakeholders that realize both benefits and barriers of dual enrollment programs. Myers indicated that more research is needed to garner more support for dual enrollment from stakeholders. Though barriers may exist for institutions implementing dual enrollment programs, increasing evidence advocates that persistence, engagement, and attainment increase for students who participate in dual enrollment (Cassidy, 2010). Logic models could be developed to build and implement dual enrollment programs. This author has created such a logic model for implementing hypothetical dual credit programs (Appendix C, Table 13).

K-through-16 Relationships

It is not uncommon for governance policies to influence high schools and community colleges to operate in distinctly separated systems (Boswell, 2000). California adopted its first state-level dual enrollment policy in 1976 (Mokher & McLendon, 2009). Over the last three decades 39 other states established dual enrollment programs, yet only 17 states had implemented dual enrollment policies between 1976 and 1993. As of 2009, all but ten states implemented some dual enrollment strategies (Mokher & McLendon, 2009). By 2020, policies were implemented governing statewide programs in forty-six states and four states allow dual enrollment to be administered at institutional and local levels (Education Commission of the States, 2020).

Barnett & Hughes, 2010; Cohen et al. (2014) suggest that community colleges were originally extensions of high schools and grew apart into separate systems over time, each evolving separate funding, curricula, and missions. In recent years, a growing interest to increase graduation rates and government funding has inspired initiatives to develop partnerships between high schools and community colleges “returning the United States to having the highest

proportion of college graduates in the world by 2020” (Barnett & Hughes, 2010, p. 58). The focus of these partnerships is to increase college enrollment, increase college-readiness, and improve persistence in college with a smooth transition from high school to college. Activities to promote high school and community college partnerships include initiatives to provide more access to college courses, resources, and tailored programs to support the needs of high school students (Barnett & Hughes, 2010). Changes in California law increases the potential for dual enrollment to be a strategy for equity, grow access to college, increase enrollment, and support student success (CCCCO, 2016). The California Education Code (EC), Section 48800, allows students to enroll in community college part-time to pursue vocational training or advanced academic work and educational enrichment at the community college level. California districts reported barriers to student participation, including lack of time on their schedules, transportation, and lack of work-based learning options (Gray et al., 2018). The findings in this study were focused on the lack of funding, faculty, and facilities. These three components were common barriers found throughout research on dual enrollment.

Dual enrollment programs bridge K-12 and higher education institutions and costs are important considerations to both (Barnett & Stamm, 2010). Finding adequate resources to start and maintain a dual enrollment program can be a barrier. Dual enrollment partnerships pursue essentially the same goals yet vary in design. Edwards & Weisburg (2011) examined geography, funding challenges, and relationships of eight dual enrollment partnerships in California. Each of these programs was career-focused with career stepping stones that added potential for motivation. The authors found that (1) dual enrollment includes student support that builds a more effective learning experience, and (2) dual enrollment was an authentic experience preparing students for college work and the college experience.

Performance Funding and Dual Credit Programs

Funding new programs requires input from many stakeholders. Gray et al. (2018) reported that districts' barriers to implement and maintain CTE programs with 50% of districts citing a lack of funding, 44% reporting difficulties in employing the right instructors, and 43% citing inadequate facilities as barriers to providing CTE programs. Because of dual credit programs potential to improve overall retention and completion rates, they also can help colleges to receive additional performance funding dollars. Helguera (2018) used quantitative data from 27 district-level administrators and qualitative data collected from interviewing six district-level administrators to examine district-level administrators' roles in allocating resources for CTE programs and improving college- and career- readiness. Over the last ten years, governmental, educational policy practices have increasingly focused on funding for college-educated workforce and career and technical education (CTE) programs (Juszkiewicz, 2015). Research showed that college certificate/degree attainment could increase economic competitiveness and personal, social, and health benefits. Some state's policies appropriate a proportion of performance funding to completion and retention metrics incentivizing degree and certificate outcomes (Burke, 2002). Li & Kennedy (2018, p. 3) studied the "impact of performance funding on three levels of credential completions: short-term certificates, medium-term certificates, and associates' degrees." The authors found that institutions that received performance funding showed no improvement of students' degree or certificate attainment.

States have provided funding streams for students enrolled in work-based learning experiences and CTE courses while earning post-secondary and high school credit. Work-based learning offers programs to high school students to earn credentials with employment experiences. In response to the growing demand for a skilled and well-educated workforce, states implemented secondary CTE policies throughout 2017 and 2018 to increase support, guidance,

and awareness of CTE programs. Legislative bills concerning CTE were enacted in 25 states in 2017 and 32 states and the District of Columbia in 2018. California, for example, established the K-12 element of the Strong Workforce Program in 2018 by appropriating \$150 million to increase the availability of quality CTE programs that were industry-aligned. In 2018, the Michigan governor devoted \$1.2 million for CTE counselors, \$1 million to increase web-based career preparation, and almost \$10 million toward CTE equipment improvements. The number of states participating and appropriating funds for CTE and workforce development increased in 2017 and 2018 (ACTE, 2017).

Funded by the U.S. Department of Education's Office of Vocational and Adult Education (OVAE), the College and Career Transition Initiative (CCTI) is a project designed by the League for Innovation in the Community College (The League) to help reinforce secondary and postsecondary institutions in (a) easing student transitions between secondary and postsecondary education as well as transitions to employment, and (b) improving academic performance at both the secondary and postsecondary levels (League, 2006). Their goals for the CCTI project are to align courses at the secondary level with the postsecondary level, to provide students with skills in high demand career fields, develop programs and build rigor in occupational programs of study that initially include (a) Law, Public Safety, and Security, (b) Science, Technology, Engineering, and Mathematics, (c) Education and Training, (d) Information Technology, and (e) Health Science (League, 2006). The minimum level of outcomes anticipated include (a) a decreased need for remediation, (b) increased persistence and enrollment in postsecondary education, (c) improved academic skills, (d) higher rates of credential attainment , and (e) expanded entry into further education or employment (League, 2006).

To establish partnerships among employers and secondary and postsecondary education the OVAE's initiative to develop common organizational structure within CTE programs yielded

16 occupational clusters with the foundation standards of knowledge and skills. In all CTE clusters with secondary and postsecondary institutions students will be exposed to these ten standards no matter their career focus or if they change their chosen area of focus:

1. Academic Foundations
2. Communications
3. Problem Solving/Critical Thinking
4. Systems
5. Information Technology/Applications
6. Safety, Health, and Environmental
7. Leadership and Teamwork
8. Ethics and Legal Responsibilities
9. Employability and Career Development
10. Technical Skills

Based on these recommended standards, consistent curriculum should be developed by postsecondary education and employers to connect students to specific occupational goals.

Impacts of Dual Enrollment Programs on Institutions

The institution considers benefits and barriers when deciding to implement a dual enrollment program. Kinnick (2012) used qualitative and quantitative data to test his hypothesis that dual enrollment is valuable to the institution while highlighting challenges and concerns. The author found that the institution's routine program assessments support the hypothesis that dual enrollment positively impacts the institution. However, there was a lack of data and coordination among institutions to share the best program evaluation practices. College readiness and dual enrollment benefit the institution with higher retention and completion rates. Barriers to

building quality dual enrollment programs may include understaffing and costs to the institution leading to a shortage of middle-skilled career and technical education certificates awarded (Kinnick, 2012).

Barriers for Students. Barriers to education may also exist for students. The U.S. Department of Education National Postsecondary Student Aid Study explains that nearly two-thirds of community college students worked while enrolled in 2016. Most U.S. students working have outstanding financial need and have jobs unrelated to their majors (Beer & Bray, 2019). Educating students to fulfill their college major and attain middle-skilled jobs is a challenge in California. The new funding formula in California (AB288) provides incentive to develop a robust dual enrollment program and articulation agreements with community high schools.

Staff and Faculty Perceptions of Dual Enrollment

Early college and dual enrollment are sometimes controversial. Staff and faculty may worry that high school teachers are not able to teach the curriculum, or high school students aren't ready for college curriculum, or counselors and faculty are already spread too thin (Ferguson et al., 2015). Kanny (2015) examined dual enrollment from students' perspectives and experiences. The study suggested that students experienced some faculty members expressing contempt for high school students that were enrolled in their classes. Faculty may find dual enrollment controversial and claim that high school teachers are not qualified to teach college-level classes. Part of the environment is the instructor's impacts on students' feelings about their experience. More research is needed into this subject.

Impacts of Dual Enrollment on Subsequent College Experiences

Dual enrollment can decrease the need for academic remediation, help with the transition to college, and positively impact motivation, performance, and completion for students (Myers, 2018). Originally designed for high-achieving students to make better use of their senior-year in high school, dual enrollment programs are developed to prepare all students for college and a skilled workforce for the 21st century (Barnett & Stamm, 2010). Increasing evidence supports taking college-level courses during high school increases college access for students typically underrepresented in higher education, students at risk of dropping out, and students with middle- to low-academic achievement (Barnett & Stamm, 2010).

Performance in high school increases students' confidence in their ability to perform in college (Chemers, Hu, & Garcia, 2001). High school students are influenced by high school coursework rather than test scores (Adelman, 2006). Advanced Placement (AP) programs benefit academically talented students while dual enrollment programs benefit a wider range of underrepresented groups who wouldn't typically have access to college culture (Venezia, Kirst, and Antonio, 2003).

This study focuses on the outcomes and experiences of dual credit students enrolled in a community college. The impacts of dual enrollment on subsequent college experiences are increased motivation and goal achievement. The abundance of research indicating dual enrollments impact on college readiness, persistence, and completion is somewhat predictable. Research into perspectives, motivation, experiences, and goal achievement of students participating in dual enrollment and subsequent short-term college success is sparse. Individual student characteristics affecting community college student outcomes has not been studied as deeply as the substantial research into educational outcomes for K-12 learning (Bailey et al.,

2005). The authors explored reasons for dramatically different outcomes of similar types of students enrolled at different community colleges. The authors examined the role characteristics of these institutions have on student outcomes and student characteristics, and the probability of students completing a certificate or degree.

This dissertation is guided by four success criteria: (1) enrollment and completion rates in first-term college courses including basic skills and college-level courses, (2) completion of all courses with a grade of “C” or better, (3) persistence from one term to another, and (4) goal achievement. Following are summaries of what the current research holds for these criteria.

Successful Completion of First-Term College Courses

Community colleges are working to realize ways to teach students in need of basic skills courses in math, reading, English, or job skills. Many students who enroll in occupational training do not enroll in basic skills classes. Washington State’s I-BEST program developed by the Washington State Board of Community and Technical Colleges (SBCTC) integrates basic skills courses into occupational training that allows students to complete their program faster (What Works Clearinghouse, 2020). California’s AB 705 requires that colleges and community college districts maximize the likelihood that a student will enroll and complete basic courses in math and English. The bill took effect on January 1, 2018 requiring a one-year time frame for placement using high school grades, high school coursework, and/or high school grade point average (CCCCO, n.d.).

Completion of all Courses with a Grade of “C” or better

Crouse & Allen (2014) studied course grade outcomes of both dual-enrolled and non-dual-enrolled students during and after high school. Though the authors found that dual-enrolled students frequently outperformed non-dual-enrolled students, outcomes may be more closely

associated with the type of postsecondary education the students chose after attending high school. Dual enrollment studies find a positive relationship among persistence and grade point average. D'Amico et al., (2013) examined relationships between policy and demographic variables affecting first-to-second-year persistence of dually-enrolled students at a Carolina technical college. The authors determined of the variables including county of residence, gender, ethnicity, course setting, and course type, course setting and course type were notable in predicting first-to-second-year persistence. Jones (2014) conducted a causal-comparative study at two institutions examining whether dual enrollment participation and course completion affect first-year persistence and grade point average. The results reveal a significantly higher persistence rate for dual-enrolled students and consistently higher collective grade point average. The authors suggest that their findings help to provide high school and college administrators knowledge about the relationship of dual enrollment and students' academic success as they transition to college (Jones, 2014).

Persistence from One Term to Another

This study uses the term persistence as students who return to COD for their next term. Swanson (2008) used a causal model to determine a relationship among dual-enrolled students' integration, persistence, and degree attainment. The author determined that dual-enrolled students were more likely to persist through the second year of college than non-participating students indicating statistically significant impacts upon students' academic momentum (Swanson, 2008).

According to Irwin (2018), dual enrolled students are less likely to drop out after the first semester. Irwin (2018), a doctoral student at Mississippi State University, used chi-square test to analyze the effect that dual effect enrollment had on the institution's persistence and degree completion rates. The author found that first-time, full-time students previously enrolled in dual

enrollment were more likely to maintain consistent enrollment than students who had not previously enrolled in dual enrollment. The author also noted that there was a correlation between students enrolled in dual enrollment and degree completion. Policy and funding at individual institutions could render different outcomes, and, as with other current research, the author noted that more research is needed. Persistence and success increase with students who were previously dual enrolled (Irwin, 2018).

Goal Achievement

Research indicates that dual enrollment leads to increased completion rates in community colleges. Dual-enrolled students are approximately 12% more likely to enroll in higher education within 7 months of graduating from high school than non-dual-enrolled students (Swanson, 2008). Dual-enrolled students carry already earned college credits to their first-year of college and “momentum toward attaining a college degree” (Karp et al., 2007; Swanson, 2008). Adequate grade accumulation in the first year of college sufficiently influences college completion. The study does not include completion of degree or certificate but rather focuses on goal achievement operationalized as units attempted and units earned.

Success in College

Fink et al. (2017) used data from the National Student Clearinghouse to track over 200,000 dual-enrolled students from 2010 to 2016. The authors found that 15% of all community college freshmen who were formerly dual enrollment students (approximately 30,000 students), 46%, or approximately 13,800 students, earned a two-year college credential, and 64%, approximately 19,200 students, earned a four-year college credential within five years. Zinth and Barnett (2018) cited evidence to support their hypothesis that dual-enrolled students are more

likely to finish high school, experience post-secondary success, and attain workforce readiness skills than students who are not dual enrolled. The authors demonstrated that dual enrolled students earn college credentials faster and at an increased rate than non-dual enrolled students. The researcher did not consider remedial course completion for this study as it is not required in California. This study does not include completion of degree or certificate but rather focuses on goal achievement.

Non-Academic Influences on Success in College. American College Testing (ACT, 2007) examined non-academic factors that influence college readiness and success. Though success in college is typically accomplished by fulfilling academic goals, non-academic student support may effectively increase college success and achievement (ACT, 2007). Non-academic factors can be classified into three groups: (1) individual psychosocial factors, such as motivation (e.g., academic self-discipline, commitment to school) and self-regulation (e.g., emotional control, academic self-confidence); (2) family factors, such as attitude toward education, involvement in students' school activities, and geographic stability; and (3) career planning that identifies a good fit between students' interests and their post-secondary work (ACT, 2007).

ACT cites non-academic components tested in a model described by Robbins et al. (2004), including academic components of an ACT score and high school GPA and non-academic components. Non-academic components are positively correlated with first-year success; these components include psychological control, commitment to learning, homework skills, setting goals, communal activity, social skills, determination, academic self-assurance and discipline. The model depicts academic components as high school grades and ACT score as 68% of college success, non-academic components as 11% of college success, and academic discipline as 21% of success in college. Counselors aware of their students' non-academic attributes can monitor non-academic qualities and intervention indicators to address student

commitment and involvement. Determination, academic self-assurance and discipline are indicators for students from various environments and backgrounds to achieve higher college GPAs. Academic and non-academic success increases among low income and racial/ethnic students as an academic accomplishment and non-academic support are achieved (ACT, 2007).

Dual Enrollment's Association with Success in College. Early enrollment, dual enrollment, and early success courses contribute to success in college (Fink et al., 2017). Success rates increase if students are dual-enrolled. Fink et al. (2017) cited that 40% of dual enrollment students 19-20 years of age attend community college, and 84% of dual enrollment students return to the community college where they were dually enrolled. Student success in dual enrollment courses in a students' first-year can contribute to success in their second-year. Cho and Karp (2013), researchers at the Community College Research Center at Columbia University, New York, used existing data from the Virginia Community College System consisting of 23,822 student-unit records and building on prior Florida research to test whether student success course enrollment has a positive association with first-year students and contributed to the persistence of second-year students. Cho and Karp (2013) found that the literature reviewed indicates an association between participation in student success courses, early enrollment, and positive academic outcomes.

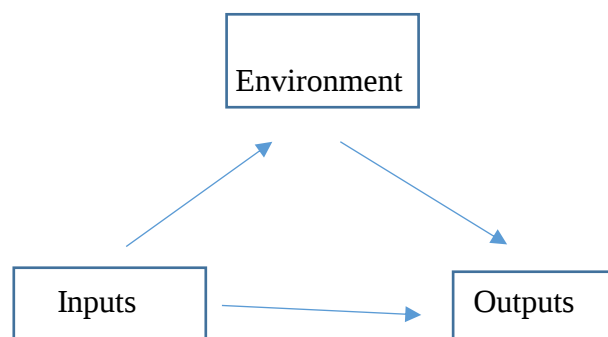
Theoretical Framework

This study uses the Astin's *Theory of Involvement* (1984) to describe the importance of student involvement in college. The three elements of the core concept are input-environment-outcome (I-E-O) variables, such as students' participation in dual enrollment (inputs), the environment working together to contribute to outcomes, and success (outputs). This lens was used to examine dual enrollment student outcomes and success. The model implies that student

outcomes result from two factors including experiences in their environment and demographic inputs. Institutions can use these variables to determine attributes for student success. Astin's (1984) *Student Involvement Theory* is also used to help explore whether input policies and educational programs contribute to student development outcomes and achievement; how student involvement can lead more directly to student developmental. This theory emphasizes students' active involvement in the learning process" (Astin, 1984, p. 522). Astin's I-E-O model (Figure 1) proposes a method for measuring the effects of a student's background attributes at the time of entry to the college environment on educational outcomes. Alexander Astin's (1984) Theory of Student Involvement examines how students develop their co-curricular involvement as a desirable outcome for higher education institutions (Astin, 1984). Alexander Astin's 1984 theory of Student Involvement guided this study, explaining the characteristics "input" of a dual enrollment student entering college in correlation to a non-dual enrolled student, student contact with the institutional higher education environment, and measured success of dual-enrolled students in correlation with non-dual enrolled students. The theory correlates college outcomes with how students develop and change as a result of involvement in co-curricular activities (Astin, 1984).

Figure 1

Astin's I-E-O Model



Students' gain from involvement is proportional to the extent to which they were involved (Astin, 1984). Astin's I-E-O model emphasizes the importance of understanding student characteristics entering the institution, the daily environment they come into contact with, and outcomes when they leave the institution and afterward (Astin, 1984).

Further Research

There is abundant research about the importance of dual enrollment and training skilled workers emphasizing the importance of preparing students for a middle-skilled workforce and dual enrollment program efficacy. Conversely, there is limited research published focusing solely on the community college experiences of former dual-enrollment students' perspectives. This study addresses the importance of early preparation for college and the engagement of former dual-enrollment students' engagement in a two-year college.

Chapter 3 - Methodology

This study examined the association between the characteristics and perceptions of formerly dual-enrolled students (independent variables) and their short-term college success (dependent variables). The goal was to test the association between independent and dependent variables.

Methods used in this research study are identified in this chapter. The sections of this chapter include:

- dependent variables, independent variables, research question, and hypotheses,
- an overview of Astin's (1991) input-environment-outcome (I-E-O) model as a theoretical framework that provides a base for the research blueprint,
- the research design for this quantitative study,
- a description of the study participants and sample,
- a description of data sources and data collection,
- methods to analyze data collected including methods to increase the quality of the study such as internal and external validity,
- ethical considerations, and limitations,
- a summary of the research methodology chosen for this study.

Dependent Variables

This study focuses on dual enrollment's association to short-term success in college as defined by the researcher's modification of criteria advanced by Achieving the Dream to measure student success (Achieving the Dream, n.d.). Achieving the Dream works with colleges nationally to improve student outcomes and success. AtD utilizes existing data to provide information about the program's efficacy as a culture of evidence to appreciate improved student

outcomes and success. Their vision for student success includes opening stepping-stones into and throughout college for at-risk learners, focus on community transformation instead of institutional transformation, emphasis on respect, engagement, and equity (AtD, n.d.). This study was guided by these four criteria:

1. Enrollment and completion rates in first-term college courses. These courses include basic skills and college-level courses.
2. Completion of all courses with a grade of “C” or better.
3. Persistence from one term to the next.
4. Goal achievement operationalized as units attempted and units earned.

Independent Variables

Independent and dependent variables chosen for this study are presented in Table 1.

Table 1

Variables in the Study and their Relationship to the Study Design

Variables in Study	Source	Level of Measurement	Variable Status
Formerly dual credit or non-dual credit	Student Information System	Nominal	Independent
Student Identifier	Student Information System	Nominal	Independent
Term of entry 2020	Student Information System	Interval	Independent
Age at Term start	Student Information System	Ordinal	Independent
Hispanic Ethnicity	Student Information System	Nominal	Independent
Race	Student Information System	Nominal	Independent
Gender	Student Information System	Nominal	Independent

Variables in Study	Source	Level of Measurement	Variable Status
Major, CTE versus non-CTE	Student Information System	Nominal	Independent
Educational Goal	Student Information System	Nominal	Independent
First Generation Status	Student Information System	Nominal	Independent
Low-income status	Student Information System	Nominal	Independent
When you were in high school which broad area of college coursework interested you most?	Student Survey	Nominal	Independent
How satisfied are you with your education experience at College of the Desert?	Student Survey	Nominal	Independent
Which best describes your current motivation to finish college?	Student Survey	Nominal	Independent
Do you plan to transfer to a four-year institution?	Student Survey	Nominal	Independent
Did you enroll in Advanced Placement (AP) in high school?	Student Survey	Nominal	Independent
Did you enroll in a dual credit program when you were in high school?	Student Survey	Nominal	Independent
What/who influenced your decision to enroll in college classes while in high school?	Student Survey	Nominal	Independent
Which adults helped you as you participated in the dual enrollment program?	Student Survey	Nominal	Independent
How did the college credits earned through the dual enrollment program apply at the college in which you are now enrolled?	Student Survey	Nominal	Independent
Did your participation in dual enrollment courses prepare you for success in your college courses?	Student Survey	Nominal	Independent
Did the dual enrollment program help you decide on a college major or career path?	Student Survey	Nominal	Independent
Overall, how satisfied are you with your dual enrollment experience while in high school?	Student Survey	Interval	Independent

Variables in Study	Source	Level of Measurement	Variable Status
How motivated are you now to complete college?	Student Survey	Interval	Independent
GPA, Fall 2020	Student Information System	Interval	Dependent
GPA, Spring 2021	Student Information System	Interval	Dependent
Credit hours attempted Fall 2020	Student Information System	Interval	Dependent
Credit hours attempted Spring 2021	Student Information System	Interval	Dependent
Credit hours earned Fall 2020	Student Information System	Interval	Dependent
Credit hours earned Spring 2021	Student Information System	Interval	Dependent
Goal Achievement	Student Information System	Interval	Dependent

Research Questions and Hypotheses

This study focuses on whether a statistically significant associations exist between dual enrollment and short-term college success. Accordingly, the following research questions and hypotheses are explored:

RQ 1. What is the association between participation in dual enrollment and subsequent college success as defined by the AtD criteria for CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

H_0 : There is no clear evidence that an association exists between dual enrollment and college success.

H_1 : There is clear evidence that an association exists between dual enrollment and college success.

RQ 2. How do CTE students' perceptions of their college experiences differ between CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

H_0 : There is no clear evidence of students' perceptions relating dual enrollment to short-term success in college.

H_1 : There is clear evidence of students' perceptions relating dual enrollment to short-term success in college.

Research Design

This study used Campbell & Stanley's (1963) Design 3, the Static Group Comparison, a Quasi-Experimental Design. For the purpose of determining whether statistically significant associations between a single treatment (intervention) group of former dual credit students enrolled at College of the Desert and a control (comparison) group of students who were not formerly enrolled in dual credit programs in high school.

Study Setting

The study was conducted at a public two-year college serving eight local cities and students in three school districts in Southern California: Palm Springs Unified School District (PSUSD), Desert Sands Unified School District (DSUSD, and Coachella Valley Unified School District (CVUSD). The total dual enrollment sections across all partnering districts are: (a) 33 sections in fall 2020, (b) 22 sections across 2020-2021, and (c) 37 sections in spring 2021 (Thompson, 2021). The institution is one within 116 community colleges in the state system (CCCCO, n.d.) and serves approximately 17,000 students. The college is a federally recognized Hispanic Serving Institution (HSI) offering certificates and two-year Associate of Arts and

Associate of Science degrees. Surrounded by 15 high schools, approximately 40% of area high school graduates matriculated to the college during the 2020-2021 academic year (COD, n.d.).

Population and Sample

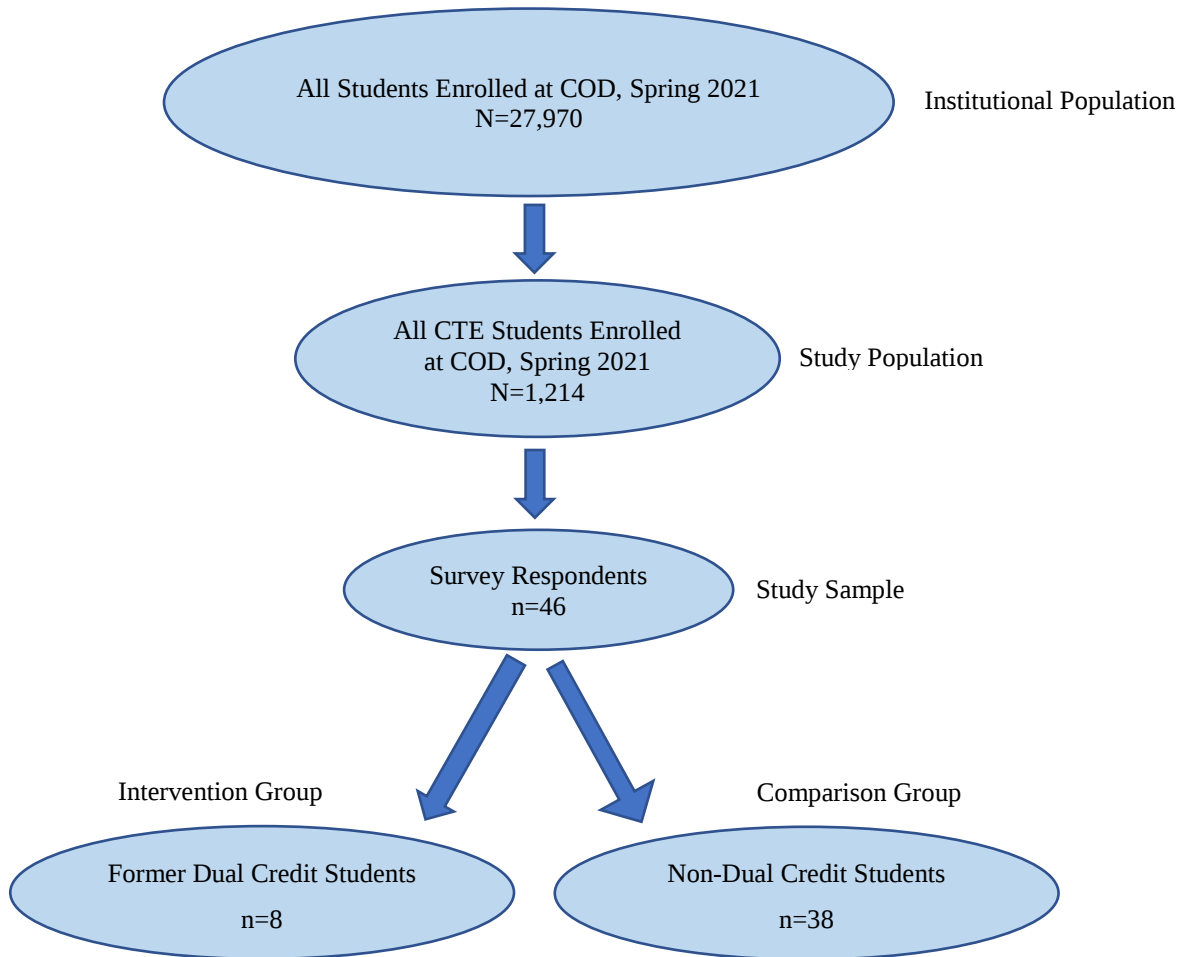
The researcher identified 1,214 CTE students attending COD (Figure 2) who met the criteria of enrollment in a CTE program in the fall of 2020 and spring of 2021 and who were aged 18 years or older. The researcher signed a non-disclosure agreement with the college to obtain the information. Eight dual-enrolled (intervention) participants and 38 non-dual-credit (comparison) participants were selected from the population enrolled at COD. Students were selected randomly for the two groups which formed the study sample (Harkiolakis, 2017).

Probability sampling allows the researcher to include a specific and random number of participants who approximate the enrolled population during the study time (Lochmiller & Lester 2017). The population is the larger group from which the random sample is chosen (Roberts, 2010).

The study yielded forty-six (46) usable responses. Survey respondents were enrolled at College of the Desert in the 2020-21 academic year and were enrolled in the spring semester of 2021 in a career and technical program. Participants must be 18 years or older to participate. A random sample of eight CTE students who were former dual credit students represented the intervention group (former dual enrollment students); a random sample group of 38 CTE students who were not dual credit in high school constitute the comparison group.

Figure 2.

Population and Sample



Data Collection and Data Sources

Quantitative data was collected using two methods (1) systematic sampling of formerly dual enrolled and non-dual credit students' data collected from the college Institutional Research (IR) office; and, (2) a survey of dual-enrolled and non-dual-credit students in the college (all data collected in this study can be found in Table 2). Based on relevant surveys found in the literature,

an online survey was designed to collect data about students' perception of motivation and success aligned with the students own experiences for this study (see Appendix A).

Data Analysis

Chi-square test of independence and t-testing were used to determine whether differences in the study variables between intervention and comparison groups were statistically different.

Internal and External Validity

This study used Campbell & Stanley's (1963) Design 3, the Static Group Comparison Design. Threats to the internal validity of this design include: (a) history of progress during the study period, (b) size of the sample, (c) maturation of students' motivation during the study period, (d) chi-square and t-test instrumentation used to analyze data, (e) biases related to participant selection, and (f) experimental mortality or loss of any participants, (Campbell & Stanley, 1963). Campbell & Stanley (1963), hold that "external validity asks the question of generalizability," the ability to replicate experimental treatment variables, settings, population, and any other variables (Campbell & Stanley, 1963, p. 5).

Ethical Considerations

The researcher is responsible for ensuring confidentiality. The identity and information of individual participants in the research study are kept confidential and stored in a hard drive for five years at the researcher's residence. The participants were informed about the data collected about them and the data's security. The researcher did not use individual names in the data collected and the researcher did not allow anyone else access to the data (Roberts, 2010). Historical data collection and analysis do not require informed consent (Lochmiller & Lester, 2017).

A quantitative survey design requires participants' anonymity and responses and informed consent steps, particularly if the survey is given online (Lochmiller & Lester, 2017). This study complied with Kansas State Universities Institutional Review Board (IRB) Operating Procedures. The researcher has completed the required Collaborative Institutional Training Initiative (CITI, 2019).

Limitations

Limitations in this study include sample size, survey methodology, data availability, and response rate. Survey participants of dual enrolled students are of interest to this study and may make the results of the study less replicable (Roberts, 2010). This study is limited to 46 participants and findings are not generalizable to all dual credit programs.

Summary

The purpose of this quantitative, associational study was to investigate the association among characteristics of former dual enrolled students and their subsequent college success. This researcher examined if dual enrollment is preparing students for college, succeeding in college work, and completing successfully. This research focused on information that examines the association between dual enrollment and success in college. This chapter described the research design methodology and sampling. The chapter also included limitations, data collection and analysis, ethical considerations, validity and reliability. Chapter four describes the findings from the study.

Chapter 4 - Analysis and Findings

The purpose of this study was to explore the perceptions and subsequent short-term success of College of the Desert (COD) career and technical education (CTE) students who were formerly enrolled in dual credit secondary programs offered by the college compared to CTE students who did not participate in secondary dual credit programs. This chapter includes the analysis of quantitative data collected from COD's Student Information System (SIS) and a survey of students' perspectives to answer these two research questions:

RQ 1. What is the association between participation in dual enrollment and subsequent college success as defined by the AtD criteria for CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

RQ 2. How do CTE students' perceptions of their college experiences differ between CTE students formerly enrolled in dual credit secondary programs and those who were not enrolled in those programs?

The researcher provides analysis of data from a study sample of 46 students who responded to a focused survey drawn from a total population of 1,214 CTE students enrolled at College of the Desert in the 2020-21 academic year. This chapter comprises the results of statistical analyses to address the research questions above. This study is guided by the researcher's modified version of Achieving the Dream's criteria for success (Achieving the Dream, n.d.). The researcher did not consider remedial course completion as it is not required in California. The study does not include completion of degree or certificate but rather focuses on goal achievement operationalized as units attempted and units earned.

This study was guided by four criteria:

1. Enrollment and completion rates for first-term college courses. These courses include basic skills and transfer-level courses.
2. Completion of all courses with a grade of “C” or better.
3. Persistence from one term to the next.
4. Goal achievement operationalized as units attempted and units earned.

The Sample

A survey was emailed to the identified population of 1,214 of CTE students. Of the 1,214 CTE students, 56 were returned as undeliverable leaving the researcher to assume that 1,158 students received the survey invitation. Out of the 1,158 students, 46 responded to the survey yielding a response rate of 3.97%. Students were able to bypass questions and not all questions yielded a response by each respondent. These disparities are addressed within the presentation of findings in this chapter.

Demographic variables include: (a) dual credit or non-dual credit, (b) race/ethnicity, (c) age, (d) gender, (e) declared major, (f) first generation status, (g) low-income status, (h) cumulative GPA, (i) total credit hours earned, and (j) goals achieved.

The sample of 46 students were enrolled in CTE classes in the 2020-2021 school year. The sample and population align closely in age and gender. Over half of the sample identify as Hispanic aligning with enrollment at the college near three-quarters Hispanic (Table 2).

Table 2*Distribution of Gender, Age, and Race/Ethnicity*

Variable	Sample n=46	Population n=1214
Gender Proportion		
Female	69.5%	62.3%
Male	30.5%	37.5%
Declined to state	0.0%	0.2%
Total Gender	100.0%	100.0%
Average Age		
	25	26
Race/Ethnicity Proportions		
Asian Chinese	6.5%	4.0%
Black	6.5%	3.7%
Hispanic	67.4%	72.8%
Native American/Alaskan Native	0%	1.0%
White	19.6%	16.4%
Declined to State	0.0	2.1%
Total Race/Ethnicity	100.0%	100.0%

The limited sample and population demographics of participants were closely aligned in gender, age, and race/ethnicity. The Career and Technical Education program population is 62.3% female and the sample is 69.5% female. The researcher has cautious confidence that the results of this study can be generalized at least to the study population at College of the Desert but that generalizations to other colleges should be approached cautiously given the limitations of the sample size and non-random selection of the subjects.

Survey Findings

The survey questions were intended to collect students' perceptions of the factors that contributed to their success in college. The survey was distributed through email accounts that students indicated as their preferred accounts as well as through secondary email accounts maximizing the chance that students would receive these invitations. Invitations were sent from the researchers Kansas State University email account.

The survey was planned to close after ten days to coincide with the end of the spring semester 2021 but only 25 students had responded at that point. To increase participation, an incentive to win a \$100 Amazon card was included in follow-up reminders sent on day ten. A total of four reminders inviting students to participate in the survey was sent to students until the beginning of the summer session. The researcher notified the students stating that the survey would close in two days and the deadline was reached on the 21st day.

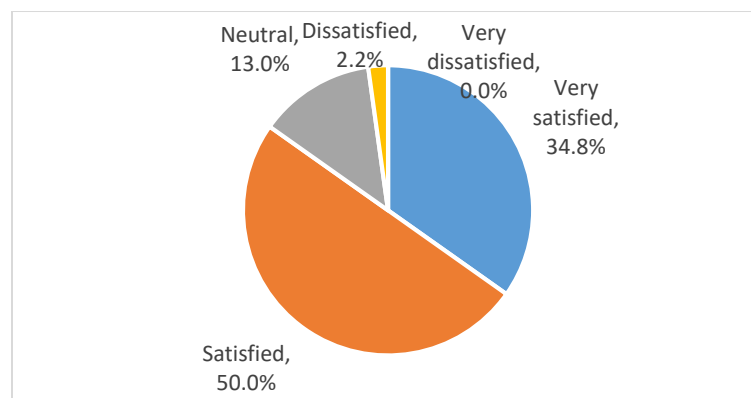
Survey Findings of Sample Students' Experiences and Perspectives

In view of Astin's input-environment-output model (I-E-O) theoretical framework used for this study, the sample of 46 students responded to questions about their perspectives of experiences and motivation in high school and college. Understanding students' "environment" which includes experiences the student has at college may affect their motivation. The descriptive statistics reported here are for both the intervention and comparison groups.

Satisfaction with your college experience. Students were asked how satisfied they are about their education experience at the college and given five options from which to choose. Responses are positive indicating that participants are "satisfied" and "very satisfied" with their college experience (Figure 3).

Figure 3

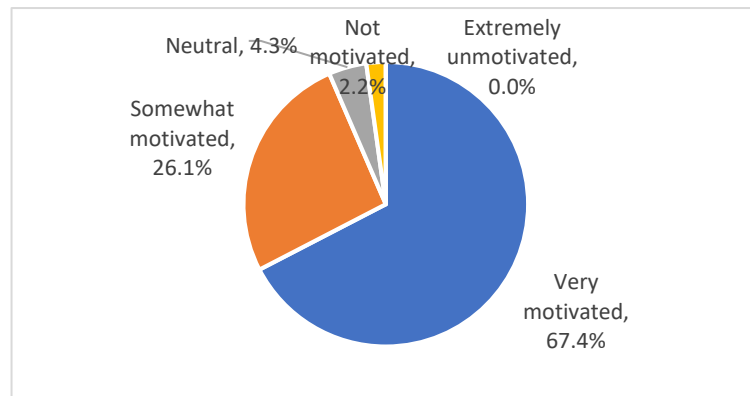
How Satisfied are you with your Education Experience at College of the Desert?



Motivation to finish. Respondents were asked how motivated they are to finish college and were given five options to choose from. Most participants responded that they were “very motivated” to finish college (Figure 4).

Figure 4

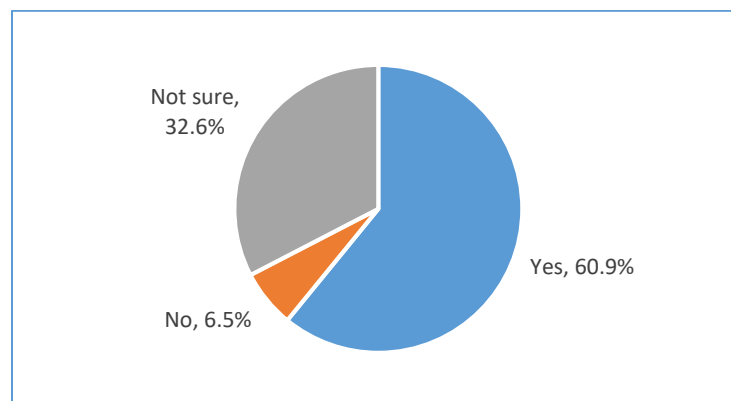
Which Best Describes your Current Motivation to Finish College?



Do you plan to transfer? The researcher addressed motivation by asking respondents if they plan to transfer to a four-year institution. Over 60% of respondents planned to transfer to a four-year institution (Figure 5).

Figure 5

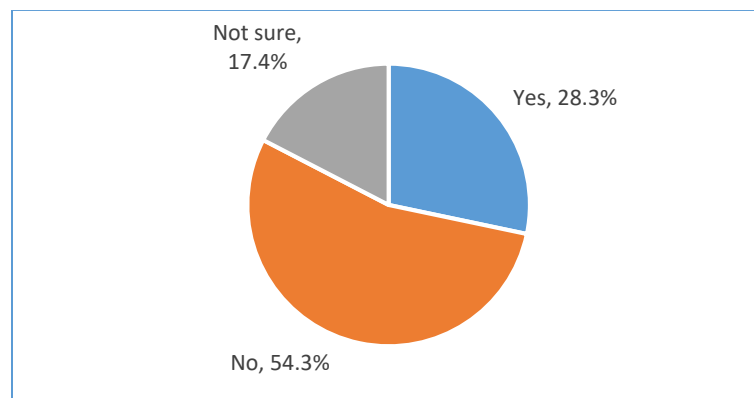
Do you Plan to Transfer to a Four-Year Institution?



Did you enroll in advanced placement? According Astin’s (1984) definition, it is important to understand students’ characteristics when entering the institution. Students’ gain from involvement is proportional to the extent to which they were involved (Astin, 1984). Table 3 displays demographic data for the study sample and population. The researcher asked respondents if they enrolled in Advanced Placement (AP) in high school. Most participants surveyed did not enroll in advanced placement in high school (Figure 6).

Figure 6

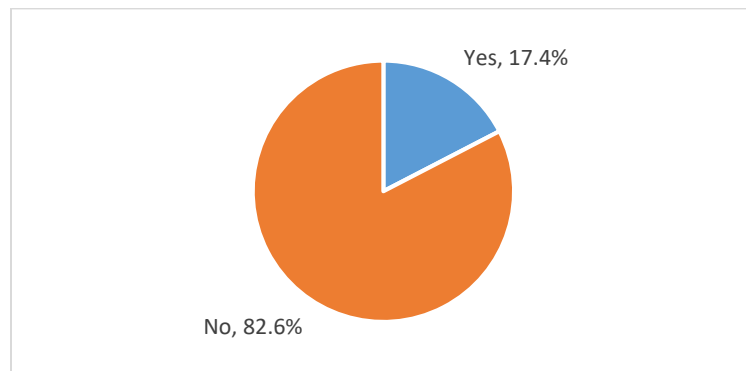
Did you Enroll in Advanced Placement (AP) in High School?



Did you Enroll in Dual Credit? Respondents were asked whether they enrolled in a dual credit program in high school. More than half indicated they had not while more than a quarter were unsure. Respondents who answered “no” or “unsure” were directed to conclude their portion of the survey at that point and the remaining eight respondents continued with the survey questions designed for the formerly dual enrolled students (Figure 7).

Figure 7

Did you Enroll in a Dual Enrollment Program when you were in High School?



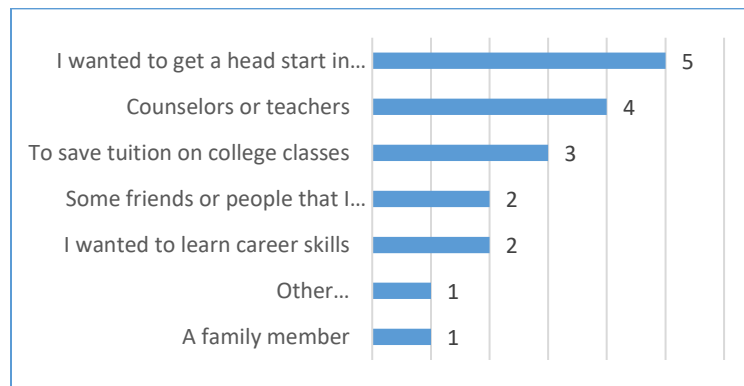
Former Dual Credit Participant Survey Findings

A series of six survey questions focused on the perceptions and experiences of the eight formerly dual enrolled respondents who were enrolled in dual credit programs. As discussed in Chapters One and Two, participating in dual enrollment in high school is thought to prepare students to be more successful in college, earn higher grades, increase persistence, increase motivation, and complete a degree or certificate faster.

Who or what played a role? The first question focused on dual credit participants asks who or what played a role in their decision to enroll in dual credit classes? Survey responses showed that most ($n = 5$) were self-motivated and the assistance of counselors and teachers was a motivating factor (Figure 8).

Figure 8

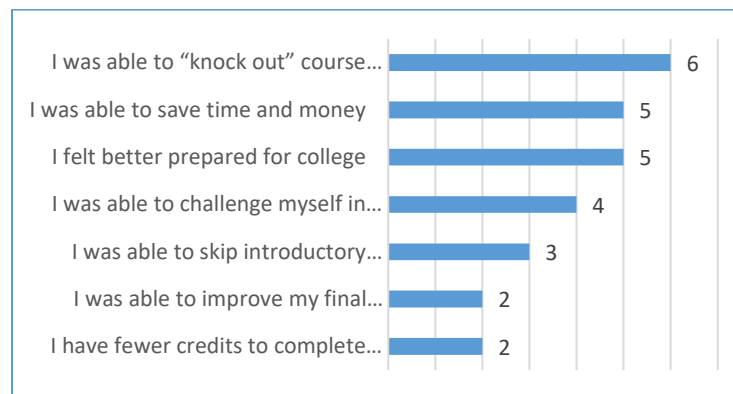
Who or What Played a Role in your Decision to Enroll in Dual Credit Classes?



How did Dual Enrollment Credits Help? Dual credit participants indicated how college credits earned in high school through the dual enrollment program helped them. Respondents were able to choose any and all choices. Of the eight dual credit respondents, most (n = 6) chose to “knock out” college classes while in high school (Figure 9).

Figure 9

How did the College Credits Earned in High School through the Dual Enrollment Program help you?

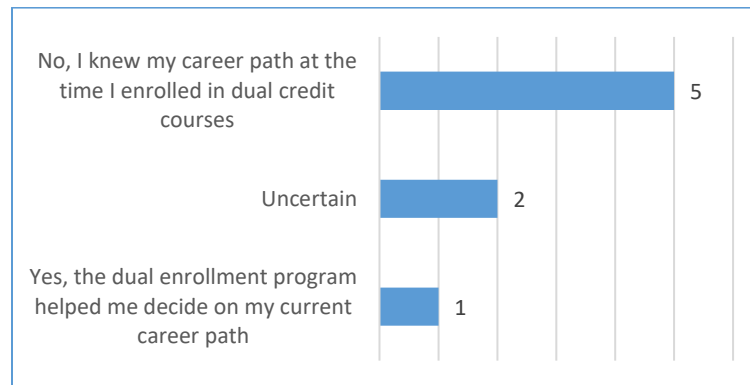


Dual Enrollment and Their Career Path. Dual credit participants were asked if the dual enrollment program helped them to decide on their current career path. Career and technical education (CTE) programs are trade focused and all students in the sample are enrolled in CTE

classes. Most (n = 5) respondents knew their career path at the time of enrolling in dual credit courses (Figure 10).

Figure 10

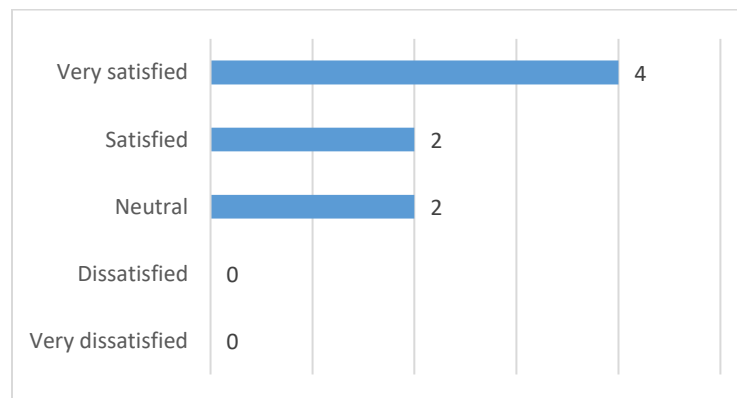
Did the Dual Enrollment Program help you Decide on your Current Career Path?



High School Dual Enrollment Experience. Dual credit participants were asked how satisfied they are with their dual enrollment experience in high school. Most participants were “very satisfied” or “satisfied” with their high school dual enrollment experience (Figure 11).

Figure 11

Overall, how Satisfied are you with your Dual Enrollment Experience while in High School?

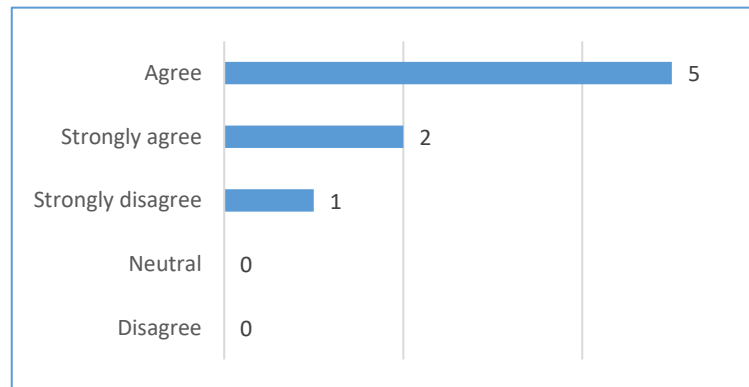


Dual Enrollment and Success in College. Dual credit students were asked if their participation in dual enrollment courses prepared them for success in their college courses. Over

half of the respondents (n = 7) expressed that their participation in dual enrollment prepared them for success in college courses (Figure 12).

Figure 12

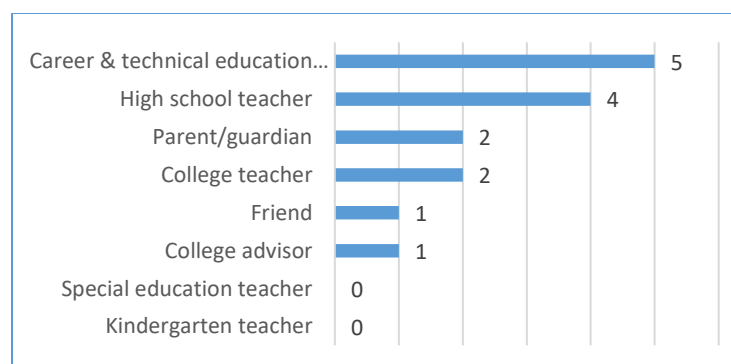
Did your Participation in Dual Enrollment Courses Prepare you for Success in your College Courses?



Which Adults Helped You Participate? Dual credit participants were asked who helped them as they participated in the dual enrollment program. Career and Technical Education counselors and teachers were the adults that helped the respondents participate in dual enrollment the most (Figure 13).

Figure 13

Which Adults Helped you as you Participated in the Dual Enrollment Program?



Finally, the survey offered dual credit participants the opportunity to add any comments about their experience as a dual credit student. Two dual credit participants left responses. One stated “it was a good provision and I totally recommend it” and the other stated “I recommend people to do it, you won’t regret it!”

Differences in Experiences and Perspectives Between Dual Credit Participants and Non-Participants

Pearson Chi-square statistical tests were used to determine whether differences between former dual credit participants and non-participants exist. The Chi-square test examines observed and expected counts between the intervention (former dual credit participants) and comparison (non-participant) groups to test for statistically significant associations. The probability (p -value) for rejecting the null hypothesis is based on the conventional alpha level of .05 or less.

Broad Area of College Coursework Interest While in High School. Results of the chi-square test of independence for students’ broad area of interest in college coursework while in high school indicate a moderate difference between observed and expected values, $\chi^2 = 0.81$, $df = 4$, $p < 0.37$ (Table 3). The null hypothesis cannot be rejected.

Table 3

Chi-Square Results for Students’ Interest in a Broad Area of College Coursework while in High School.

Group		General academics	Coursework leading to employment
Dual credit	Observed	6	2
	Expected	4.87	3.13
	Residual	1.13	1.13
Non-dual credit	Observed	22	16

Group		General academics	Coursework leading to employment
	Expected	23.13	14.87
	Residual	1.13	1.13

Satisfaction with the Education Experience at College of the Desert. The results of the chi-square test of independence for students' perception of satisfaction with their education experience at COD indicate a moderate difference between observed and expected values, $\chi^2 = 5.24$, $df = 4$, $p < 0.16$ (Table 4). The null hypothesis cannot be rejected.

Table 4

Chi-Square Results for Student Satisfaction with the Educational Experience at COD.

Group		Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
Dual credit	Observed	2	3	3	0	0
	Expected	2.78	4.00	1.04	0.17	0
	Residual	0.78	1.00	1.96	0.17	0.00
Non-dual credit	Observed	14	20	3	1	0
	Expected	13.22	19.00	4.96	0.83	0
	Residual	0.78	1.00	1.96	0.17	0.00

Dual Credit Enrollment and Plan to Transfer. The results of the chi-square test of independence for students' plan to transfer to a four-year institution and dual credit enrollment indicate a marginally significant difference between observed and expected values, $\chi^2 = 8.57$, $df = 4$, $p < 0.06$ (Table 5). Analysis of the data indicated the association approaches significance (0.06 vs 0.05) but the null hypothesis cannot be rejected.

Table 5*Chi-Square Results for Plan to Transfer to a Four-Year Institution*

Group		Yes	Not sure	No
Dual credit	Observed	6	0	2
	Expected	4.87	2.61	0.52
	Residual	1.13	2.61	1.48
Non-dual credit	Observed	22	15	1
	Expected	23.13	12.39	2.48
	Residual	1.13	2.61	1.48

Dual Credit Enrollment and Motivation to Finish College. The results of the chi-square test of independence for students' motivation to finish college do not indicate a strong difference between observed and expected values, $\chi^2 = 0.59$, $df = 4$, $p < 0.77$ (Table 6). Analysis of the data indicated that motivation to finish college was similar between both dual credit and non-dual credit students and the null hypothesis cannot be rejected.

Table 6*Chi-Square Results for Motivation to Finish College*

Group		Very motivated	Somewhat motivated	Neutral	Not motivated	Extremely unmotivated
Dual credit	Observed	5	3	0	0	0
	Expected	5.39	2.09	0.04	0.17	0
	Residual	0.39	0.91	0.04	0.17	0.00
Non-dual credit	Observed	26	9	2	1	0
	Expected	25.61	9.91	1.65	0.83	0
	Residual	0.39	0.91	0.35	0.17	0.00

Enrollment in Advanced Placement. The results of the Chi-square test for enrolling in advanced placement in high school do not indicate a strong difference between observed and expected values, $\chi^2 = 1.25$, $df = 2$, $p < 0.68$ (Table 7). Analysis of the data indicated that motivation to finish college was similar between dual credit and non-dual credit students but the null hypothesis cannot be rejected.

Table 7

Chi-square Results for Student's Enrolled in Advanced Placement in High School

Group		Yes	Not sure	No
Dual credit	Observed	2	1	5
	Expected	2.26	1.39	4.35
	Residual	0.26	0.39	0.65
Non-dual credit	Observed	11	7	20
	Expected	10.75	6.61	20.65
	Residual	0.25	0.39	0.65

Student Information System (SIS) Data Findings

First Generation Status, Fall 2020. The results of the chi-square test of independence for first generation status, fall 2020, does not indicate a strong difference between observed and expected values, $\chi^2 = 1.24$, $df = 1$, $p < 0.27$ (Table 8). The null hypothesis cannot be rejected.

Table 8*Chi-Square Results for Students' First-Generation Status, Fall 2020*

Group		Yes	No	Total
Dual credit	Observed	6	2	8
	Expected	3.96	1.04	8
	Residual	2.04	0.96	
Non-dual credit	Observed	34	4	38
	Expected	33.04	4.96	38
	Residual	0.96	0.96	

First Generation Status, Spring 2021. The results of the chi-square test of independence for first generation status, Spring 2021 indicates a moderate but still insignificant difference between observed and expected values, $\chi^2 = 0.81$, $df = 1$, $p < 0.07$ (Table 9). Analysis of the data indicate that the probability of an association is marginally significant though the null hypothesis cannot be rejected.

Table 9*Chi-Square Results for Students' First-Generation Status, Spring 2021*

Group		Yes	No	Total
Dual credit	Observed	6	2	8
	Expected	6.26	1.74	8
	Residual	0.26	0.26	
Non-dual credit	Observed	30	8	38
	Expected	29.74	8.26	38
	Residual	0.26	0.26	

Low-Income Status, Fall 2020. The results of the chi-square test of independence for low-income status, fall 2020 indicates a moderate difference between observed and expected values, $\chi^2 = 0.81$, $df = 1$, $p < 0.07$ (Table 10). Analysis of the data indicate that the probability of an association is marginally significant though the null hypothesis cannot be rejected.

Table 10

Chi-Square Results for Students' Low-Income Status, Fall 2020

Group		Yes	No	Total
Dual credit	Observed	2	6	8
	Expected	1.74	6.26	8
	Residual	0.26	0.26	
Non-dual credit	Observed	8	30	38
	Expected	8.26	29.74	38
	Residual	0.26	0.26	

T-Tests: GPA, Units Attempted, and Units Earned

Switching from categorical data to interval level data, the independent t-test measures mean for a possible association using a significance level of 0.05 (alpha). A larger t-statistic indicates that a difference exists between the two sample sets and a smaller t-stat indicates the groups are more similar.

Fall 2020 Grade Point Average. The GPA for the eight previously dual-enrolled participants in the intervention group ($M = 2.74$, $SD = 1.80$) compared to the 36 non-dual enrolled participants in the control group ($M = 2.68$, $SD = 1.80$) was not significant difference in Fall 2020 GPA. There was not a marginally significant difference in GPA scores between dual-

enrolled and non-dual enrolled participants $df(8)$, t Stat = 0.11, $p = .92$, the null hypothesis cannot be rejected.

Spring 2021 Grade Point Average. The eight previously dual-enrolled participants in the intervention group ($M = 3.39$, $SD = 0.33$) compared to the 36 non-dual enrolled participants in the control group ($M = 2.90$, $SD = 1.19$) demonstrated no strong difference in Spring 2021 GPA.

There difference in GPA scores between dual-enrolled and non-dual enrolled participants nearly satisfied the criteria for marginally significant at 90%, $df(16)$, t Stat = 1.74, $p = .10$, the null hypothesis cannot be rejected.

Fall 2020 Units Attempted. The eight participants in the intervention group ($M = 45.43$, $SD = 1728.95$) compared to the 36 participants in the control group ($M = 30.26$, $SD = 775.69$) demonstrated no strong difference in Fall 2020 units attempted. There was no significant difference in units attempted between intervention and comparison participants $df(7)$, t Stat = 0.93, $p = .38$, the null hypothesis cannot be rejected.

Fall 2020 Units Earned. The eight participants in the intervention group ($M = 40.29$, $SD = 1069.24$) compared to the 36 participants in the control group ($M = 27.08$, $SD = 693.19$) did not demonstrate a strong difference in Fall 2020 units earned.

There was no significant difference in units earned between intervention and comparison participants $df(8)$, t Stat = 1.00, $p = .34$, the null hypothesis cannot be rejected.

Spring 2021 Units Attempted. The eight participants in the intervention group ($M = 40.21$, $SD = 992.98$) compared to the 36 participants in the control group ($M = 39.53$, $SD = 764.21$) did not demonstrate a strong difference in Spring 2021 units attempted.

There was no significant difference in units attempted between intervention and comparison participants $df(8)$, t Stat = 0.76, $p = .47$, the null hypothesis cannot be rejected.

Spring 2021 Units Earned. The eight participants in the intervention group ($M = 47.21$, $SD = 888.49$) compared to the 36 participants in the control group ($M = 34.66$, $SD = 519.36$) did not demonstrate a strong difference in Spring 2021 units earned.

There was no significant difference in units earned between intervention and comparison participants $df(7)$, $t \text{ Stat} = 1.06$, $p = .33$, the null hypothesis cannot be rejected.

The researcher does not reject the Null for the independent t-test and concludes that there is no strong difference between dual enrolled and the mean success of non-dual enrolled participants.

Short-Term Success in College of Formerly Dual Credit CTE Students

Measurement of short-term success was guided by four criteria: (1) enrollment and completion rates in first-term college courses including basic skills and college-level courses, (2) completion of all courses with a grade of “C” or better, (3) persistence from one term to another, and (4) goal achievement operationalized as units attempted and units earned.

Higher Course Completion Rates. Enrollment and completion in first-term college courses. These courses are both the transfer-level and non-transfer-level courses. Transfer-level courses are not required for enrollment in California community colleges but are highly encouraged in the first year (CCCCO, n.d.). Results of the chi-square test of independence for these courses completed successfully were significantly different between intervention and comparison participants, $\chi^2 = 0.03$, $df = 1$, $p < 0.02$ (Table 11). Analysis of the data indicates that previously dual-enrolled participants completed these courses successfully in college at a significantly higher rate than non-dual enrolled participants and the null hypothesis can be rejected.

Table 11*Chi-Square Results for Former Dual Credit Students' Higher Course Completion Rates*

Group		Successfully Completed	Not Successfully Completed	Total
Dual credit	Observed	7	0	7
	Expected	3.85	3.15	8
	Residual	0.15	0.15	
Non-dual credit	Observed	19	18	37
	Expected	18.15	14.85	38
	Residual	0.15	0.15	

Complete all courses with “C” or better. Students enroll in and successfully complete courses with a grade of “C” or better. During the Fall 2020 semester, the intervention group earned mean GPA of 2.68 compared to a mean GPA 3.32 GPA for the comparison group.

Persistence. Persistence from Fall 2020 to Spring 2021 was consistent between the intervention and comparison groups. Seven previously dual enrolled and 33 non-dual enrolled participants enrolled in Fall 2020, $\chi^2 = 0.05$, $df = 1$, $p < 0.90$, a total of 40 participants completing some units. In Spring 2021, out of 44 participants, 8 previously dual re-enrolled and 36 non-dual enrolled participants completed some units, $\chi^2 = 0.78$, $df = 1$, $p < 0.38$. Persistence was fairly consistent and the null hypothesis cannot be rejected.

Goals Achieved. The researcher measured completion by goal achievement operationalized as units attempted and units earned. Results of the chi-square test of independence for students' goals achieved were met for Spring 2021, $\chi^2 = 0.78$, $df = 1$, $p < 0.38$ (Table 12). Analysis of the data indicated that education goal achievement in college was similar

between both dual credit and non-dual credit students are similar and the null hypothesis cannot be rejected.

Table 12

Chi-Square Results for Students' Educational Goal Status, Spring 2021

Group		Unit goal achieved	Unit goal not achieved	Total
Dual credit	Observed	4	4	8
	Expected	4.36	3.64	8
	Residual	0.36	0.36	
Non-dual credit	Observed	20	16	36
	Expected	19.64	16.36	38
	Residual	0.36	0.36	

Summary

Results of chi-square tests indicate that most participants in the intervention group perceive that dual enrollment prepared them for success in college courses (87.5%). A statistically significant association exists for former dual credit students and first-term college course completion rates are significantly higher compared to non-dual enrolled participants.

First-term college course completion was significantly associated with dual enrollment status. Data for the intervention group showed 100% completion rate and 51% for the comparison group. GPA results for formerly dual enrolled participants indicate a difference at a .10 confidence level which nearly satisfied the criteria for marginal significance and could be considered significant within a small sample size. Completion with “C” grade or better, persistence, and achieving goals indicated no significant differences.

All members of the intervention group were female. The survey results indicated that most students who were enrolled in dual credit wanted to get a “head start” in earning college

credit and were able to “knock-out” courses they would have had to take in college. Students who are dual enrolled tend to know their career path at the time they enrolled in dual credit and most participants were “very satisfied” with their high school dual enrollment experience. Adults who influenced their decision to enroll in dual credit were CTE counselors and high school teachers. It’s possible that parents and peers also influenced their decision to enroll in dual credit. Of the dual credit and non-dual credit sample, there was no significant association between those who enrolled in Advanced Placement (AP) and those who enrolled in dual credit. Survey results suggest motivation to finish college is high in both groups.

The information in this chapter discussed data and findings gleaned from COD’s Student Information System (SIS) and from a web-based survey administered to CTE students over the age of 18 who were enrolled in the 2020/21 school year. Results included students’ demographic data, perspectives, and experiences related to dual enrollment’s association with short-term success in college as defined, in portion, by the criteria created by Achieving the Dream (Achieving the Dream, n.d.).

Chapter Five includes and summary of the problem being addressed, the purpose, research questions, methodology, main findings, and implications of the study. Chapter Five concludes with the researcher’s recommendations drawn from this study.

Chapter 5 - Conclusions and Recommendations

The measurement of student success in this study was guided by four criteria: (1) enrollment and completion rates in first-term college courses including basic skills and college-level courses, (2) completion of all courses with a grade of “C” or better, (3) persistence from one term to another, and (4) goal achievement. The study compared the experiences of CTE students who were formerly enrolled in dual credit programs at the secondary school and those CTE students who were not dual enrolled to explore the association linking community college student perceptions and experiences, and short-term success.

Astin's (1991) input-environment-outcome (I-E-O) model is the theoretical framework for this study and provides a lens to examine students' background attributes at the time of entry to college, during their engagement within the institutional environment, and subsequent outputs quantified in this study as short-term success.

Implications of the Findings

Motivation in College

It is clear that the intervention and comparison groups were equally motivated to finish the Associate degree program at the community college (93.5%). A majority of participants in both groups planned to transfer to a four-year institution (60.9%). Both intervention and comparison groups were mostly interested in general academics in high school and one-third was more interested in coursework leading quickly to employment. The majority indicated that they are “satisfied” or “very satisfied” with their education experience at College of the Desert (COD).

The Association of Dual Enrollment and Short-Term Success in College. Findings indicate that a large majority (85.5%) of the intervention group agree that dual enrollment

courses prepared them for success in their college courses. Thirty-three states have a systemwide assessment and placement policy (Whinnery & Odekar, 2021). California does not allow community colleges to require remedial courses but does require “maximum probability that a student will enter and complete transfer-level coursework in math and English (CCCCO, n.d.). Remedial education is sometimes referred to as developmental education. First-term college course data in this study refer to developmental and transfer-level. Results for first-term college courses completed successfully were significantly different between intervention and comparison groups and indicate a statistically significant association ($p = .02$) between former dual credit students and success in first-term college coursework. Results for GPA nearly satisfied the criteria for marginal significance ($p = .10$) between former dual credit students and grade point average. More than half of the formerly dual enrolled students expressed that their participation in dual enrollment prepared them for success in college. Dual enrolled students are motivated and their plan to transfer to a four-year institution was marginally significant.

Dual-Enrolled Students’ Perceptions. Survey responses for the eight former dual enrolled students (intervention group) indicate the most were self-motivated. Sixty-two percent also indicate that they wanted to get a “head start” earning college credit and save tuition on college classes. Counselors and teachers played a role in their decision to enroll in dual credit classes. Most (75%) felt better prepared for college and were able to “knock out” courses in high school that they would have had to take in college. Most dual enrolled students indicated that they already knew their career path before enrolling for dual credit. Overall, students were “very satisfied” and “satisfied” with their dual enrollment experience while in high school.

Low-Income and First-Generation Status. There were significantly more low-income and first-generation students in the intervention group. First-generation student status was associated and marginally significant with dual enrollment participation ($p = .07$) although not at

the .05 significance level selected for this study. This study finds that participation in dual enrollment programs is associated with first-generation status. Low-income status and dual credit participation was also marginally significant at the ($p = .07$) confidence level. The researcher concludes that participation in dual enrollment programs is positively associated with student low-income status.

This study captures student perceptions of dual enrollment and subsequent success in college. This study contributes to a growing body of research focused on dual enrollment and uniquely focuses on students' point-of-view. A Type 1 error means rejecting the null hypothesis when it may be actually true. A Type 2 error means not rejecting the null hypothesis when it is actually false. It's possible that this study may not have included enough statistical power to detect effects of certain size (Banerjee et al., 2009). The small size in this study may limit generalizability of the results reported here. Although the intervention and comparison groups were similar in age and race/ethnicity to the general student population at College of the Desert, other factors may be at work that can account for the generally insignificant results between groups found in the study. The low response rate to the survey suggests further research may be fruitful to determining whether this study's findings will be similar across time.

Insignificant results were possibly the result of small sample size and the effect of non-respondents. Chi-square results with large samples frequently yield statistical significance when smaller samples may not.

Technically, the hypothesis cannot be rejected when evidence does not exceed the evidentiary standard and the results are insignificant. Lack of evidence does not represent proof that something does not exist. Practically, the researcher didn't prove that the association between dual enrollment and subsequent college success does not exist but believes that the null hypothesis is false. Lack of power to reject the hypothesis does not, however, suggest the

hypothesis is true. Given the likelihood that a chi-square test with a larger sample may lead to a false finding that statistical significance exists, future research should proceed cautiously.

Recommendations, Future Research

Dual enrollment is generally thought to increase GPA, persistence, and completion. Motivation is a factor and dual enrolled students in both high school and college. Expectations and course loads in some high school senior year programs may not be motivating students to enroll in college in the first term after graduating or encouraging students to participate in college credit courses during their high school senior year. Future research could focus on transforming the senior year to the “transition to college year” requiring dual credit courses.

Eight students in the population indicated “unsure” if they had participated in advanced placement. Its probable many high school students are unaware of advanced placement. Future research could investigate the availability of dual enrollment and advanced placement programs and evaluate the broad reach of both. Seventy-five percent of the former dual credit CTE student were planning to transfer to a higher institution. Future research could explore reasons why CTE students plan to transfer to 4-year institutions rather than directly entering a career pathway.

All respondents in the intervention group were female. Future studies could look at gender and dual enrollment. The sample and population demographics aligned closely in gender, age, and race/ethnicity. The Career and Technical Education program population is 62.3% female and the sample is 69.5% female. Future studies could explore gender and CTE.

Data was difficult to gather for this study. Data collection could be improved with better data reporting. State leaders could better connect K-12 and postsecondary data systems ensuring to collect and report meaningful data about dual enrollment programs. The Data Quality Campaign released a report stating “to make dual enrollment programs work, school and state

leaders need access to timely, accurate data about which students have access to these programs and how participation impacts their lives after high school” (Karva, 2021, pg. 1).

The Carl D. Perkins Career and Technical Education Act requires states to annually report dual credits earned. Just 32 states reported dual enrollment participation or completion this year. Only 22 of those 32 states reported any sort of disaggregated data. Fifteen states included other college and career readiness indicators along with dual enrollment such as Advanced Placement. State leaders could better report data on enrollment in both Advanced Placement and dual enrollment to understand the impact of each program. The K-12 and postsecondary state-wide data system could include student persistence and postsecondary attainment information provided by the National Student Clearinghouse and the High School Longitudinal Study. Cross-agency, high-quality data governance is a strategic way to align dual enrollment data collection and reporting with best practices (Karva, 2021).

Probability levels. The perception of confidence and to reject the null when dependent solely on p-values is limiting. Future research may produce different results using different analysis methods and perhaps a higher level of significance determined *a priori*. Demographics were similar with no difference in motivation between intervention and comparison groups. Fisher’s exact test may be used in analysis of small samples relying less on the approximation results of the chi squared test and achieving exact results (Kim, 2017). The .05 level selected for this exploratory study may have been set too high and may have consequently masked significant findings. Using a higher level of probability to test hypotheses may allow researchers to go beyond the artificial polarity of whether to reject the null or not. The association between the two groups in the sample ($H_0: \mu_1 - \mu_2 = 0$) is the mean score for group one (μ_1) and the mean score for group two (μ_2) (Aberson, 2002). The APA manual recommends confidence intervals, the examination of differences between means to improve interpretation of what we could plausibly

expect from a population (American Psychological Association, 2001). The researcher recommends that future research in this area incorporate a larger sample of participants and not rely artificially high probability levels which might obscure differences worth pursuing.

Concluding Remarks

Although the study did not investigate alignment with industry, future studies could investigate a formal process of streamlining CTE training in community college as an established internship with employers leading directly to employment. Dual enrollment programs could deliver more competent programs if they align the curriculum with specific industry input. Industry professionals and those doing the hiring should be involved in curriculum development and training guidelines.

Exploring students' perceptions of dual enrollment and subsequent short-term success as measured by the criteria used in this study can provide first-hand information to improve dual enrollment programs and to accelerate completion in community college. Community colleges could design and deliver dual enrollment programs aligned with industry competencies and needs using resources to expand high school articulation relationships with the goal of completing college successfully and transition into rewarding employment.

References

- Aberson, C. (2002). *Interpreting null results: improving presentation and conclusions with confidence intervals*. Humboldt State University. <https://www.jasnh.com/a6.htm>
- Achieving the Dream. (n.d.). <https://www.achievingthedream.org/>
- Achieving the Dream. (2009). Field guide for improving student success. Community Colleges Count. Pdf.
- Achieving the Dream. (n.d.). *One Goal – Success for All Students*. The Achieving the dream student-centered model of institutional improvement. <https://www.achievingthedream.org/sites/default/files/resources/Achieving%20the%20Dream%20Student-Centered%20Model%20of%20Institutional%20Improvement.pdf>
- ACT. (2007). *The role of nonacademic factors in college readiness and success*. Iowa City, IA: Author.
- Adelman, C. (2006). The toolbox revisited: Paths to degree completion from high school through college. Washington, DC: U.S. Department of Education.
- American Association of Community Colleges (AACC). (2014). Empowering community colleges to build the nation's future. http://www.aacc21stcenturycenter.org/wp-content/uploads/2014/04/EmpoweringCommunityColleges_final.pdf
- American Association of Community Colleges (2014). Empowering community colleges to build the nation's future. http://www.aacc21stcenturycenter.org/wp-content/uploads/2014/04/EmpoweringCommunityColleges_final.pdf
- American Association of State Colleges and Universities. (2002). *The open door: Assessing the promise and problems of dual enrollment*. Washington, DC; Author.
- American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: Author.
- An, B.P. (2013a). The influence of dual enrollment on academic performance and college readiness: Differences by socioeconomic status. *Research in Higher Education*, 54, 407-432.
- An, B.P. (2013b). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis*, 35, 57-75.
- An, B. P., & Taylor, J. L. (2015). Are dual enrollment students college ready? *Evidence from the Wabash National Study of Liberal Arts Education*, 23(58). Education Policy Analysis Archives.

- Andrews, H. A. (2000). Lessons learned from current state and national dual-credit programs. *New Directions for Community Colleges*, (111), 31-39. Doi: <http://dx.doi.org.er.lib.k-state.edu/10.1002/cc.11104>
- Association for Career and Technical Education. (2017). *State Policies Impacting CTE: 2017 Year in Review*. Association for Career and Technical Education. <https://ctepolicywatch.acteonline.org/2018/01/new-report-2017-state-cte-policy-review-.html>
- Astin, A. W. (1984, January). Student involvement: A development theory for higher education. *Journal of College Student Development*. 40, 518-529. https://www.researchgate.net/publication/220017441_Student_Involvement_A_Development_Theory_for_Higher_Education
- Bailey, T., Calcagno, J. C., Jenkins, D., Kienzl, G., & Leinbach, T. (2005). *The effects of institutional factors on the success of community college students*. Community College Research Center Teachers College, Columbia University. Eric Database. (ED484345).
- Bailey, T., & Karp, M. M. (2003). *Promoting college access and success: A review of credit-based transition programs*. Washington, DC: U.S. Department of Education, Office of Adult and Vocational Education.
- Barnett, E., & Hughes, K. (2010). *Community college and high school partnerships. Issue brief*. New York: Community College Research Center, Teachers College.
- Barnett, E., & Stamm, L. (2010). *Dual enrollment: A strategy for educational advancement of all students*. www.blackboard.com/cmspages/getfile.aspx?guid=8bd289a8-1f36-4de9-f09812821ff6.
- Barr, M. J., & McClellan, G. S. (2012/2018). *Budgets and financial management in higher education* (2nd/3rd eds.). Jossey-Bass.
- Barrett, L. K., & Long, B. V. (2012). The Moore method and the constructivist theory of learning: Was R.L., Moore a constructivist? *PRIMUS*, 22(1), 75-84. doi:10.1080/10511970.2010.493548
- Bean, J. P. (1990). Why students leave: Insights from research. In D. Hossler, J.P. Bean, & Associates (Eds.), *The strategic management of college enrollments* (pp. 170-185). Jossey-Bass.
- Beer, A., & Bray, J. B. (2019). *The college-work balancing act*. Association of Community College Trustees.
- Bill & Melinda Gates Foundation. (n.d.). *Post-secondary success*. <https://www.gatesfoundation.org/what-we-do/us-program/postsecondary-success>
- Bourdieu, P. (1977). Cultural reproduction and social reproduction. In Karabel, J., Halsey, A. (Eds.), *Power and ideology* (pp. 487-510). New York, NY: Oxford University Press.

- Boswell, K. (2000). Building bridges or barriers? Public policies that facilitate or impede linkages between community colleges and local school districts. *New Directions for Community Colleges*, (111), 3-15. doi: <http://dx.doi.org.er.lib.k-state.edu/10.1002/cc.11101>
- Braxton, J. M., Hirschy, A. S., McClendon, S. A. (2004). Understanding and reducing college student departure. San Francisco, CA: Jossey-Bass.
- Burke, J. C. (2002). Funding public colleges and universities for performance: Popularity, problems, and prospects. Albany, NY: Rockefeller Institute Press.
- California Community Colleges Chancellor's Office. (CCCCO). (n.d.). *What is AB 705?* Assessment and Placement. <https://assessment.cccco.edu/ab-705-implementation>
- California Community Colleges Chancellor's Office. (CCCCO). (n.d.). <https://datamart.cccco.edu/Default.aspx>
- California Community Colleges Chancellor's Office. (CCCCO). (n.d.). *Dual enrollment*. <https://www.cccco.edu/About-Us/Chancellors-Office/Divisions/Educational-Services-and-Support/What-we-do/Dual-Enrollment#:~:text=Dual%20enrollment%20lets%20you%20earn,toward%20your%20high%20school%20diploma>.
- California Community Colleges Chancellor's Office. (CCCCO). (n.d.). *Key Facts*. <https://www.cccco.edu/About-Us/Key-Facts>
- California Community Colleges Chancellor's Office. (CCCCO). (2004, February). *Taxonomy of Programs*, 6th. Edition. <https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx>
- California Community Colleges Management System. (n.d.). Student data retrieval system. <https://webdata.cccco.edu/ded/ded.htm>
- California Department of Education. (2019). *Dual and concurrent enrollment strategies*. <https://www.cde.ca.gov/ci/gs/hs/duenconstgs.asp>
- California Department of Education. (n.d.). *Career technical education. Teaching and learning*. <https://www.cde.ca.gov/ci/ct/>
- California Edge Coalition. (2018, May 14). The skills gap in California <https://caedge.org/the-skills-gap-in-california/>
- Campbell, D. & Stanley, J. (1963). Experimental and quasi-experimental designs for research. Reprinted from *Handbook of Research on Teaching*. Library of congress catalogue card number 81-80806. ISBN: 0-395-30787-2. Y-BBS-10 09 08.

- Cambridge Dictionary. (n.d.). *Grade-point average*.
<https://dictionary.cambridge.org/us/dictionary/english/grade-point-average>
- Cassidy, L. J. (2010, January). Dual enrollment: Lessons learned on school-level implementation. US Department of Education (ED). Office of elementary and secondary education. Contract Number #E-07-CO-0106 with EDJ Associates, Inc. in Herndon, VA.
- Chemers, M. M., Hu, L. T., Garcia, B. F. (2001). Academic self-efficacy and first year college student performance and adjustment. *Journal of Educational Psychology*, 93, 55–64.
doi:10.1037/0022-0663.93.1.55
- Cho, S., & Karp, M. M. (2013, January). Student success courses in the community college: Early enrollment and educational outcomes. *Community College Review*, 41(1), 86-103.
<http://web.a.ebscohost.com.er.lib.k-state.edu/ehost/detail/detail?vid=0&sid=87a95fea-3a1e-4533-98c4-35ff7ef895a9%40sdc-v-sessmgr03&bdata=JnNpdGU9ZWhtv3QtbGl2ZQ%3d%3d#AN=85704917&db=aph>
- Christenson, W., & Messner-Zidell, S., & Lee, G. Kass, D., & McMullan, M. (2012, June). *Can California Compete? Reducing the skills gap and creating a skilled workforce through linked learning*. America's Edge
- Clotfelter, C. T., Ehrenberg, R. G., Getz, M., Siegfried, J. J. (1991). *Economic challenges in higher education*. Chicago, IL: The University of Chicago Press.
- Cohen, A. M., Brawer, F. B., & Kisker, C. B. (2014). *The American community college (Sixth ed.)*. San Francisco: Jossey-Bass.
- College Board. (2021). How to convert your GPA to a 4.0 scale.
<https://pages.collegeboard.org/how-to-convert-gpa-4.0-scale>
- College and Career Access Pathways Partnerships. (CAPP). (2015-2016). *AB-288 Public Schools*. California Legislative Information, Bill Information. Retrieved from
https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB288
- College of the Desert. (n.d.). *Institutional Research*. College of the Desert (COD).
<http://www.collegeofthedesert.edu/fs/research/Pages/default.aspx>
- College of the Desert. (n.d.). *Strategic master plan goals*. College of the Desert (COD).
<http://www.collegeofthedesert.edu/aboutus/Pages/goals.aspx>
- Crouse, J. D., & Allen, J. (2013). College course grades for dual enrollment students. *Community College Journal of Research and Practice*, 38(6), 494-511.
- D'Amico, M. M., Morgan, G. B., Robertson, S., & Rivers, H. E. (2013). Dual enrollment variables and college student persistence. *Community College Journal of Research and Practice*, 37(10), 769-779. DOI: 10.1080/10668921003723334

- Dounay, J. (2006). *Advanced placement. ECS policy brief: High school--advanced placement*. Education Commission of the States, 700 Broadway, Suite 1200, Denver, CO 80203. Retrieved from ERIC Retrieved from <https://er.lib.k-state.edu/login?url=https://www-proquest-com.er.lib.k-state.edu/reports/advanced-placement-ecs-policy-brief-high-school/docview/62089364/se-2?accountid=11789>
- Education Commission of the States (2015). *Dual enrollment: who is responsible for paying tuition*. <http://ecs.force.com/mbdata/MBQuestRTL?Rep=DE1309N>.
- Education Commission of the States (ECS). (2020). <http://ecs.force.com/mbdata/mbprofgroupall?Rep=DEA#:~:text=Statewide%20policy%20in%20place%3A%20Forty,Definition%20or%20title%20of%20program>.
- Edwards, L., Hughes, K. L., & Weisburg, A. (2011). *Different approaches to dual enrollment: Understanding program features and their implications*. New York: Community College Research Center.
- Fike, D. S., & Fike, R. (2008, October 1). Predictors of first-year student retention in the community college. *Community College Review*. <https://doi.org/10.1177/0091552108320222>
- Fink, J., Jenkins D., & Yanagiura, T. (2017, September 27). *What happens to students who take community college & dual enrollment courses in high school?* Community College Research Center. National Student Clearinghouse Research Center. <https://ccrc.tc.columbia.edu/publications/what-happens-community-college-dual-enrollment-students.html>.
- Frey, B. (2018). The SAGE encyclopedia of educational research, measurement, and evaluation. <https://methods.sagepub.com/reference/the-sage-encyclopedia-of-educational-research-measurement-and-evaluation/i4458.xml>. DOI: <https://dx.doi.org/10.4135/9781506326139.n103>
- Ferguson, C., Baker, P., & Burnett, D. (2015). Faculty members' perceptions of rigor in dual enrollment, accelerated programs and standard community college courses. In J. L. Taylor & Pretlow (Eds.), *New Directions for Community Colleges: No. 169. Dual enrollment policies, pathways and perspectives* (83-92). San Francisco, CA: Jossey-Bass.
- Gagnon, D., Liu, J., & Cherasaro, T. (2021). *Understanding access to and participation in dual enrollment by locale and income level* (REL 2021–089). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2021089.pdf
- Gray, L., Lewis, L., & Ralph, J. (2018). *Career and technical education programs in public school districts: 2016-17*. First Look. NCES 2018-028. National Center for Education Statistics (NCES). US Department of Education. ERIC No. ED582132

- Harkiolakis, N. (2017, June 28). Quantitative research methods: From theory to publication. Kindle Edition. ISBN: 1543148131
- Heck, R. H., Lam, W. S., & Thomas, S. L. (2014). State political culture, higher education spending indicators, and undergraduate graduation outcomes. *Educational Policy*, 28, 3-39.
- Helguera, M. (2018). *The allocation of resources for career technical education programs that improve college- and career-readiness*. [Unpublished Doctoral Dissertation]. University of Southern California. DOI: 10.25549/USCTHESES-C89-29212.
- Hughes, K. L., Karp, M. M., Bunting, D. & Friedel, J. (2005). Dual enrollment/dual credit: its role in career pathways. In D. M. Hull (Ed.), *Career Pathways: Education with a Purpose* (pp. 227-225). Waco, TX: CORD.
<http://ccrc.tc.columbia.edu/Publication.asp?UID=337>
- Irwin, S. (2018). *The effects of dual enrollment on an institution: Student persistence and degree attainment at the community college* (ProQuest No. 10979748) [Doctoral dissertation]. Grand Canyon University. ProQuest Dissertations and Theses Global.
- Jones, S. (2014). Student participation in dual enrollment and college success. *Community College Journal of Research and Practice*, 38, 24-37.
- Juszkiewicz, J. (2017, November). *Trends in community college enrollment and completion*. American Association of Community Colleges.
- Kanny, M. A. (2015). Dual enrollment participation from the student perspective. *New Directions for Community Colleges*, 169, 59-70. doi:10.1002/cc.20133
- Karp, M. M., Bailey, T. R., Hughes, K. L., & Fermin, B. J. (2004). *State dual enrollment policies: Addressing access and quality*. US Department of Education, 1-52.
<https://er.lib.k-state.edu/login?url=https://www-proquest-com.er.lib.k-state.edu/docview/62126983?accountid=11789>
- Karp, M. M., Bailey, T. R., Hughes, K. L., & Fermin, B. J. (2005). *State dual enrollment policies: Addressing access and quality*. (CCRC Brief No. 26). Community College Research Center, Teachers College, Columbia University. <https://er.lib.k-state.edu/login?url=https://www-proquest-com.er.lib.k-state.edu/docview/62136222?accountid=11789>
- Karp, M. M., Calcagno, 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*. St. Paul, MN: University of Minnesota, National Research Center for Career and Technical Education.
<http://ccrc.tc.columbia.edu/Publication.asp?UID=547>

- Karva, F. (2021, October 14). With data, leaders can better support student' pathways. *Data Quality Campaign*. <https://dataqualitycampaign.org/leaders-can-better-support-students-pathways/>
- Keily, T. (2019). *Career and technical education: What is the issue and why does it matter?* Education Commission of the States. ERIC No. ED592376.
- Kim H. Y. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restorative dentistry & endodontics*, 42(2), 152–155. <https://doi.org/10.5395/rde.2017.42.2.152>
- Kinnick, K. N. (2012). The impact of dual enrollment on the institution. *New Directions for Higher Education*, (158), 39-47. Doi:10.1002/he.20013.
- Kotter, J. P. (1996). *Leading change*. Cambridge, MA: Harvard Business Press.
- Laerd Statistics. (n.d.). Point-biserial correlation using SPSS statistics. <https://statistics.laerd.com/spss-tutorials/point-biserial-correlation-using-spss-statistics.php>
- League. (2006). *Pathways to student success, case studies from the college and career initiative*. College and Career Transition Initiative. League for Innovation in the Community College. https://www.league.org/sites/default/files/CCTI%20Publication_Pathways%20to%20Student%20Success.pdf
- Li, A. Y., & Kennedy, A. I. (2018). Performance funding policy effects on community college outcomes: Are short-term certificates on the rise? *Community College Review*, 46(1), 3-39.
- Lochmiller, C. R., & Lester, J. N. (2017). *An introduction to educational research: Connecting methods to practice*. Sage. ISBN 978-1-4833-1950-6
- Maheshwari, V. K. (2018, January 23). *Causal-comparative research*. Literature review in behavioral research. Jainism-a religion. <http://www.vkmaheshwari.com/WP/?p=2491>
- Martinez, D. (2020). Data Research class. College of the Desert.
- Martinez, N. (2018, June). Report critique: The utility of dual enrollment in institutional strategic enrollment management and student college access. *Journal of College Access*, 4(1), 64-67.
- McCabe, R. H. (2000). *No one to waste: A report to public decision makers and community college leaders*. Community College Press.
- Milem, J. F., & Berger, J. B. (1997, Jul/Aug). A modified model of college student persistence: The relationship between Astin's theory of involvement and Tinto's theory of student departure. *Journal of College Student Development*, 38(4), ERIC 387.

- Mohr, J. W., & Ventresca, M. (2002, January). *Archival Research Methods*. ResearchGate. DOI: 10.1002/9781405164061.ch35.
https://www.researchgate.net/publication/258628588_Archival_Research_Methods
- Mokher, C. G., & McLendon, M. K. (2009). Uniting secondary and post-secondary education: An event history analysis of state adoption of dual enrollment policies. *American Journal of Education*, 115(2), 249-277. <https://er.lib.k-state.edu/login?url=https://www-proquest-com.er.lib.k-state.edu/docview/61906751?accountid=11789>
- Mullin, C. M. (2012, February). *Why access matters: The community college student body*. (Policy Brief 2012-01PBL). American Association of Community Colleges.
<http://files.eric.ed.gov/fulltext/ED532204.pdf>
- Myers, C., & Myers, S. (2017, winter). *Dual enrollment policies and undergraduate rates in the United States: An institutional and cohort approach using the 2006-2014 IPEDS*. Research & Practice in Assessment; Lynchburg, 12. ProQuest: 2002129574
- Myers, T. L. (2018). *Case study: Stakeholder perceptions of dual enrollment within career and technical education* (ProQuest No. 10974109) [Doctoral dissertation]. Grand Canyon University. ProQuest Dissertations and Theses Global.
- My Work Choice. (2019, December 2). *What is workforce development?*
<https://myworkchoice.com/blog/workforce-development/>
- National Alliance of Concurrent Enrollment Partnerships (NACEP). (n.d.). *What is concurrent enrollment?* <http://www.nacep.org/about-nacep.what-is-concurrent-enrollment/>
- National Center for Education Statistics. (2016). *Digest of education statistics: 2015 (NCES 2016-014)*. Washington, DC: Institute of Education Sciences.
- National Student Clearinghouse Research Center. (2018). *Persistence & retention*.
<https://nscresearchcenter.org/snapshotreport33-first-year-persistence-and-retention/#:~:text=The%20persistence%20rate%20is%20the,return%20to%20the%20same%20institution.>
- O'Banion, T. U. (Ed.). (2019). *13 Ideas that are transforming the community college world*. Rowman & Littlefield. ISBN:9781475844900 <https://www.aacc.nche.edu/wp-content/uploads/2018/04/CCEnrollment2017.pdf>
- Public Policy Institute of California. (2011, January). *California workforce: Californian faces a skills gap*. ERIC. ED515629. <https://eric.ed.gov/?id=ED515629>
- Quintero, C. (2018). *The role of district administrators in developing career technical education programs to assist students in becoming college- and career-ready* (ProQuest No. 10819762) [Doctoral dissertation]. University of Southern California, ProQuest Dissertations and Theses Global.

- Radovan, M., & Makovec, D. (2015). Relations between students' motivation, and perceptions of the learning environment. *Center for Educational Policy Studies Journal*, 5(2), 115-138. Retrieved from <https://er.lib.k-state.edu/login?url=https://www-proquest-com.er.lib.k-state.edu/scholarly-journals/relations-between-students-motivation-perceptions/docview/1895969409/se-2?accountid=11789>
- Rankin-Gonzalez, L. (2018). *The role of community college: Dual enrollment experiences in college readiness and success* (ProQuest No. 10936648) [Doctoral dissertation]. Capella University, ProQuest Dissertations and Theses Global.
- Research designs: non-experimental vs. experimental. (n.d.). *Statistic Solutions*. <https://www.statisticssolutions.com/research-designs-non-experimental-vs-experimental/#:~:text=Non%2Dexperimental%20research%20is%20usually,any%20interference%20from%20the%20researcher.>
- Rivera, L.E., Kotok, S., & Ashby, N. (2019). Access to dual enrollment in the United States: Implications for equity and stratification. *Texas Education Review*, 7(2), 14-29. <http://dx.doi.org/10.26153/tsw/2282>
- Roberts, C. (2010). *The dissertation journey A practical and comprehensive guide to planning, writing, and defending your dissertation*. Corwin, A Sage Company.
- Robbins, S., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychological and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, 130, 261–288.
- Rothstein, R. (2004). *Class and schools: Using social, economic, and educational reform to close the Black–White achievement gap*. Washington, DC: Economic Policy Institute.
- Scribbr. (2020, June 12). *Correlation research*. <https://www.scribbr.com/methodology/correlational-research/>
- Sewell, T. (2018, November 3). Speaker on current and future workforce needs. Community College Leadership Program class, College of the Desert, Palm Desert, CA.
- Shapiro, D., Dunda, A., Huie, F., Wakhungu, P. K., Yuan, X. Nathan, A., Hwang, Y. (2010) A national view of student attainment rates by race and ethnicity-Fall 2010 cohort. Signature Report No. 12b. *National Student Clearinghouse*. ERIC Number: ED580302
- Shanholtz, S. (2019, July 18). *It's time to think about middle-skilled jobs and education*. University of West Virginia. <http://statchatva.org/2019/07/18/middle-skill-jobs-and-education/>
- Sorensen, T. J. (2019). *High school dual-credit correlations with college matriculation, retention, and success rates*, (ProQuest No. 13420027) [Doctoral dissertation]. Edgewood College. ProQuest Dissertations and Theses Global.

- Speroni, C. (2011). *Determinants of students' success: The role of advanced placement and dual enrollment programs*. New York, NY: National Center for Postsecondary Research.
- Stein, J. L. (2007). Peer educators and close friends as predictors of male college students' willingness to prevent rape. *Journal of College Student Development*, 48(1), 75-89.
- Stevenson, D. L., Schiller, K. S., & Schneider, B. (1994). Sequences of opportunities for learning. *Sociology of Education*, 67(3), 184-198, doi:10.2307/2112790.
- Strayhorn, T. L. (2008). How college students' engagement affects personal and social learning outcomes. *Journal of College and Character*. 10:2., DOI; 10.2202/1940-1639.1071. <https://www.tandfonline.com/doi/abs/10.2202/1940-1639.1071>
- Swanson, J. L. (2008). *Executive summary: An analysis of the impact of high school dual enrollment course participation on post-secondary academic success, persistence and degree completion*. Chapel Hill, NC: National Alliance of Concurrent Enrollment Partnerships.
- Thompson, Brian. (February 21, 2020). *Creating Dual Enrollment Pathway Partnerships*. [Powerpoint slides]. College and Career Access Pathways. College of the Desert.
- Vargas, J., Hooker, S., Collins, M. & Gutierrez, A. (2019). *13 Ideas that are transforming the community college world*. Rowman & Littlefield. ISBN:9781475844900
- Venezia, A., Kirst, M., & Antonio, A. (2003). *Betraying the college dream: How disconnected K-12 and post-secondary education systems undermine student aspirations*. Palo Alto, CA: The Bridge Project, Stanford Institute for Higher Education Research.
- Ventresca, J., & Mohr, J. (2017, August 11). *Archival research methods*. The Blackwell Companion to Organizations. <https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781405164061.ch35>
- Voorhees, R. (March 18, 2020a). Logic model lecture. *Kansas State University*.
- Voorhees, R. (March 30, 2020b). Methods lecture. *Kansas State University*.
- Warner, L., Gates, S. L., Ortega, J. U., & Kiernan, M. (2012, June). *Can California compete? Reducing the skills gap and creating a skilled workforce through linked learning*. America's Edge. <https://edsources.org/wp-content/uploads/old/CA-AE-Skills-Report-2012-update.pdf>
- Western Interstate Commission for Higher Education. (2006). *Accelerated learning options: Moving the needle on access and success*. Boulder, CO: Author.
- What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. (2020, September). *Integrated Basic Education Skills and Training g (I-BEST)*. Retrieved from <https://whatworks.ed.gov>.

- Whinnery, E. & Odekar, V. (2021, April 25). 50-state comparison. *Education Commission of the States*. <https://www.ecs.org/50-state-comparison-developmental-education-policies/>
- W.K. Kellogg Foundation. (2004, January). *Logic model development guide: Using logic models to bring together planning, evaluation, and action*. Retrieved from WKKF. org
- W.K. Kellogg Foundation Website. (n.d.). *W.K. Kellogg Foundation evaluation handbook*. <https://www.bttop.org/sites/default/files/public/W.K.%20Kellogg%20LogicModel.pdf>
- Zinth, J., & Barnett, E. (2018). Rethinking dual enrollment to reach more students. *Education Commission of the States*. ERIC No. ED582909

Appendix A - Survey Email Invitation

Survey Email Invitation

Response Requested by 05/28/2021: Student Success Perspectives Survey

Dear Career & Technical Education (CTE) Student:

Your CTE instructors strive to develop high-level, competitive programs to enhance your careers. As a chef in the culinary program, we are continually increasing opportunities for students to compete with the best.

I am emailing to request your participation in a brief online survey. This survey should take no longer than 5 minutes of your time. This survey will lend important information to a College of the Desert study of the success of its students who were enrolled or not enrolled in secondary dual-credit programs.

Your participation is voluntary and your responses will be confidential. No attempt will be made to identify individuals in reporting survey results, responses, and simply consists of completing this short survey.

Any questions about the research project can be directed to my email at kstruwe@collegeofthedesert.edu.

To complete the quick survey, please click the following link or copy and paste into your browser:

Thank you for participating.

Kurt Struwe

Appendix B - Student Survey

1. Please provide your preferred email address.
2. Please provide your first and last name. (Contact information will not be saved)
3. What year did you graduate from high school?
4. Were you enrolled at COD in fall 2020?
 - Yes
 - No
5. When you were in high school which broad area of college coursework interested you most?
 - General academics (e.g., math, English, history, sociology, etc.)
 - Coursework leading to quickly to work and employment (e.g., autobody, electronics, other vocational courses, etc.)
6. How satisfied are you with your education experience at College of the Desert?
 - Very satisfied
 - Satisfied
 - Neutral
 - Dissatisfied
 - Very dissatisfied
7. Which best describes your current motivation to finish college?
 - Very motivated
 - Somewhat motivated
 - Neutral
 - Not motivated
 - Extremely unmotivated
8. Do you plan to transfer to a four-year institution?
 - Yes
 - No
 - Not sure
9. Did you enroll in Advanced Placement (AP) in high school?

- Yes
 - No
 - Not sure
10. Did you enroll in a dual credit program when you were in high school?
- Yes (if yes, please answer questions 7 through 11)
 - No (if not, thank you for taking part in this survey)
11. Who or what played a role in your decision to enroll in dual credit classes? (check all that apply):
- Counselors or teachers
 - I wanted to learn career skills
 - To save tuition on college classes
 - Some friends or people that I knew
 - A family member
 - I wanted to get a head start in earning college credit
 - Other...
12. How did the college credits earned in high school through the dual enrollment program help you? (Check all that apply.)
- I felt better prepared for college
 - I was able to start skip introductory classes
 - I have fewer credits to complete than students just starting in the same program
 - I was able to save time and money
 - I was able to challenge myself in ways not possible with other high school classes
 - I was able to improve my final high school class standing
 - I was able to “knock out” courses in high school that I would have had to take in college
 - Other...
13. Did the dual enrollment program help you decide on your current career path?
- Yes, the dual enrollment program helped me decide on my current career path
 - No, I knew my career path at the time I enrolled in dual credit courses

- ☐ Uncertain
14. Overall, how satisfied are you with your dual enrollment experience while in high school?
- ☐ Very satisfied
 - ☐ Satisfied
 - ☐ Neutral
 - ☐ Dissatisfied
 - ☐ Very dissatisfied
15. Did your participation in dual enrollment courses prepare you for success in your college courses?
- ☐ Strongly agree
 - ☐ Agree
 - ☐ Neutral
 - ☐ Disagree
 - ☐ Strongly disagree
16. Which adults helped you as you participated in the dual enrollment program? (check all that apply)
- ☐ Friend
 - ☐ High school teacher
 - ☐ Special education teacher
 - ☐ Career & technical education counselor
 - ☐ College teacher
 - ☐ College advisor
 - ☐ Parent/guardian
 - ☐ Other...
17. Do you have any additional comments about your experiences as a dual credit student or as a COD student?

Thank you for completing this survey.

Appendix C - A Logic Model for Implementing Dual Credit Programs

W. K. Kellogg's Foundation Logic Model (2004) makes possible planning, thinking, and communications about program purpose and achievements. Program logic modeling is used as a roadmap to build and implement a dual enrollment program (Appendix C, Table 13).

The model is a roadmap of how the dual enrollment program might work, what activities are necessary, and how desired outcomes are reached. Effective program evaluation allows stakeholders to collect and analyze data, gather information, and continually improve programs. Using the logic model creates better learning opportunities, knowledge of how the program works and why, and improves documentation of outcomes. After assumptions are presented the logic model is developed in an organized and visual way into five categories; planned work is described as *input* and *activities*; intended results are described within *outputs*, *outcomes*, and *impact* (W. K. Kellogg Foundation, 2004).

The program logic model visually presents an understanding of resources available to operate the program, activities planned, and desired results. A sequence of activities is linked to the results in a picture of how the program will work. *Resources* are described in the planned work section referred to as *inputs*. Most important is the support and desire from the VP of Education which ties to funding. Data is necessary for outcomes and important to prove the assumptions that dual enrolled students excel in college work, are more likely to complete with a certificate or degree, achieve higher GPAs, and are better prepared for the workforce (W. K. Kellogg Foundation, 2004).

Program *activities* will use these resources as tools, technology, and processes to implement the program into action. The dual enrollment committee will meet to develop a dual

enrollment handbook for students and faculty. The handbook will be used as a resource to train faculty and staff in the implementation of the dual enrollment program. Faculty and staff will meet with high school administrators, faculty, and staff to develop articulation agreements. The state of California has implemented new guidelines for dual enrollment and early college access. The program will adhere to rules and guidelines and improve opportunities to increase state funding through the dual enrollment program. Input and activities lead to results (W. K. Kellogg Foundation, 2004).

Table 13*Logic Model for Developing a Dual Enrollment Program*

ASSUMPTIONS	INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES	IMPACT
1. Dual enrollment adequately prepares high school students excel in college work, complete credentials, and be better prepared for the workforce. 2. Dual enrolled students excel in college work and complete with credentials. 3. COD will build capacity to wholly implement dual enrollment to high schools. 4. COD will develop and faculty/student handbook to fully explain dual enrollment with the institution.	1. COD IR data including employers and IPEDs data. 2. VP of Education and a Dual Enrollment Committee's commitment. 3. Staff, faculty, and administration's dual enrollment expertise. 4. High school staff, faculty, and administration's support and participation.	1. Faculty and staff training to develop and/or teach classes at selected high schools. 2. Development of parent and student support services. 3. Articulation agreements and recruitment of students. 4. Creation of a faculty/student handbook to simplify the process. 5. Creation of web link on the COD portal connecting high school students and parents to early education.	1. Establishment of dual enrollment classes with high schools. 2. Curriculum reflects competencies and standards established by the state of California. 3. Integration of handbook to COD and high school stakeholders. 4. Front-page web link is easy-to navigate for parents and high school students searching for early education.	1. Students in dual enrollment programs will earn higher GPAs 2. Dual enrolled students will complete credentials at a faster rate. 3. Dual enrolled students will be better prepared for the workforce. 4. Enrollment at COD will increase first-year, first-semester students.	1. Dual enrollment will have a direct impact on workforce development and community college education. 2. Dual enrollment will be a catalyst in cohesive CTE course development in-line with workforce needs.

Impact measures the changes in the institution and/or community, intended or unintended. Impact typically occurs after the conclusion of project funding and within seven to

10 years. The dual enrollment program should be observed within three to four years as students complete and enter the workforce within 2 to 3 years (W. K. Kellogg Foundation, 2004).

Effective program evaluation allows stakeholders to collect and analyze data, gather information, and continually improve programs. Using a clear strategy creates better learning opportunities, knowledge of how the program works and why, and improves documentation of outcomes. After assumptions are presented the vision is developed in an organized and visual way (Kotter, 1996).

Appendix D - Major Choices within the Sample and Population

Spring 2021 data for majors were retrieved from the SIS. This data derived from the SIS at College of the Desert depicts majors chosen by dual-enrolled students and non-dual enrolled students (Appendix D, Table 14).

Table 14

Majors within the Sample and Population

Major	Sample	Percent	Population	Percent
Accounting	2	4.35%	31	2.55%
Administration of Justice	5	10.87%	107	8.81%
Administrative Office Assistant	1	2.17%	12	0.99%
Advanced First Aid and Safety, CPR/AED	0	0.00%	1	0.08%
Agri-Business	0	0.00%	4	0.33%
Alcohol and Drug Studies	0	0.00%	24	1.98%
Architectural Technology	0	0.00%	27	2.22%
Automotive Alternative Fuels	0	0.00%	3	0.25%
Automotive Braking Systems	1	2.17%	25	2.06%
Basic Correctional Officer	0	0.00%	1	0.08%
Basic Fire Fighter	2	4.35%	13	1.07%
Basic Radio Production	0	0.00%	1	0.08%
Biology	1	2.17%	0	0.00%
Building Automation Control	0	0.00%	13	1.07%
Building Inspection Technology	0	0.00%	2	0.16%
Business Administration	10	21.74%	160	13.18%
Child and Adolescent Development	0	0.00%	12	0.99%

Digital Design & Production	0	0.00%	21	1.73%
Early Childhood Education	0	0.00%	79	6.51%
Early Childhood Education Site Supervisor	0	0.00%	4	0.33%
Elementary Teacher Education	0	0.00%	24	1.98%
Emergency Medical Services	0	0.00%	25	2.06%
Environmental Horticulture	0	0.00%	8	0.66%
Environmental Sciences	0	0.00%	4	0.33%
Film Production	0	0.00%	12	0.99%
Film, Television, and Electronic Media	1	2.17%	17	1.40%
Fire Technology	0	0.00%	14	1.15%
Fitness Specialist	0	0.00%	7	0.58%
General Agriculture	1	2.17%	13	1.07%
General Business	0	0.00%	44	3.62%
General Drafting	0	0.00%	3	0.25%
Golf Management	1	2.17%	3	0.25%
Health Science	12	26.09%	290	23.89%
Hospitality Management	0	0.00%	11	0.91%
Human Resource Generalist	0	0.00%	3	0.25%
Intermediate Culinary Arts	6	13.04%	29	2.39%
Journalism	0	0.00%	6	0.49%
Liberal Arts: Business and Technology	0	0.00%	7	0.58%
Mass Communication	0	0.00%	1	0.08%
Natural Resources	0	0.00%	14	1.15%
Nutrition and Dietetics	1	2.17%	12	0.99%
Power Generation and Distribution	0	0.00%	6	0.49%
Public Health Science	0	0.00%	9	0.74%
Real Estate Development	0	0.00%	13	1.07%
Registered Nursing	1	2.17%	34	2.80%
Reserve Police Officer	0	0.00%	15	1.24%
Retail Management	0	0.00%	1	0.08%
Sports Medicine	0	0.00%	17	1.40%
Turfgrass Management Technician	0	0.00%	3	0.25%
Vocational Nursing	1	2.17%	8	0.66%
Welding Technology SENSE Entry-Level Welder	0	0.00%	1	0.08%
Undeclared	0	0.00%	20	1.65%
Total Majors	46	100.0 %	1214	100.00%