

A comparison of the enrollment and academic success of dual credit and non-dual credit students at Des Moines Area Community College

by

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LIST OF ACRONYMS

Iowa's Fifteen Area Community Colleges

NICC-01	Northeast Iowa Community College
NIACC-02	North Iowa Area Community College
ILCC-03	Iowa Lakes Community College
NCC-04	Northwest Community College
ICCC-05	Iowa Central Community College
IVCCD-06	Iowa Valley Community College District
HCC-07	Hawkeye Community College
EICCD-09	Eastern Iowa Community College District
KCC-10	Kirkwood Community College
DMACC-11	Des Moines Area Community College
WITCC-12	Western Iowa Technical Community College
IWCC-13	Iowa Western Community College
SWCC-14	Southwestern Community College
IHCC-15	Indian Hills Community College
SCC-16	Southeastern Community College

ABSTRACT

The role of the community college is multi-faceted and provides expanded access and opportunities to numerous students at all levels. Post-secondary institutions, primarily community colleges throughout the United States, have recently expanded their partnerships with secondary schools to create opportunities which provide students to be enrolled in college course while still enrolled in high school. These high school students are enrolling in higher education at record rates as they participate in these expanding partnerships. These “seamless” educational opportunities are designed specifically for students at the high school level and are known nationally as “dual credit,” “concurrent enrollment,” and “joint enrollment,” (Kleiner & Lewis, 2005). These programs are created to provide high school students wider access to more rigorous academic and technical courses, savings in time and college costs, more efficiency in learning, and enhanced college admission and retention. Providing effective transitioning strategies and programming opportunities like these to students who seek to continue their educational pursuits after high school is of great importance for high schools, two-year institutions and four-year institutions of higher learning.

The objective of the study was to determine if dual credit students at Des Moines Area Community College had similar demographics, within-term course retention, and academic success as non-dual credit students. It also set out to determine the impact of independent variables upon success for both groups of students. The Wilcoxon nonparametric test, Chi-square test and logistic regression were used to compare the students

from DMACC's dual credit population with DMACC's non-dual credit students entering right out of high school as first-time, full-time students.

Among the findings were: (a) the majority of both groups of dual and non-dual credit students were 18 year old, white males, who were not eligible for pell grants; (b) there were no significant differences in within-term course retention of dual credit students and non-dual credit students when examined by gender, race/ethnicity, or Pell eligibility; (c) there was a significant difference in the success of the dual credit students when compared to the success of the non-dual credit students; (d) there was no significant difference in the success of the dual credit students compared to the non-dual credit students specifically examined by gender, and Pell eligibility; (e) dual credit students had significantly different ACT math scores and 1st semester GPAs when compared to the non-dual credit students; (f) there were five significant variables which had significant impact individually and collectively upon the success of both groups of students. These in order of largest impact are as follows: dual credit English, 1st semester GPA, taking DMACC math, taking DMACC English, and ACT English scores.

The study should be replicated on a statewide basis at the community college level and four year college level, both public and private because of the number of dual credit students transitioning to college. Although there was some information about the enrollment of dual credit students in the state of Iowa previous to the study, there was no formal analysis of the student transition success to college. A qualitative study would also be very beneficial to learn more from the students in order to fully understand the benefits and ways to improve dual credit programming.

CHAPTER 1. INTRODUCTION

Today's comprehensive community colleges in the United States provide numerous educational opportunities for individuals while being responsive to multiple demands by the communities that they serve. In 2008 there were 1,195 community colleges which were classified as public, independent, or tribal, with an enrollment of 6.5 million credit students and 5 million non-credit students (AACC, 2008). This represented 46% of all undergraduate students enrolled in 2008 (National Center Educational Statistics, 2008). These students came to the community colleges to pursue numerous educational objectives including academic transfer degrees, career and technical degrees, continuing education offerings, and remedial offerings (Cohen & Brawer, 2008). Many students come to community colleges with an array of previous educational experiences and backgrounds which can have a tremendous impact upon their pursuits and degree aspirations.

Community college students potentially have more characteristics which can inhibit success when compared to those at the four-year institutions (Nora, 2000). Students often have lower high school class rank, lower test scores, gaps in their educational pathways, numerous social characteristics, and financial situations which can be barriers for their success (Cohen & Brawer, 2008). A student's likelihood of being successful at the community college is dependent on high school curricular offerings, previous academic experience, and personal characteristics (Adelman, 2006). These personal, financial, social, and academic challenges can have a tendency to impede students' progress toward their educational goals (Pascarella & Terenzini, 2005). Students' behaviors exhibited during college, coupled with background characteristics, create a significant need for attention and study.

The open-access, comprehensive mission of transfer, vocational, continuing education, and community service have come to be core foci of the comprehensive curriculum according to Bragg (2001) and these foci continue to increase and evolve as community colleges expand their missions. Increasingly, community college leaders are faced with the challenging reality of developing this community responsive institution which seeks to provide expanded opportunities for a wide variety of students. Community colleges throughout the United States have recently partnered with secondary institutions in creating “seamless” educational opportunities specifically for students at the high school level who also enrolled in college courses and programs. These high school students are enrolling in higher education at record rates as they participate in these expanding partnerships.

Students can enroll in a number of formalized advanced courses and programs during their high school years in partnerships with postsecondary institutions. Traditional methods of students receiving college credit at the high school level are programs such as the Advanced Placement (AP) program, College Level Examination Program (CLEP) program, and actual attendance at the post-secondary institution (Kim et al., 2004; Karp et al., 2004). These traditional programs have enabled students to receive college credits and often require them to successfully test at a certain level on a standardized test before credit is awarded. A relatively recent national trend for high school students to enroll in college credit programs is dual enrollment or joint enrollment programming which provides college credit opportunities for students while they are still enrolled in high school (Robertson et al., 2001). As these partnerships have increased, there is a growing concern to examine pre-college experiences which might be attributable to degree completion and postsecondary success for these students (Cohen & Brawer, 2008).

Background

Providing effective transitioning strategies and programming opportunities like these to students who seek to continue their educational pursuits after high school is of great importance for high schools, two-year institutions and four-year institutions of higher learning. The senior year of high school has been referred to as a “waste of time” because of the lack of rigor, relevance, and connectivity to the next level of successful career paths for students (Kirst, 2001). Nationwide, the senior year has been targeted to ensure that students are successful and adequately prepared as they transition to postsecondary education.

Educational leaders have been supporting a “seamless” educational model to close gaps which exist between secondary and postsecondary and improve transitioning for students (Bailey & Karp, 2003). A seamless approach provides many opportunities for staff from both institutions to work together to ensure student preparedness. Instructional rigor and relevance are analyzed by examining curriculum at both institutions to ensure students received the academic preparation necessary to succeed as they transition.

National educational reform movements, especially high school reform movements, have been advocating this improved connectivity between secondary and postsecondary institutions for years. A National Commission on Excellence in Education (1983) report entitled *A Nation at Risk*, (1983) clearly initiated this criticism when it warned that the academic achievement of our high school students lagged behind their counterparts in developed nations. This report set the stage for higher expectations and accountability from state governors, legislators, and other policymakers to be commonplace for all students. It began a process in America in which accountability was more closely tied to programs offered in America’s high schools.

In an attempt to ensure this accountability in all states, the federal government most recently passed the No Child Left Behind Act of 2001 (NCLB) into legislation. This act requires states to be more accountable for educational gains and improvement of all students according to federal guidelines. The original No Child Left Behind Act mandates that all students be proficient in reading and math by 2014. Consequently, most of the emphasis of the school systems since NCLB has been directed toward students who do not meet the proficiencies established at the grade levels. High achieving students who can pass the standardized test requirements are often overlooked as schools focus on raising the scores of those students in the middle of the curve (Ramirez, 2007). In addition, most of the accountability and funding emphasis has been placed upon the formidable elementary years and little emphasis has been placed upon the high school years. Consequently, there has been little evidence that high schools have improved and in fact, have fallen short in at least three key areas:

- High dropout rates-The National Center for Educational Statistics (2007) reported that the rate of public high school students who graduate with a regular diploma four years after starting 9th grade (average freshman graduation rate) was 75%.
- Low academic expectations-The National Commission on the High School Senior Year (2001) reported that only 43% of high school seniors thought themselves to be in demanding academic programs and only 12% in technical education programs felt they were in demanding programs. Just 44% had completed the minimum academic number of credits recommended by the report, “A Nation at Risk”, (National Commission on Excellence in Education, 1983).

- Low transition rates from secondary to postsecondary- The transition rate of students who enter postsecondary educational institutions immediately following high school has been at 64% since 1998 according to The National Center for Educational Statistics (2005). This rate indicates that a high percentage of students are not receiving additional education beyond their high school experience at a time when it is very necessary to develop advanced skills in an increasingly complex work environment.

Dual Credit-A National Trend

Dual credit, also known as “dual enrollment,” “concurrent enrollment,” and “joint enrollment,” alludes to the enrollment of high school students in college courses and subsequently earning college credits (Kleiner & Lewis, 2005). Students receive credit at both the secondary and post-secondary level as they complete courses which are set up between content specialists at both institutions, therefore the term “dual credit” or “dual enrollment”. This programming provides high school students the following benefits: wider access to more rigorous academic and technical courses; savings in time and college costs; promotion of more efficiency in learning; and enhancement of college admission and success in college (Kleiner & Lewis, 2005). Dual credit partnerships are providing educational institutions a means to reinvigorate their students during the end of their secondary school experience by creating more effective and successful transitioning to the next level (Andrews, 2001).

By providing a more seamless pathway for high school students to move between the high schools and community colleges, dual enrollment is thought to promote greater collaboration between these institutions (Bailey & Karp, 2003). In this national trend to

prepare students more successfully for college, 40 states have enacted dual enrollment policies which support the development of these programs (Hughes, Karp, Fermin, & Bailey, 2004). This is an attempt to insure quality and provide resources to make these partnerships effective and successful. According to the U.S. Department of Education (2004), 11,700 (71.3%) of the U.S. high schools offered and allowed high school students to take dual credit college courses in 2003. In the same year, 11,000 (66.7%) of U.S. high schools offered AP (Advanced Placement) courses for their students and 390 (2.4%) offered IB (International Baccalaureate) programming (NCES, 2004).

Many states have well documented studies to examine the growth patterns in the dual credit movement and have passed legislation to provide parameters for this recent programming trend. Florida has grown from 3,609 students in 1992 to 32,196 students in 2007 (Florida Community College System, 2007). This was 10% of all 11th and 12th graders in Florida's high schools participating in the programming. Virginia has grown from 11,186 students in 2000 to 29,963 un-duplicated students in 2008 (Virginia Community Colleges, 2009). Illinois is another state which has experienced tremendous growth in their dual credit community college programming and they have grown from just under 25,000 students enrolled in 2002 to over 58,000 students enrolled in programming in 2007 (Illinois Community College Board, 2008). Minnesota has also experienced substantial growth in their dual credit programming which has increased from 3,528 students in 1986 to 17,812 students in 2004 (Minnesota State Colleges and Universities, 2005).

Dual enrollment is one of several strategies and program initiatives which have emerged recently to address the transition success of students in the multitude of programs offered in higher education. Student participation in these partnerships can lead to many

positive outcomes as identified by Hughes, Karp, Fermin, & Bailey, (2004). These benefits include the following:

- Increased and enriched academic rigor of the high school curriculum. This is particularly applicable for students who finish their high school requirements before the completion of their senior year.
- Help for low-achieving students to meet high academic standards and therefore reduction of the need for remediation in postsecondary institutions.
- More academic opportunities and electives in resource-strapped, small, or rural schools.
- Reduction of high school dropout rates and increased student educational aspirations particularly for students who do not have educational role models.
- Help for students to acclimate to college by exposing them to the reality of the postsecondary experience.
- Reduction of college costs by enabling students to earn college credit while in high school and often shorten their time to degree.

Although evidence of these outcomes was sparse, (Hughes, Karp, Fermin, & Bailey, 2004), dual enrollment has been very attractive to educators and policymakers because it seeks to increase the rigor of secondary education and to improve connectivity between secondary and postsecondary institutions. These two common trends in education attempt to improve the success of students as they transition from secondary to postsecondary and therefore the success of students as they pursue degree completion at the postsecondary institutions.

Enrollment Growth in Iowa's Community Colleges

Iowa has embraced joint enrollment with their secondary and postsecondary institutions. Legislated incentives have been created in Iowa which involve creating joint enrollment opportunities for students between the secondary schools and Iowa's 15 community colleges whose boundaries determine which school districts they are to partner with. Similar boundaries exist for Iowa's Area Education Agencies which coincide with the community colleges. The Area Education Agencies are the regional agencies set up in Iowa to provide support services and connectivity to the secondary schools within their jurisdiction. These agencies provide connectivity between the K-12s and the Iowa Department of Education and also some with the community college districts in Iowa.

The Department of Education in Iowa most recently categorized this programming as "concurrent enrollment" in new "Senior Year Plus" legislation (Iowa Department of Education, Condition of Community Colleges Annual Report, 2009). The following sections examine general enrollment trends and joint enrollment trends in Iowa's community colleges and K-12 institutions, specifically focusing on Des Moines Area Community College District (DMAACC). DMAACC serves the largest population (754,260) of any Iowa community college.

Iowa community college student enrollment has been on a steady rise over the past years in the credit issuance category as depicted in Table 1.1. This has meant an increase from 95,556 credit unduplicated enrollment in Iowa in 1999 to 128,146 credit unduplicated enrollment in fiscal year 2008, (Department of Education, Condition of Iowa Community Colleges, 2008). This period of time was at the heart of dual credit program development within the state. This was a 34% increase in credit enrollment during this period of time as is

illustrated below. Non-credit student enrollment has decreased 18% during this same period of time (Table 1.1).

Table 1.1 Iowa community college student enrollment (2000-2008)

Fiscal year	Credit unduplicated	Non-Credit duplicated	Non-Credit unduplicated	Combined unduplicated
1999-2000	95,556	670,899	354,587	450,143
2000-2001	98,602	684,853	347,578	446,180
2001-2002	105,719	672,910	331,948	437,667
2002-2003	111,745	653,974	326,334	438,079
2003-2004	116,439	575,637	302,994	419,433
2004-2005	120,217	557,944	294,668	414,885
2005-2006	121,753	544,627	287,073	408,826
2006-2007	125,990	535,050	278,736	404,726
2007-2008	128,146	555,032	289,098	417,244

Source: Iowa Department of Education MIS Reports, 2000-2008 Fiscal Year-End Reports.

Table 1.2 illustrates the credit enrollment and credit growth from 2002-2008. Significant credit increases have been the trend at Iowa's community colleges since 2002 while enrollment has also increased rapidly during this time (Table 1.2). This enrollment increase has resulted in a slight decrease in the number of credits received by each student enrolled. Credit issuance from 2002-2008 increased by 303,306 credits for an increase of 19%. During this same period of time the community colleges increased their credit enrollment by 22,427 students or 21% according to Table 1.2. This percentage increase in enrollment has outpaced the increase in credits issued during this time.

Student ethnicity has remained fairly consistent in Iowa's community colleges over the last four years. Table 1.3 represents the community college student ethnicity from 2005-2008. Increases have occurred in every category except for American Indian which ranged in

Table 1.2 Iowa community college credit issuance (2002-2008)

Fiscal year	Community College Credits Issued	Community College Credit Enrollment	Credits Per Student
2002	1,555,609	105,719	14.7
2003	1,660,542	111,745	14.9
2004	1,737,909	116,439	14.9
2005	1,782,187	120,217	14.8
2006	1,781,027	121,753	14.6
2007	1,831,161	125,990	14.5
2008	1,858,915	128,146	14.5

Source: Iowa Department of Education, Bureau of Community Colleges and Career and Technical Education, 2008.

total percentage from 0.6 % to 0.7% of the total enrollment. American Indian enrollment decreased a total of 75 students while all other groups increased. In 2008, 10.9% of the students were minority compared with 89.1% white. This was an increase of 2.0% and translated into 2,363 students, however, the community college enrollment consisted of predominantly white students.

Table 1.3 Iowa community college enrollment by race/ethnicity (2005-2008)

Race/Ethnicity	2005		2006		2007		2008	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Minority	10,678	8.9	11,223	10.0	12,337	10.5	13,043	10.9
Black	4,583	3.8	4,874	4.3	5,321	4.5	5,704	4.8
American Indian	824	0.7	751	0.7	755	0.6	749	0.6
Asian	2,227	1.8	2,290	2.1	2,461	2.1	2,616	2.2
Hispanic	3,044	2.6	3,308	2.9	3,800	3.3	3,974	3.3
White	99,675	91.1	101,256	90.0	104,615	89.5	106,342	89.1
Total Reporting	110,353	100.0	112,479	100.0	116,952	100.0	119,385	100.0
No Response	9,864		9,274		9,038		8,761	
Total	120,217		121,753		125,990		128,146	

Source: Iowa Department of Education, 2008 Fiscal Year-End Reports

Student gender percentages have remained consistent over the last six years in Iowa's community colleges (Table 1.4). Males accounted for 42% to 43% and females accounted for 57% to 58% of the students enrolled throughout the state. These percentages are consistent with the national gender percentages enrolled in community colleges.

Table 1.4 Iowa community college enrollment by gender (2002-2008)

Fiscal year	Male	Percentage	Female	Percentage
2002	45,010	43%	60,594	57%
2003	47,213	42%	64,377	58%
2004	49,160	42%	67,201	58%
2005	50,762	42%	69,360	58%
2006	51,771	43%	69,748	57%
2007	54,189	43%	71,553	57%
2008	55,006	43%	72,965	57%

Source: Iowa Department of Education MIS Reports, 2008 Fiscal Year-End Report

Table 1.5 Iowa community college enrollment by district (2002-2008)

College	2002	2003	2004	2005	2006	2007	2008
NICC	5,603	6,412	6,816	6,951	7,033	6,739	6,827
NIACC	3,991	3,930	4,073	4,267	4,366	4,475	4,718
ILCC	4,404	4,381	4,428	4,516	4,558	4,581	4,402
NCC	1,585	1,575	1,699	1,661	1,766	2,004	2,116
ICCC	6,183	6,431	6,528	6,932	6,919	7,456	7,916
IVCCD	3,310	3,398	3,507	4,068	3,869	4,023	3,977
HCC	6,536	7,371	7,821	7,750	7,837	8,376	8,374
EICCD	9,990	10,513	10,721	11,223	11,355	11,114	11,278
KCC	18,580	19,946	20,846	21,468	20,418	21,674	21,461
DMACC	20,736	21,913	23,465	24,780	26,801	28,054	29,573
WITCC	7,113	7,565	7,979	8,026	7,802	7,665	7,570
IWCC	5,817	5,624	6,032	6,243	6,610	6,888	6,855
SWCC	1,719	1,810	1,800	1,727	1,810	1,868	1,992
IHCC	6,053	6,601	6,255	6,132	6,068	6,464	6,544
SCC	4,099	4,275	4,469	4,473	4,541	4,609	4,543
Total	105,719	111,745	116,439	120,217	121,753	125,990	128,146

Source: Iowa Department of Education, Bureau of Community Colleges, Community College MIS.

Iowa's community college system consists of 15 colleges which vary considerably in enrollment within the state. DMACC was the community college with the highest enrollment at 29,573 students enrolled in 2008 and Southwest Community College was the smallest in enrollment with 1,992 students in 2008 (Table 1.5). Total enrollment has increased from 105,719 in 2002 to 128,146 credit students enrolled in 2008. This amounted to a 21% increase of 22,427 students. In 2008, DMACC's enrollment accounted for 23% of the total student enrollment of all community colleges in the state.

Joint Enrollment Growth in Iowa's Community Colleges

Joint enrollment is the term utilized by the Department of Education in Iowa to refer to the partnerships which are existent in Iowa. Joint enrollment of high school students consists of the following three types of programs: PSEO, contracted courses, and individual student tuition paying programs. High school enrollment in Iowa's community colleges from these three categories has grown from 15,633 students in 2002 to 31,450 students in 2008 (Table 1.6). This was a 101% growth rate and an increase of 15,817 high school students enrolled in Iowa's community colleges over this period of time (Department of Education, Condition of Iowa Community Colleges, 2008). Total community college enrollment growth from 2002-2008 was 22,355 students and of this enrollment growth 15,817 (70.75%), was attributable to joint enrollment high school students. These students accounted for 14.79% of the total enrollment of Iowa's community colleges during 2002 and 24.54% in 2008.

Table 1.6 Iowa community college joint enrollment (2002-2008)

Fiscal year	High school students unduplicated	Total Credit students unduplicated	Percentage of total unduplicated	Percentage increase unduplicated
2002	15,633	105,719	14.79%	-
2003	17,833	111,745	15.96%	14.07%
2004	21,050	116,439	18.08%	18.04%
2005	22,905	120,217	19.05%	8.81%
2006	25,578	121,753	21.01%	11.67%
2007	30,099	125,990	23.89%	17.68%
2008	31,450	128,146	24.54%	4.49%

Source: Iowa Department of Education MIS Reports, 2008 Fiscal Year-End Report

As the number of high school students attending the community colleges has increased, there has also been an increase in the number of credits that these students received (Table 1.7). Credits received by high school students in 2008 increased 127,385 credits or 118% over 2002 (Table 1.7). The percentage of the total credits issued to high school students as a percentage of total credits has increased from 6.93% in 2002 to 12.65% in 2008 (Department of Education, Condition of Iowa Community Colleges, 2008). As shown in Table 1.6, there was a 101% increase in the number of high school students enrolled from 2002 to 2008 and there was an increase of 118% of credits issued during the same period of time.

Table 1.7 Iowa community college credits earned by high school students (2002-2008)

Fiscal year	High school student credits issued	Community College credits issued	Percentage of total issued
2002	107,767	1,555,609	6.93%
2003	122,754	1,660,542	7.39%
2004	145,281	1,737,909	8.36%
2005	163,051	1,782,187	9.15%
2006	189,312	1,781,027	10.63%
2007	224,984	1,831,161	12.28%
2008	235,152	1,858,915	12.65%

Source: Iowa Department of Education, Bureau of Community Colleges and Career and Technical Education, 2008.

Student ethnicity for joint enrolled students is illustrated in Table 1.8 below. As the programming has grown there has been an increase in the number of minority students served. However, the total percentage of minorities served (8.01%) was lower than the total percentage of minorities served (10.9%) by Iowa's community colleges (Tables 1.3 & 1.8).

Table 1.8 Iowa community college joint enrollment by ethnicity (2005-2008)

Race/Ethnicity	2005		2006		2007		2008	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Minority	650	4.15	1,051	5.86	2,074	7.72	2,256	8.01
Black	141	0.90	231	1.29	512	1.91	540	1.7
American Indian	61	0.39	71	0.40	106	0.39	128	0.4
Asian	219	1.4	329	1.84	496	1.85	586	1.9
Hispanic	229	1.46	420	2.34	960	3.57	1,002	3.2
White	15,020	95.85	16,872	94.14	24,797	92.28	25,929	91.99
Total Reporting	15,670	100.0	17,923	100.0	26,871	100.0	28,185	100.0
No Response	2,163		3,127		3,228		3,265	
Total	17,833		21,050		30,099		31,450	

Source: Iowa Department of Education, 2008 Fiscal Year-End Reports

The percentage of blacks served by joint enrollment programming indicates the biggest difference between the two groups. Blacks served (4.8%) in the total student enrollment was a much higher rate than those served (1.7 %) in the joint enrollment programs (Tables 1.3 & 1.8).

Student gender for joint enrollment has also been somewhat different than that of the general community college student enrollment. While the percentage of male enrollment for joint enrollment has ranged from 47-49%, male enrollment for the general community college population has been lower and remained consistently at 42-43%. Female enrollment for joint enrollment has been ranged from 51-53% while the total community college enrollment has remained steady at 57-58%. The gender of jointly enrolled high school students is illustrated in Table 1.9.

Table 1.9 Iowa Community College joint enrollment by gender (2002-2008)

Fiscal year	Male	Percentage	Female	Percentage	Not Reporting
2002	7,443	48%	8,176	52%	14
2003	8,783	49%	9,048	51%	2
2004	10,239	49%	10,811	51%	0
2005	11,135	49%	11,766	51%	4
2006	12,337	48%	13,201	52%	40
2007	14,305	48%	15,707	52%	84
2008	14,781	47%	16,669	53%	51

Source: Iowa Department of Education MIS Reports, 2008 Fiscal Year-End Report

Joint enrollment, broken out by the 15 community college districts in the state of Iowa, is illustrated in Table 1.10 from 2004-2008. All of the community college districts grew substantially over this period of time with the exception of Western Iowa Tech Community College which decreased 6.3% of their total enrollment. DMACC had the

highest number of joint enrolled students in the state with 9,249 joint enrolled students who were enrolled in either Postsecondary Enrollment Options (PSEO) courses, college courses offered through a contract between the local school district and the college, or enrollment in college independently as a tuition paying student.

Table 1.10 Iowa high school joint enrollment, percentage of total enrollment, and percentage enrollment change by community college (2004-2008)

College	2004		2005		2006		2007		2008		% Change '04-'08
	N	%	N	%	N	%	N	%	N	%	
NICC	1,791	26.3%	1,905	27.4%	2,230	31.7%	2,277	37.5%	2,409	35.3%	9.0%
NIACC	721	17.7%	945	22.1%	944	21.6%	1,059	23.8%	1,262	26.7%	9.0%
ILCC	1,226	27.7%	1,215	26.9%	1,279	28.1%	970	21.2%	1,582	35.9%	8.2%
NCC	445	26.2%	459	27.6%	574	32.5%	671	36.1%	608	28.7%	2.5%
ICCC	2,314	35.4%	2,606	37.6%	2,707	39.1%	2,928	44.1%	3,026	38.2%	2.8%
IVCCD	671	19.1%	750	18.4%	782	20.2%	1,035	27.4%	1,033	26.0%	5.9%
HCC	836	10.7%	802	10.3%	1,019	13.0%	1,436	18.7%	1,598	19.1%	8.4%
EICCD	964	9.0%	1,434	12.8%	810	7.1%	2,372	23.9%	2,081	18.5%	9.5%
KCC	1,701	8.2%	1,601	7.5%	1,766	8.6%	2,275	11.5%	2,527	11.8%	3.6%
DMACC	5,007	21.3%	6,071	24.5%	7,736	28.9%	8,646	32.7%	9,249	31.3%	10.0%
WITCC	2,486	31.2%	2,025	25.2%	2,135	27.4%	2,350	30.7%	1,882	24.9%	-6.3%
IWCC	1,278	21.2%	1,416	22.7%	1,598	24.2%	1,925	29.2%	1,733	25.3%	4.1%
SWCC	430	23.9%	448	25.9%	493	27.2%	528	34.6%	632	31.7%	7.8%
IHCC	623	10.0%	616	10.0%	691	11.4%	884	14.9%	1,061	16.2%	6.2%
SCC	557	12.5%	612	13.7%	814	17.9%	743	16.2%	767	16.9%	4.4%
Total	21,050	18.1%	22,905	19.1%	25,578	21.0%	30,099	25.6%	31,450	24.5%	6.4%

Source: Iowa Department of Education, Bureau of Community Colleges, Community College MIS.

Joint enrollment has increased from 2004 to 2008 by a total of 6.4% (Table 1.10). In 2008 this enrollment accounted for 24.5% of the total enrollment in Iowa's 15 community colleges compared to 18.1% in 2004. As reflected in Table 1.10, DMACC has consistently had a higher percentage of their total enrollment (31.3% in 2008) consist of high school joint enrollment students than the state average (24.5% in 2008).

Enrollment increases of unduplicated students attending the community colleges has resulted in a corresponding increase in the number of credits that high school students received as indicated in Table 1.7 and Table 1.11. The percentages of the total credits issued increased from 8.4% in 2004 to 12.6% of total community college credits issued in 2008 (Department of Education, Condition of Iowa Community Colleges, 2008). This was a steady increase in percentage of total community colleges credits issued connected primarily to high school partnership programs. During this period of time the number of credits

Table 1.11 Iowa high school joint enrollment credit hours by college, percentage of total credits, and percent change in joint credits by community college (2004-2008)

College	2004		2005		2006		2007		2008		% Change 04-08
	N	%	N	%	N	%	N	%	N	%	
NICC	12,335	12.1%	12,665	12.1%	15,173	15.8%	15,906	17.3%	18,414	18.9%	6.8%
NIACC	5,883	8.8%	6,754	10.0%	7,551	11.4%	7,984	12.1%	9,194	13.5%	4.7%
ILCC	8,366	12.3%	7,985	11.2%	8,853	12.6%	8,687	12.1%	12,970	18.7%	6.4%
NCC	3,219	12.6%	3,191	12.9%	4,797	18.0%	5,498	19.3%	5,141	17.3%	4.7%
ICCC	16,538	16.8%	20,796	20.3%	23,221	22.4%	24,078	22.2%	26,291	22.4%	5.6%
IVCCD	5,438	8.9%	6,161	9.2%	6,252	10.1%	8,164	13.1%	7,854	12.7%	3.8%
HCC	4,981	4.0%	4,982	4.1%	6,247	5.2%	8,168	6.4%	9,958	7.9%	3.9%
EICCD	5,915	3.9%	8,599	5.6%	4,438	2.8%	18,230	12.2%	11,757	7.9%	4.0%
KCC	10,643	3.2%	10,339	3.0%	13,422	4.0%	15,660	4.5%	14,276	4.2%	1.0%
DMACC	34,189	11.5%	43,322	14.0%	55,235	17.0%	63,349	18.4%	73,072	19.7%	8.2%
WITCC	17,282	16.8%	13,261	12.5%	14,386	14.0%	16,240	16.0%	12,766	12.8%	-4.0%
IWCC	10,669	11.1%	13,164	12.7%	15,052	13.7%	18,330	16.0%	15,647	13.7%	2.6%
SWCC	1,909	6.2%	4,057	13.8%	4,735	16.0%	4,788	14.8%	5,244	16.3%	10.1%
IHCC	4,690	4.5%	4,079	4.0%	4,514	4.5%	5,568	5.2%	7,727	7.0%	2.5%
SCC	3,225	4.2%	3,700	4.9%	5,440	7.2%	4,337	5.9%	4,843	6.5%	2.3%
Total	145,281	8.4%	163,052	9.1%	189,313	10.6%	224,985	12.3%	235,985	12.6%	4.2%

Source: Iowa Department of Education, Bureau of Community Colleges, Community College MIS.

received by high school students increased at every college (Table 1.11) except for SWCC.

This college has seen a decrease in the number of joint credit issued and a corresponding decrease in the percent change from 2004-2008 of total credits issued by the college.

Table 1.12 Iowa community college credits earned by high school students (2002-2008)

Fiscal year	Dual Credit credits issued	High School students enrolled	Average annual number of credits/student
2002	107,767	15,633	6.89
2003	122,754	17,833	6.88
2004	145,281	21,050	6.90
2005	163,051	22,905	7.12
2006	189,312	25,578	7.40
2007	224,984	30,099	7.47
2008	235,152	31,450	7.48

Source: Iowa Department of Education, Bureau of Community Colleges and Career and Technical Education, 2008.

The average number of community college credits received by high school students has also been on the increase statewide. As shown in Table 1.12, the average number of credits received in an academic year rose from 6.89 credits in 2002 to 7.48 in 2008, (Department of Education, Iowa Community Colleges High School Enrollment Report, 2008). This was the average number of community college credits received by high school students within joint enrollment programs. Even though this appears to be a substantial increase it only equates into one college course per semester during their senior and sometimes junior years of high school.

K-12 Enrollment in Iowa

The population of secondary students in Iowa has slowly declined over this same period of time when community college enrollments have been on the rise. This is attributable to many factors, one of which is the loss of rural communities which were once thriving and growing and the loss of jobs in these communities. The result has been a reduction in the population and fewer students attending Iowa's secondary schools. Table

1.13 shows the gradual enrollment decline in Iowa's secondary schools from 2004-2008.

There has been a decrease of 7,507 students during this time in the secondary schools in Iowa for a 1.4% decrease in enrollment.

Table 1.13 Iowa's public and non-public school K-12 enrollments (2004-2008)

Fiscal year	Public Students	Non-Public Students	Total Enrollment
2004	485,001	37,243	522,254
2005	483,335	36,161	519,496
2006	483,105	35,250	518,355
2007	482,584	34,278	516,862
2008	480,609	34,138	514,747

Source: Iowa Department of Education, Condition of Education Report, 2008.

Public school students are regionalized within Iowa according to the same boundaries established and utilized for the state's community college districts. These boundaries establish high school and community college partnerships in joint enrollment ventures. Table 1.14 shows the breakout of secondary students within the boundaries of the community college districts. This displays the high school enrollments in the state of Iowa designated according to the Area Education Agency (AEA) within the state (Department of Education, Iowa Annual Condition of Education, 2008).

Overall the high school enrollments have increased slightly in DMACC's service area (AEA 11) from 2005 to 2008. It is important to note that 25.5% of Iowa's high school enrollment was within DMACC's service area (AEA 11) as shown in Table 1.14. This area has also had increases in secondary enrollment and an increased percentage of total students since 2005 unlike many of the districts which have experienced a decline.

Table 1.14 Enrollment in Iowa's Area Education Agencies (2005-2008)

AEA	2004-2005		2005-2006		2006-2007		2007-2008	
	N	%	N	%	N	%	N	%
1	31,601	6.5	31,446	6.5	31,340	6.5	30,896	6.4
267	65,815	13.6	65,310	13.5	64,925	13.5	64,262	13.4
4	10,113	2.1	10,026	2.1	*	*	*	*
8	33,144	6.9	32,692	6.8	32,180	6.7	31,548	6.6
9	49,151	10.2	49,100	10.2	48,901	10.1	48,420	10.1
10	64,589	13.4	64,963	13.4	65,752	13.6	66,135	13.8
11	118,351	24.5	119,823	24.8	121,068	25.1	122,451	25.5
12	29,774	6.2	29,407	6.1	39,100	8.1	38,617	8.0
13	30,671	6.3	30,563	6.3	30,243	6.3	29,887	6.2
14	10,695	2.2	10,535	2.2	10,371	2.1	10,120	2.1
15	22,385	4.6	22,157	4.6	21,833	4.5	38,093	7.9
16	17,049	3.5	17,083	3.5	16,871	3.5	*	*
State	483,335	100.0	483,105	100.0	482,584	100.0	480,609	100.0

Source: Iowa Department of Education MIS Reports, 2005-2008 Fiscal Year-End Reports

*These AEAs combined with others during these years.

The makeup of the public school population has seen a slight decrease in the white population and a general increase in the minority population. All minority categories showed increases and the white population decreased 9.2% from 1998 to 2008 (Table 1.15). Table 1.15 shows the 2008 population of the secondary schools to be 85% white and 15% minority. 2008 jointly enrolled students consisted of 92% white students and only 8% minority (Table 1.8). Representation of minority students in jointly enrolled programs was 6.79% lower than the percentage (14.8) in the total secondary student population of 2008.

Table 1.15 Iowa public school enrollment by ethnicity (1998, 2007, 2008)

Race/Ethnicity	1997-1998		2006-2007		2007-2008		Percent Change	
	Number	Percent	Number	Percent	Number	Percent	'07-'08	'98-'08
All Minority	38,769	8.0	66,563	14.0	70,012	14.8	5.2	80.6
African American	16,253	3.4	25,117	5.3	26,680	5.6	6.2	64.2
American Indian	2,307	0.5	2,800	0.6	2,905	0.6	3.8	25.9
Asian	7,855	1.6	9,425	2.0	9,866	2.1	4.7	25.6
Hispanic	12,345	2.6	29,221	6.2	30,561	6.5	4.6	147.4
White	443,380	92.0	408,304	86.0	402,616	85.2	-1.4	-9.2
Total	482,149	100.0	474,867	100.0	472,628	100.0	-0.5	-2.0

Source: Iowa Department of Education, 2008 Fiscal Year-End Reports

History of Concurrent Enrollment at Des Moines Area Community College

Concurrent enrollment programming at Des Moines Area Community College has been in existence since 1999 (Des Moines Area Community College Office of Planning and Research, 2008). The programming began in 1999 with the Des Moines Public Schools and their magnet career and technical facility in downtown Des Moines known as Central Academy. This facility draws students from over 35 surrounding school districts who attend advanced program offerings in the career and technical areas and also the advanced arts and sciences. Programming was set up in 1999 in the career and technical areas and in the following year contractual agreements were drawn up to include the arts and science classes (Des Moines Area Community College Office of Planning and Research, 2000).

During this same year (1999) Des Moines Area Community College received a request from seven school districts in Story County to begin a building construction trades program which would be a dual credit program offered to students with a DMACC certified

instructor (Des Moines Area Community College Office of Planning and Research, 2001). The seven school districts signed an agreement with DMACC which allowed for the students to attend the DMACC program and also meet the requirements for their high school diploma. The school districts committed to send 32 students to the program and DMACC agreed to hire an instructor and teach the building trades program. This program was initiated at the request of local building construction contractors who identified a need to have skilled workers for their profession in Story County. Annually the programming has expanded and numerous other curricular offerings such as health, criminal justice, automotive, manufacturing, and culinary arts were added. Currently there are 350 students from the Story County school districts enrolled in a newly constructed facility which offers dual credit programs in ten career and technical areas (Des Moines Area Community College Office of Planning and Research, 2009).

As is shown below in Table 1.16, high school joint enrollment at Des Moines Area Community College grew 305% from 2002 to 2008 (Department of Education, Iowa Community Colleges High School Enrollment Report, 2008). This enrollment growth accounted for almost 30% of DMACC's total enrollment of full time and part time students in 2008. These students accounted for nearly 20% of all DMACC credits issued in 2008 and 30.96% of all high school joint enrollment credits statewide (Table 1.17).

The dual credit programming is referred to as the "Career Advantage" program and it enables primarily juniors and seniors to enroll in numerous arts and science transfer courses and career and technical courses during their high school experience. Many of the courses students are able to take without leaving their high school environment and students take

Table 1.16 DMACC high school joint enrollment (2002-2008)

Fiscal	DMACC HS Credit students	Total HS/CC Credit students	Total CC Credit students	Percentage of total
2002	3,029	15,633	105,719	14.79%
2003	3,634	17,833	111,745	15.96%
2004	5,007	21,050	116,439	18.08%
2005	6,071	22,905	120,217	19.05%
2006	7,736	25,578	121,753	21.01%
2007	8,646	30,099	125,990	28.73%
2008	9,249	31,450	128,146	29.41%

Source: Iowa Department of Education MIS Reports, 2002-2008 Fiscal Year-End Reports.

Table 1.17 DMACC high school joint enrollment credits (2002-2008)

Fiscal	DMACC HS Credit students	Total HS DMACC Credits	Total CC High School Credits	Percentage of total Credits
2002	3,029	20,679	107,767	19.19%
2003	3,634	23,542	122,754	19.18%
2004	5,007	34,189	145,281	23.53%
2005	6,071	43,322	163,052	26.57%
2006	7,736	55,235	189,313	29.18%
2007	8,646	63,349	224,985	28.16%
2008	9,249	73,072	235,985	30.96%

Source: Iowa Department of Education MIS Reports, 2002-2008 Fiscal Year-End Reports.

these classes from their high school instructor who is also certified to teach at the community college level. Some specialized courses and programs such as health and criminal justice require students to travel to the community college campus or center and are considered comprehensive programs for students who are primarily juniors and seniors. These students attend for the entire academic school year.

Beginning with the fiscal year 2008, the Iowa Department of Education began to collect more detailed information regarding high school students who attend community

colleges. As part of this process, the Department began to utilize terminology which categorized these students into programs. They began to utilize the term “joint enrollment” when referring to these high school students. Three categories within joint enrollment were established to clarify the programming that high schools and community colleges offered for their students. These three areas consist of Postsecondary Enrollment Options (PSEO) courses, contracted courses and programs which are established between the two institutions, and tuition paying programming in which the student pays regular tuition to attend the courses offered by the community colleges.

Statewide the PSEO enrollment accounted for 17.6% of the total jointly enrolled students and 12.3% of the total joint credits issued of all community colleges in 2008. The

Table 1.18 Iowa high school joint enrollment credit hours by Agreement, by College (2008)

College	<u>PSEO</u>		<u>Contracted/Concurrent</u>		<u>Tuition</u>		<u>Total Joint Enrollment</u>		Unduplicated Joint Enrollment
	Students	Credit Hours	Students	Credit Hours	Students	Credit Hours	Students	Credit Hours	
NICC	413	2,471	2,126	14,585	151	1,358	2,690	18,414	2,409
NIACC	160	1,043	964	6,787	138	1,364	1,262	9,194	1,262
ILCC	630	3,653	1,140	8,649	127	668	1,897	12,970	1,582
NCC	96	475	530	4,459	40	207	666	5,141	608
ICCC	755	3,483	2,648	22,808	0	0	3,403	26,291	3,026
IVCCD	293	1,482	860	6,373	0	0	1,153	7,854	1,033
HCC	318	2,032	1,366	7,132	149	794	1,833	9,958	1,598
EICCD	497	2,424	1,567	7,392	286	1,942	2,350	11,757	2,081
KCC	733	3,508	1,834	9,647	246	1,122	2,813	14,276	2,527
DMACC	559	2,632	8,646	66,094	691	4,346	9,896	73,072	9,249
WITCC	155	1,046	1,727	11,720	0	0	1,882	12,766	1,882
IWCC	184	1,053	1,629	14,493	24	101	1,837	15,647	1,733
SWCC	334	1,766	398	3,396	20	82	752	5,244	632
IHCC	250	1,211	761	5,718	158	799	1,169	7,727	1,061
SCC	162	659	655	3,893	58	291	875	4,843	767
Total	5,539	28,937	26,851	193,144	2,088	13,072	34,478	235,152	31,450

Source: Iowa Department of Education, Bureau of Community Colleges, Community College MIS.

tuition paying students accounted for 6.6% of the total enrollment and 5.6% of the total credits issued statewide during 2008 according to Table 1.18.

As evidenced in Table 1.18, most of the students and credits were in the “contracted” category. Concurrent enrollment is the term used to refer to students within the contracted course and program area. Of the 235,152 credits issued through statewide joint enrollment programming in 2008, 193,144 credits were in the category of contracted partnerships. This accounted for over 82% of the credits received by high school students statewide. It is this programming in Iowa that has recently been embraced by the community colleges and high schools to create new opportunities for students.

DMACC enrolled the largest number of concurrent credit high school students and issued the biggest number of credits to high school students in the Iowa community college system in 2008 (Department of Education, Iowa Community Colleges High School Enrollment, 2008). Table 1.19 indicates the percentages of high school students attending DMACC contracted courses since 2002. The high school students accounted for over 29% of DMACC’s total enrollment in 2008 and almost 18% of DMACC’s total credits issued to students. This was a 16.36% increase from 2002 comparing high school students as a percentage of the total enrollment at DMACC. As shown below in Table 1.19, in the 2002 school year, of the 20,736 students enrolled at DMACC, 2,671 or 12.9% were concurrent students. In 2006, this number had jumped to 6,181 high school concurrent credit students enrolled at DMACC and they took a total of 39,844 credits (Table 1.11). Data indicate that almost 30% of all students enrolled at DMACC in 2008 were concurrently enrolled students and they were enrolled in 66,094 credits (Table 1.20).

Table 1.19 DMACC student enrollment of contracted/concurrent students (2002-2008)

Fiscal Year	Total HS DMACC Concurrent/Contracted students	Total DMACC unduplicated	Total CC Credit Enrollment unduplicated	Percentage of total DMACC unduplicated
2002	2,671	20,736	105,719	12.88%
2003	3,174	21,913	111,745	14.48%
2004	4,225	23,465	116,439	18.00%
2005	5,136	24,780	120,217	20.73%
2006	6,181	26,801	121,753	23.06%
2007	8,014	28,054	125,990	28.57%
2008	8,646	29,573	128,146	29.24%

Source: Iowa Department of Education MIS Reports, 2002-2008 Fiscal Year-End Reports.

Table 1.20 DMACC credit growth of concurrent/contracted enrollment (2002-2008)

Fiscal Year	Total HS Concurrent/Contracted students	Total HS Concurrent credits	Total DMACC Credits	HS Percentage of total DMACC Credits
2002	2,671	16,256	253,469	6.41%
2003	3,174	18,466	274,666	6.72%
2004	4,225	27,535	297,319	9.26%
2005	5,136	34,745	309,718	11.22%
2006	6,181	39,844	325,384	12.25%
2007	8,014	52,987	345,204	15.35%
2008	8,646	66,094	371,161	17.81%

Source: Iowa Department of Education MIS Reports, 2002-2008 Fiscal Year-End Reports.

Table 1.20 indicates the substantial credit growth at DMACC which was attributable to the concurrent enrollment programming. These credits grew from 16,256 in 2002 to 66,094 in 2008 at DMACC. This was a 406% increase in the number of credits received by concurrent students from 2002-2008 (Table 1.20). Concurrent enrollment students accounted for 17.81% of total credits issued at DMACC and joint enrolled students accounted for 19.7% of the total credits issued by DMACC. This indicates the recent trend of concurrent programming when considering all of the high school credits issued at DMACC.

The Iowa Department of Education (2009) has just recently begun to analyze the high school enrollment within each community college district. Only aggregate data were collected on the students when examining gender and ethnicity in previous years. The gender breakout for jointly enrolled students in 2008 at DMAACC was as follows: male-48.8%, and female-51.2%, (Iowa Department of Education, Joint Enrollment Report, 2008). These percentages were very similar to the State's total joint enrollment male and female percentages (47% male and 53% female, Table 1.9). The 2008 total community college population, however, had a considerably higher percentage of females (57%) and lower percentage of males (43%) than that of DMAACC jointly enrolled student population.

The ethnicity breakout for jointly enrolled students in 2008 at DMAACC was as follows: White-88.9%, Black-3.5%, Asian-3.7%, American Indian-0.4%, and Hispanic-3.5%. These percentages were very similar to the total community college populations in Iowa. However, the minority population served in DMAACC's joint enrollment programs was higher (11.1%) than that of the statewide total of jointly enrolled minority students (8%).

Statement of the Problem

Public secondary education in the United States has struggled with its purpose to provide a meaningful experience for students which allows for them to successfully transition to the next educational level (Boswell, 2000). It does not effectively serve the majority of American students in long range decision making, choosing careers pathways, developing good citizenship, and preparing for higher education (Adelman, 1999). Numerous efforts were implemented over the years to more effectively ensure student success between secondary and postsecondary institutions (Hughes, Karp, Fermin, & Bailey, 2006; Bailey &

Karp, 2003). One of the most recent efforts nationwide has been the rapidly expanding dual credit programming which seeks to provide seamless transitioning for students between secondary and postsecondary institutions (Andrews, 2001). In Iowa these programs have been developed primarily between high schools and community colleges and the growth has occurred in the “concurrent enrollment”. However, the effectiveness of these programs has not been well researched and documented during this recent growth.

Recent community college enrollment growth has provided greater access to more students and new programming opportunities such as dual credit programming ease the transition of these students and seek to improve their success toward degree completion (Bailey & Karp, 2003). This dual credit growth trend also requires research to closely examine the effectiveness of these programs and their impact on student success when they reach the community college. Growth has occurred exponentially and much of the research which has been done has been specific to the state in which the programming was offered (Hughes, Karp, Fermin, & Bailey, 2006). This growth has created numerous concerns about the success of these students and the quality of the programming especially when credits were being issued to students by their high school teachers as part of their high school day (Bailey & Karp, 2003).

Need For the Study

Tracking of Iowa community college dual credit students has received attention in recent years because of fast growth, funding streams, and accountability. These programs have also grown exponentially throughout the state and people are continually seeking justification and data on this group of students who are then attending four year schools and

community colleges after their high school graduation. State funding is also directly tied to student participation in the programming which brings more accountability to Iowa's community college system.

The increasing number of dual credit students and the number of credits received by these students, as illustrated in Table 1.11, indicates that numerous high schools are partnering with DMACC for transition programming to the community college system, yet DMACC has very little data indicating the success of these students as they enter the community college and pursue their educational goals. Although there is some information about the enrollment of dual credit students at DMACC there has been no formal analysis of the success of their transition to DMACC. In order to better serve this population of students, an analysis of their success factoring in dual credit experiences was necessary. This lack of research at the community college level has implications about the value and quality of these programs within the institutions in which they exist, and also externally when state funding continues to increase as the programming increases. Consequently, there was a need to more closely examine the success of these students and programs offered between community colleges and high schools.

When this study was performed there were no statewide data on the success of these dual credit students available to community colleges and there were no statewide data available on the students after enrollment at the community colleges. The first detailed data collected on high school students receiving credit at the community colleges in Iowa began in 2005 by the State Department of Education (Department of Education, Iowa Community Colleges High School Enrollment, 2005).

Although there was a need for a statewide study of dual credit students, each community college has the responsibility to track student success for their respective institution. This study was the first at DMACC to analyze institutional data to determine how dual credit students compared to non-dual credit students in enrollment, within term course retention, academic success, and to examine the impact of independent variables upon student success.

Theoretical Framework

Success visited: pre-entry attributes

Student success is a very common topic in community colleges today. The importance to be responsible to the public and accountable for the revenue streams entering the system is crucial for the continued existence of Iowa's community colleges. In addition, the internal necessity to create programming options for students which allow for continued success is of the utmost value for the institution and the students as they pursue their career goals in the community college setting.

Two of the most recognized benefits of dual credit programs within the research are that they enable students to more smoothly transition into postsecondary education and they better prepare students academically and socially and increase success for students at the post-secondary level (Andrews, 2001; Bailey & Karp, 2003; Kleiner & Lewis, 2005). Research on student development and retention (Astin, 1987; Bean & Metzner, 1985; Pascarella & Terenzini, 1991; Tinto, 1993) supports the benefits that students are provided as a result of dual credit programs. The emphasis of this study is to determine if this was the

case at Des Moines Area Community College as students experience dual credit courses in high school and then transition to the community college.

The theoretical framework utilized for this study focused on the research from Vincent Tinto's Academic and Social Integration model (Tinto, 1993). Dual credit experience was examined as a pre-entry variable for the students who transition to the community college. It examined the effectiveness of this programming and the success of these students while examining their transition to the community college given their previous experiences with dual credit courses while in high school.

One of the most applicable models of student retention regarding pre-entry variables is that of Tinto (1975). Tinto (1993) identified multiple factors which contribute to student departure in his model of institutional departure. Tinto (1993) utilized the work of Spady (1970) to further his work and constructed the model of social and academic integration as a model of a student's tendency to stay in college. His work is some of the most widely recognized when working in the area of student retention and is well respected in the field of education. He theorized that students come to institutions with a variety of patterns of personal, family, academic characteristics and skills which include intentions regarding their academic background during high school, career goals and their future involvement as a student. He indicated that students enter institutions with a variety of attributes (gender, race, ability), family backgrounds, (social status attributes, value climates, and expectation climates), and pre-college experiences (GPA, academic and social attainments). Each of these may have had direct and indirect impact upon student performance in college. The model established that given the individual student characteristics, prior experiences, and

commitments that integration into the academic and social systems of the college most directly affected the student's continuation at the college.

Pascarella and Terenzini (1991) confirmed Tinto's model of social and academic integration in the university setting and stressed the importance of faculty to connect with students on academic intellectual matters. Pre-college traits were identified by Pascarella and Terenzini and include the following: aptitude, achievement, personality, aspiration, and ethnicity. These "traits" are very similar to what Tinto describes as pre-entry attributes in his model of social and academic integration.

Another very well known researcher in this area is Astin (1997), who identified the very familiar "input-environment-outcome" (IEO) model. Astin targeted the attributes that the student brings to the institution as the input in the model which corresponds to the pre-entry attributes of Tinto (1993), and the pre-college traits of Pascarella and Terenzini (1991). Astin (1997) identified these as the demographic characteristics, family backgrounds, and the social and academic backgrounds the students bring to the institution.

In this research, students were examined to determine if participation in dual credit programs at the high school level in Math 121, Math 129 and/or English 117 and 118 courses helped predict if students were successful measured by successful completion of 24 Associate of Arts Degree credits compared to non-dual credit students. Numerous predictor variables (gender, race, age, Pell grant eligibility, ACT English and math scores, and 1st semester GPA in subsequent courses) were examined to help determine how they impacted the success of the students as measured by successful completion of 24 credits. Further discussion of the theoretical framework will take place in Chapter 2.

Methodology

This study was a quantitative statistical analysis using descriptive statistics, Wilcoxon, chi-square statistics, t-tests, and logistic regression analysis to determine whether participation in concurrent enrollment helped predict success at Des Moines Area Community College. Descriptive statistics were gathered to analyze the demographics of the students within the study. The Wilcoxon Z approximation was the non-parametric test used to determine association between distributions of two categorical variables (Gravetter & Wallnau, 2004). It was used in this study to analyze within-term course retention of the dual credit and non-dual credit students specifically by gender, race, and Pell eligibility. The chi-square was used to examine the academic success of the dual and non-dual credit students specifically by gender, race, and Pell eligibility. A t-test was utilized next to examine the significance of the ACT English and math scores and the 1st semester GPA comparison between dual and non-dual students. The final analysis utilized a logistic regression to examine the impact individually and collectively of independent variables upon student success as they enrolled at Des Moines Area Community College. The regression was run to determine the effects of the following variables on the students' success: race, Pell grant eligibility, gender, ACT scores, and area of dual credits earned and GPA in subsequent courses. The independent variables were broken into categories for ease of description and analysis.

Data were collected from Des Moines Area Community College's Institutional Research department from the 2003-2005 semesters and it was pulled at the end of the fall term in 2008 on the dual credit participation variables from DMACC's secondary data set. Targeted course data were collected on the students in community college courses which led

to STEM related areas, (science, technology, engineering, math), to determine the impact of the concurrent enrollment of the students in these areas.

Objectives

The purpose of this study was to determine if the dual credit students enrolled at DMACC in Arts and Science courses which lead up to STEM related courses outperform non-dual credit students in similar courses taken at Des Moines Area Community College. Both dual credit and non-dual credit students were studied in the areas of the Arts and Sciences as they take courses. Analyses took place in the following: within-term retention, academic success of the students, academic backgrounds, and impact of variables upon student success. Successful completion of 24 transfer degree credits within two years was the dependent variable of the study. The independent variables of this study were dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPAs. If DMACC is to address locally the success of dual credit students, there needed to be an analysis to determine how dual credit students compare to non-dual credit students in success as they transition to the community college.

Information regarding transition success of dual credit students is important to Iowa's higher education system because dual credit programs have just recently been implemented in the state of Iowa. An analysis will be also be very beneficial for DMACC, state leaders, and local high schools to address the success of the dual credit programming by examining the success of students as they transition to the community college. DMACC enrolls the highest percentage of dual credit students in the state of Iowa and this study can serve as a pivotal start for a statewide study in determining the effectiveness of dual credit

programming. The population of students who transitioned from high school dual credit programs into DMACC from 2003 to 2005 was the unit of analysis for this study. This study examined community college students and the factors related to their success.

The primary objective of the study was to compare the success of dual credit and non-dual credit students enrolled at DMACC to determine if there were significant differences between the groups. Students were studied as they took similar courses as students attending DMACC. Specifically, the purpose was to determine if dual credit students were more or less likely than non-dual credit students to experience success defined as completing 24 credits with at least a 2.0 GPA within a two year period of time while attending DMACC full-time right after high school.

The intent of the study built upon previous knowledge of pre-entry attributes of postsecondary students in earlier work in an attempt to establish new processes to better understand successful transitioning of dual credit students as they enroll in the community college system. The study examined retention theory in an attempt to begin the process of exploring the correlating factors which determine student success specific to pre-entry attributes that students possess before coming to college. Characteristics of the learners were examined in an attempt to determine demographic similarities. It examined the relationship between these variables in an attempt to determine the significance of relationships which existed between the variables. Finally, the study contributed to the pre-entry research regarding retention and transitioning to postsecondary institutions, and specifically the dual credit experiences relating to studies focusing on high school students transitioning to community colleges.

Research Questions

This study was conducted at Des Moines Area Community College studying dual credit students from 2003-2005 who had enrolled in and completed entry-level math and English courses as high school students. They then enrolled at the community college in additional courses. Specifically, the purpose of the study addressed the following questions:

1. What are the characteristics of non-dual credit students entering DMACC and dual credit students entering DMACC who had previously completed math and/or English courses as high school students in partnership programs specifically examined by gender, race, age and Pell eligibility?
2. What is the course retention during the first semester of non-dual credit students entering DMACC and dual credit students entering DMACC who had previously completed math and/or English courses as high school students in partnership programs specifically examined by gender, race, and Pell eligibility?
3. What is the academic performance of dual credit students who had previously completed math and/or English courses as high school students in partnership specifically examining gender, minority status, and Pell eligibility?
4. What is the academic performance among non-dual credit students entering DMACC specifically examining gender, minority status, and Pell eligibility?
5. Are there statistically significant differences in academic performance between dual credit and non-dual credit students specifically examining ACTE, ACTM, and 1st semester GPA?
6. Does participation in dual credit programs at the high school level in math and/or English courses help predict if students were successful measured by successful

completion of 24 Associate of Arts Degree credits within two years with a minimum 2.0 GPA? Which predictor variables (gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPAs after attending DMACC) helped determine that a dual credit student was successful at DMACC as measured by successful completion of 24 credits within two years? Specifically, what was the rate at which dual credit students experience success compared to non-dual credit students at DMACC measured by successful completion of 24 credit hours within two years?

Student success, measured by successful completion of 24 transfer degree credits was the dependent variable of the study. The independent variables of this study were dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPA. Control for academic ability was established by examining all students from both groups who had similar cut scores on the ACT. Mean scores were statistically similar for the students examined.

Significance of the Study

In Iowa, DMACC is the largest community college which consists of six campuses located in central Iowa. DMACC enrolled 23.06% of all arts and science students in 2008 according to the Department of Education, Condition of Iowa Community Colleges (2008). Twenty-five percent of Iowa's entire population (754,260) resides in DMACC's service area and 29.41% of all high school students taking community college dual credits in 2008 took them from DMACC (Condition of Iowa Community Colleges (2008). This accounted for 9,249 students out of a total of 31,450 high school students who took credits from Iowa's fifteen community colleges in fiscal year 2008 (Annual Iowa Community Colleges High

School Enrollment Report, 2008). In order to effectively serve this population of students as they transition from the high school and pursue their educational pathways, accurate data on enrollment, transition, and success regarding dual credit students must be accessible to community college decision makers. DMACC has not previously in its history conducted an analysis of the characteristics, transition, and success of dual credit students.

A study to determine if there is a significant difference within these groups of students when comparing dual credit students and non-dual credit students specifically by gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPAs will be valuable for decision makers. Information derived from this study will provide valuable insight for decision-makers who are responsible for creating this seamless transition from high school to postsecondary. These data will be valuable to advisors, counselors, department chairs, deans, and admissions staff in developing transition assistance programs for jointly enrolled students.

Close examination and analysis of this transition is essential for the community college and the high schools to ensure that the junior and senior years of high school are designed to provide students with a “seamless” educational pathway so that they are adequately prepared to experience success at the community college. Commitment to academic success and effective transitioning is important to provide a successful opportunity for students who enter the community college degree programs through dual credit partnerships.

Assumptions

The following assumptions were made considering this study:

1. The students accurately reported their status during high school and college enrollment on their application at Des Moines Area Community College.
2. The data utilized for this study from the Office of Institutional Research at Des Moines Area Community College, the Iowa Department of Education, and the United States Census Bureau were accurate.

Limitations of the Study

The data for the study were collected from the 2003 through the 2005 enrollment records. It was necessary to rely on DMACC's administrative computing system, DMACC's Office of Planning and Research, and the Iowa Department of Education.

Another limitation of the study was the accurate tracking of a multitude of students who enrolled in the educational system and then stop attending for a variety of reasons. The study was limited by the exclusion of full and part-time students who started for a period of time and then dropped out of college for a period of time. This is common in the community college system.

Another limitation of the study was the tracking of only students who attended DMACC. Even though the majority of dual enrolled students gained credit from DMACC, this data cannot be generalized statewide in its application.

Definition of Terms

ACTE: ACT English score

ACTM: ACT Math score

AP: Advanced Placement courses offered to high school students and well accepted nationally at most colleges as testing credits.

Arts and Science: Courses in the liberal arts, pre-professional that partially fulfill the requirements for an associate of arts degree.

Career Advantage: Dual credit programming offered at Des Moines Area Community College.

Career and Technical: Courses offered in technical areas which lead to an associate of applied sciences degree or diploma.

Career Academies: Subject area two hour/day programs offered to high school students usually in career and technical subject areas at Des Moines Area Community College.

Community College: A regionally accredited postsecondary institution of higher education that offers the associate degree as its highest degree.

Concurrent Enrollment: Similar to dual credit programming but there is not issuance of high school credit in some concurrent enrollment. Students are enrolled in college at the same time they are enrolled in high school.

Dual Credit: Programs which enable high school students to enroll in college courses during high school which also fulfill credit requirements for their high school diploma. Students receive both high school and college credit for a successfully completed college class.

Dual Enrollment: When students are both enrolled and taking classes in the high school and the college.

G.P.A.: Grade point average-a statistical method of determining the average of grades when multiple courses are involved.

IB: International Baccalaureate programming which allows for advanced credits to be achieved through programming which is recognized internationally.

Joint Enrollment: A definition used by the Iowa Department of Education to include PSEO, specially contracted courses, and tuition paying students receiving credit at post-secondary institutions.

Full-Time Student: A student enrolled in 12 credit hours in the fall and spring and 8 credits in the summer session.

Part-Time Student: A student enrolled in less than 12 credit hours in the fall and spring terms and less than 8 credits in the summer session.

Pell Eligible: Federal criteria to determine financial assistance to attend college.

Persistence: Successful fall to spring student enrollment without interruption and without dropping or failing all classes.

Pre-entry Attributes: Characteristics students come to college with.

Retention: Maintaining student enrollment for the entire term.

STEM: Identified courses in the areas of science, technology, engineering, and math.

Success: Success was defined for purposes of this study as completion of 24 credits at DMACC within two years with at least a 2.0 GPA.

Transition: Movement of students from one institution to another, usually involving another level of education.

CHAPTER 2. REVIEW OF RELATED LITERATURE

Introduction

This chapter provides an examination of the literature which is relevant to issues surrounding retention, pre-college characteristics, measuring success of college students, partnership programming between secondary and postsecondary, and the emergence of dual credit programming. To clearly understand the impact of dual credit programming on student success at the college level the first section of this chapter examines the importance of student pre-college characteristics from the perspective of the following three researchers: Tinto, Pascarella, and Astin. This research is important to the understanding of dual credit programming because it specifically identifies attributes that students bring to college as determinants of their success (Tinto, 1993). The second section examines the analytical framework of community college student success and focuses mainly upon transcript analysis and the work of Linda Hagedorn in the Transfer and Retention of Urban Community College Students (TRUCCS) Project (Hagedorn, Maxwell, Brocato, & Moon, 2001).

The third section examines high school transitioning literature related to the ongoing attempt to create “seamless transitioning” opportunities for students. High school reform is examined as a driving force of the “seamless transition” effort between secondary and postsecondary institutions. During this third section, is a discussion on the synopsis of the history and depiction of high school and college articulated programs which attempt to create seamless transitioning opportunities for students. High schools and colleges across the country have offered these programs in an attempt to more effectively transition high school students and allow for them to find success in college.

The fourth section of this chapter is a comprehensive examination of dual credit programming, focusing specifically on how these programs have developed historically and how they are different than traditional programs. Much emphasis has centered on the historical development of these programs in the literature and how they have emerged to fulfill numerous goals which center on successful transitioning of students from high school to college. A complete description is included of dual credit programming, including features which differentiate the programming, identifiers of the programming, effective models, integral components which are existent within these programs and common practices and policies which resulted from this development.

The final section provides an overview of dual credit research studies pertaining to student success. Existing research on dual credit programming is documentation of the recent expansion and development of these programs across the United States and often documents practices which are existent in numerous states. It reviews pertinent and relevant literature on dual credit programs, students, and the issues involving retention and transitioning of these students from high school to college. The intent of this review was to examine key issues and current research related to dual credit student enrollment at community colleges and their subsequent seamless transition from high school to the community colleges.

Pre-Entry Attributes and

Retention Research

Almost two-thirds of high school graduates in 2005 entered postsecondary institutions immediately upon graduation (NCES, 2005). Nationally, nearly 60% of students enrolling in colleges required at least one remedial course according to (NCES, 2004). In 2003, 57% of

high school graduates who had been out of high school for up to eleven years had completed some college but only 28% had a bachelor's degree (NCES, 2005) The issue of high school student preparedness for college and success when transitioning has surfaced recently because of changes in employer expectations, more emphasis on mass education, and a concern for poorly prepared high school graduates (Nunley, Galotto, & Smith (2000).

The topic of student departure in higher education has had a good deal of attention devoted to it throughout the years (Tinto, 1993). As a result, much research has been done to analyze college students and attrition over the years (Astin, 1997; Bean & Metzner, 1985; Braxton, 2000; Pascarella, Lorang, & Terenzini, 1981; Spady, 1970; Tinto, 1993). A result of this research has been retention models which had been utilized to identify and address the numerous factors which contribute to a student's decision to remain enrolled or drop out of college. These theories had a broader perspective of retention associated with the student's degree completion goal or ambition and are important to understand when seeking to identify methods to improve student attrition. This section will discuss the potential impact upon the student environment related to these theoretical models of attrition.

One of the earliest models of student attrition is the work of Spady (1970). In his work with student attrition he paralleled the work of Durkheim (1951) who studied suicidal tendencies in society. Durkheim found people had increased suicidal characteristics when they were isolated and not successfully integrated into their environments. These individuals did not feel part of a community and were not comfortable in the environments in which they were living. He found that the likelihood of suicide increased when integration was absent.

Spady (1970) realized similar characteristics existed with college students who did not feel they were part of their environment. He found that students who dropped out of

college had similar characteristics and linked those characteristics with the tendency to drop out of school. He used the variables of grades, intellectual development, normative congruence, and support through friendships to determine the connection of the student and linked that to their tendency to drop out of college. Tinto (1993) utilized the earlier work of Spady (1970) to further his work and constructed the model of social and academic integration as the two areas which determined the student's tendency to stay in college. Tinto identified three stages of separation, transition, and incorporation, to explain how students progress through college.

Tinto (1993) laid out, in his model of institutional departure, a variety of attributes with which a student enters into the postsecondary institution and begins his/her educational experience. He identified the "pre-entry attributes" of college students and established three categories of family background, individual attributes, and pre-college schooling. The family background attributes include social status attributes, value attributes, and expectation climates. These are the attributes associated with a student impacted by the family environment they experienced previous to their college experience. Individual attributes associated with the student include gender, race, and ability. Pre-college schooling encompasses such areas as grade-point averages, courses experienced, and academic and social attainment that a student has experienced prior to the post-secondary college experience. These three categories of attributes, referred to as "pre-entry attributes of Tinto's model are brought to the institution by the students and help determine the success of the students as they pursue their post-secondary education (Tinto, 1993).

Students' pre-entry attributes lead to varying levels of goal and institutional commitments which interact with the social and academic environments of the institution.

This interaction results in various levels of integration into the social and academic systems within the institution resulting in positive and negative experiences for students (Tinto, 1975). Tinto (1975) indicated that student entry characteristics affect a student's initial commitment to the institution which in turn influenced institutional commitment. Social integration positively influences this commitment which has a tendency to positively affect student persistence in college.

Another component in Tinto's model is that of "goals and commitments." Tinto identified students' intentions and commitments to include dispositions and aspirations connected to personal goals and dedication to those goals. Specifically student participation was examined to determine the effect upon attrition. Tinto (1993) indicated that as the integration in the subgroup for students increased, it strengthened their commitments to both their personal goals and the institution through which these ambitions are achieved.

Tinto (1993) indicated that there are three principles of effective retention programs which involve commitment to the following: student welfare, education of all students, and integration of students into the academic and social communities of the institution. These experiences begin to formulate and later impact how the student will perform when integrated into the institution. Tinto (1993) theorized that students enter the institution with a variety of these pre-entry attributes which include numerous patterns of personal, family, and academic characteristics and skills, which impact their initial dispositions and intentions regarding college attendance. He goes on to formulate that these initial dispositions and intentions are continually modified as students encounter the structures and members of the academic and social systems of the institution. Positive experiences within the institution,

both academically and socially, presumably led to greater student integration and therefore persistence in college. Tinto (1993) provided the following definition of integration:

Integration is the extent to which the individual shares the normative attitudes and values of peers and faculty in the institution and abides by the formal and informal structural requirements for membership in that community or in subgroups of it. As integration increases, it strengthens students' commitments to both their personal goals and to the institution through which these goals may be achieved. Negative interaction and experiences, however, tend to impede integration and distance the individual from the academic and social communities of the institution, thereby reducing commitments to both goals and institution and promoting the individual's marginality and ultimate withdrawal (p.116).

Tinto (1993) indicated that both the informal and formal experiences an individual has within the institution can have a tremendous impact upon the student. This occurs in the social system formulated by the students and also the academic system which is part of the institutional experiences of the students. When these two systems yield positive experiences, social and academic integration occur which positively affect the students (Tinto, 1993).

Tinto (1975) did report a positive relationship between students' goal commitment, previous academic experiences and their persistence in studies conducted at four-year institutions.

Other researchers have also identified the importance of students' pre-college experiences. Pascarella's (1985) "General Causal Model" identifies five sets of elements which have an influence on student learning. These consist of organizational characteristics of institutions, student pre-college traits, institutional environment, social interactions, and

quality of student work. Within this model, the first set of structural and organizational characteristics consist of enrollment, faculty to student ratio, selectivity, and percent residential. The second set of pre-college traits identified by Pascarella (1985) included the following: aptitude, achievement, personality, aspiration, and ethnicity. These first two sets then shape the third set which is the institutional environment the student is attending. The three sets of variables then influence the fourth set which includes the social interactions of students with the faculty and others on campus (Pascarella & Terenzini, 1991). The fifth set is the quality of student work, which completes the five sets of elements within the model. Pascarella (1985) suggested that student growth is a result of direct and indirect effects of these five sets of variables. These “pre-college traits” are very similar to what Tinto describes as pre-entry attributes in his model of social and academic integration (Tinto, 1993).

Another very well known researcher in this area is Astin (1997), who identified the very familiar input-environment-outcome (IEO) model. Astin targeted the attributes that the student brings to the institution as the input in the model which corresponds to the pre-entry attributes of Tinto (1993), and the pre-college traits of Pascarella and Terenzini (1991). Astin identified these as being the demographic characteristics, family backgrounds, and the social and academic backgrounds the students bring to the institution.

These researchers (Tinto, 1993; Pascarella & Terenzini, 1991; Astin, 1997) found that when students were able to have effective educational experiences both socially and academically at the appropriate time in their educational career and then can develop sound career goals, they were more likely to persist in their postsecondary experiences. They stress the importance of educational experiences and goal commitment at the time of matriculation as an important factor tied to the importance of completing a college education and creating

the motivational impetus that affects persistence at a college. Hagedorn, Maxwell, and Hampton (2002) found that students who maintained a positive viewpoint coupled with high educational goals were likely to persist in their college experience. They found that when students were able to clearly identify their goal, commit to that goal, and had a positive perspective toward their educational experience, they were more likely to persist (Hagedorn, et.al, 2002).

These student characteristics were identified as “pre-entry attributes” by Tinto (1993), “pre-college traits” by Pascarella (1985), and as “input” that students bring to the institution by Astin (1997). They all indicated the importance of the students’ academic experiences and social experiences which had been developed previous to being enrolled in post-secondary institutions. These academic experiences along with previous social experiences help determine the success of students as they integrate into the college environment both academically and socially. Tinto’s model of social and academic integration stresses that these pre-entry attributes help formulate student dispositions and intentions which influence student retention in college (Tinto, 1993). The researchers indicated the importance of positive experiences, both socially and academically, as students attend postsecondary institutions and they stress the importance of considering the entering student characteristics which impact student outcomes (Astin, 1997). This study will seek to use this component of “pre-entry attributes” and examine the attributes of the students during their high school experience directly connected to their experiences in dual credit programming while in high school during this period of time.

Analytical Framework

Two-Year Community College Success

Researchers recognize the need to have the above-mentioned models applied to the community colleges (Braxton, 2000; Hagedorn, 2006; Pascarella & Terenzini, 2005). It is with this research that the community college student can become more understood and programs can be created which will more specifically enable them to experience success at the community college level. With the recent growth in community college enrollment and the access created, there have been concerns about the success of their students and their attrition rates.

In order to fully understand research literature which examines the applicability of retention models to community colleges, it is important to first examine the purpose and mission of the nation's community college system. In 2006-2007 there were 1,045 community colleges in the United States with an enrollment of 6.2 million students. This was 35% of all postsecondary students enrolled in 2006-2007 (National Center Educational Statistics, 2008). Community colleges are open-access institutions developed around a variety of functions: academic transfer, vocational and technical offerings, continuing education, developmental education, and community services (Cohen & Brawer, 2008). They allow easy access and students often register without much commitment and without completing a plan of study with an advisor or counselor (Cohen & Brawer, 2008).

Bailey and Morest (2004) identified the following three categories of community college missions: core, vertical, and horizontal. The core mission is identified as the degree granting programming which leads to an associate degree, a terminal occupational degree or certificate. Bailey and Morest (2004) identified the vertical mission as that programming

which reaches downward to the secondary schools and upward into the four year degree granting institutions. They explained this as the necessary connectivity to ensure success for students as they come to the college and as they exit the college. The horizontal mission encompasses the development of programming outside the core mission which is continuing education, contract training, grant programs, and creation of centers which are often run by the college.

Bragg (2001) identified the transfer, vocational, developmental, continuing education and community service foci of the community colleges and indicated that they have become increasingly important to the expanding mission of the community colleges as they have evolved over time. Bailey and Morest (2004) categorized the developmental foci of the community college as part of the core mission because most of this programming eventually leads to a degree or certificate while Bragg (2001) and Cohen and Brawer (2008) gave it an individual category. All of these researchers identified very similar functions of the community college system which has been and will continue to evolve as communities continue to change. Cohen and Brawer (2008) go on to say that the functions are not as neatly organized as one might think and they are very intertwined at the college. As a result of this multifaceted purpose that community colleges seek to fulfill, accurately being able to apply retention models to them has been difficult.

Academic and Social Integration

Many researchers have worked to examine Tinto's model as it relates to the community college setting and results of academic and social integration at commuter colleges have been mixed. Pascarella, Duby, and Iverson (1983) found that for commuter

students attending an urban setting, positive effects of academic integration on student persistence were observed. However, they found the effect social integration upon student persistence was negative for students and represented an increased risk for attrition for commuter students (Pascarella, Duby, & Iverson, 1983). Pascarella and Terenzini (1991) concluded that social integration for commuter students may even be a liability for persistence. They made these conclusions based on the fact that some community colleges are not large enough to provide adequate social opportunities for their students and that commuter students are not attending commuter colleges for purposes of social integration. Bean and Metzner (1985) also found that the non-traditional students are affected much more in the attrition process by the external environment than by the social integration variables affecting the traditional students. Examples of these might be their work status, financial status, academic skills, and balancing all of these.

Bean and Metzner (1985) indicated attrition tendencies specifically for non-traditional students who have not had much social connectivity to the institution. The two important aspects of their work are related to the academic and environmental variables and their affect upon student outcomes. Bean and Metzger found that students who had high values for the academic variable and low values in the environmental had a tendency to drop out of college. If the opposite were true, students had a tendency to remain in college. They found that if a student has positive academic outcomes but negative psychological outcomes the student had a tendency to drop out of college. They also found that if a non-traditional student had negative academic, but positive psychological outcomes, they had a tendency to stay enrolled in college (Bean & Metzner, 1985).

Bean and Metzner (1985) identified two inter-related variables which are important and applicable to the purpose of this study. Student's educational experiences and goals at the time of matriculation were defined as the importance ascribed to obtaining a college education. Student goal commitment was defined as the amount of personal importance placed upon that achievement after the student has gained some experience in the college environment.

Findings by researchers have been very positive regarding the effects of Tinto's model of social and academic model when studied at commuter colleges. Both social and academic integration had positive effects on the persistence and graduation rates of community college students (Braxton, Sullivan, & Johnson, 1997; Pascarella, Duby, & Iverson, 1983). Strategies to target first year students have had major implications for community college administrators because of the high attrition rates with these students. Efforts to create schedules for incoming students which increase social bonds between groups of students is a growing body of research surrounding classrooms organized as learning communities (MacGregor, 2000). Napoli and Wortman (1996) observed strong correlations with persistence of commuter students for both academic and social integration. Bers and Smith (1991) also found that academic and social integration measures were significantly connected to the persistence of community college students.

Community colleges have taken on numerous foci and missions as they have developed over the years to become what they are today and as they have done this it has been extremely difficult to effectively measure why students leave the institution (Cohen & Brawer, 2008). Even as the experts have recommended that the retention models be applied to the community college settings there have been mixed results of the studies (Napoli &

Wortman, 1996). In particular, social integration has had positive effects when studied at larger commuter college settings and it has had negative results when colleges have not been provided it in quality settings for this aspect of Tinto's model (Pascarella, Duby, & Iverson, 1983; Pascarella & Terenzini, 1991).

Academic integration, on the other hand, has been found to have positive affects upon community college student retention (Pascarella, Duby, & Iverson, 1983; Bers and Smith, 1991). When this academic integration is positive for community college students, it strengthens students' commitments to both their personal goals and to the institution through which these goals may be achieved (Tinto, 1993). These researchers indicate the importance of positive experiences, both socially and academically, as students attend higher education institutions and they stress the importance of considering the entering student characteristics which impact student outcomes (Astin, 1997). While most of the research done on retention has been done at four year institutions, community colleges are also under scrutiny because of increased federal accountability and greater competition for funding (CCRC, 2005).

Indicators of Community College Success

Retention has been the traditional measure of success at the college level for years and the most often cited model is Vincent Tinto's Integration Model (1975). Much research has been done over the years to examine numerous student academic and social characteristics which impacted the students' enrollment during college (Adelman, 1999; Astin, 1975; Bean, 1980; Braxton, 2000; & Tinto, 1993). Much of this research has been done in the four-year setting and has been difficult to apply to the community college because of commuter student characteristics. Retention rates at community colleges typically

lag behind similar rates at the four-year colleges and universities for a variety of reasons (Hagedorn, Chlebek, & Moon, 2004). Even though all colleges and universities are required to report retention figures to state and federal governments, the task of doing so for community colleges is more difficult due to high turnover rates and more diverse student enrollments (Hagedorn, 2004). Hagedorn indicated that definitions of retention often overlook the following:

- Part-time students
- Transfers from other colleges
- Students currently not working toward a degree or certificate
- Students entering the college other than the fall term
- Undeclared students

The measures of success for community college students are thought to be almost as diverse as the students themselves (Hagedorn, 2004). Hagedorn (2005) indicated that there are richer measures for colleges to utilize when examining the success of their students. She especially sees a need for this at the community college level. It is for these reasons that she recommends additional evaluation of community college students utilizing transcript analysis to measure student success.

Much of the early transcript analysis work has come from Adelman's longitudinal research based on transcripts done with the United States Department of Education and entitled *Answers in the Tool Box*, (Ademan, 1999). *Answers in the Toolbox* was a study which examined what contributes most to four year degree completion even if the students attended other types of institutions. This research based in student transcript analysis and surveys was a longitudinal study of a national cohort from the time students were in the 10th

grade until they were age 30 in 1993. Adelman found that there were two important and influential factors associated with the research. Firstly, was the student's continuous enrollment once a true start had been made in the post-secondary institution? Secondly, "academic resources" which was a measure dominated by the academic content and performance that students bring forward from secondary school to college (Adelman, 1999). This variable established by Adelman in his research parallels Tinto's "pre-college attributes" (Tinto, 1993), Pascarella's "pre-college traits", (Pascarella, 1985), and Astin's "input variables". Adelman found that this measure was dominated by the rigor, intensity, and quality of the curriculum taken at the secondary level. Within the high school background category Adelman considered three areas of high school background which impacted degree completion. High school curriculum reflected 41% of the academic resources, test scores reflected 30%, and class rank/academic GPA reflected 29% (Adelman, 1999). Adelman examined student background in relation to bachelor degree completion and recorded the following selected findings:

- Curriculum produced a higher percent than the other two measures for those earning bachelor's degrees. The findings indicated that curriculum correlation was .54, which was higher than test scores (.48), or class rank (.44).
- The impact of high school curriculum of high quality and quality on degree completion was much more pronounced and positive for Latino and African-American students than any other pre-college academic resource indicator.
- When considering pre-college curriculum, the level of math a student studies has the strongest continuing influence on student bachelor degree completion. A student

finishing a math course beyond the level of Algebra 2, more than doubles the odds a student entering postsecondary will complete a bachelor's degree.

- Academic resources consisting of high school curriculum, test scores, and class rank, produce a much steeper movement toward bachelor's degree completion than does student socioeconomic status.
- Advanced placement completion was more strongly correlated with bachelor's degree completion than it was with college access.

Adelman examined student grades, courses the student dropped, withdrew from, left incomplete, or even repeated (Adelman, 1999). He concluded that examining the student's patterns regarding courses completed compared to courses enrolled in was a much more valuable measure to consider than whether a student was enrolled as a part-time or full-time student at a post-secondary institution. He also studied whether the student attended more than one institution and examined GPA along the course of their college experience. During this study and subsequent research of *The Toolbox Revisited*, (Adelman, 2006), Adelman utilized student transcripts that schools routinely collected as sources of information which provided a more objective data source (Hagedorn, 2005). Hagedorn also indicated that transcripts offer rich data about the students, (length of attendance, full or part-time, continuous or sporadic enrollment, course dropping patterns, course taking patterns, and academic success level). Most importantly transcript analysis offers a road map of the curriculum and courses taken by the students.

Dr. Linda Hagedorn was the director of a major longitudinal community college study supported by the United States Department of Education and the Lumina Foundation

which took place in the Los Angeles Community College District (LACCD). The project was entitled the Transfer and Retention of Urban Community College Students (TRUCCS, 2001). TRUCCS (Hagedorn, L.S., Maxwell, W., Brocato, P., & Moon, H.S., 2001) collected questionnaire and transcript data from over five thousand students enrolled in one of nine community college campuses in the Los Angeles area. The project sought answers about how to increase student success in the community college system which was made up of Latino populations which make up 22-75% of the total number of students (Hagedorn & Cepeda, 2004).

During the TRUCCS project a questionnaire designed for urban community college students was administered to 5,011 students in nine colleges within the Los Angeles Community College District (Hagedorn, 2001). Students also agreed to allow researchers to examine their college records. This analysis of the student records enabled the researchers to analyze groups of students and their academic behaviors (Hagedorn, 2004). Very early in the project it became clear that the richest source of the knowledge for the researchers were the student transcripts which enabled them to examine course enrollments of all of the students (Hagedorn, Moon, Cypers, Maxwell, & Lester, 2006). During the study the researchers examined students who indicated that it was their intent to transfer and complete a four year degree. They used this analysis to measure, comprehend, and examine student progression and identify factors which determined their success and hurdles associated with transferring from a community college setting to a four-year college or university. The TRUCCS data showed that the traditional linear flow of students from high school to community college to university was very rare for urban community college students (Hagedorn, et.al., 2006).

Transcript analysis can effectively be utilized to analyze groups of students and their academic behaviors as they chart their course through the community college because it provides the institutional leaders with robust information which adds dimension and depth to the discussion regarding community college retention, completion and transfer (Hagedorn, 2004). Hagedorn indicated that this information regarding the paths that students take within the system can be valuable for leaders to examine to improve and provide support for the students to become more successful. During this process, students' success can be more closely monitored to pinpoint how areas such as curriculum, course offerings, course delivery, course scheduling, student enrollment, and instructional methods might be addressed to provide for more student success at the community college level.

History and Overview of

High School Reform and “Seamless Transition”

Startling figures indicate that only 70% of students nationally graduate from high school (Barton, 2006). Dropping out of high school is a gradual process of disengagement, and the reason is a lack of clear connections between high school and personal goals (Bridgeland, Dilulio, and Morison, 2006). More than 1.2 million high school students drop out of high school every year and many of those who graduate require remedial courses entering college. Forty-two percent of community college freshman and 20% at four-year colleges fall into the category in need of remediation in courses such as reading, writing, or math (National Center for Educational Statistics, 2004). Of those who graduate high school, 53% entered college directly out of high school, and only 35% earned a postsecondary degree according to Adelman (2006). Adelman found that the intensity and the rigor of the

secondary school curriculum were the best predictors of whether a student would go on to successfully complete a bachelor's degree.

High schools bear the biggest responsibility of ensuring that students are prepared to be successful as they transition to postsecondary institutions but they are not giving them the skills and knowledge to succeed in college. According to the scoring on the National Assessment of Educational Progress (NAEP), only one-quarter of high school seniors are proficient in math, only one-half demonstrated basic proficiency in science, and one-quarter lacked basic proficiency in English (NCES, 2007). College admission exams indicate similar trends among high school students. Of all the high school juniors and seniors who took the ACT college entry exam in 2007, only 43% met the benchmark for college readiness in the area of mathematics (ACT, 2008).

Ernest Boyer was one of the early researchers on the effectiveness of the high school. Boyer (1983) found that high schools must share a sense of purpose with their staff, students, administration, parents and partners by sharing a vision of what they are trying to accomplish. He indicated that this focus was much more important than students focusing totally on their Carnegie units. Wise (2008) also indicated that all students require high quality secondary school education and made the following statement:

“The United States faces a choice: Do nothing to fix a broken high school system and watch our competitiveness further decline, or summon the political will to demand change.” (p.8)

High school, particularly the senior year of high school, is under a new round of scrutiny from educators, and policymakers according to a recent report by the *National*

Commission on the High School Senior Year (2001). The report found that current design of the high schools seems to be effective for only a portion of the students they serve and even the best students often spend their final year of high school taking easy classes, focusing on extra-curricular activities, and focusing more on their jobs than they do on academics. “The senior year of high school has been identified as a national concern and issue” (Andrews, 2004, p. 415). *The National Commission on the High School Senior Year* (2001) saw little connectedness to postsecondary education systems which seek to provide challenge, motivation, access to the world outside the classroom, and support which is essential for high school students. The senior year of high school was described by the Commission in this fashion:

For a variety of reasons, student motivation drops in the senior year. Short of a miserable failure in the senior year, practically every college-bound student knows that what they have accomplished through grade 11 will largely determine whether or not they attend college, and if so, which college. As a result, serious preparation ends at Grade 11 (p. 6).

This call for reform and change at the high school level is not new. Early reform in the high schools emerged with a report, *Breaking Ranks: Changing the American Institution* (1995) by the National Association of Secondary School Principals (NASSP) and focused on increasing academic rigor for all students in an attempt to address the deficiencies of the nation’s high schools. *Breaking Ranks: Changing an American Institution* (1995), and *High Schools of the Millenium* (2000), by the American Youth Policy Forum both challenged the American high school structure and recommended that the main goal of high schools should

be to prepare all students for postsecondary education in order to meet the need of a global workforce. These reports targeted the rigor of secondary curriculum to better prepare students for success after high school, whether that be work or postsecondary education, and it challenged the structure of high schools in America. Recommended strategies focused upon requiring higher levels of math, science, and English, offering more college level courses and the alignment of high school curricula with entry level college requirements. This emphasis specifically targeted effective transitioning of students to their next pathway of work or further education and allowing students to earn postsecondary education credit while in high school. Demand for reforming high school to college transitions continues to surface as skills necessary for jobs continue to increase because of applications of technology and the ever increasing body of knowledge and advanced scientific discoveries (Kirst & Venezia, 2004; Finn, 2006; Jacobson, 2006; and Katz, 2006).

Underprepared students has been one of the main reasons for this emphasis as 60% of all postsecondary students need at least one remedial course upon entering college (NCES, 2004). Deil-Amen and Rosenbaum (2002) indicated that students who require remedial courses are more likely to drop out of college than their counterparts who need less remedial assistance. This remediation causes complications for students' degree completion, adds additional costs for students and states in education related costs, and in lost wages.

Reforming high schools and providing a meaningful rigorous and relevant experience to all students during this crucial time has long been the emphasis of both secondary and postsecondary educational institutions (Learner & Brand, 2006). America's K-12 and higher education systems are regarded as among the least-linked systems found in the world because they operate on a system of local control at every level (Boswell, 2000). Significant

disconnects exist between K-12 and college faculty, curricula, programming, and expectations (Boswell, 2000).

The U.S. Department of Education's National Commission on Excellence in Education published the report, *A Nation at Risk*, in 1983. This document is often cited as the origin of current reform efforts in the nation's educational system. *A Nation at Risk* (1983), indicated that our educational systems were not preparing our youth to succeed at the postsecondary level and it called for major changes in secondary systems throughout the United States. More emphasis was to be placed upon fundamental units of instruction which was an attempt to ensure that the students in America could compete with students from other countries and that they would be prepared to enter and successfully complete postsecondary education. The following are highlights of the report (National Commission of Excellence in Education, 1983):

- Graduation requirements should be strengthened so that all students establish a foundation of five new basics: English, mathematics, science, social studies, and computer science.
- Schools and colleges should adopt higher and measurable standards for academic performance.
- The amount of time students spend engaged in learning should be significantly increased.
- The teaching profession should be strengthened through higher standards for preparation and professional growth.
- In addition to the traditional sequence of studies available for college-bound students, new equally demanding mathematics curricula need to be developed for those students who do not plan to continue their formal education immediately after high school.

No Child Left Behind Legislation (2001) is the most recent mandated reform handed down by the federal government and made the responsibility of the states. Under *No Child Left Behind*, states are working to close the achievement gap and make sure all students,

including those who are disadvantaged, achieve academic proficiency according to plans determined by the states. Annual state and local school district report cards seek to inform parents and stakeholders regarding progress made on the plans. Schools are held accountable and those that do not make progress must provide additional services to correct deficiencies and, if still not making appropriate progress after five years, implement changes regarding the way the school is run.

In *The Lost Opportunity of Senior Year: Finding a Better Way*, (2001) the National Commission on the High School Senior Year called for a re-examination of how students are transitioned from high school to colleges and the widely discussed initiative to facilitate this ineffective process of transitioning was dual enrollment or concurrent enrollment. The American Diploma Project did the same in *Ready or Not: Creating a High School Diploma That Counts* (2004), by urging high schools to raise their expectations so that alignment occurs between college and high school and that students be prepared to enter and compete in highly skilled jobs.

During this push for reform and legislated efforts to improve the preparedness of students attending postsecondary or the work place ACT released a report *Crisis at the Core* (2004) indicating the lack of student preparedness for college-level work in English, math, and science. The report found that the deficiencies are existent among males, females, and all ethnic groups within the graduating class of 2004. Based on ACT's national readiness indicators ACT came to the following conclusions:

1. Just 26% of ACT-tested 2004 graduates met ACT's College Readiness Benchmark indicating readiness for their first college credit course in Biology.
2. Just 40% met the benchmark for readiness in their first college credit course in Algebra.

3. Only 68% were ready for their first course in English.

Another important national study conducted by the American Youth Policy Forum, (2006) *The College Ladder: Linking Secondary and Postsecondary Education for Success for All Students* is the result of a two-year effort to examine schools, programs, and policies which link secondary and postsecondary educational efforts to assist students in earning college credit or taking college level courses. They were very inclusive of a variety of models and program types offered in high schools and they identified the term Secondary-Post-Secondary Learning Options (SPLOs). SPLOs as defined in the study included dual enrollment, Advanced Placement (AP) courses, Tech Prep, and middle and early college high schools. Early college high schools are programs set up throughout the nation which allow students to participate in college while they are still in high school. The authors set out to investigate the following questions:

- Is there evidence that these different models of SPLOs are effective at increasing academic performance, closing the achievement gap, and increasing entry to and retention in postsecondary education, particularly for first-generation, low-income, or students of color and students with disabilities?
- Do financing mechanisms seek to support equity and access by all students? Is there also evidence that these programs are cost effective?
- Are college courses for high school students as rigorous and at the same level as regular college courses?
- Is there evidence which exists to demonstrate that these programs meet their respective goals of serving a specific target population or solving a specific problem?

The College Ladder: Linking Secondary to Postsecondary Education for Success for All Students (2006)

The College Ladder Findings

Only a limited number of evaluations from the study contained longitudinal data, which meant the evaluations were point in time evaluations. Very few of the evaluations (15%) were able to compare to a control group in the study to determine any significance. The results were that the SPLOs helped to decrease the district's overall dropout rates. Rates of college attendance were higher for SPLO participants, especially for middle and low achieving students. Students participating in the programs typically did as well or better during college than their traditional-aged classmates. Retention of these students with previous college experience was also better which inferred that these students make an easier transition into higher education. There also was no evidence that these programs shorten time to degree attainment for students, and course rigor at the high schools was similar to rigor of the course offered on the college campus if measures of quality were implemented within the programming. Lerner and Brand (2006) concluded that research for these programs must become more rigorous to answer specific questions about the effectiveness of these programs which are offered in partnerships between secondary and postsecondary institutions. This collaboration between secondary and postsecondary teachers and administrators provided a supportive environment for students as they entered this very difficult time of transitioning and Lerner and Brand confirmed the need to collect data which targets the effectiveness of these programs.

The *ACT National Curriculum Survey* (2007) is a nationwide survey of educational practices and expectations conducted by ACT every three to five years which summarizes

what postsecondary institutions believe is necessary for incoming students and what secondary students are learning. It seeks to identify the gaps which are existent in the important transition from high school to college. The ACT National Curriculum Survey Results (2007) included the following highlights:

1. What postsecondary instructors expect entering college students to know is far more targeted and specific than what high school teachers view as important.
2. Remedial-course teachers' rating of mathematics and reading skills tend to align more closely with those of postsecondary instructors than those of high school teachers.
3. While most high school teachers across subject areas believe that meeting their state's standards prepares students for college-level work, most postsecondary instructors disagree.
4. High school teachers believe that today's high school graduates are less well prepared for postsecondary education and work than graduates in previous years, while postsecondary instructors perceive no difference.
5. There are specific differences between high school instruction and postsecondary expectations in every major curriculum area.
6. ACT's Educational Planning and Assessment System tests are aligned with the content and skills that postsecondary educators identify as important for college readiness.

The survey found that state standards are not focused on college readiness but instead are lists of all possible content the teachers desire for student exposure. State standards and assessments should be validated by actual college student success data instead of assessments which measure their content which is disconnected from colleges. Further, high school teachers are held accountable to teach all content and skills identified in their state standards and they focus on this content. However, postsecondary instructors across content areas feel

that state standards do a poor job of preparing students for postsecondary work. These results indicate a large gap between the two types of institutions.

Finally, the *ACT National Curriculum Survey* (2007) found that English and writing instructors at the postsecondary level highly value punctuation and grammar more than high school instructors. Similarly, postsecondary math and science instructors rate a rigorous understanding of fundamental concepts to be much more beneficial than exposure to multiple content topics that high school instructors deem as most important. These findings clearly indicate that secondary and postsecondary institutions need to formulate joint programs which naturally allow for their instructors and their leaders to address the problems mentioned above.

In a recent report by Strong American Schools, (2008) entitled *Diploma to Nowhere*, a thorough examination of the lack of rigor in high schools and the ensuing result of college remediation is discussed. The report by Strong American Schools (2008) lists the following recommendations to ensure that the issue of high school student preparedness is addressed:

1. States, high schools and colleges need to collect better data and start reporting publicly the percentage of students receiving remediation.
2. Improve high school standards and instruction by challenging students with more rigor at the high school to ensure that students are prepared for college.
3. Boost accountability. Educators, parents, business leaders, and policymakers need to work together to create a more interconnected system which will provide common goals and benchmarks for student success to be prepared for college.
4. Enhance remediation by providing more support to remedial students. Much more support must be provided by colleges to ensure that remedial students can experience success in the postsecondary environment.

The Association of Career and Technical Education has also targeted reform for the high schools. Their position paper *Reinventing the American High School for the 21st Century* (ACTE, 2007) concluded that all students should graduate from high school fully prepared to participate in postsecondary education and the high-skilled workplace. College connected programming was an integral component of their models that they recommended for all high school graduates. Bragg (1997) and Grubb (1997) stressed the importance of the technical preparation (tech prep) which has articulation between high schools and community colleges both in technical instruction and the integrated academic areas. These programs are difficult to develop and implement between the various institutions but yield positive results when attention was paid to high academic standards (Bragg, 2001).

As this resurgence of reform at the high school level has surfaced in America, many states are aggressively moving to address these deficiencies according to Lerner and Brand (2006). The American Diploma Project Network is a coalition of 23 states actively working to align K-12 curriculum, assessments, and accountability with the demand of college and work. Twenty-two states have implemented the State Scholars Initiative which uses business leaders to motivate students toward completion of rigorous courses while in high school. The National Governors Association High School Honor Program supports 26 states as they emphasize improving graduation rates and better prepared college ready students. These efforts indicate that leaders are seeking to create programs which provide effective transitioning for all students. Lerner and Brand (2006) indicated that the high school reform agenda must seek to include an equal focus on making learning engaging, relevant, and connected to the future if students are going to be successful. Kirst (2004) concluded that United States high school students have higher aspirations for college than ever before in our

nation's history because parents, teacher, policymakers, and business leaders have stressed the importance of college in order to succeed. However, he also pointed out that students, parents, and educators are not receiving clear messages and programming which develop the skills necessary for high school students to enter and succeed in college (Kirst, 2004).

This push for rigor has not necessarily translated into more engaged learning and better connectivity to the adult world which motivates students and makes high school attractive for today's youth. Numerous types of programs have been developed to fill the gaps which are existent in today's educational system and better prepare students for the college environment.

High School and College Partnership Programs

The release of a publication by the Carnegie Commission on Higher Education (1971) entitled *Less Time, More Options* suggested tremendous changes in the United States system of higher education. This publication suggested that necessary changes were undergraduate education could be reduced by roughly one-fourth without sacrificing the quality of the four-year degree and college credit should be awarded for high school work. As a result, there was national attention for a more seamless approach between secondary and postsecondary education and policy-makers and leaders were challenged to examine these issues.

Blanchard (1971) indicated that a national survey of curriculum articulation found much overlap and duplication occurring between high school and college curriculum which suggested a waste of time and money within the system.

Kirst (2004) provided numerous recommended strategies which were a result of Stanford University's *Bridge Project*, a six year national study designed to take a look at how

high schools and colleges can improve upon becoming more connected. Kirst had this to say about the disconnect:

The current fractured systems send students, their parents, and K-12 educators conflicting and vague messages about what students need to know and be able to do to enter and succeed in college. For example, this research found that high school assessments often stress different knowledge and skills than do college entrance and placement requirements. Similarly, the coursework between high school and college is not connected; students graduate from high school under one set of standards and, three months later, are required to meet a whole new set of standards in college. Current data systems are not equipped to address student needs across systems, and no one is held accountable for issues related to student transitions from high school to college (p.51).

Kirst (2004) went on to offer the recommendations to improve the current situation which consist of the following:

- Examine how postsecondary placement exams and K-12 exit-level standards and assessments can become more compatible.
- Review postsecondary placement exams for more effectiveness.
- Enable high school students to take postsecondary placement exams during high school so they can become better prepared.
- Sequence general education courses and link them to appropriate senior-year courses.
- Create additional successful dual credit programs between high schools and colleges to include additional high school students.
- Create data collection standards at both secondary and postsecondary institutions and utilize them to connect the educational sectors.
- Create more funding to improve K-16 connectivity.

Secondary and postsecondary institutions must work together to bridge the gap which is existent between their systems for the benefit of students, parents, faculty and staff (Kirst, 2004). Several factors such as employer expectations, a concern about poorly prepared high school graduates, and movement for mass education have rendered previous secondary and postsecondary partnership efforts inadequate (Nunley, Shartle-Galotto, & Smith, 2000). A concerted effort by policymakers, educators, parents, and students is necessary to ensure that students are prepared adequately for college (Boswell, 2001). Increasingly community colleges throughout the nation are being called upon to cooperate with the K-12s to provide these opportunities to high school juniors and seniors (Boswell, 2001).

Researchers suggest the need to re-examine higher education and K-12s to establish partnerships which would provide less duplication and a smoother transition from secondary to post-secondary institutions (Adelman, 1999; Andrews, 2001; Bailey & Karp, 2003; Kirst & Venezia, 2004; Windham, 2003). As early as 1999, legislation in 22 states allowed for qualified students to participate in multiple forms of dual enrollment programming which enabled students to earn high school and college credit simultaneously (McCarthy, 1999). High school students have since been able to receive college credit through a variety of methods and at a variety of four year and two year institutions.

The College Ladder: Linking Secondary and Postsecondary Education for Success for All Students (2006) identified numerous methods from which high school students can receive college credit during high school. The report was very comprehensive and inclusive of a variety of models and program types offered in high schools and identified the term Secondary-Post-Secondary Learning Options (SPLOs). These include the following traditional methods of students receiving college credit at the high school level:

- *Advanced Placement (AP)*, AP is often considered a form of dual enrollment within the research. High school students take courses and they culminate in a nationwide exam which is scored. These courses are taught by AP trained teachers who follow AP curriculum.
- *International Baccalaureate (IB)*, IB is a demanding two-year pre-college program which leads to criterion referenced tests upon which credit is awarded. This college credit is accepted in numerous countries.
- *College Level Examination Program (CLEP)*, credit from this programming comes from examination upon entry to college. Students take an exam in a particular subject and receive a score which determines if credit is awarded.
- *Tech Prep*, tech prep is a series of courses offered to high school students which lead to a technical certificate or diploma. Funding for this programming comes under the Carl Perkins Act from the federal government.
- *Middle and early college high schools*, middle and early college high schools are usually located on or near a college campus and allow for students to complete both high school and college credits. Students graduate with a high school diploma and also college credit and they are encouraged to remain enrolled a fifth year and graduate with an associate's degree.
- *Dual enrollment*, dual enrollment programming allows for students to enroll in college level classes while still in high school. These programs can be located at the college or in the high schools.

Karp and Hughes (2008) have also identified high school credit programs and use the terminology of credit-based transition programs or (CBTPs) to refer to the programs created which allow for high school students to take college level classes and earn college credits while they are still in high school. Included are the familiar Tech Prep, dual credit, Advanced Placement (AP), International Baccalaureate (IB), and middle and early college high school programs. These programs can vary in features and are categorized in the following ways:

- *Enhanced Comprehensive*- similar to comprehensive programs which offer multiple sequential course offerings over a period of time but also provided for the students are a number of support services which address social, personal, and academic preparation necessary for college success.
- *Comprehensive*- programs which include multiple sequential course and program offerings over a period of semesters and even years for high school students.
- *Singleton*- elective college level courses which students select and receive credit for while in high school. They typically involve a student taking one course at a time during their regular school day and at the local high school.

Enhanced Comprehensive Programs

Middle and Early College High Schools are schools set up on the community college or university campus to provide multiple types of college credit programs (dual enrollment, Advanced Placement, International Baccalaureate, and tech prep) to high school students who are enrolled (Vargas, 2004). They provide support systems for students to be successful

and target populations who wouldn't otherwise have this opportunity if they were attending their assigned high schools. Learning takes place in small environments which have high achievement standards and demand quality college level work from the students (Vargas, 2004).

The Early College High School Initiative which started in 2002 is another example of involvement in dual credit programs which has recently surfaced. This initiative is funded by the Bill and Melinda Gates Foundation, the Carnegie Corporation of New York, the Ford Foundation, and the W.K. Kellogg Foundation. Initially they granted \$40 million to create 70 small schools which would blend secondary and postsecondary with the goal of moving low-income and poorly prepared students toward successful degree completion (Hoffman and Vargas, 2005). Currently the funding has reached \$120 million and 180 schools are under development. Early college high schools are schools where students complete high school with a diploma and also a two-year degree so they either have an associate degree or two years toward a bachelor's degree. Students from these schools have reported improved attendance, graduation rates, college transfer rates and improved employment rates (Palmer, 2000).

Comprehensive Programs

International Baccalaureate (IB) was established in 1968 and consists of a two year international curriculum taught by trained teachers (CEEP, 2006). The curriculum integrates critical thinking, intercultural studies, and an exposure to multiple perspectives while covering curriculum from six academic subject areas. Upon completion of the requirements,

student work and an external examination determine if students receive an IB diploma. Individual colleges have their own policies to determine issuance of credits based upon these IB exams. These programs typically provide academically accelerated students challenging opportunities which make widespread participation unlikely (Morest and Karp, 2006). These programs are also coming into focus recently because of the interest and emphasis from leaders who wish to examine more closely the effectiveness of educational systems in an attempt to better prepare high school students to be successful when entering college.

Tech Prep is a program which was originally designed to create better transition opportunities for students between high school and community colleges and it focused mainly on career and technical programs (Parnell, 1985). These programs begin with the last two years of high school and continue onto the next two years of college for students. The Perkins Act (1984) has allowed for funding which is intended to connect high schools to community colleges utilizing this model. Often referred to as the Carl D. Perkins Act, it authorizes federal funds to support vocational education programs in an attempt to improve the access of either those who have been underserved in the past or those who have greater-than-average educational needs. This program turned out to be the onset of dual enrollment for numerous states and colleges (Bragg, 2001). Federal funding was provided to initiate collaborative programs between local community colleges and high schools and the federal government hoped that sustainability would be the result when advanced levels of training and skill development took place in specialized career and technical areas which were not offered individually by the schools.

These Tech Prep programs were created with a goal to create curricular alignment between high school courses and college courses so high schools students could transition

seamlessly to college and enter into degree programs with advanced standing because of this curricular alignment during high school (Bragg, 2001). Students would complete these courses during high school and agreements would be previously worked out between the institutions so that the courses would “articulate”. This means the students would receive credit for the courses because of this articulation agreement and the student would have to be enrolled at the postsecondary institution for a length of time before the student would be given the college credit for the work done while in high school.

In an examination of eight Tech Prep consortia, students tended to not benefit from the articulated credit because the students were not aware of the agreement according to Bragg (2001). Articulation allowed for students to gain credit at the receiving institution only when they would attend there for at least a semester. These students also experienced difficulty in receiving credit when they attended colleges because these agreements were institution specific and the credits would not be accepted unless the students attended that specific college (Hughes, Karp, Bunting, & Friedel, 2005). These programs have enabled practitioners to establish partnerships which led to agreements in which high school students received credits in the career and technical areas (Bragg, 2001).

As these programs have transitioned into dual credit programs and away from articulated credits, there have been numerous students who have benefited from dual credits who would not otherwise have had the opportunity for college credits to be received while still in high school (Hughes, Karp, Bunting, & Friedel, 2005). This transition has allowed career and technical students to participate in college credit programming while still in high school.

Singleton Programs

AP, traditionally known as “advanced placement” is a program which offers students 35 courses across 20 subject areas taught by specially trained faculty in the high school setting (CEEP, 2006). Students have the opportunity to take a single AP course if they wish and at the end of the course they can take a standardized externally scored exam in which they receive a score from 1-5. Colleges then award credit based upon the scores received by the students on the exams. A three or above on the AP exam typically enables a student to receive college credit at the receiving institution according to each individual institution.

Dual enrollment, also known as “dual credit,” “concurrent enrollment,” and “joint enrollment,” alludes to the participation of high school students in college courses and the earning of college credits by the students (Kleiner and Lewis, 2005). This movement is viewed as providing high school students benefits such as wider access to more rigorous academic and technical courses, savings in time and college costs, promoting more efficiency in learning, and enhancing college admission and retention in college for these students according to Kleiner and Lewis (2005).

The dual credit movement is offering educational institutions a means to motivate their students during the end of their secondary school experience intending to provide successful transitioning to the next level (Andrews, 2001). A growing number of reformers, researchers, and policymakers suggest that middle and even low-achieving students may benefit from these types of programs which seek to bridge the gaps between high schools and colleges according to the National Commission on the High School Senior Year (2001). This is one of numerous strategies and program initiatives which are surfacing to address the

retention and success of students in the multitude of programs offered to students in community colleges.

Community colleges are increasingly participating in partnerships with high schools which allow high school students opportunities to enroll in college courses. These opportunities are usually called “dual credit” or “dual enrollment” programs and they enable students while still completing their high school education to also be enrolled for community college courses in a multitude of disciplines. Both two-year and four-year colleges partner to provide dual credit programming, though two-year colleges are more likely to be involved in dual credit programming connected with the high schools (Kleiner & Lewis, 2005).

Dual enrollment is a relatively new growth phenomenon in educational institutions and it has provided an expanded opportunity for students to experience access to a college education (Adelman, 1999). Bailey and Karp, (2003) also expressed that these programs provide an expansion of opportunities which allow for access to be more equitable as a result of this option for students.

Comprehensive Examination of Dual Credit Programs

This overview provides the framework for the creation of dual credit programming which is thought to have started in 1972 at Dekalb Community College in Illinois (Mabry, 1988). At about the same time, Syracuse University started a partnership with seven high schools in New York called Project Advance (Daly, 1985). Syracuse University was looking for a way to address the duplication of curriculum between the last two years of high school and the first two years of college. By 2001, about 4,000 students from more than 120 high schools in five states had enrolled in Syracuse’s Project Advance (Gehring, 2001). Teachers

in the high schools must meet Syracuse's academic requirements for adjunct faculty, and they must follow the same syllabi, use the same textbooks, and grade using the same criteria found in similar courses offered at the university. Syracuse has served as a model for other universities which include Indiana University, University of North Carolina, and the University of Pittsburg (Gehring, 2001).

LaGuardia Community College in New York established LaGuardia Middle College High School on their community college campus in 1974 which also was a major development of partnerships allowing students access to dual credit programming. This was a different model than that mentioned above because it was located on the college campus. Florida also created the Accelerated Mechanism Program in 1979, which is one of the oldest state-sponsored academic acceleration programs in the country (Hunt & Carroll, 2006). This program began shortly after the release of a publication by the Carnegie Commission on Higher Education (1971) titled *Less Time, More Options*.

Numerous states and colleges followed suit and began to develop, implement, and create statewide policies for dual credit programs which enabled a larger number of students to equitably experience dual credit opportunities in widespread curricular areas. Minnesota was one of the first states to create policy to enable statewide dual credit opportunities, (Boswell, 2001; Clark, 2001; Andrews 2000). Minnesota created a statewide policy in 1985 which was the Postsecondary Enrollment Options (PSEO) to provide high school juniors and seniors with challenging opportunities by enabling them to take college courses. Additional states followed Minnesota by enacting their own policies to create these opportunities for high school students. The Education Commission of the States (1998) identified twelve states which have comprehensive dual enrollment programs. These states are Colorado, Florida,

Georgia, Maine, Massachusetts, Michigan, Minnesota, New Jersey, Ohio, Utah, Washington, and Wisconsin. These states have adopted policies which allow students to pay little or no tuition, earn both high school and college credits, and encounter few course restrictions (McCarthy, 1999). Iowa legislated a moderately comprehensive program which only costs the students if they fail the course, sets limits on the tuition fees, and sets restrictions on eligible courses which can be taken by students. This programming is called the Postsecondary Enrollment Options Act (PSEO) in Iowa.

According to the United States Department of Education Office of Vocational and Adult Education, (2004) there are 42 states with dual enrollment policies and 18 of those mandate that dual enrollment opportunities be provided. The largest percentage (85%) of students who were enrolled in college credit in 2003 took dual credit coursework (NCES, 2003). NCES (2002) indicated that in the 12 month academic year, 2002-2003, 45% of high school students who received college credit received their credit only through dual enrollment programs and 40% of the students received their credits within dual credit programs and a combination of other programs. Only 15% of the students in 2003 received their credits outside of dual credit programs (NCES, 2002). High schools are required to inform students of these programs and they must also accept some credits earned in college toward their high school diploma. Colleges in these states must also allow high school students to enroll in their college courses. Many of the states are also requiring financial reporting on these programs annually to determine resource allocation to the colleges and the high schools in these partnerships.

Characteristics of Dual Credit Programs

Programs which allow for high school students to receive college credits throughout the country vary widely from state to state in their structure, course location, teacher requirements, student requirements, and their funding streams, (Bailey, Hughes, & Karp, 2002). According to the National Center of Education Statistics, (2005) during the 2003 school year there were 1.2 million high school students across the country enrolled in college credit courses. Of these students, 74% of them were high school students enrolled in courses in their high schools, 23% were in courses taught on the college campus, and 4% were taking distance education courses for college and high school credit simultaneously.

NCES (2002) reported among all institutions partnering with secondary institutions to deliver college credit for high school students, public two-year institutions had a greater percentage of high school students taking college level courses within dual credit programs than public four-year and private four-year institutions. (93 % versus 64% and 29 %, respectively). Public two-year institutions also had a greater number of students taking college level courses outside of dual enrollment programs than public four-year and private four-year institutions (63% versus 40%, and 18% respectively). According to NCES (2002), 77% of high school students received their college credit at two-year institutions, compared with 8% receiving their college credit at private four-year institutions, and 15% receiving their college credit at public four-year institutions. Overwhelmingly, this data indicate that dual credit programs are the main delivery system to college credit access for high school students (85%) and public two-year institutions are most involved in their delivery (77%).

Andrews (2000) revealed one of the main concerns expressed of faculty at the college was that these programs would not entice the students to take the courses the college offered

on campus. Andrews found the opposite to be true and that students enrolled at the community college when they realized the quality of their classes was high and the stigma attached to enrolling at a community college was reduced because of the experiences that dual credit students had during their high school years.

NCES (2002) also collected data regarding location of the dual credit course and whether the college courses were taught by college instructors only, high school instructors only, or by both. Among institutions with dual enrollment programs, 73% of the public 2-year institutions offered courses to high school students on the high school campus, compared to 47% for public four-year institutions, and 28% for private four-year institutions. Of the programs with courses taught on the high school campus, 26% were taught by college instructors only, 32% were taught by high school instructors only, and 42% reported they were taught by both college and high school instructors (NCES, 2002).

Open access institutions have formed numerous dual credit programs to benefit a wide range of students. However, concerns about rigor and quality have led many states to create minimum academic requirements for students to participate in the programs especially when the courses are transfer courses (Bailey, Hughes, & Karp, 2002). Some states base their entry upon high school grade point average, standardized test scores, and allow only juniors and seniors in high school (Boswell, 2001; Andrews, 2000). Florida, for example, is a state that sets one requirement for students taking academic courses (GPA of 3.0) and sets one for students taking technical courses (GPA of 2.0). All of the students must pass entry proficiency exams expected of any college entrants (Florida Community College System, 2000). Ohio uses grade point averages in the specific area that a student is taking the college

credit course so they do not exclude students who might be very strong in English but weaker in math (US Department of Education, 2004).

Program funding also varies within the dual credit programs and it has been a significant concern for states (US Department of Education, 2004). In seven states of the thirty that reported having dual credit policies regarding funding, the students themselves are required to pay tuition for the dual credit courses. Of the remaining twenty-three states, tuition was paid for by the state or by the institutions in 17, and the remaining six make it an institutional decision as to who pays the tuition; college, high school, or the student. Funding for dual credit programs varies widely and the funding streams to the colleges and the high schools based on average daily attendance (ADA) becomes very complicated from state to state (US Department of Education, 2004).

Dual Credit Support and Criticism

There has been much national concern about how to improve the senior year of high school and to create a more effective process of coordination between secondary and postsecondary institutions (Andrews, 2004). Dual credit programs have recently emerged as an answer to these concerns. Andrews (2004) went on to say that two of the main reasons that dual credit programs have surfaced was to improve the senior year of high school and to shorten the time to a degree. Numerous researchers (Andrews, 2004; Bailey, Hughes, & Karp, 2002; Bragg, 2001; Gehring, 2001; Vargas, 2004) identified several benefits of dual enrollment. These benefits include the following:

- Students gain high school and college credit simultaneously and are exposed to college during their high school educational experience.

- Dual credit programming provides more rigor to the high school curriculum which engages students and better prepares them to transition to college.
- Dual credit enriches curricular choices for students by increasing the availability of interesting and challenging courses.
- Dual enrollment provides the opportunity for students to transition to postsecondary institutions by becoming familiar with college earlier.
- Reduces the cost of college for students.
- Time to degree can be shortened.
- Courses are offered to a broader range of students than those who traditionally attend college.
- Provides a more seamless transition from high school to college.

This programming has gained momentum because it addresses the goals of two major trends in education: increasing the quality and rigor of the secondary offerings for students while attending high school, and strengthening the relationships and connectivity between the secondary and postsecondary educational sectors (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). Dual credit programming gives students the opportunity to experience their career ambitions and receive transcripts from a college while doing so. This experience allows students academic college experiences and career exploration as they transition from high school to college.

Adelman's recent work on college completion rates turns out to be very significant regarding dual credit programming and postsecondary retention. According to Adelman (2006), "less than 20 credits by the end of the first calendar year of enrollment (no matter in

what term one started, whether summer, fall, winter, or spring) is a serious drag on degree completion.” Adelman asserts that helping students get a head start on earning college credit while in high school is a positive move:

It is all the more reason to begin the transition process in high school with expanded dual enrollment programs offering true postsecondary coursework so that students enter higher education with a minimum of 6 additive credits to help them cross that 20-credit line. Six is good, nine is better, and 12 is a guarantee of momentum (p.20).

Adelman (1999) suggested that the strongest predictor of bachelor’s degree completion is the rigor and quality of the student’s high school curriculum. Dual credit programming provides students the opportunity to experience their career ambitions and college rigor while providing quality curricular offerings (Bailey, Hughes, & Karp, 2003). This allows students academic college experiences and career exploration as they transition from secondary to postsecondary which enriches their high school experience (Andrews, 2004). Students experience college courses and college culture during this period of time with an integrated level of support which is provided in partnership by the high school and the community college staff. Andrews (2000) stated that dual credit programs are one of the most effective ways for secondary and postsecondary institutions to develop relationships.

As these programs have developed through partnerships between secondary and post-secondary institutions in the United States, much support and governmental policies have been created to support their implementation as illustrated above. Even though there has been much support for the programming, Blair, (1999) pointed out the following:

- High school should be high school and students should not miss out on their relationships and high school years.
- Students are too young at this age for college level responsibility and work.
- Too many college classes can be a real burden and time commitment can be a problem when there is so much going on in high school.
- Dual credit programs delete the schools of top talent and leaders that the schools need.
- Lower level students are left out of dual credit program opportunities.

Dual Credit Effectiveness

Even though dual credit enrollments of secondary students at community colleges across the United States have been referred to as one of the largest movements in education at the start of the twenty-second century, there has been very little research to track these students within the post-secondary institutions (Marshall & Andrews, 2002). The research regarding the academic success and transitioning of students from dual credit programs is sparse (Orr, 2002). Many states and institutions have progressed in their attempt to provide legislation and procedures which insure quality dual credit educational opportunities for the students while also implementing measures to collect data on the students who participate. Much of the recent research has been exploring these state policies and dual credit program features and has been qualitative in nature (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007).

One of the earliest universities to begin dual credit programming was also one of the first to collect some research on their participants. Syracuse University's *Project Advance* was started in 1972 and is thought to be one of the pioneer university projects to provide dual

credit programming to area schools (Andrews, 2004). By 1999, Project Advance had reached over 120 high schools in five states. Numerous successes are reported of students who participated in the programming. Student success was listed as the following:

- 91% of graduates received recognition for the dual credits taken.
- 93% of the students reported a “B” average or above throughout their four years of college.
- 95% positively recommended the courses offered through the programming.

The City University of New York (CUNY) system currently runs dual credit programming called *College Now* through which students earn college credit. Students must be academically proficient to participate and when they are not they are required to take remedial coursework through the college (Bailey, Hughes, & Karp, 2002). Kleiman (2001) found that College Now participants were twice as likely to graduate from college on time and were also less likely to need remedial courses compared to those students who did not participate in the dual credit programming during high school.

Windham (2001) also studied the effectiveness of dual credit programs by examining student success in subsequent courses. She studied students who had taken credits from the Florida Community College System during high school and also examined if there was an impact upon student subsequent course grades if the dual credit course was taught by an instructor employed by the high school or by the college. She also studied the transferability of the dual credit courses by examining if the students had to repeat courses they had taken as dual credit students during high school. For purposes of the study, only students in the most popular courses were used. These included the following: American History, Biology,

Composition, European History, Humanities, Pre-Calculus, and Political Science. A student was considered successful if they completed the course with a grade of a “C” or better.

Of the 11,857 students within the study, 9,135 or 77% completed the subsequent course successfully. These students were then analyzed to determine if there was any difference in the success of the students as determined by dual credit courses taught by high school teachers or another teacher employed by the college. The analysis indicated no significant difference between the two groups. When taught by a high school instructor the success was 77.16% and when taught by another instructor the success was 76.98% in subsequent courses. This study indicated the performance of dual credit students in subsequent courses was not related to the employment of the instructor of the dual enrollment courses taken previously by the students.

Windham (2001) concluded that only 3% of the students actually repeated the course once enrolled in college. While she found that some of the students repeated to improve their dual credit grade, she also found that some students who had good performance in the dual credit course also repeated. This indicated colleges in the state of Florida requiring some unnecessary coursework for students.

Marshall and Andrews (2002) reported results in three important areas as they surveyed students who had participated in dual credit programming between Illinois Valley Community College (IVCC) and Marquette High School which was a participating secondary school district within its service area. Courses offered in the programming to the Marquette students were all transfer courses in History, Philosophy, English I and II, Sociology, Psychology, Music, and Art Appreciation which were general education courses at the community college and also other colleges and universities in Illinois. Graduates who

participated in the programming averaged 18 semester hours of college credit and described the program as meaningful and helpful to prepare for future college level work. Marshall and Andrews found the following:

- *College Impressions Improved.* High school students prior to enrollment at Illinois Valley Community College (IVCC) rated the college “average”; 2.9 on a 5 point scale. After participation in dual credit programs and graduating from high school the students’ ranking improved to 4.2.
- *Positive Student Comments.* Students responded that they had strong academic challenges, good college experiences while still in high school and they valued the college credit because they could graduate early.
- *Grading and student performance.* High school student grade distribution from the Marquette High School students was comparable to on-campus grade distribution for similar classes.

Research in Kentucky’s Community College System (KCCS) pertaining to dual credit courses was completed by Welsh, Brake, and Choi (2005). These researchers set out to determine which predictor variables; (1) student performance in high school, (2) gender, (3) residence, (4) ethnicity, and, (5) socio-economic status, have an impact on measures of student success and participation including; (1) credits earned in dual credit programs, (2) deficient credits in dual credit courses, and (3) cumulative grade point average in dual credit courses. These predictor variables were chosen because of the state’s goal to increase dual credit enrollments and increase the diversity of the students participating in the programming. The researchers found that gender and residence were the only two predictor

variables with significant beta weights on all three criterion variables. Neither of these was a powerful predictor of total credits earned by dual credit students. Also the data demonstrated that ACT English and math subtests were the most powerful predictors of deficient credits and cumulative credits in dual credit courses. The researchers concluded in the state of Kentucky that high school performance is the most important factor in student success and enrollment in dual credit courses and demographic characteristics also play an important role in the performance of students (Welsh, Brake, & Choi, 2005).

Current research indicates there is evidence that students find the programming useful to prepare them for college (Bailey, Hughes, & Karp, 2002). It may motivate them to take more rigorous curricular offerings, provide them clear guidelines about college preparation, enable them to get acclimated to college, and begin their college careers early to avoid duplication of courses and accumulate college credits while still in high school (Andrews, 2004; Orr, 1999; Windham, 2001; Welsh, Brake, & Choi, 2005).

Despite the popularity of dual credit programming, there is little research on the success of dual credit students who are tracked throughout their high school and into their college careers to determine the success of their experience (Bailey, Hughes, & Karp, 2002). Students who begin their postsecondary education while still enrolled in high school and then enroll at a two-year college have not been researched extensively.

Summary

The importance of this study of dual credit opportunities has been addressed in this review of literature. This chapter began by examining current retention research specifically focusing on student characteristics developed previous to college full-time enrollment. Researchers have categorized these experiences that students bring with them to the college as “pre-entry attributes” (Tinto, 1993), “pre-college traits” (Pascarella & Terenzini, 1991), and “input” (Astin, 1997) and all stressed the importance of these experiences for students during their high school careers.

Historically, high school reform efforts have also initiated discussion on the importance of secondary schools to partner with postsecondary institutions with a focus on partnerships which better prepare students to succeed. Numerous efforts call for a more “seamless transition” between secondary and post-secondary institutions which create programs and provide students additional experiences during their “pre-college” experience and also help students graduate from high school. Barton (2005) indicated alarmingly that only 70% of students nationally graduate from our countries high schools. 42% entering community colleges and 20% entering four-year colleges are in need of developmental courses (NCES, 2004). Much of the reform literature focused on the need to more closely examine the high schools specifically targeting the senior year to more effectively enable students to be successful as they enter post-secondary institutions.

College credit programs have been in existence in many forms for high school students since the 1970s and increasingly, credit has been issued to high school students throughout the twentieth century through a variety of methods through two-year and four-

year institutions. The most prolific form of this programming has been referred to as “dual credit” programming.

Literature regarding dual credit programs has focused on how these programs have developed and evolved over the years to become what they are today. Much emphasis has centered on the historical development of these programs and how they have emerged to fulfill numerous goals which center on successful transitioning of students from high school to college. Existing research on dual credit programming is documentation of the recent expansion and development of these programs across the United States and often documents practices which are existent in numerous states. It identifies effective models and integral components which are existent within these programs and establishes common practices and policies which have resulted from this development and there is much need to study the success of the students who participate in these programs to determine the effectiveness of the dual credit programs.

In summary, the review of the literature clearly identified the need to study the effectiveness of dual credit programming as a means to provide a more seamless transition for student success. It is imperative to study these students participating in these collaborative partnerships and collect data which will further guide existing programs and help newly developing programs across the nation. Understanding dual credit programs more thoroughly will assist all leaders to create an environment which improves the success for all students.

CHAPTER 3. METHODOLOGY

The preceding chapter addressed relevant retention models and research, and provided an overview of dual credit enrollment including the history, framework, and relevant research. The purpose of this study was to determine if the dual credit students enrolled at DMACC as prospective STEM transfer students experienced success at the same level as non-dual credit students. The study tracked students over a five year period from 2003-2007 who were first time full time students at DMACC. The dual credit students within the study had previously taken at least one of the following courses during their high school enrollment: (English 117, English 118, Math 121, Math 129). A quantitative analysis was used in this research to determine if there were any significant differences in within-term course retention, academic success of students to 24 credit hours within a two year period, academic background of the students, and the impact of these variables upon student success. Success of the dual credit students was the criterion variable or dependent variable of the study.

This chapter describes the methodology used to compare DMACC's dual credit population who had previously completed math and/or English courses with non-dual credit students. This study delimits the population as the dual credit students and subsequent first time full time enrollees from DMACC's service area of eleven counties. The chapter was broken into the following areas: (1) Study Population; (2) Research Questions; (3) Hypotheses; (4) Research Design; (5) Data Collection; and (6) Data Analysis.

Study Population

This study focused only on the dual credit population in Des Moines Area Community College's service area and subsequent first time full time enrollees at DMACC. The rationale for this narrow focus was threefold. First, DMACC has the highest number of high school students participating in dual credit programming in the state of Iowa which allows for more statistically robust results of the analysis. Secondly, enrollees at DMACC encompassed a wide spectrum of students who sought to complete programs in the arts and sciences for transfer purpose. Finally, reliable data were available at DMACC regarding dual credit students.

Students included in this study were dual credit students and non-dual credit students who entered DMACC after high school graduation from DMACC's eleven county service. These dual credit students were identified as Associate of Arts degree students who had previously completed courses in Math 121, 129 and English 117 and 118. These courses are Finite Math, Calculus, and Composition 1 and 2. The non-dual credit students entered DMACC as Associate of Arts students as first time full time students out of high school. There were 1,069 students served by DMACC who met the criteria for this study. These students were enrolled as students attending any number of DMACC campuses or attending through online enrollment. DMACC campuses include the following: Ankeny, Boone, Carroll, Newton, Urban, and West campus. Students also may have attended classes offered at DMACC's Hunziker Center or Success Center which offer classes but are not recognized as campuses.

Students included in the study took dual credit courses and then enrolled at DMACC during the 2003, 2004, and 2005 school years were tracked through 2007 to determine if they

had achieved success defined as 24 credits within two years with a 2.0 GPA. Students received their credits while enrolled as high school students and were enrolled in dual credit courses at a high school facility or college campus to attend courses set up in partnership with local high schools through DMACC's Career Advantage dual credit program.

These students were identified by their status codes in the college's Management Information System (MIS). Internal records kept by the college's Program Development Department were also used to supplement the MIS data to ensure reliability. Transcript data were used from DMACC which included academic and demographic information of the dual credit students.

Dual and non-dual students were analyzed in the following areas: (1) gender; (2) minority student status; and (3) Pell grant eligibility. These predictor variables or independent variables were used throughout the research. This study compared transition success in subsequent courses of dual credit students and non-dual credit students utilizing the predictor or independent variables of the study.

Research Questions

1. What are the characteristics of non-dual credit students entering DMACC and dual credit students entering DMACC who had previously completed math and/or English courses as high school students in partnership programs specifically examined by gender, race, age and Pell eligibility?
2. What is the within-term course retention during the first semester of non-dual credit students entering DMACC and dual credit students entering DMACC who had

- previously completed math and/or English courses as high school students in partnership programs specifically examined by gender, race, and Pell eligibility?
3. What is the academic performance defined as completion of 24 credits within two years with at least a 2.0 GPA, of dual credit students who had previously completed math and/or English courses as high school students in partnership specifically examining gender, minority status, and Pell eligibility?
 4. What is the academic performance defined as completion of 24 credits within two years with at least a 2.0 GPA among non-dual credit students entering DMACC specifically examining gender, minority status, and Pell eligibility?
 5. Are there statistically significant differences in academic performance between dual credit and non-dual credit students specifically examining ACTE, ACTM, and 1st semester GPA?
 6. Does participation in dual credit programs at the high school level in math and/or English courses help predict student success measured by successful completion of 24 Associate of Arts Degree credits?

Hypotheses

The following null hypotheses and alternate hypotheses were formulated and guided this research:

1. The within-term course retention for dual credit students is significantly less than within-term course retention of non-dual credit students at DMACC when examined by gender, race and Pell grant eligibility.

- H₀₁ No difference exists in the within-term course retention rates between male dual credit students and non-dual credit students at DMACC.
- H₀₂ No difference exists in the within-term course retention rates between female dual credit students and non-dual credit students at DMACC.
- H₀₃ No difference exists in the within-term course retention rates between white dual credit students and non-dual credit students at DMACC.
- H₀₄ No difference exists in the within-term course retention rates between minority dual credit students and non-dual credit students at DMACC.
- H₀₅ No difference exists in the within-term course retention rates between Pell eligible dual credit students and non-dual credit students at DMACC.
- H₀₆ No difference exists in the within-term course retention rates between non-Pell eligible dual credit students and non-dual credit students at DMACC.
2. DMACC serves a lower percentage of dual credit students successfully completing 24 credits than it does the non-dual population attending DMACC.
- H₀ No difference exists between dual credit students and non-dual credit students successfully completing 24 credits at DMACC.
3. DMACC serves a lower percentage of dual credit students successfully completing 24 credits at DMACC than it does non-dual credit students attending DMACC when examined by gender.
- H₀ No difference exists between percentages of dual credit students and non-dual credit students successfully completing 24 credits at DMACC when examined by gender.

4. DMACC serves a lower percentage of dual credit minority students successfully completing 24 credits at DMACC than it does non-dual credit minority students successfully completing 24 credits at DMACC.

H_0 No difference exists between percentages of minority dual credit students and minority non-dual credit students successfully completing 24 credits at DMACC.

5. DMACC serves a lower percentage of dual credit students successfully completing 24 credits at DMACC than it does non-dual credit students attending DMACC when examined by Pell grant eligibility.

H_0 No difference exists between percentages of dual credit students and non-dual credit students successfully completing 24 credits at DMACC when examined by Pell grant eligibility.

6. There are statistically significant differences in ACT English scores between dual credit and non-dual credit students specifically examining ACTE.

H_0 No significant differences exist in ACT English scores between dual and non-dual credit students.

7. There are statistically significant differences in ACT math scores between dual credit and non-dual credit students.

H_0 No significant differences exist in ACT math scores between dual and non-dual credit students.

8. There are statistically significant differences in first semester GPA between dual credit and non-dual credit students.

H_0 No significant differences exist in first semester GPA between dual and non-dual credit students.

9. There are significant differences in rates of success defined as having earned 24 credits with a GPA of at least 2.0 within two years at DMACC, when examining factors of dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPAs, individually and collectively.

H₀ There are no significant differences in rates of success, defined as having earned 24 credits with a GPA of at least 2.0 within two years at DMACC, when examining factors of dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, DMACC math and English, and 1st semester GPAs, individually and collectively.

Research Design

The research design of this study utilized a sequential strategy to collect quantitative data. Quantitative methodology was used for this research which utilized post-positivist claims of reduction of specific variables, hypotheses, and questions to test the theories explored within the literature review (Creswell, 2003). This approach challenges the traditional notion of absolute truth as it relates to knowledge and recognizes that researchers cannot be sure or positive about knowledge claims when studying the behaviors and patterns of human beings (Phillips & Burbules, 2000).

Throughout the study a post-positivist perspective was utilized to examine the previously mentioned research questions using a quantitative research design. This post-positivist approach proposes that scientific inquiry is the primary method of collecting knowledge about phenomena (Creswell, 2003). Creswell goes on to indicate that a post-positivist research approach is one that seeks to examine the causes which are thought to

influence the outcomes in a particular situation. The quantitative researcher also seeks to reduce the ideas into a set of ideas to examine and example of this is variables which constitute hypotheses and research questions. Within this study numerous research questions and hypotheses were developed to study the behavior of dual and non-dual credit students as they attended DMACC as first time full time students. The numerical collection of observations to study the students' behaviors took place within the research. Creswell (2003) indicates that the research approach of a post-positivist is to begin with a theory, collect data that supports or rejects, and make changes based on the knowledge.

Creswell (2003) identifies the following assumptions of a post-positivist approach to research:

- Research evidence is imperfect and fallible and absolute truth cannot be attained.
- Rational consideration, data, and evidence from observations shape knowledge. Knowledge is derived from observation and that inferences can be formulated based on the observations within the study.
- Another assumption of quantitative research is that it can be applied to explain why certain conditions exist or why changes take place. These assumptions are researcher's attempt to explain a cause and effect relationship.
- Research seeks to seek to explain the situations in the causal relationships with true and relevant statements.
- Objectivity in the research is crucial to the research.

- Post-positivist research is the process of continually making claims and revisions based upon findings and building upon research so usually quantitative research typically starts with testing a theory.

For the purpose of the study, this 2003-2005 population of dual and non-dual students was the sample for the purpose of generalizing about the overall population of DMACC of other cohorts of first time full time dual and non-dual student cohort student groups entering DMACC right out of high school (Compton, 2008). Analyses results from these groups allowed for generalizations to be made about students enrolled at DMACC during other academic years.

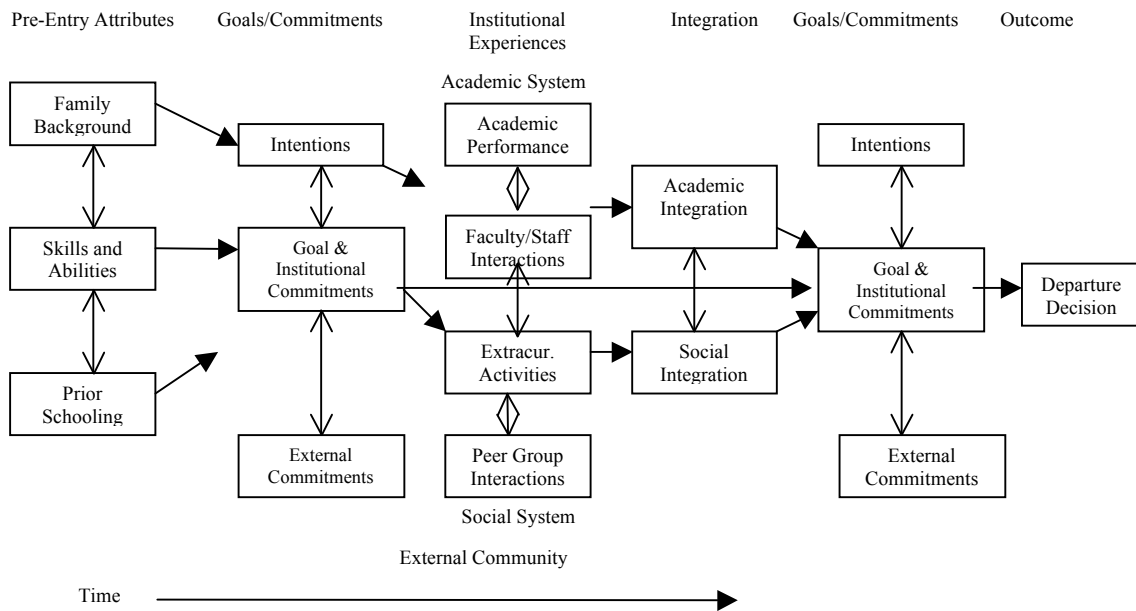
Theoretical Approach

The theoretical framework for the study drew from Tinto's Social and Academic Integration Model of Retention. The predominant aspect of the theoretical framework regarding this research has been the consideration of dual credit math and English curriculum as the "pre-entry attributes" that high school students have experienced according to Tinto's Model (1993). This model indicates that student's experiences during high school have an impact upon their success in college and the experiences help students toward degree completion (Tinto, 1993).

Tinto (1993) laid out, in his model of institutional departure (Figure 2.1), a variety of attributes with which a student enters into the postsecondary institution and begins his/her educational experience. He identified the "pre-entry attributes" of college students and established three categories of family background, individual attributes, and pre-college

schooling. Family background attributes include social status attributes, value attributes, and expectation climates. Skills and abilities associated with the student include gender, race, and ability. Prior schooling encompasses such areas as grade-point averages, courses experienced, and academic and social attainment that a student has experienced prior to the post-secondary college experience. The main focus of this research was to examine the pre-

Figure 3.1 Tinto's Academic/Social Integration Model (1993, p. 114.)



college schooling experiences impact upon success of these dual credit students in the areas of math and English compared with non-dual credit students. They were first time students who attended DMACC full time and were examined specifically by gender, race, pell status, ACTE, and ACTM scores, and curriculum experienced to determine the impact upon students success measured within the study. These “pre-entry attributes of Tinto’s model are

brought to the institution by the students and help determine the success of the students as they pursue their post-secondary education (Tinto, 1993).

Figure 3.1 provides a conceptual view of Tinto's Academic and Social Integration Model of Retention (Tinto, 1993). The pre-entry attributes analyzed within this study included curriculum and academic backgrounds of the students while they attended secondary schools in their educational experiences. Tinto (1993) theorizes that positive student pre-entry attributes presumably lead to greater student integration and thus to persistence. The underlying basis of Tinto's theory of these "pre-entry attributes" is similar to Pascarella's (1991) "pre-college traits" and Astin's (1997) "involvement".

The purpose of the study was also to determine what variables determine success identified as completion of 24 credits within two years with a minimum GPA of 2.0. The research of Hagedorn and Adelman were utilized to more closely examine community college research and attributes affiliated with the students. Transcript analyses was utilized to examine within term retention, success to 24 credits, curriculum, and 1st semester college GPA (Adelman, 2006; Hagedorn, 2005). Additional high school reform research focusing on "seamless transitioning" was also examined to frame the dual credit research (ACT, 2008; Andrews, 2004; Boswell, 2000; Boyer, 1983. *A Nation at Risk*, (1983) was one of the earlier reports which recommended drastic reform measures for America's educational institutions. The dual credit research of Karp, Andrews, Bailey and others examined the benefits of dual credit programming as providing rigorous high school curriculum and good connectivity between the institutions of the secondary and postsecondary.

This research operationalized these theoretical frameworks by tracking the student's success as they enrolled as first time full time students at DMACC. The unit of analysis was

the student who was enrolled as a dual enrolled student during their high school experience and then enrolled at DMAACC after high school graduation. The two groups of students, dual credit and non-dual credit, were examined to gain an understanding of how the two groups compared when examining percentages by gender, ethnicity, age, and Pell eligibility. This provided demographic information on the groups for the research. Numerous types of tests were then utilized to examine the students within the study. Firstly, the research examined these students based on course retention. All of the students in the sample were dual credit and non-dual credit students who subsequently enrolled at Des Moines Area Community College. Because the data were not normally distributed a nonparametric Wilcoxon Z approximation was used to examine the retention of students specifically by gender, minority status, and Pell eligibility.

Secondly, the Chi-square test was used to examine the success of the dual credit students and non-dual credit students at DMAACC with success defined as completion of at least 24 credit hours within two years with a GPA greater than 2.0. This study compared frequencies from DMAACC's dual credit students with frequencies from DMAACC's non-dual credit students entering college after completion from high school. These students were successful students analyzed by dual credit status, gender, minority status, and Pell eligibility status. The Chi-square test was used because the variables to be examined were nominal. The proportions for the observed and expected frequency results between these groups should show no significant statistical difference according to the null hypothesis established for the dual and non-dual groups. Secondary data available on these students were utilized for the purpose of this study and the setting was Des Moines Area Community College. The success of the students was the dependent variable in the study and it was examined by

taking a look at the success of dual credit and non-dual credit students as they took subsequent courses in the identified areas of arts and sciences.

The third analysis sought to determine if there were significant differences in ACT math and English scores and first semester GPAs of the dual credit and non-dual credit students involved in the study. Because the frequencies were normally distributed a standard t-test was utilized for this section of the study. According to the null hypotheses no significant statistical differences should exist in ACTE, ACTM and first semester GPA between dual and non-dual credit students.

The final analysis utilized a sequential logistic regression model to determine the impact upon success of the students when examining the factors of dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, and 1st semester GPAs. A forward selection procedure was utilized for the variables in the logistic regression model. According to the null hypothesis, there are no significant differences in rates of success, defined as having earned 24 credits with a GPA of at least 2.0 within two years at DMACC, when examining factors of dual credit status, gender, race, Pell grant eligibility, DMACC English, DMACC math, ACTE, ACTM, and 1st semester GPAs.

Data Collection

The data collection consisted of multiple data sets which were necessary to provide information to answer questions of the study and collection took place at the end of the fall term 2008 from the MIS system at DMACC. The first question: What are the characteristics of dual credit and non-dual credit students entering DMACC as first time full time students

specifically examining them by gender, ethnicity, age, and Pell eligibility? Descriptive statistics were collected to examine these students in these categories.

The second question was: Are there significant differences in the success of dual credit students and non-dual credit students measured by 1st semester course retention after transfer from their local high school to DMACC? One set of data was retrieved from the administrative database, SCT Banner, and the Office of Institutional Research at DMACC. Data collection took place at the end of the fall term in 2008 and included the number of courses dropped by dual credit students who had taken math and English dual credit courses within the 2003-2007 period of time compared to the non-credit students. An analysis was completed of student within-term course retention of full time students attending DMACC in any term and within-term retention was defined by whether a student withdrew from a course. Completion of a class included those students earning an F grade in the course. This analysis examined within-term course retention by gender, race, and Pell grant eligibility. DMACC requires students to indicate one of five races: White, Black, Asian, Hispanic, or Native American. The analysis examined the White students and categorized the rest as minority students because of the small numbers in these categories.

The third question was: Are there significant differences in the success of dual credit students and non-dual credit students measured by successfully completing 24 credits at DMACC. An analysis of DMACC's dual credit students who had completed math and English courses and non-dual credit students who had attended DMACC right out of high school was conducted to answer the first set of questions regarding success of this group of students. Data collection consisted of the following: frequency of dual credit students who were successful defined as achieving more than 24 credits within two years at DMACC with

a GPA greater than or equal to 2.0 compared to regular non-dual credit students attending DMACC. Successful students were also examined by gender, ethnicity, and Pell eligibility.

The next question was: Are there statistically significant differences in dual credit students and non-dual credit students specifically examining ACTE, ACTM, and first semester GPA. One set of data was retrieved from the administrative database, SCT Banner, and the Office of Institutional Research at DMACC which included ACTE, ACTM, and first semester GPAs of the students within the study. Each of the questions will generate a different set of data to be utilized to answer the question. To accurately answer these research questions, the analysis focused upon DMACC's enrollment of dual credit students and non-dual credit students from 2003-2005.

The final analysis considered the impact on student success when examining the following variables: dual credit math, dual credit English, race, Pell grant eligibility, gender, DMACC English, DMACC math, ACTM, ACTE, and first semester GPAs in subsequent courses. Data collection will include the enrollment of students while they were post-high school graduation and continuing to take DMACC courses. The data was retrieved from the institutional administrative database, Banner, and the Institutional Research Office at DMACC. The analysis will examine the impact independently and collectively of the variables upon successful completion of 24 credits at DMACC.

Data Analysis

Quantitative statistical analysis was utilized for this research study. Descriptive statistics were gathered to provide information describing the population included within the study. Assumptions were adhered to within the analyses to make valid interpretations of the

data. These included the following: all students during the time period were included in the analysis; students included in the analysis only indicated one gender, race, pell status or dual status; all were actual observations of students in the groups identified; and the cell sizes were not less than five with one degree of freedom. Analysis of dual credit student and non-dual credit student within-term course retention, specifically examining them by gender, race, and Pell eligibility, was the next analysis of the study. A nonparametric Wilcoxon Z approximation was used instead of a t-test because the data was not normally distributed. This allowed examination of the mean course retention rates of the dual credit students and the non-dual credit students identified in the study. All students during the time period studied were included in the study and had only indicated one gender, race, and pell status.

The third data analysis set out to determine if the populations were different and it utilized chi-square tests to do that. It examined if there was a difference in success to 24 credit hours at DMACC within two years with at least a 2.0 GPA of the dual credit students and non-dual credit students specifically examining them by gender, race, and Pell eligibility. This analysis was used to determine if there was a significant difference in the success of dual credit students compared to non-dual credit students. The study also analyzed the successful students to 24 credits by gender, minority status, and Pell eligibility.

The chi-square distribution was the non-parametric test used to determine if there was any association between the distributions of two categorical variables of dual credit students and non-dual credit students. The analysis was conducted to evaluate hypotheses about the proportions or relationships of students who experienced success in subsequent courses were the same for both dual credit students and non-dual credit students. The study compares expected frequencies from non-dual credit students with frequencies from dual credit

students attending DMACC. The proportions for the expected results between the group of non-dual credit students and the group of dual credit students should show no statistical difference according to the null hypothesis. The analysis of these students studied over this period of time was conducted using a significance level of $p=0.05$. The analysis determined whether the proportions of success were the same for dual credit students and non-dual credit students in attendance at DMACC and then examined the successful students by gender, minority status, and Pell eligibility.

The next analysis of the study was to determine if any significant statistical difference existed between the dual credit students and the non-dual credit students when examining ACTE, ACTM, and their 1st semester GPAs when attending DMACC as full time students. Because these results were normally distributed a standard t-test was used. The p-value for when variances are equal was used in this analysis because the p-value for equity of variables was above .05. When this value was at or below .05 the Unequal Satterthwaite value was utilized.

A multivariate statistical method, sequential logistic regression analysis was used to answer the questions regarding which predictor variables most effectively predicted success for dual credit students who had taken math and English dual credit courses and non-dual credit students. Race, gender, Pell grant eligibility, ACT scores, area of dual credits earned, DMACC English, DMACC math, and GPA in subsequent courses were the variables analyzed simultaneously and collectively to draw conclusions and offer explanations about the research questions. Logistic regression is useful when the distribution for the responses for the dependent variable is expected to be nonlinear and when an individual is expected to fall into one category (e.g. successful) or another (e.g. unsuccessful) (Tabachnick and Fidell,

2007). Logistic regression was used for the research questions in this study to estimate the odds probability of the dependent variables (subsequent course success) occurring as the values of the independent variables change.

CHAPTER 4. RESULTS

The purpose of this study was to determine if dual credit students enrolled at DMACC as first time full time students experienced success at the same rate as non-dual credit students. This chapter provides the results of the analyses of data gathered in this study of dual credits students and non-dual credit students who entered Des Moines Area Community College from 2003-2005. These students were examined as prospective transfer students at DMACC. The study examined the characteristics of dual credit students and non-dual credit students who enrolled as first time full time students at DMACC in STEM related courses. Multiple analyses were utilized to examine the students' retention, academic success, academic backgrounds, specifically examining whether dual credit students experienced success at the same level as non-dual credit students.

Within-term course retention was examined and analyzed according to gender, race, and Pell grant eligibility. Dual credit students and non-dual credit students were also examined to determine if there was any difference in successfully completing 24 credit hours within a two year period of time with at least a 2.0 GPA specifically examining gender, minority status, and Pell eligibility. An analysis to determine if there was any significant statistical difference between the dual credit students and the non-dual credit students specifically examining ACTE, ACTM, and first semester GPA will also be conducted. The final purpose of the study was to determine the impact of the variables both individually and collectively upon student success as defined as achievement of 24 credit hours within two years with at least a 2.0 GPA.

The objective of the study was to examine the two groups of students, and compare within-term course retentions, academic success, and academic backgrounds of dual credit and non-dual credit students at DMACC to determine if there were any significant differences between them. The students were compared on the dual credit status, minority student status, gender, Pell grant eligibility, ACTE, ACTM, and 1st semester GPA,.

Specifically the study determined if dual credit students:

1. Had similar demographic characteristics as non-dual credit students at DMACC when examined by gender, minority status, and age and Pell eligibility.
2. Were more or less likely than non-dual credit students to have had higher within-term course retention at DMACC during their first semester.
3. Were more or less likely than non-dual credit students to succeed defined as receiving 24 credits within a two year period of time at DMACC having earned at least a cumulative GPA => 2.00.
4. Were more or less likely to have had statistically significant different ACTE, ACTM, and 1st semester GPAs than non-dual credit students.

DMACC cooperates with area high schools to track the enrollment of high school students attending the community college upon transfer and for subsequent terms of enrollment, however there exists no data which analyzes how the dual credit students perform after transitioning from the area high schools. This study analyzed the data of high school dual credit student retention, success and background at DMACC as full time students and the impact of variables upon their success.

Introduction

The Statistical Analysis System (SAS) was used for the data analysis and interpretation within this study. This study examined the student demographics, within-term course retention during the 1st semester, success, and impact of variables upon success of dual credit and non-dual credit students attending DMACC as full time students. In each of the research questions the data was examined by gender, minority status, and Pell grant eligibility. The number of American Indian, Asian, Black and Hispanic students as dual credit students and non-dual credit students was too low to apply any statistical analysis so the groups were combined to form the minority group utilized within the study. Descriptive statistics consisted of frequency of dual credit students and dual credits students compared by gender, minority status, and Pell eligibility.

Retention statistics of dual credit students and non-dual credit students were examined next within the study specifically examining them by gender, race, and Pell eligibility. A nonparametric Wilcoxon Z approximation was used in this within-term course retention analysis. This analysis examined six hypotheses based on retention of dual and non-dual students within their first semester enrolled full time at DMACC.

The academic success analysis utilized the chi-square non-parametric test to determine if there was any association between the distributions of two categorical variables of dual credit students and non-dual credit students. The analysis was conducted to evaluate hypotheses about the proportions or relationships of students who experienced success in subsequent courses. These were the same for both dual credit students and non-dual credit students. Academic background analyses utilized t-tests to compare dual credit students' and non-dual credit students' ACTE, ACTM, and their 1st semester GPAs. Finally, a logistic

regression analysis was used which allows an estimation of success, for each of the independent variables based on the actual success and characteristics of the students in the study.

Research Question 1-Demographic Data of Study Participants

The first research question examined characteristics of the population of dual credit students and non-dual credit students at DMACC enrolled as first time full-time students. They were examined by gender, minority status, age and Pell eligibility. Dual credit students who completed the criteria of having taken any math and/or English credit courses as a dual credit student in high school and then transitioned to DMACC between the years of 2003 through 2005 were included in the study. Non-dual credit students included were those students who went straight to DMACC from high school and enrolled as first time, full-time students. The students were analyzed specifically by gender, race, age and Pell eligibility. Tables 4.1 and 4.2 represent the demographic data affiliated with the study and provide information about the participants within the study. This data are intended to show the size of the groups utilized for the study. These tables will provide a general overview of the number of students affected as issues are identified within the study.

Table 4.1 represents the total number of dual credit students attending DMACC as first time full-time students ($n=71$) who had completed at least one course in the area of math and/or English, and Table 4.2 represents the number of non-dual credit students ($n= 996$) attending DMACC as first time full-time students from 2003 through 2005. This data are intended to show the size of the groups utilized for the study.

Table 4.1 Demographics of dual credit students who completed courses in areas of math and/or English, (FY 2003-2005)

Variable	N =71	Frequencies		Percentage	
		Male	Female	Male	Female
<i>Gender</i>		40	31	56.3	43.7
<i>Race/Ethnicity</i>					
White		35	27	49.3	38.1
Black		0	2	0.0	2.8
Hispanic		1	1	1.4	1.4
Asian		1	0	1.4	0.0
American Indian		0	0	0.0	0.0
Unknown		3	1	4.2	1.4
<i>Age</i>					
17		1	2	1.4	2.8
18		29	22	40.8	31.0
19		10	7	14.1	9.9
<i>Pell Status</i>					
Eligible		4	6	5.6	8.5
Not Eligible		36	25	50.7	35.2

Table 4.2 Demographics of non-dual credit students, (FY 2003-2005)

Variable	N =996	Frequencies		Percentage	
		Male	Female	Male	Female
<i>Gender</i>		526	470	52.8	47.3
<i>Race/Ethnicity</i>					
White		481	423	48.3	42.6
Black		0	2	0.0	0.2
Hispanic		3	8	0.3	0.8
Asian		4	5	0.4	0.5
American Indian		1	4	0.1	0.4
Unknown		37	28	3.7	2.8
<i>Age</i>					
17		10	22	1.0	2.3
18		346	326	34.7	32.7
19		170	122	17.1	12.3
<i>Pell Status</i>					
Eligible		77	114	7.7	11.5
Not Eligible		449	356	45.1	35.8

Gender

The majority of the dual credit students involved in the study were male ($n=40$, 56.3%), while just under one-half ($n=31$, 43.7%) of the dual credit students were female. The non-dual credit student group was also predominantly male ($n=526$, 53%), while the female non-dual credit representation was just under one-half ($n=470$, 47.3%) of the group.

Race/Ethnicity

The majority of both groups were white when examined by race/ethnicity. Whites made up 87.3% of the dual credit group and 90.9% of the non-dual credit group. White males represented the largest segment ($n=35$, 49.3%) of dual credit students, and also the largest segment ($n=481$, 48.3%) of the non-dual credit group. Non-white dual credit students were small percentages for both groups. The dual credit non-white population ($n=5$, 7.0%) and non-dual credit non-white population ($n=27$, 2.7%) both represented small groups of students. In the dual credit group, females tended to be more diverse ($n=3$, 4.2%), than the males ($n=2$, 2.8%). In the non-dual credit group, females also tended to be more diverse ($n=19$, 1.9%), than the males ($n=8$, 0.8%).

Age

The ages of the students were limited for the study to this short range of three years. The average age of the dual credit students was 18.2 years and 18.3 for the non-dual credit students. The mode for the dual credit group was 18 ($n=51$) while the mode for the non-dual credit students was also 18 ($n=672$). Both groups of students were predominantly 18 years old and were males (40.8% dual and 34.7% non-dual). These students were from any of the fiscal

years from 2003 to 2005 who entered DMACC as first time full-time students and their age was examined upon entry. Table 4.2 indicates that the entry age for the dual credit students and the non-dual credit students was predominantly 18 for both groups of students with few entering at age 17 as full-time students.

Pell Eligibility

Both dual and non-dual groups were also examined by student Pell eligibility status. The dual credit group consisted of 14.1% (n=10) Pell eligible, while the non-dual credit group consisted of 19.2% (n=191) Pell eligible. Both groups of students had higher percentages of females Pell eligible than males. Dual female Pell eligible student percentage (8.5%) was much higher than that of dual male Pell eligible student percentage (5.6%). Dual female Pell ineligible student percentage (35.2%) was much lower than dual male Pell ineligible percentage (50.7). These percentages were consistent for the non-dual students (Table 4.1 & 4.2).

Research Question 2-Within-term Course Retention

The next research question set out to determine if there was a significant difference in the within-term course retention for dual credit students and non-dual credit students at DMACC when examined by gender, race and Pell grant eligibility. For the second research question, dual credit and non-dual credit student within-term course retention was examined during the first term of their enrollment at DMACC. Within-term course retention was examined specifically in the following categories of students: male, female, white, minority, Pell eligible, and not Pell eligible. The sample for this analysis consisted of 1,067 students.

Dual credit students ($n=71$) and non-dual credit students ($n=996$) were examined to determine if there was any significant difference in within-term course retention between the two groups. The Wilcoxon test was used for the following hypotheses because the data were not normally distributed and therefore, a t-test could not be utilized. Instead a nonparametric Wilcoxon Z approximation was used with the two-sided probability.

Table 4.3 Within-term course retention of dual credit and non-dual credit students DMACC by gender, race and Pell (FY 2003-2005)

Variable	N=1,067	% Course Retention		% -point difference	P-value
		Dual	Non-dual		
<i>Gender</i>					
Males		90.84	89.60	1.24	.4382
Females		92.83	91.98	0.85	.4261
<i>Race/Ethnicity</i>					
White		92.05	90.86	1.19	.2219
Minority		95.00	90.37	4.63	.5576
<i>Pell Eligibility</i>					
Pell		91.46	91.56	-0.010	.9420
No Pell		91.76	90.51	1.25	.2212

* $p < .05$, ** $p < .01$, *** $p < .001$

The Wilcoxon test was used to test the hypotheses to examine if within-term retention rates of dual credit students and non-dual credit students were significantly different when examining the populations by gender, minority status, and Pell eligibility. Table 4.3 indicates that there is little variance between dual credit students' and non-dual credit students' within-term course retention rate percentages in their first semester as full time students at DMACC when examined by gender, minority status, and Pell eligibility. Because the retention rates

did not indicate any significant differences in any of the analyses, *Null Hypotheses 1* could not be rejected.

Research Questions 3 & 4- Academic Performance of Students

For the third and fourth questions 1,069 dual credit and non-dual credit students were examined who had previously earned credits at DMACC from the fall of 2003 through the fall of 2005. These students were examined to determine if there was any significant difference in their success to 24 credits at DMACC within a two year period of time with at least a 2.0 GPA. The four hypotheses formulated for these questions are listed below and are tested using chi-square analyses.

The number of dual credit students was compared to determine if differences were existent in the various categories. The Chi-square analysis allowed for this to determine if the expectations for the distributions for the selected categories matched the actual distribution.

Success to 24 Credits Hours

Null hypothesis 2: H_0 No difference exists between dual credit students and non-dual credit students successfully completing 24 credits at DMACC with a cumulative GPA of 2.0 or better, within 2 years or graduated with an associate degree.

The Chi-square analysis of the successful dual credit students at DMACC compared to the successful non-dual credit students is tabulated in Table 4.4. The analysis indicated that there were significant differences in the dual credit population who experienced success compared to the non-dual credit student population. During the 2003-2007 years the percentage of dual credit students achieving success was 87.32% ($n=62$) of the dual credit student

population. The non-dual credit student population achieving success was 64.43% ($n=643$) of the non-dual credit student population during the same period of time at DMACC. The Chi-square test result comparing the two groups was significant at ($p<.05$).

Table 4.4 Dual credit student population success to 24 credit hours at DMACC compared to the non-dual credit student population success to 24 credit hours at DMACC (FY 2003-2005)

Variable	N=1,069	Dual Students	Percentage	Non-dual Students	Percentage
Unsuccessful		9	12.68	355	35.57
Successful		62	87.32	643	64.43
%-point dif			74.64		28.86
Total N		71		998	
P-value		<0.0001 ***			

* $p<.05$, ** $p<.01$, *** $p<.001$

In summary, there was a higher percentage of dual credit students who were successful compared to the non-dual credit students. This success is statistically significant because the probability of obtaining a Chi-square this large or larger by chance is less than one chance in 10,000 or $<.0001$. DMACC served a significantly higher percentage of dual credit students who experienced success to 24 credit hours within two years with a cumulative GPA of at least 2.0 compared to the non-dual credit students. Since there was a significant difference in the dual credit students' percentage of success and those in the non-dual credit population, *Null Hypothesis 2* was rejected.

Success by Gender

Null hypothesis 3: H_0 No difference exists between percentages of dual credit students and non-dual credit students successfully completing 24 credits at DMACC when examined by gender.

The Chi-square analysis of the successful dual credit students compared to the successful non-dual credit student population examined by gender is tabulated in Table 4.5. The analysis indicated that there were not significant differences in the successful dual credit population compared to the successful non-dual student population when examining them by gender at DMACC. There were a total of 704 female and male students who achieved success according to the definition within the study. Both dual credit and non-dual credit successful students were utilized for this sample. During this period of time the female students achieving success was 51% ($n=359$) of the total students achieving success. Successful males accounted for 49% ($n=345$) of the population of students. The Chi-square test results comparing the success of these students by gender in the study was not significant at ($p<.05$).

Table 4.5 Dual credit students achieving success to 24 credit hours at DMACC compared to non-dual credit students achieving success to 24 credit hours at DMACC by gender (FY 2003 -2005)

Variable	<i>N</i> =704	Females	Percentage	Males	Percentage
Dual Students		29	46.8	33	53.2
Non-Dual Students		330	51.4	312	48.6
Total		359	50.99	345	49.01
P-value		0.4864			

* $p<.05$, ** $p<.01$, *** $p<.001$

In summary, there was not a statistical significant difference in the percentages of success of dual credit and non-dual credit students when examined by gender. However, there was a higher percentage (51.4%, $n=330$) of non-dual credit females who achieved success to 24 credit hours compared to the percentage of dual credit females (46.8%, $n=29$) who achieved

success when considering all students who achieved success. Dual credit male percentage (53.2%, $n=33$) was the highest percentage of successful students and was 4.6% higher than that of non-dual credit males (48.6%, $n=312$). Because the analysis did not result in a significant difference in the success of the groups by gender, *Null Hypothesis 3* failed to be rejected.

Success by Race/Ethnicity

Null hypothesis 4: H_0 No difference exists between percentages of dual credit students and non-dual credit students successfully completing 24 credits at DMACC when examined by minority status.

The next Chi-square analysis is tabulated in Table 4.6 and consists of the successful dual credit and non-dual credit students examined by ethnicity. Two categories of “minority status” and “white” were used for the analysis because the number of students within the individual ethnicity categories was too small. The analysis indicated the minority students achieving success was 3.47% ($n=23$) of the total students achieving success. Successful whites accounted for 96.53% ($n=640$) of the population of students achieving success which includes both dual and non-dual credit students. There were 663 students identified by minority status or white who achieved success as part of the study.

Table 4.6 Dual credit students achieving success to 24 credit hours at DMACC compared to non-dual credit students achieving success to 24 credit hours at DMACC by minority status (FY 2003-2005)

Variable	N=663	Minority	Percentage	White	Percentage
Dual Students		4	6.67	56	93.33
Non-Dual Students		19	3.15	584	96.85
Total		23	3.47	640	96.53

* $p < .05$, ** $p < .01$, *** $p < .001$

For this analysis the test was irrelevant because the number of minority students was just too small in the sample of successful dual credit and non-dual credit students. The percentage of successful minority students was 3.47% and the percentage of successful white students was 96.53. Because there was insufficient data to address this hypothesis, recommendation for further research will be given in Chapter 5.

Success by Pell Eligibility

Null hypothesis 5: H_0 No difference exists between percentages of dual credit students and non-dual credit students successfully completing 24 credits at DMACC when examined by Pell eligibility.

This final Chi-square analysis is tabulated in Table 4.7 and consists of the successful dual credit students and non-dual credit students examined by Pell eligibility. The analysis indicated the Pell eligible students achieving success was 16.03% ($n=113$) of the total students achieving success. Successful Pell-ineligible students accounted for 83.97% ($n=592$) of the population of students achieving success which includes both dual and non-dual credit students. There were 705 students identified by Pell eligibility who achieved success as part of

the study. The Chi-square test results comparing the success of Pell eligible and Pell-ineligible students in the study was not significant at ($p < .05$).

Table 4.7 Dual credit students achieving success to 24 credit hours at DMACC compared to non-dual credit students achieving success to 24 credit hours at DMACC by Pell eligibility (2003-2005)

Status	<i>N</i> =705	Pell Eligible	Percentage	Not Pell Eligible	Percentage
Dual Students		8	12.90	54	87.10
Non-Dual Students		105	16.33	538	83.67
Total		113	16.03	592	83.97
P-value		0.4825			

* $p < .05$, ** $p < .01$, *** $p < .001$

In summary, there was not a statistical significant difference in the percentages of success of dual credit and non-dual credit students when examined by Pell eligibility. There was a higher percentage (87.1%, $n=54$) of dual credit not Pell eligible students who achieved success to 24 credit hours compared to the percentage of non-dual credit not-eligible students (83.67%, $n=538$) who achieved success when considering all students who achieved success. Dual credit Pell eligible percentage (12.9%, $n=8$) was the lowest percentage of successful students and was 3.43% lower than that of non-dual credit Pell eligible successful students (16.33%, $n=105$). The analysis did not determine any significant difference in the percentages of success in the two groups examined by Pell eligibility. *Null Hypothesis 5* failed to be rejected.

Research Question 5- Academic Background of Students

For the next research question, the backgrounds of the dual credit students were examined to see if they had statistically significant different ACTE, ACTM, and 1st semester GPAs compared to the non-dual credit students. This question examined the entire population of students ($n=1,069$). For hypotheses 6, 7, & 8, an independent sample t-test was utilized because there was normal distribution of the data. The t-test was used to examine whether the means of the ACT scores and 1st semester GPAs were statistically different from each other for the dual credit students and the non-dual credit students within the study.

ACT English

Null hypothesis 6: H_0 No significant differences exist in ACT English scores between dual and non-dual credit students.

Table 4.8 depicts the ACT English comparisons of the dual credit and non-dual credit students within the study. A total of 1,069 students were analyzed for this comparison and student scores on their ACT college admission tests from 2003-2005 were utilized. For comparison purposes, Table 4.8 lists the mean scores and the standard deviations of those scores.

Table 4.8 ACT English, ACT math, and 1st Semester GPA comparison of dual credit and non-dual credit students at DMACC (FY 2003-2005)

Variable	<i>t</i>	<i>t</i> -test for Equality of Means			
		df	p-value (2-tailed)	Mean Difference	Std. Error Difference
<i>ACT English</i>	1.92	1,067	0.055	0.749	0.3899
<i>ACT Math</i>	4.33	1,067	0.0004***	1.7128	0.3952
<i>1st Semester GPA</i>	0.4323	1,067	0.0007***	0.1574	0.1401

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.9 ACT English, ACT math, and 1st Semester GPA comparison of dual credit and non-dual credit students DMACC (FY 2003-2005)

Variable	<i>n</i>	<i>t</i> -test Statistics			
		mean	Std.Dev	Std. Error	Range
<i>ACT English</i>					
Dual Credit Students	71	23.632	3.2127	0.3813	19-35
Non-Dual Credit Students	998	22.885	3.1714	0.1004	19-35
<i>ACT Math</i>					
Dual Credit Students	71	24.085	3.8312	0.4547	19-34
Non-Dual Credit Students	998	22.372	3.1697	0.1003	15-34
<i>1st Semester GPA</i>					
Dual Credit Students	71	2.9468	0.9874	0.1172	0-4
Non-Dual Credit Students	998	2.5145	1.1506	0.0364	0-4

* $p < .05$, ** $p < .01$, *** $p < .001$

The mean ACTE score was 23.632 for the 71 dual credit students and the mean ACTE score was 22.885 for the 998 non-dual credit students within the study. This mean score difference between the two groups was not significant at the $p < .05$. Therefore, *Null Hypothesis 6* failed to be rejected.

ACT Math

Null hypothesis 7: H_0 No significant differences exist in ACT math scores between dual and non-dual credit students.

The t-test comparison of the ACT math scores of the dual credit and non-dual credit students is presented in Table 4.8. This hypothesis examines if there is a significant difference in the math ACT admission scores of this same group of students from 2003-2005. Mean scores of the students were utilized for the analysis.

Table 4.8 depicts the ACT math comparisons of the dual credit and non-dual credit students within the study. For this comparison 1,069 student scores from 2003-2005 were used. For comparison purposes Table 4.9 lists the mean scores and the standard deviations of those scores. The mean ACTM score was 24.085, with a standard deviation of 3.8312 for the 71 dual credit students and the mean ACTM score was 22.372, with a standard deviation of 3.1697 for the 998 non-dual credit students within the study. This mean score difference between the two groups was significant at the $p < .05$. Therefore, *Null Hypothesis 7* was rejected.

1st Semester GPA

Null hypothesis 8: H_0 No significant differences exist in first semester GPA between dual and non-dual credit students.

The final t-test examined the dual and non-dual credit students to see if significant differences exist between the two groups. This test examines the students' 1st semester GPA as the students are enrolled at DMACC as full-time students. This t-test comparison is presented in Table 4.8.

Table 4.9 depicts the 1st semester GPA comparisons of the dual credit students (N=71) and non-dual credit students (N=998). For this comparison 1,069 student scores from 2003-2005 were used. Table 4.9 lists the mean scores and the standard deviations of those scores. The mean GPA score for the dual credit group was 2.9468 with a standard deviation of .9874 and the mean GPA mean score was 2.5145 with a standard deviation of 1.1506 for the 998 non-dual credit students. This mean score difference of 1st semester GPAs between the two groups was significant at the $p < .05$. Therefore, *Null Hypothesis 8* was rejected.

As shown in Table 4.10, Levene's test for ACT English and 1st semester GPA yielded values greater than .05 for variance of the means. This indicates that these two had equal variances. For these two variables the pooled *t*-test values and p-values were used in Table 4.8. ACT math, however, had $F=1.46$, $p=.0193$. This indicated that the variance was unequal for the ACT math comparison and the Satterthwaite method was used to determine the *t* value and the p value of this variable.

Table 4.10 Levene's test for equality of variances in ACT English, ACT math, and 1st Semester GPAs (FY 2003-2005)

Variable	F	P-value
<i>ACT English</i>	1.03	0.8424
<i>ACT Math</i>	1.46	0.0193*
<i>1st Semester GPA</i>	1.36	0.1047

* $p < .05$, ** $p < .01$, *** $p < .001$

Research Question 6- Likelihood to Have Individual and Collective Variables Which Impact and Determine Predictability of Success

The final research question explored the relationship of several independent variables to the likelihood of success to 24 credit hours within two years with a minimum GPA of 2.0 utilizing sequential logistic regression. Application of a regression analysis addressed this question.

Logistic Regression Analysis

A sequential logistic regression analysis was chosen for the last hypothesis because the dependent variable of student success was examined to determine the impact of the variables within the study. The dependent variable in this case was a simple dichotomy of success or no success of the student to 24 credit hours within two years with at least a 2.0 GPA. For the analysis 1,069 observations were read and 998 were used. 71 observations were deleted due to missing values for the response or explanatory variables which were used. The sample within the model was split into 662 successful students (coded 1) and 336 unsuccessful students (coded 0).

Null hypothesis 9: H_0 There are no significant differences in rates of success, defined as having earned 24 credits with a GPA of at least 2.0 within two years at DMACC, when examining factors of dual credit status, gender, race, Pell grant eligibility, ACTE, ACTM, DMACC English, DMACC math, dual credit English, dual credit math, and 1st semester GPAs, individually and collectively.

The sequential logistic regression model's five independent variables accounted for over 59% of the variability within the model. As is shown in Table 4.11 the combined r-square

for all of the variables totaled .5980. All of the independent variables met the significance= $\leq .05$ for use in the model. None of the other independent variables met the 0.05 significance level for entry into the model.

Table 4.11 Summary of Regression Model (FY 2003-2005)

Variables	N-998	Number In	R-Square	P-value
1 st Semester GPA		1	.5403	.0001***
DMACC Math		2	.5771	.0001***
DMACC English		3	.5889	.0001***
Dual Credit English		4	.5945	.0197*
ACTE		5	.5980	.0334*

* $p < .05$, ** $p < .01$, *** $p < .001$

The dependent variable of success in this model was coded 1 so the odds ratios in the model reflect the increase in odds of an outcome of success with a one unit increase in the independent variable. It is also interpretable as an effect size and the closer the ratio to 1 the less the effect upon the dependent variable, success to 24 credits. Table 4.12 shows odds ratios, and 95% confidence intervals for odds ratios, for each of the five independent variables. According to the Wald criterion, all of the variables (1st semester GPA, DMACC English and math, dual credit English, and ACTE) reliably predicted student success ($p < .05$). The variables within the model in order of odds ratio are illustrated in Table 4.12.

Table 4.12 Odds Ratio Estimates for the Independent Variables associated with the success at DMACC listed by highest probability (2003-2007)

Variable	N=998	Point Estimate	95% Wald Confidence Limits	
Dual Credit English		6.430	1.272	32.512
1 st Semester GPA		6.185	4.872	7.850
DMACC Math		2.938	1.962	4.398
DMACC English		2.818	1.699	4.674
ACTE		0.936	0.880	0.995

Dual credit English had the highest odds ratio within the model at 6.43. This indicates that those students who had previously taken English in high school as a dual credit student were 6.43 times as likely to experience success as defined within the model. The next predictor variable with the highest odds ratio was 1st semester GPA. The odds ratio for this predictor variable was 6.19 which indicated that as students successfully increase their GPA during their 1st semester as a full time student at DMACC they are 6.19 times as likely to experience success as defined by the model. DMACC math increases the students' likelihood of success by 2.94 times within the model and DMACC English increases the likelihood of success by 2.82 times within the model. Both are significant predictors of student success and tremendously increase the probability of success to 24 credits. The final significant independent variable was that of student ACT English score. Even though this variable was statistically significant at the $p=.0339$ level, the odds ratio of .94 shows little change in the likelihood of student success on the basis of a one-unit change in ACT English. *Null hypothesis 9* was rejected.

CHAPTER 5. SUMMARY, DISSCUSSION, AND RECOMMENDATIONS

Reform initiatives have suggested more rigorous high school curriculum and more effective connectivity between secondary and postsecondary institutions for decades in national reports such as *Nation at Risk* (1983) and *Breaking Ranks* (1995). This focus upon the high schools has brought with it repeated recommendations to address the issues facing students in the United States regarding both high school dropout rates and college retention. The number of students who fail to graduate high school is concerning, given the 70% national graduation rate (Barton, 2006).

Even more alarming is the fact that only 44% of high school graduates had the academic credits recommended by the *Nation at Risk* (1983) report and the transition rates of students to college have remained constant at 64% since 1998 (NCES, 2005). Even when students do make the transition to college many are ill-prepared to succeed (Adelman, 2006). At least one remedial course is necessary for 60% of students in attendance in college (NCES, 2004). As a result, of those who graduate high school and enrolled in college, only 35% earned a postsecondary degree (Adelman, 2006). Adelman goes on to indicate that rigorous curriculum is the most important factor of a student's secondary background to increase probability to degree completion. The importance of these experiences is emphasized as the "pre-entry attributes, pre-college traits, and input" of prominent retention theories (Tinto, 1993; Pascarella and Terenzini, 1991; & Astin, 1997).

Finding a solution to help these students experience success as they attend college and complete a degree is a challenging dilemma. While retention is a very complex and

sophisticated issue, there are ways that secondary and postsecondary institutions can help increase students' chance of completing a degree. This study examined one approach to help students' retention in college, dual credit programs which help to increase the rigor of secondary curriculum and provide more effective connections between secondary and postsecondary institutions. This final chapter provides a summary of this research study and will be organized into the following sections: (1) summary; (2) findings; (3) conclusions; (4) limitations; and (5) recommendations.

Summary of the Study

Literature Review

Secondary and postsecondary institutions have offered a variety of credit opportunities for students in high schools for decades in an attempt to better prepare students for college and improve retention rates for students as they pursue a college degree. These programs have been designed to meet a multitude of needs, including providing more rigorous curriculum and additional electives, less duplication, reduced college costs, and more college experiences. Traditional programs have been the Advanced Placement (AP) program, College Level Examination Program (CLEP) program, and actual attendance at the post-secondary institution (Kim et al., 2004; Karp et al., 2004).

A more recent trend has been dual credit programming as 40 states have enacted dual enrollment policies which support the development of these programs in the United States (Hughes, Karp, Fermin, & Bailey, 2004). This is an attempt to insure quality and provide resources to make these partnerships effective and successful. According to the U.S.

Department of Education (2004), 11,700 (71.3%) of the U.S. high schools offered and allowed high school students to take dual credit college courses in 2003.

Most of the recent research regarding dual credit programming has explored state policies and program features and has been qualitative in nature (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). However, there have been a few studies which have experienced subsequent college success after participating in dual credit programming during high school. The City University of New York (CUNY) system currently runs dual credit programming called *College Now* through which students earn college credit. Kleiman (2001) found that *College Now* participants were twice as likely to graduate from college on time and were also less likely to need remedial courses compared to non-participants of the programming.

Current research indicates there is evidence that high school students find the programming beneficial to prepare them for college (Bailey, Hughes, & Karp, 2002). It may motivate them to take more rigorous curricular offerings, provide them clear guidelines about college preparation, enable them to get acclimated to college, and begin their college careers early to avoid duplication of courses and accumulate college credits while still in high school (Andrews, 2004; Orr, 1999; Windham, 2001; Welsh, Brake, & Choi, 2005).

Despite the popularity of dual credit programming, there is little research on the success of dual credit students who are tracked throughout their high school and into their college careers to determine the success of their experience (Bailey, Hughes, & Karp, 2002). Students who begin their postsecondary education while still enrolled in high school and then enroll at a two-year college have not been researched extensively.

The purpose of this study was to determine if dual credit students who had previously taken math or English dual credit courses and entered DMACC from 2003-2005

experienced success at higher rates than non-dual credit students, and to identify which predictor variables helped increase the likelihood of success. The theoretical framework for this study was drawn from retention research foundational models, including Tinto's Academic and Social Integration Model (1993), Pascarella's General Causal Model (1985), and Astin's Involvement Model (1993). These models focus on a combination of student variables, specifically pre-college attributes and pre-college traits of the students which impact their decision to stay or leave the institution.

The retention theories mentioned above have established retention as a process which involves numerous variables and their impact as a longitudinal process. A review of the research found that numerous variables have impact upon student attrition including, previous academic experiences, gender, race, test scores, socioeconomic status, class rank, and a wide variety of activities that students participate in.

Additional literature examined for this study included two year commuter college research on retention which examined the difference between two-year and four-year college students in attendance at these settings. The work of Hagedorn and Adelman were utilized to more specifically examine the characteristics of commuter students. High school reform literature was also extensively examined specifically targeting dual credit programming.

Design and Methods

The sample of students included in this study was dual credit students and non-dual credit students who entered DMACC after high school graduation from DMACC's eleven county service. These dual credit students were identified as Associate of Arts degree students who had previously completed courses in Math 121, 129 and English 117 and 118.

These courses are Finite Math, Calculus, and Composition 1 and 2. The non-dual credit students entered DMACC as Associate of Arts students as first time full time students out of high school. There were 1,069 students served by DMACC who met the criteria for this study.

Specifically, the purpose of the study was to determine if dual credit students at Des Moines Area Community College had similar demographics, within-term course retention, academic success compared to non-dual credit students, and academic backgrounds. It also set out to determine the impact of independent variables upon success for both groups of students entering DMACC right out of high school as first time, full-time students.

The dependent variable for success was the dichotomous variable, which was coded to indicate if a student completed 24 credits within two years with a minimum GPA of 2.0. (1=success to 24 credits, 0=no success). Within-term course retention during the first semester and academic backgrounds of the students were also examined within the study, specifically by gender, race, and Pell eligibility.

The study sought to determine if there were significant differences in the following: (a) within-term course retention of dual credit students and non-dual credit students while enrolled at DMACC examined by gender, race, and Pell eligibility, (b) academic performance, measured by success to 24 credit hours, of dual credit and non-dual credit students examined by gender, race, and Pell eligibility, (c) academic background, measured by ACTE, ACTM, and 1st Semester GPA, of dual credit and non-dual credit students, (d) and the impact of numerous variables upon student success to 24 credits within two years with a minimum of a 2.0 GPA from DMACC.

Findings

Background Characteristics of Dual and Non-Dual Students

The first research question establishes a demographic profile of the students within the study who are attending DMAACC right out of high school as first time, full-time students. They were examined by gender, age, ethnicity, and Pell eligibility. The findings for the background characteristics are described by each category.

Gender

The findings indicated that the dual credit students and non-dual credit students enrolled at DMAACC as first time full-time students had many similarities when examined by gender. Both groups were predominantly male with 56% of dual credit students and 53% of non-dual credit students within that category. These male percentages are higher than that of the general community college population in Iowa which remains consistent at 42-43% and is very consistent with the gender breakout of community college students in the United States (NCES, 2007). Student gender for Iowa joint enrollment has been somewhat different than Iowa's general community college student enrollment. Percentages of male jointly enrolled students in Iowa ranged from 47-49% and female percentages are 50-53% which was considerably different than the sample of dual credit students within the study.

The 2008 national trends for community college enrollment by gender were 60% female and 40% male (AACC, 2008). In the state of Iowa in 2008, the community college enrollment by gender was 57% female and 43% male (IDOE, 2008). At DMAACC during 2008, the enrollment consisted of 56% female and 44% male (IDOE, 2008). These figures would indicate that females are under-represented within both the dual credit group and the

non-dual credit groups within the study. This could be because of the STEM focus of the study.

Age

The students within the study were either 17, 18, or 19 years old because of the limitations set on both groups of dual and non-dual credit students. Age of entry to DMACC for both groups was also fairly consistent within each group with 96.7% of the dual credit students entering at age 18 or 19 compared with 95.8% of non-dual credit students entering at these same ages. The highest percentages from both groups were 18 year old males (40.8% dual and 34.7% non-dual). Of the dual credit students only three (4.2%) were 17 years old and 68 (95.8%) were 18 or 19. Of the non-dual credit students only 32 (3.3%) were 17 years old and 964 (96.7%) were 18 or 19. In 2008, in the state of Iowa the community college enrollment consisted of 12% age 17 and under, 52% from 18-22, and 36% above age 22. Both of the groups had low numbers of 17 year old students with the majority of the students falling into the largest represented age group of students enrolled at community colleges in 2008.

Race/Ethnicity

Racial diversity of the students within the study varied slightly for both groups. Because the numbers of minority students within the study the minority races were collapsed into one category of “minority students”. Even though the 2008, K-12 minority population consisted of 14.8% and the white population was 85.2%, jointly enrolled minority students were far below that. The majority of community college jointly enrolled students (92%) in

2008 were white while the minority group was 8% of jointly enrolled students. Of the dual credit students reporting within the study, (N=67/71) 92.5% were white, while 7.5% were classified as minority. Within the non-dual reporting group (N=931/996), students consisted of 97.1% white and 2.9% were minority.

Both groups consisted of predominantly white students with the dual credit group 92.5% white and the non-dual credit group 97.1% white. The white percentages of students within the study for both groups were higher than the general Iowa community college population during this time which was 89.1% white in 2008. The Iowa joint enrollment community college population was 92% and 8% minority during this time and was very similar to the dual credit population within the study.

In the state of Iowa in 2008, the community college enrollment by ethnicity was made up of 90.8% white and 9.2% minority students (IDOE, 2008). It is apparent that Iowa's community college joint enrollment of minorities is very similar to the community college enrollment of minority students. The percentage (7.5%) of minority dual credit students in the study is also very similar to the total percentage (8%) of jointly enrolled minority students in Iowa in 2008. These percentages mirror the percentage (9.2%) of minority students enrolled in all Iowa community colleges statewide in 2008.

Pell Eligibility

Pell eligibility was also very similar for both groups within the study with 14.1% of dual credit students and 19.2% of non-dual credit students being Pell eligible. Joint

enrollment in the state of Iowa in 2008 had a total of 16% of the students who qualified for free and reduced lunch who were high school students. This is an indicator used by the K-12 system for level of income of the parents. This percentage is very similar to the Pell eligible percentages of both the dual and non-dual credit groups. The number of Pell eligible students attending DMACC in 2008 was 4,865 of the 29,573 students enrolled. This amounted to 16.5% of all students enrolled. This percentage is very consistent with the dual credit and non-dual credit populations within the study.

Within-Term Course Retention

The findings regarding the differences in within-term course retention of dual and non-dual credit students examined by gender, minority status and Pell eligibility during the first term after finishing high school were also consistent between the two groups of dual credit and non-dual credit students. The first analysis examined the dual and non-dual student retention specifically by gender to determine if there was any significant difference in within-term course retention. The within-term course retention of dual males (90.84%) was not significantly different than the non-dual male within-term course retention (89.6%) with a *p*-value of .4382. The within-term course retention of dual credit females (92.83%) was not significantly different than the non-dual female within-term course retention (91.98) with a *p* value of .4261. The within-term retention rate of white dual credit students (92.05%) was not significantly different than the non-dual credit white within-term retention rate (90.86%). The *p* value for the analysis was .2219 which was not significant at the .05 level. The minority students' within-term retention for dual and non-dual students (95% and 90.37%) was not significantly different with a *p* value of .5576. The final variable of Pell eligibility

also did not find a significant difference in the within-term course retention of dual (91.46) and non-dual students (91.56). The p value was .9420 for the Pell group. The Pell ineligible dual students' within-term course retention (91.56) was not significantly different than the non-dual Pell ineligible within-term course retention (90.51). The p value was also not significant at .2212.

These retention rates and p values indicated that there were not significant differences in the retention rates of dual and non-dual credit students when examined by gender, ethnicity, and Pell eligibility. Even though there were not significant differences, the retention rates of the dual credit students were higher in all categories except when examining Pell eligible dual and non-dual students. These findings are consistent with research regarding dual credit programming easing the transitioning to college (Adelman, 1999; Andrews, 2001; Bailey & Karp, 2003; Kirst & Venzia, 2004; Windham, 2003).

Academic Success

A very significant finding within the study was in the comparison of the dual credit students and the non-dual credit students in success to 24 hours within a two year period with at least a 2.0 GPA, which was used as the definition of success for the study. These successful dual and non-dual credit students were then examined specifically by gender, ethnicity, and Pell eligibility.

Dual and Non-Dual Success

Not only did the non-dual credit students achieve success at a lower rate, the percentage of unsuccessful non-dual credit students (35.57%) was nearly triple that of dual

credit students (12.68%). Adelman's (1999) research confirmed this finding in the study as he identified the importance of "academic resources" which consist of academic content and performance that students bring to college with them from high school as being crucial to college success. These dual students had these opportunities to be exposed to college rigor during their secondary experience and were much more successful to 24 credit hours with at least a 2.0 GPA within two years. This finding is also supported by researchers who indicated the importance of "pre-college attributes" which benefit students as they make the transition and move toward success in college (Tinto, 1993; Pascarella & Terenzini, 2005; & Astin, 1975). An examination of the dual and non-dual student success specifically by gender, ethnicity, and Pell eligibility resulted in the next findings from the study.

Gender

The findings for success examined by gender contained a sample of 704 students. Dual credit students accounted for 62 of the students and non-dual credit students accounted for the remainder (N=642). When examining the successful students specifically by gender, there was not a significant difference. However, a higher percentage of dual credit females (46.8%) experienced success to 24 credits compared to the percentage of females (43.7%) in the dual credit sample. On the other hand, dual credit males had a lower success rate (53.2%) compared to the percentage of males (56.3%) in the dual credit sample.

Successful female percentage (51.4%) also increased in the non-dual credit area compared to the sample percentage (47.3%) and success of male non-dual credit students (48.6%) decreased compared to the percentage of males (52.8%) in the non-dual credit sample. These data show consistent increases in the percentages of females experiencing

success in both groups compared to the percentage of females in the sample. It also shows decreases in the percentages of males experiencing success in both groups compared to the percentages of males in the sample.

Ethnicity

The next analyses involved examining if there was any significance in the success of dual and non-dual credit students specifically by ethnicity. The total number of students in this analysis consisted of 704 students from both dual and non-dual credit groups. The chi-square analysis was used for this and the analysis for student success examined by minority status found that one cannot draw definite conclusions because the number of minority students was too low. There was insufficient data to address this hypothesis. This finding requires further research for this group.

Pell Eligibility

The last analysis within this area of academic success consisted of examining the dual and non-dual credit students to determine if there was significance between the two groups when examined by Pell eligibility. For this analysis there were 705 successful students from both groups categorized by Pell eligibility. The findings indicated that there was not a significant difference in the percentages of students from both groups when examined by Pell eligibility. In the findings there was a higher percentage (87.10%) of successful dual credit not Pell eligible students compared to the percentage (85.9%) of the dual not Pell eligible students in the study. There was a smaller percentage (12.90%) of successful dual Pell eligible students compared to the percentage (14.1%) of Pell eligible dual credit students in the study.

The findings for the non-dual credit students were also consistent with the dual credit students. In the findings there was a higher percentage (83.67%) of successful non-dual credit Pell ineligible students compared to the percentage (80.9%) of the non-dual Pell ineligible students in the study. There was a smaller percentage (16.33%) of successful non-dual Pell ineligible students compared to the percentage (19.2%) of Pell ineligible non-dual credit students in the study.

Academic Background

The analysis to determine if there were significant differences in the academic background examined the ACT math and English and 1st semester GPAs of the two groups of students. This was research question five within the study and a t-test was utilized to examine the mean scores of the students and the dual sample was $n = 71$, and the non-dual sample was $n = 998$.

ACT English and Math

The findings indicated no significant difference in the ACT English scores of the dual credit students and the non-dual credit students. The p -value was .055 for the significance of the mean scores for the groups. Even though the ACT English mean score for the dual credit students (23.632) was higher, it was not significant at the .05 level, compared to the ACT English score of the non-dual credit students (22.885).

The findings for the dual credit students' ACT math scores did however indicate a significant difference between the two groups of dual and non-dual students. The p -value was .0004 and was significant at the .05 level. The mean dual credit math score was 24.085 and

the mean non-dual credit score for was 22.372. This finding of significance in math ability is supported in the research as a contributing factor which contributes to the success of these dual credit students as they enter college. There is a wealth of research which stresses the importance of rigorous high school curriculum and test scores as indicators of success for students as they enter college (e.g., Adelman, 1999; Astin, 1997; Pascarella, 1985; Tinto, 1993; Learner & Brand, 2006; Kirst & Venezia, 2004). Adelman (1999) specifically found that when considering pre-college curriculum, the level of math a student completes successfully has the strongest influence on bachelor degree completion. This study found a significant difference in the ACT math scores of the dual credit students and their success to 24 credit hours was 87.32% compared to the non-credit students' success rate of 64.43%.

1st Semester GPA

The findings for 1st semester GPA as the students attended DMACC as first-time full-time students was significant at the .05 level. There was a statistically significant difference in 1st semester GPAs between the two groups of dual credit and non-dual credit groups. The mean 1st semester GPA of the dual credit students was 2.9468 compared to the mean 1st semester GPA of the non-dual credit students of 2.5145. This was a significant difference in the mean GPAs of the two groups of students with a significance of .0007. The findings of this study confirm the findings of previous researchers regarding the importance of pre-college attributes, dual credit experiences, and rigorous curriculum in high school (Kleiner & Lewis, 2005; Andrews, 2001; Bailey, Hughes & Karp, 2002; Kirst & Venezia, 2004; Nunley, Shartle-Galotto & Smith, 2000; Windham, 2001).

Impact of Variables Upon Success

The findings in the study regarding the impact of variables upon the success of students to 24 credit hours with a minimum of 2.0 GPA within two years did reflect the literature reviewed about pre-entry characteristics, benefits of rigorous curriculum, and the benefits of dual credit programming (Kleiner & Lewis, 2005; Andrews, 2001; Bailey, Hughes, & Karp, 2002; Kirst & Venzia, 2004; Nunley, Shartle-Galotto, & Smith, 2000; Windham, 2001). There were five variables that had significance upon student success to 24 credit hours. Dual credit English had the highest odds ratio within the model at 6.43. The next predictor variable with the highest odds ratio was 1st semester GPA which had an odds ratio of 6.19. DMACC math increases the students' likelihood of success by 2.94 times within the model and DMACC English increases the likelihood of success by 2.82 times within the model. Both are significant predictors of student success and tremendously increase the probability of success to 24 credits. The last significant independent variable was student ACT English score. Even though this variable was statistically significant at the $p=.0339$ level, the odds ratio of .94 shows little change in the likelihood of student success on the basis of a one-unit change in ACT English.

The findings for the impact of the variables both individually and collectively upon success defined as reaching 24 credit hours within two years with at least a 2.0 GPA suggested that numerous variables had significant impact upon student success. The variables which impacted success of students in order of impact were dual credit English, 1st semester GPA, taking math and English at DMACC, and ACT English scores. These findings reflected the literature regarding the importance of students' previous attributes and traits acquired before entry into the college setting (Astin, 1997; Pascarella, 1985; Tinto, 1993). Adelman (1999) concluded that the measure of success in college was dominated by overall

rigor, intensity, and quality of the curriculum students experienced at the secondary level and curriculum produced a higher correlation for success than did test scores or class rank. These researchers stress the importance of pre-college academic experiences which prepare students for college success. The findings indicated the benefit of previously experienced college coursework which is rigorous and also reflects current literature on dual credit student enrollment benefits intended to provide successful transitioning to college (Kleiner & Lewis, 2005; Andrews, 2004; Bailey, Hughes, & Karp, 2002; Bragg, 2001; Gehring, 2001; Vargas, 2004).

Conclusions

The findings in this study confirm that dual credit students in math and English courses experienced success at significantly high rates than did non-dual credit students over a three year period of time. Within-term course retention was not significantly different for the dual and non-dual students within the study. There were also significant differences in ACTM and 1st semester GPAs of the dual credit students. Dual credit English and 1st semester GPAS were the highest predictors of success/retention among all of the students within the study.

The findings of this study confirm Tinto's (1993) Academic and Social Integration Model, which indicates that student retention should be examined while considering the students' "pre-college attributes" experienced during high school. By examining a combination of these "pre-entry attributes", Tinto expressed that researchers should have a better idea of why students stay or leave an institution. The next section of this chapter focuses upon the variables in this study within the context of the literature review.

This study applied 9 hypotheses to examine enrollment, retention, success, student background, and impact of variables upon student success of dual credit students and non-dual credit students attending DMACC as first time full time students. The review of the literature would support the rejection of the Null Hypotheses involving student pre-entry attributes having no affect upon student success to 24 credit hours, within-term course retention, and 1st semester GPA specifically examining the students based on gender, minority status, Pell eligibility, and ACT scores. While differences became apparent in many of the pre-entry attributes of the students, there was no significant difference in the success of the students based on gender, minority status, or Pell eligibility. Numerous conclusions can be drawn within this study, with a clear understanding that further investigation and analyses should be conducted in the future to further research in this area.

1. Overall, dual credit students and non-dual credit students enrolled at DMACC from 2003-2007 as first time full-time students were very similar when examined by gender, minority status, Pell eligibility and age. Both groups were predominantly male with 56% of dual credit students and 53% of non-dual credit students. This is a higher percentage of males than the state and national community college enrollment figures which reflect 56% female enrollment (NCES, 2007). A point of concern was the lower percentage of females attending DMACC as first time full time students out of college whether dual or as non-dual students. The college must examine the lower percentage of female enrollment and determine why more are not choosing to attend DMACC. Both groups were made up of predominantly white students. The students reflected consistent enrollment of students by ethnicity compared to the Iowa community college enrollment figures. Continued recruitment of minorities into both

- groups and examination of their success is necessary by the college. The age of the students was also consistent among both groups and with first time full-time students in the community college system. Entry to DMACC for both groups was comparable with over 95% of students entering at ages 18 or 19. Pell eligibility was also very similar for both groups within the study with 14.1% of dual credit students and 19.2% of non-dual credit students being Pell eligible. Even though the study indicated no significant difference in student success by Pell eligibility continued examination of these students should be a priority of the college in the future.
2. There were not any significant differences in within-term retention rates of dual and non-dual students specifically examined by gender, minority status, and Pell eligibility. As a result of this the college should continue to examine the retention of these students during their first year at DMACC.
 3. Dual credit students achieved success at a much higher percentage (87.32%) than did the non-dual credit students (64.43%). The significant difference in the success of students was between the two groups of dual and non-dual credit students. Research on dual credit programming would suggest that dual credit students make the college adjustment more effectively than non-dual credit students because of numerous factors that they experience during their secondary experience (Andrews, 2001; Karp & Hughes, 2008). When these students were examined specifically by gender and Pell eligibility there were not significant differences and there just were not enough students to make the analysis of success of the groups by ethnicity credible. Continued efforts on the part of the college need to take place to examine student success by gender, Pell-eligibility and minority status. This should be a

- comprehensive examination which includes all students attending community college and other public and private colleges to gain an accurate understanding of dual credit students served by DMACC during their high school dual credit experience.
4. Student academic background in ACT math and their 1st semester GPAs were significantly different among dual and non-dual credit students. It is interesting to note that dual credit students' mean ACT in math was 24.05 compared to the mean ACT math score for non-dual credit students was 22.37. This information confirms the importance of math as an indicator of student college success when considering pre-college curriculum, the level of math a student studies has the strongest continuing influence on student bachelor degree completion (Adelman, 2006). The 1st semester GPA mean for the dual credit students was 2.9468 compared to the non-dual credit students' mean of 2.5145. This significance in GPA also confirms the educational reform recommendations of a "seamless" educational approach which seeks to provide opportunities for staff from both institutions to work together to ensure student preparedness as they transition to the next level of education (Kirst & Venezia, 2004). However, the ACT English scores of the two groups were not significantly different.
 5. The regression analysis indicated that there were five variables which significantly impacted the success of students individually and collectively. These in order of significance were dual credit English, 1st semester GPA, taking DMACC English and math, and ACT English. Dual credit experience (6.43) had a significant impact upon students' success to 24 credit hours as did 1st semester GPA (6.185). The issue of recruiting more dual credit students to attend DMACC is particularly important,

because this study revealed that dual credit English students were more successful than non-dual credit students attending as first time full-time students. Even though the number of dual credit students was small within this study, overall dual credit students had better within-term retention rates, success to 24 hours, 1st semester GPAs, and higher probability to experience success as a college student. These findings confirm the retention theories in Chapter 2, (Tinto, 1993; Pascarella, 1985; Astin 1993) and dual credit research indicating the benefits for students as they attend college (Adelman, 1999; Andrews, 2001; Bailey & Karp, 2003; Kirst & Venezia, 2004; Windham, 2003).

Limitations

The limitations of the study are important to note regarding the dual credit and non-dual credit students who were analyzed within this study. The following limitations should be considered while drawing conclusions from the findings associated with this study.

1. This study was limited to only dual credit students who had completed previous courses in math and English and were working toward completion of an Associate of Arts degree at DMAACC. It was not clear what they intended to do with their degree.
2. The study also only focused on students attending DMAACC right after high school. It did not consider those who attend later with a gap between high school and college. It also is not known how many dual credit students attend DMAACC on a part-time basis and intend to complete an Associate of Arts degree. Demographics, within-term course retention, academic success, academic backgrounds, and the impact of independent variables for part-time or later attending students are also unknown.

3. Because the study was quantitative, there was no attempt to find out the reasons for student who did not persist and for whom course retention was problematic.
4. The data affiliated with this study pertain only to DMACC and cannot be generalized to any other community college in Iowa.

Recommendations

The following recommendations are made for further study and practice associated with dual credit programming:

Recommendations for further study

1. All community colleges in Iowa should replicate this study for students who are attending the community colleges after completion of dual credits during their high school experience. Conducting a statewide study on the enrollment, retention, success, academic backgrounds and impact of variables upon student success with consistent statewide data collection is becoming more possible with the State's movement toward common student identification and reporting for high school jointly enrolled students.
2. All Regent universities should also apply this study for students who are attending the state's universities after completing dual credits during their high school experience especially in the areas of arts and sciences credits because of the number of these students who attend the four-year colleges and universities. Regents and community colleges should jointly replicate this study for students who had completed dual

- credits during high school and then attended the community college and then transferred to the university.
3. The results of this study provide valuable data and information which examines the importance of experiences of students in the secondary educational systems with the subsequent post-secondary experiences. The study generates additional questions which should be addressed in further studies at DMACC. An expansion of the arts and science students who have experienced dual credit programming should be analyzed to determine the impact of additional factors including part-time students, online students, students entering at any age, completion to degree at DMACC, and success in transition to four-year institutions. Qualitative studies could also include dual and non-dual student perceptions of such factors as academic adjustment to college, social adjustment to college, familiarization with college resources, and other related perceptions thought to benefit students' success in their college experience.
 4. This study should also be applied to career and technical students and it should be expanded to include all of the areas mentioned above. An expansion of this study to include career and technical students who have experienced dual credit programming should be analyzed to determine the impact of additional factors including part-time students, students entering at any age, completion to degree at DMACC, and success in transition to four-year institutions. Career and technical students should also be involved in qualitative studies to include dual and non-dual student perceptions of such factors as academic adjustment to college, social adjustment to college, familiarization with college resources, and other related perceptions thought to

- benefit students' success in their college experience. These students actually attend and experience the community college environment which would enrich the study.
5. The results of this study call for much more research and close examination of student experiences while in secondary institutions in preparation for a two-year degree, four-year degree or the work environment. The necessity to examine the expansion of dual credit programming to provide additional students the opportunity to enjoy the benefits revealed by this study is imperative (Andrews, 2004; Bailey, Hughes, & Karp, 2002).

Recommendations for further practice at DMAACC

Based on the study it becomes apparent to provide the following recommendations for practice at DMAACC. Even though additional analysis of dual credit student transitioning is necessary to determine why students enroll, persist, continue to enroll and succeed at DMAACC, the results of this study make it necessary for DMAACC to take steps immediately. The following recommendations will be brought forward at DMAACC:

1. Create a dual credit work group specific to the task of transitioning students to DMAACC. The study only dealt with students transitioning in the areas of transfer oriented students who were working toward an AA degree. Services must be designed specific to these students and it is also imperative for the group to examine and implement strategies for the much larger group of students transitioning to DMAACC who had previously completed some college credit while they were in high school. This group should create and implement services which will provide the necessary

- support to this group of students who enroll as transitioning students to DMACC from a variety of programs.
2. Expand the program development advisory role at DMACC to include specific responsibilities to develop and implement the following transitioning programs and services for dual credit students wishing to transition to DMACC as students:
 - a. A First Year Experience program for dual credit students who are identified as high risk who are enrolling at DMACC. Students can be selected utilizing a number of different criteria and will be provided activities to improve their retention and success while at DMACC. As part of this programming these students will be given the necessary support to effectively transition from the high school environment to the community college environment. Parent and student orientations, campus visits, degree requirements, financial aid seminars, and other experiences should be created specifically for this population of dual credit students to ensure their success during their enrollment and especially during their first year of enrollment at DMACC.
 - b. Create a mentoring program as part of this student experience which will allow for the students to receive support and guidance from staff and faculty at DMACC as they progress during their enrollment at DMACC. Programs should include support services orientation available at DMACC, course enrollment recommendations, and other mentoring activities which are beneficial for students.
 - c. Prepare these students as much as possible with the necessary support and resources as they transition from DMACC to attend other colleges and

universities. These may include advisor contact, orientations, campus visits, connections with mentoring programs, and other experiences necessary to make this a smooth and effective transition.

3. Establish a dual credit student transfer committee to address the issues surrounding the transfer of dual credit students to other colleges and universities after enrollment at DMACC.
4. Target and identify those students experiencing success and create a communication plan for them to address reasons for lack of success toward 24 credit hours and/or degree completion. Expand the program development advisory role at DMACC to include specific responsibilities to develop and implement the following support programs and services for these identified students:
 - a. Create internal programs for these students to provide necessary support to effectively transition and adjust to the community college environment. Parent and student orientations, campus visits, degree requirements, financial aid seminars, and other experiences should be created specifically for this population.
 - b. Provide a complete set of support services provided by the college to make these students successful. These include but are not limited to tutoring services, student support services, technology services, library resources, financial aide services, and counseling services.
 - c. Familiarize students with faculty mentoring, student groups and clubs, and learning communities that are available.

- d. Connect students with career planning tools which will allow for them to plan and prepare for degree completion at DMACC.
5. As part of the staff development associated with DMACC faculty and adjuncts at the high school level, develop programming which enables staff and faculty to better understand the resources and support available to students who transition to DMACC. This training should also allow for all of the adjunct staff who currently work with dual credit students at the high school level to better meet the needs of students as they begin their transition to DMACC.
6. Create internal programs for all faculty teaching at the high school level which enables them to receive the appropriate orientation, and training to more effectively represent the college department. These activities may include discussions involving curriculum, assessment, college procedures, departmental policies, and programs which can provide additional resources to the dual credit students within their courses.
7. Create opportunities specific to dual credit faculty at the high school level which allows them to collaborate with other faculty at the college and has access to faculty development activities related to their areas of curriculum, workforce preparation, transfer issues and programs, college policies, technology, program offerings, retention, persistence, and student support services available to students at the college.
8. Create more extensive partnerships between all of the campus locations and the local school districts to establish “transition councils” for districts currently involved in the

transition process of dual credit students. DMACC currently has locations in 6 different communities which serve a large number of local school districts. Several economic conditions are causing a greater number of students to begin their attendance at a community college. While the transition process for students has been improved as students work toward their college degree in a variety of dual credit programs during high school, the high school to community college transition committee should continue to explore models which can make this transition most effective as students attend the community college. This can expand the responsibilities to a much broader scope to create more effective programs and processes for students as they make these transitions.

9. Communicate these recommendations with the necessary leaders internally and externally to garner the support necessary to more effectively provide transition services to dual credit students attending DMACC.

Recommendations for further practice for High Schools, Parents and Students

Based on the study it becomes apparent to provide the following recommendations for practice to those outside of DMACC. Even though additional analysis of dual credit student transitioning is necessary to determine why students enroll, persist, continue to enroll and succeed at DMACC, the results of this study make it necessary for recommendations to go to the high schools, parents of high schools students and students. The following recommendations will be brought forward to these groups:

1. Create a communication plan which utilizes data on the success of students from this study and disperse it to the high schools, parents and students.

2. Discuss the importance of math and English for students in rigorous curriculum at the high school and into the first year of college.
3. Create communication which accurately documents the options for these students at DMACC and 4-year public and private colleges.
4. Work with the parents, students, and high schools to gain accurate data which will allow for more precise collection of information to document the success of these students in the future.

Closing

A larger impact of dual credit programming is being realized at DMACC than has ever been experienced previously in the history of this community college. The importance of examining the impact and effectiveness of this programming as part of a systematic continuous improvement process is imperative and this study has formally begun that process. This is consistent with four year schools and community colleges throughout the country as these opportunities are being utilized and implemented to address the critical crisis of high school student preparedness which is ever present. For decades, reform efforts have emerged and consistently sought to address improved curriculum and programming which bridges the gap that exists between secondary and post-secondary institutions. The overwhelmingly dominant answer to this request has been dual credit programming nationally, in the state of Iowa, and also locally at DMACC.

The findings in this study of dual credit and non-dual credit students at DMACC are very interesting and demand additional attention. The state of Iowa has just recently passed legislation, "*Senior Year Plus*" which systematically creates specific rules, regulations, responsibilities, and opportunities surrounding all programs which allow high school students

to achieve college credit. DMACC plays a crucial role in this because it is the largest community college in the state and it serves 54 high schools. It enrolls the highest number of jointly enrolled and dual enrolled students in the state. The study indicated that the college has increasingly served a larger number of these students who enter DMACC and other institutions. The study revealed that there is a tremendous amount of work to be done to ensure that all students have the necessary background and opportunities during their high school careers in order to enroll in and experience success at college. If Iowa is to continue to address the issues surrounding student college preparedness, expansion and continuation of this programming and research is necessary to ensure quality. DMACC must also continue to do more to address its responsibilities associated with high school enrollments in order to continually improve college success of students.

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