

THE IMPACT OF DUAL AND ARTICULATED CREDIT ON COLLEGE READINESS AND TOTAL CREDIT HOURS IN FOUR SELECTED COMMUNITY COLLEGES: EXCERPTS FROM A DOCTORAL DISSERTATION LITERATURE REVIEW

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This paper provides a review of literature related to dual credit and the influence of dual credit on student outcomes in college. The first section reviews terms and definitions associated with dual credit, the history of dual credit policy and program implementation, and advantages and issues related to dual credit. The next section examines the relationship between dual credit and tech prep. Many similarities exist between those two programs in the definition and goal of each program. One of the primary goals of the two programs is to enhance the students' transition from secondary to postsecondary institutions. The third section reviews the literature on the background of students who participate in dual credit. The last section summarizes the literature about the influence of dual credit participation on student outcomes in college, indicated as college readiness, retention, and academic performance.

What is Dual Credit?

Dual credit, the approach by which students receive both high school and college credit for the same course work, has received enormous attention in recent years. The original intent of dual credit was to provide more challenging curricula to the academically prepared high school students. Over the past three decades, the target recipients of the program have expanded to include a wider range of students, including average and even under-achieving students (Clark, 2001). In 2001, all but three states in the U.S. offered some form of dual enrollment defined as one in which a high school student enrolled in a postsecondary institution while still in high school (Education Commission of the States, 2001). However, concerns about inconsistency in using the term, dual credit have been discussed. McMannon (2000) observed that "there is not generally accepted or consistent language for such programs, a situation that reflects the different policies, purposes, and logistical arrangements for them" (p. 3).

*Dual Credit: Terms and Definitions*

More than one term has been used to describe a dual credit program that allows high school students to enroll in college level courses and receive both high school and college credits (Robertson, Chapman, & Gaskin, 2001). Terms used to indicate the premise of receiving credits at both high school and college by taking a college level course include concurrent enrollment, dual enrollment, dual credit, and concurrent credit. According to Greenberg (1989), *concurrent enrollment* is a term used to describe programs that permit high school students to enroll in college-level courses prior to graduation and to receive credit toward their high school diploma while simultaneously receiving college credit. Windham (1996) and Hebert (2001) used *dual enrollment* to indicate the same kind of program that Greenberg called concurrent enrollment. Fincher-Ford (1997) defined *dual credit* as earning credits in both high school and college simultaneously while still in high school based upon formalized agreements between high school and postsecondary institutions. Clark (2001) took an even more elaborate view than others. He stated that the credit-earning aspects should be named *dual and concurrent credit*, while the status of being enrolled needs to be called as *dual and concurrent enrollment*. Kim et al. (2003) shared this perspective and found support for it in a Delphi study in the state of Illinois.

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Kim et al. (2003) conducted a Delphi survey in response to the need to clarify dual credit definitions and prioritize issues in Illinois. The researchers had two meetings with a panel of experts consisting of secondary and postsecondary personnel and state representatives in Illinois. Based on results of the two meetings, the researchers reached consensus on the following definitions: *Dual credit* refers to students receive both high school and college credit for a college-level class successfully completed. *Dual enrollment* references students are concurrently enrolled (and taking college level classes) in high school and college. *Articulated credit* refers to courses or programs that align secondary and postsecondary education in order to allow students who successfully complete high school courses to become eligible to apply for credit in the corresponding college course in the future. This definition of dual credit concisely portrays that high school students who enroll in college level courses receive credit from both the high school and the college while in high school.

Added confusion arises between dual credit and articulated credit. Both can be associated with a pathway for students to accelerate earning a degree or certificate in postsecondary institutions. Fincher-Ford (1997) differentiated them and provided a definition for each term. According to her, *dual credit* is a “process, by which a student enrolls in a course at one institution for credit and, upon enrollment at a second institution of a different level, also receives credit for the same course at the second institution” (p. 7). She described *articulated credit* as “transfer credit that results from matching course competencies in the technical field and applying the credit from high school to college-level work” (p.42).

The process of obtaining credit also differs between dual credit and articulated credit. Clark (2001) pointed out that the credit-awarding process for dual credit is much simpler than for articulated credit; students take college-level courses, either at their own high school or on a college campus and completed courses are recorded on both the high school and the community college transcripts at the end of the semester. In contrast, students who completed articulated credit courses go on to the college transcript when they enroll in college and fulfill the terms of the articulated agreement, such as receiving the grade of B or higher from the articulated course and being enrolled in a certificate or associate degree program within a certain numbers of years (Fincher-Ford, 1997).

### *History of Dual Credit*

The origin of dual credit is debated. When exam-based programs, such as Advanced Placement (AP) and International Baccalaureate (IB), are identified as examples of dual credit programs, the history traces back to the mid 1950’s (Clark, 2001; Greenberg, 1989). However, if exam-based programs are not considered dual credit programs, the beginning point is different. Hebert (2001) noted that dual credit students did not need to take a test administered by an external source to qualify for college credit, rather credit was awarded based on the entire course rather than test results like Advanced Placement (AP). From this perspective, the origin of dual credit goes back to the 1970’s. Fincher-Ford (1997) conducted a literature review and interviewed high school and community college administrators nationwide. Her study reported that dual credit programs existed in the early 1970s, although the number of programs did not grow significantly until the 1980s. According to Fincher-Ford, Syracuse University’s Project Advance was the first configuration of a secondary and postsecondary dual credit partnership. Examining the history of dual credit programs shows that early program initiatives were mostly implemented in local settings, especially led by community colleges.

*Dual Credit Programs Initiated on the Institution Level.* The Syracuse University’s Project Advance (SUPA) program was established in 1973 to resolve the senioritis issue in Syracuse, New York. At first, this program targeted mostly high academic achievers (Boswell, 2001; Gaines et al., 1985). Assuming the vanguard role of SUPA in dual credit, SUPA is known for its large enrollments. Approximately 4,000 students from 120 high schools participated in this program (SUPA, <http://supa.syr.edu/SupaOnline/factsheet.html>). Following this model, several dual credit programs emerged throughout the nation. These include the LaGuardia Community College’s Middle College High School in 1974, Florida International University’s Partners in Progress program in 1982, and Kingsborough Community College’s College Now program in 1984.

The Middle College High School program in LaGuardia Community College in New York City started in 1974. This dual credit program focused on high school students at high risk of dropout. The program presented rigorous academic environments and provided intensive faculty and peer support. It also assisted students through extensive counseling. Students took college-level courses based on an interview with a Middle College counselor, and their academic progress was occasionally checked by the same counselor (Cunningham & Wagonlander, 2000; Wechsler,

2001). This program was replicated in 24 other sites and adopted to serve more than 6,000 students (Clark, 2001). Of the 4,500 students enrolled in Middle College High School National Consortium schools in 1999-2000, about 41% of them took college classes, showing a 97% pass rate (Hoffman, 2003). The postsecondary attendance rate for the Middle College High School program in LaGuardia Community College graduates were 81.0% in 1993 and 73.0% in 1997 (Wechsler, 2001). Key features of the program that are thought to be successful are pre-college experience, special counseling, and tutoring work for the students, especially at-risk students.

Similar to SUPA, the College Now program, which started at Kingsborough Community College, City University of New York in 1984 was taught by selected high school teachers. This program focused on the average achievers, usually ranging between 65% to 80% percentile ranks in high school (Burg, 2002; Crook, 1990; Kleiman, 2001). To take the tuition-free College Now course, students had to take competency tests in math, reading, and English writing, and they needed to pass a cut-off point for a set remedial range. Integration of the remedial component was found to further increase the quality of the program and assist students (Burg, 2002; Kleiman, 2001). The College Now program anticipated serving about 45,000 students in 2002-2003 (Hoffman, 2003). Burg (2003) reviewed an internal report from a participating high school in College Now which showed that over 98% program participants attended college, compared to an 85% college attendance rate of its overall graduating class. The results from an evaluation study by Crook (1990) showed that the program was effective in increasing rates of college entry, retention, and completion, even when high school academic ability indicators were controlled for.

*Dual Credit Programs Initiated on the State Level.* In response to the increasing interest in and demand for dual credit programs, several states have implemented state-level policies that make provisions for such programs (Robertson et al., 2001). The first dual credit program at the state level with state legislation is found in Minnesota's Post-Secondary Enrollment Options (PSEO) program. Minnesota adopted statewide dual credit legislation, entitled the Post-Secondary Enrollment Options Act, in 1985 (Boswell, 2001; Clark, 2001; Greenberg, 1989; Oregon Joint Boards of Education, 2000). Within the program, any 11th and 12th grade students who met the regular admission standards of the postsecondary institution to which they applied were allowed to take regular college courses on the college campus at state expense. Observing the success of this program, several other states followed the suit. Midwest states including Michigan, Indiana, Iowa, and Ohio adopted the Minnesota model and established legislation at the state level (Boswell, 2001; Clark, 2001; Oregon Joint Boards of Education, 2000).

The Minnesota dual credit program has grown steadily. Between 1994 and 1995, a total of 6,671 public high school juniors and seniors took college-level courses through this program, representing approximately 6% of total high school juniors and seniors. According to one study of the PSEO program issued by the Minnesota State Colleges and Universities (MnSCU) Office of Internal Auditing, about 20% of high school seniors in Minnesota earned college credits before graduating from high school (MnSCU, 2001). The Minnesota Higher Education Services Office (2004) website reports that "during the 2002-03 school year, 7,520 Minnesota high school juniors and seniors participated in PSEO at a post-secondary institutions, comprising about 5.3% of the total junior and senior student population in Minnesota. And in 2003, over 3,000 students earned 12 or more post-secondary credits in the PSEO program" (<http://www.mheso.state.mn.us>). The PSEO program also permits public high schools to provide college-level courses. This arrangement is made between postsecondary institutions and the school district and is referred to as "College in the High School." It is estimated that, during the 2002-03 school year, 12,000 high school students participated in a college-level course using this option.

The success of the Minnesota dual credit program contributed to the passage of the Running Start legislation in the Washington state. In 1990, the State of Washington initiated expanded educational opportunities for public high school students (Boswell, 2001; Clark, 2001; Oregon Joint Boards of Education, 2000; Washington State Board for Community and Technical Colleges, 2002). Initially this program allowed qualified 11th and 12th graders the opportunity to take college courses at community and technical colleges without paying college tuition. In 1994, the legislature expanded the program to include three 4-year universities because a school district does not always have a community college in its district. The program's popularity continued to rise. Between 2001 and 2002, enrollment in colleges totaled 14,313 individuals with 8,521 of them as full-time students, representing an enrollment increase of about 4% over the previous year (Washington State Board for Community and Technical Colleges, 2002). The successful implementation of the Running Start program has drawn enormous attention and interest from the public, and it has prompted other states to establish dual credit programs (Boswell, 2001; Clark, 2001).

Another current effort in the state of Washington is the College in the High School Program (CHP). Similar to Minnesota's, students take college level courses at high school locations taught by a high school or a college faculty member who is qualified to teach in accordance with state standards. In addition, local high school and colleges administer this program based on locally developed agreements. During 1997 and 1998, 21 colleges and universities served 3,585 students through this program (Oregon Joint Boards of Education, 2000).

*Dual Credit Implementation on the National Level.* Several of the studies cited previously describe the implementation status of dual credit on the institutional and state level, but few studies give description of the status of dual credit on the national level. A study with a representative sample of American higher education institutions in 1982 found that 87% of these institutions were admitting qualified high school students prior to high school graduation (Fluit & Strickland, 1982, cited in Oregon Early Options Study, 2000). Reisberg (1998) and Boswell (2001) reported that at least 38 states offer formal dual enrollment programs. Frazier (2000) conducted a survey and interviewed state-level spokespersons, and he detailed state laws and regulations regarding dual enrollment policies in the U.S. He grouped all 50 states into three categories according to the degree of the state's control and dual enrollment operations. His study found that dual enrollment programs are operated through state legislation in 23 states, whereas 12 states have no state legislation but a state agency leads in the development of guidelines to direct dual enrollment programs. Dual enrollment programs operate based on local agreements between school district and college in the other 15 states.

Frazier (2000) also found that the scale of dual enrollment implementation greatly differed among different states. There were numerous states that reported to have over 1,000 participants in dual enrollment programs without including exam based or tech prep programs. Among 26 states that reported the number of participants, Florida reported the highest number of dual-credit students. A state official in Florida informed Frazier that about 27,000 students in the community college took dual enrollment courses prior to enrollment in a community college and 333 of them obtained college credits from 4-year institutions. However, Frazier also acknowledged the need for further analysis of these dual enrollment student numbers because tech prep students enrolled under the Perkins Act may not be separated from dual enrollment students in this state. Florida places different eligibility for dual enrollment in vocational courses from dual enrollment in academic courses and dual enrollment in vocational courses may overlap with courses related to tech prep (Lord, 2002). According to Windham (1996), there were 23,343 dual credit students between 1994 and 1995 in Florida, and they earned a total of 62,745 hours of credit toward Associate of Arts (AA) degrees.

Crooks (1998) reported that about 204,790 high school students were involved in dual enrollment courses in the U.S. in the 1995-1996 school year. Clark (2001) estimated the approximate number of dual credit students as 560,000 in 2000, relying on various sources. This figure suggests about 8% of the total high school students in the U.S. experienced dual credit program. Although these figures could include duplicate counts, they indicate a large number of high school students are enrolled in dual credit courses, and this growth pattern is anticipated to continue.

#### *Advantages of Dual Credit*

Rapid expansion and the growing interest in dual credit generated a great deal of debate over the values and merits of the program. Many authors, however, supported dual credit course offerings for high school students (Andrews, 2001a, 2001b; Boswell, 2000; Cartron, 2001; Chatman & Smith, 1998; Greenberg, 1989; Hugo, 2001; Pierce, 2002). Realizing the transitional problems between secondary and postsecondary education, these authors suggest dual credit programs are a potential means to resolve problems, such as the disconnected curriculum, senioritis, high school dropout, remediation, and attrition.

Saving time and money through dual credit is a primary benefit frequently cited (Andrews & Marshall, 1991; Chatman & Smith, 1998; Greenberg, 1989; Kruger, 2000; Puyear, 1998). Earning college credit while in high school can accelerate student progress toward degree completion in college, reducing overall tuition costs. Often students can take dual credit courses getting tuition waive, either fully or partially. For the students of low-income families, the financial benefit is a key factor in pursuing college education (Greenberg, 1989). Among many dual credit programs, the Running Start program has reported financial gains for participants in dual credit. During the 2001-2002 year, students and their parents saved \$17.4 million in tuition by participating in this program (Washington State Board for Community and Technical Colleges, 2002). Kruger (2000) examined graduates from a community college in Utah between 1997 and 2000 who completed at least one dual enrollment course, and about 60% of the

students included in his study completed about one quarter of college-level courses prior to high school graduation, saving up to \$600 in tuition. Considering the increasing cost of a college education, this advantage appeals to both students and parents.

Another attractive feature of dual credit is the claimed cure for “senioritis” by providing greater academic challenges. Many students take few challenging courses in the 12<sup>th</sup> grade of high school. Several studies advocated dual credit to reduce the occurrence of “senioritis” in U.S. high schools (Andrews & Marshall, 1991; Catron, 1998; Chatman & Smith, 1998; Gaines & Wilbur, 1985; Peterson, 2003). Many researchers also noted that taking dual credit courses contributes to reducing course duplication in the high school and college curricula (Chatman & Smith, 1998; Johnstone & Del Genio, 2001; Peterson, 2003).

Some researchers maintained that dual credit can provide students with opportunities to explore and decide further education after high school graduation (Chatman & Smith, 1998; Greenberg, 1989; Oregon Early Options Study, 2000). According to these authors, experiences in college-level course work and college expectations enable students to test and be reassured about their ability to succeed in college. Ninety six percent of principals and ninety percent of teachers involved with the Syracuse University’s Project Advance (SUPA) program responded that the SUPA program was helpful for students to develop more realistic expectations about college work (Bailey et al., 2002). According to Bailey et al., students’ early-exposure to the college curriculum and environment will not only facilitate “the academic transition to college” but also “help students make the psychological transition” (p. 7).

An increase in students’ educational opportunities has been claimed as another benefit of dual credit (Adelman, 1999; Brigham, 1998; Hoffman, 2003; Hugo, 2001; Lords, 2000). These authors emphasized that disadvantaged students, such as the minority and low socioeconomic status students can gain access to college through dual credit. They also held a view that dual credit programs can recruit students whose plans do not include college and retain students who do not plan to complete high school. Another advantage of dual credit programs is to expand educational opportunities to students in small rural high schools (Bailey et al., 2002; Boswell, 2001; Catron, 2001).

Bailey et al. (2002) stated that small rural schools often have limited curriculum options due to the lack of faculty and school resources. Under such circumstance, dual credit can facilitate the sharing of resources among participating entities. Bailey et al. (2002) pointed out that Career and Technical Education (CTE) dual credit courses are especially helpful to students located in small rural high schools. The potential of dual credit to provide access to college resources and nearby facilitates is a good way to make up for eliminated elective and CTE coursework caused by increased emphasis on academic courses in high school.

Last, many authors claim that dual credit programs enhance students’ chances for admission to an institution of higher education and their chances for success once they have matriculated (Bailey et al., 2002; Brigham, 1989; Chatman & Smith, 1998; Clark, 2001; Fincher-Ford, 1997; Greenberg, 1989; Kleiman, 2001; Lords, 2000; Puyear, 1998). Those authors maintain that having taken college-level course work and having met college expectations, students can make the transition to college as better-prepared students, ensuring their academic success in college.

### *Issues and Concerns about Dual Credit*

Dual credit programs have several advantages, but like other educational programs, several issues have also arisen concerning them. Many authors who claimed the values and merits of dual credit programs also expressed concerns related to them (Andrews & Marshall, 1991; Andrews, 2001a; Clark 2001; Fincher-Ford, 1996; Gaines & Wilbur, 1985; Greenberg, 1989; Oregon Early Options Study, 2000).

The accelerated degree completion and financial gains through dual credit indicated as a primary benefit are not always evident. Through a survey with officials in the 50 states, Frazier (2000) found that students had to pay for dual enrollment courses in 28 states. Also, some students do not use earned college credits because they are not accepted by or transferred to other colleges and universities (Andrews, 2001a; Clark, 2001; Frazier, 2001; Johnstone & Del Genio, 2001; Kim et al, 2003). Some postsecondary institutions do not accept dual credits earned, based on agreements between local high schools and other postsecondary institutions. Some postsecondary institutions do not recognize dual credits when courses taken through a dual credit program are irrelevant to students’ selected college

major. As a result, students who took dual credit courses prior to college enrollment may not always save time and money.

Another major issue is how to maintain program quality (Andrews & Mees, 2001; Clark, 2001; Kim et al., 2003). Survey results with community college presidents in Illinois show the weight of this issue (Andrews & Mees, 2001). The Delphi study conducted by Kim et al. (2003) provides evidence of its importance. In this study, the authors asked a panel of experts about their major concerns with dual credit programs. The areas rated as most pressing were the issues of quality maintenance and secondary/postsecondary collaboration.

Some researchers (see, for example, Johnstone & Del Genio, 2001; Reisberg, 1998) question the legitimacy of dual credit courses. Whether college-level courses taught by high school teachers in high school settings or classes dominated by high school students represent bona fide college-level learning experiences remain unanswered (Johnstone & Del Genio, 2001; Reisberg, 1998). Rather than being taught by full-time college faculty, many dual credit courses are taught by either adjunct faculty of the college or high school teachers serving as adjunct faculty (Andrews, 2001a; Andrews & Marshall, 1991; Gaines & Wilbur, 1985; Hebert, 2001; Oregon Early Options Study, 2000). Hebert (2001) compared two groups of students who took a dual credit mathematics course, one group of students taught by high school teachers and the other group taught by college faculty. She found that the grades for students taught by high school teachers were significantly better in subsequent coursework in mathematics than those from the other group. The students taught by the high school teachers received more high grades (A's and B's) in subsequent coursework than did their counterparts. The students taught by the college faculty received more low grades (D's and F's). Chi-square test results showed significant difference in grade distribution for the two groups ( $\chi^2 = 11.070$ ,  $df = 5$ ,  $p < .05$ ).

Another key issue is how to increase students' educational opportunities through dual credit while maintaining student selection criteria, as a way to maintain program quality. This is an area where the multiple foci of dual credit can be perceived as contradictory. Student selection is closely interweaved with access. If student selection criteria become stricter, student access to dual credit programs will be limited. In contrast, if selection criteria become looser, students' opportunities to have dual credit experiences will increase, although broadening the constituency of the program can be viewed as lowering quality standards.

The acceptance of younger students can trigger the under age students issue. The junior or senior standing in the high school is the most common age selection criteria (Boswell, 2001; Clark, 2001; Kim et al., 2003), but in some cases, even freshman and sophomores can take dual enrollment courses (Frazier, 2000). High school students may not be mature enough to handle some college materials and the college environment. Johnston and Kristovich (1998) pointed out that administrators at postsecondary institutions should be very aware of the liability they face by having underage students on the college campus.

Last, inconsistent dual credit funding practices have been indicated as a concern (Clark, 2001; Kim et al., 2003). Survey results with officials in the 50 states (Frazier, 2000) show the great variation in policies associated with dual enrollment program funding. He noted that a common response to the question about funding policies was often, "that depends" (p.11). His study indicates that the student pays in 28 states, school district pays in 9 states, and as part of a recruitment and public relations plan some colleges pay, although the state reimburses colleges in most cases. A study completed by the Oregon Joint Boards of Education (2000) also points out the variation in funding policies. This study indicates that among 23 responding states, 9 states reported that students have the main responsibility for paying tuition, and 9 states indicated the state or district is the main funding source (Oregon Joint Boards of Education, 2000).

One issue associated with state funding practice is "double dipping," implying that the state pays for both colleges and high schools regarding the same dual enrolled students (Bailey et al., 2002). This issue has been a main reason why some state officials and legislators oppose dual credit programs. Limited state financial resources can lead to states considering reducing funding to the colleges and high schools. Reduced funding can make high schools and colleges less motivated to offer dual credit courses and decrease the financial benefit, especially problematic to lower-income students' participation (Bailey et al., 2002).

### *The Relationship between Dual Credit and Tech Prep*

Dual credit and tech prep are two approaches that are intended to assist with student transition between high schools and colleges. The Carl D. Perkins Vocational and Applied Technology Education Act (VATEA) of 1990 (also known as Perkins II) is important in the evolution of tech prep because it provided an official federal endorsement for the concept. The emphasis of tech prep is on close relationships and collaboration between secondary and postsecondary institutions, and this idea parallels a primary goal of dual credit to improve students' successful transition to college. The linkage between secondary and postsecondary institutions is at the core. Fincher-Ford (1997) presented this view succinctly by stating that "the high school and community college partnership has been and continues to be incredibly fertile for many kinds of progressive educational initiatives... Dual credit is only one of them. Tech prep is another" (p. 6).

Some scholars argue that the rise of tech prep has contributed to the growth of dual credit. Sometimes dual credit program courses are claimed as a part of tech prep programs, as in the case with Pierce (2001), who pointed out that some of the most extensive use of dual credit courses occurs in tech prep programs. On the contrary, some authors consider tech prep as a type of dual credit. For example, Clark (2001) classified dual credit as four types, such as examination-based, school-based, college-based, and career preparation, identifying tech prep as illustrative of career preparation credits. Frazier (2000) reported that in his inquiry, many state government officials viewed the dual enrollment concept as connected primarily with tech prep offerings under the federally funded Perkins Act. In fact, some respondents were unable to distinguish tech prep students enrolled under the Perkins Act from dual credit students in general studies. The conceptual similarity was even more tangible when, as Fincher-Ford (1997) mentioned, "the dual-credit option enhances the educational pathways for both tech prep and college prep students" (p. 6). Catron (2001) and Bailey et al. (2002) perceived dual credit as another effort to increase articulation between high school and community college curriculum, along with tech prep.

Tech prep is one program that has resulted in considerable progress in formalizing articulated curricular between secondary and postsecondary institutions (Orr, 1998). An articulated curriculum between high schools and postsecondary institutions requires formal linkages in course offerings and aims to enhance transition and facilitate collaboration. It can also contribute to making secondary curricula more academically rigorous. The Perkins Act Amendments, in both Perkins II and III, were a very important impetus in expanding the scope of articulation agreements between secondary and postsecondary institutions (Hershey et al., 1998). Through federal legislation, states were funded for implementing and expanding tech prep programs, and the development and revision of articulation agreements played a central role. According to Hershey et al. (1998), by 1995 about 96% of tech prep consortia in the U.S. had articulation agreements in place between secondary and postsecondary institutions.

Perkins III placed greater emphasis on ensuring non-duplicative sequences of courses. In particular, tech prep students were allowed to concurrently enroll in secondary and postsecondary coursework (American Vocational Association, 1998), and this concurrent enrollment is where the greatest similarity between dual credit and tech prep is found. However, some differences between the two programs are noteworthy. Tech prep was originally initiated as a comprehensive reform. In contrast, dual credit has been targeted at the course level (Bailey et al., 2002). Course offerings in dual credit are often less programmatic compared to those in tech prep. In addition, the type of courses offered in each program differs. Tech prep courses often include numerous Career and Technical Education (CTE) courses, whereas dual credit courses often include academic courses (Bailey et al., 2002).

Understanding these similarities and differences contributes to a better understanding of dual credit relative to tech prep, especially in terms of primary goals, credit awarding processes, and type of courses offered. Without dual credit, the credits students obtain from a college are often deterred on officially recognized once they have enrolled in college within a certain numbers of years, matched the required competencies, and submitted a credit request form. With dual credit acknowledging students' credit gains upon completion of a course, such delay is no longer necessary (Fincher-Ford, 1997). In addition, inclusion of dual credit within tech prep implies that tech prep students benefit from obtaining general academic dual credit courses and career technical course credits through an accelerated program (Bragg & Reger, 2002). The following section examines the literature about students' demographic and educational background characteristics in high school in regards to dual credit participation as a precursor to a discussion of literature on the influence of dual credit on student outcomes.

## Dual Credit Participants

Students' demographic characteristics have been examined to understand dual credit participants. Although many studies have investigated race/ethnicity and socioeconomic status to identify the social status of program participants, this researcher found few dual credit studies that looked at students' socioeconomic status. Most dual credit studies inspected only the gender and race/ethnicity of program participants.

### *Gender*

Several studies reported that more female students participated in dual credit programs than male students (Cesta, 2003; Johnston & Kristovich, 1998; Windham, 1996; Washington State Board for Community and Technical Colleges, 2002; <http://www.mheso.state.mn.us>). Among the 339 participants in a dual enrollment program at one Illinois community college, 58% of the participants were female. In one dual credit study reviewed by Windham (1996), the proportion of female students in a dual credit program in Florida rose from 56% in 1990 to 75% in 1992. In the report of the Running Start program (Washington State Board for Community and Technical Colleges, 2002), female students comprised 58% of the total 14,313 participants in 2001. In the case of Minnesota, the proportion of female students in the PSEO program remained substantially larger than males, rising slightly between 1996 and 2003. In 2003, the gender distribution of program participants was 2,633 (34%) males and 5,151 (66%) females as compared to 2,403 (36%) males and 4,287 (64%) females in 1996 (<http://www.mheso.state.mn.us>). Windham (1996) found female dual credit participants more frequently transferred to four-year institutions than males, and completed college at a higher and faster rate than their male peers (Cesta, 2003).

### *Race/Ethnicity*

Most dual credit studies examining race and ethnicity identified White students as the most dominant group (Fincher-Ford, 1997; Greenberg, 1989; Johnston & Kristovich, 1998; Soder, 2000; Washington State Board for Community and Technical Colleges, 2002; Windham, 1996). The only exception was Marquez's (1999) study from the setting of two community colleges in Arizona whose majority dual credit participants were ethnic minorities, at 72%. Greenberg (1989) reported that the participants in the middle college high school program in New York were 45% White, 33% Hispanic, 21% Black, and 1% Asian, and about 40% were from families on public assistance. Windham (1996) reviewed two dual credit studies and reported that 77% of students who entered one community college in Florida were White in the 1990 cohort, and the ratio of White to other groups was higher at 83% in 1992. Another study reviewed by Windham indicated that the ratio of White students was 75% in comparison to 25% for other ethnic groups in one Florida community college. Similar patterns of White to minority students were found in the Running Start report for the state of Washington (Washington State Board for Community and Technical Colleges, 2002). In the fall of 2001, non-White students represented only approximately 18% of the total of 14,313 participants.

The status of White students as the primary constituency of dual credit students is not surprising given that White-non-Hispanic students comprise the largest proportion of the entire elementary and high school student population at 63.3% (U.S. Census Bureau, 2000). Whether dual credit is favored by White students is inconclusive, but Fincher-Ford (1997) reported that her interview with urban school district administrators indicated a lack of dual credit opportunities in school districts with limited resources. Soder (2000) interviewed members of the National Network for Education Renewal (NNER) high schools and found some felt that dual credit opportunities were more limited for non-White and economically disadvantaged students than for White students, but this view was not unanimous. Marquez (1999) compared the ethnic composition of college enrollees from two student groups, one with dual credit and the other without dual credit. In his study, White students comprised 72.4% of the subjects from the non-dual credit group, but only 28% of the dual credit group. The context-specific nature of these findings calls for more comparisons in different dual credit settings before conclusions can be generalized.

Whether White dual credit students are more successful in transferring to four-year institutions is also inconclusive. Some studies, such as the Running Start program report showed that more White dual credit students transferred to four-year institutions than non-Whites. However, the White group also comprised the vast majority of the participants. The ethnic distribution of Running Start program participants who transferred to the University of Washington was 460 White students (50%), 275 Asian American (29.9%), 39 Hispanic (4.2%), 24 African

American (2.6%), 9 Native American (1.0%), 4 Hawaiian/Pacific Islander (0.4%), and 109 Other/Not Indicated (11.8%), showing White program participants were the majority of transfer students. However, considering that White students consisted of over 80% of the total 14,313 Running Start program participants, but among the 920 Running Start program participants who transferred to University of Washington, only 50% were White, it was actually a substantial decrease in the proportion of Whites in the overall racial composition (Washington State Board for Community and Technical Colleges, 2002).

### *High School Performance of Dual Credit Participants*

Some scholars suggest dual credit was originally targeted to assist high achieving students but was gradually expanded to a broader range of students, including middle and even lower achieving students (Bailey et al., 2002; Clark, 2002; Greenberg, 1989; Lords, 2000). Many authors pointed out that dual credit programs would be particularly beneficial to students who would otherwise not have an opportunity to attend college (Adelman, 1999; Brigham, 1989; Greenberg, 1989; Hoffman, 2003; Lords, 2000). However, this expansion of eligible program recipients raised concerns about the quality, integrity, and rigor of dual credit programs. This historical shift led to the response for many dual credit programs to set academic requirements for dual credit participants (Bailey et al., 2002; Clark, 2001). Most commonly found eligibility requirements linked to GPA, class rank, ACT/SAT scores, and college placement tests.

GPA was used frequently to determine enrollment eligibility and often combined with nationwide standardized test scores (Clark, 2001). However, each state slightly differed from another in the minimal GPA required. In Florida, Massachusetts, Missouri, and Oklahoma, the minimum GPA requirement for dual credit enrollment was 3.0 (Clark, 2001). Students in Kentucky had to possess an above average score on a specified test and GPA, above 3.2 out of 4.0 (Kentucky Council on Higher Education, 2002). Mississippi's dual enrollment program required that students have a composite score of 21 or better on the ACT or equivalent SAT and GPA of 3.0 or higher from a 4.0 scale (Mississippi Legislature, 1998). Sometimes lower criteria were applied to take CTE dual credit courses, as in the case of Tennessee. In that state, students needed a 3.0 or better GPA and an ACT composite score of 19 or higher to enroll in the general education dual enrollment programs, but the business and technical programs required a minimum GPA of 2.5 (Tennessee Board of Regents, 2002).

Further, several studies reported that dual credit students performed better than other students while in high school (Greenberg, 1989; Richardson, 1999; Washington State Board for Community and Technical Colleges, 2002). Syracuse University Project Advance (SUPA) participants exceeded the national average by about 100 points on the verbal and 117 on the math SAT scores, and 66.6% of SUPA students ranked in the top fifth of their class (Greenberg, 1989). A study conducted by the University of Arizona (Richardson, 1999) found similar results. In this study, students who earned community college credit through dual enrollment had a GPA 0.12 higher than those without college credit, and their mean SAT score was about 40 points higher. Also, the performance data of Running Start students who transferred to the University of Washington in fall 2001 (Washington State Board for Community and Technical Colleges, 2002) showed that their GPA was 3.67, the SAT verbal and math average was 572 and 591 respectively, and the ACT average was 24.9 points, higher than the national average SAT and ACT scores.

This review of literature suggests that the overall high school performance of dual credit students is higher than non-dual credit students due, at least in part, to the academic requirement for enrollment eligibility. One study examined the relationship between college GPA and dual credit participants' high school performance (Donahue, 1993), showing a significant relationship between high school GPA prior to dual enrollment and college GPA. However, the relationship between achievement test scores such as writing, reading, and numerical skills and overall college GPA was not significant.

### College Outcomes of Students

As previously mentioned, the dual credit literature is replete with claims of positive outcomes but scarce with outcome studies. Cambra (2000) surveyed 139 higher education institutions nationwide about students with dual credits relative to retention and academic success, reporting the majority made no assessment of such programs because it was not required. A study by Soder (2000) of selected high schools in the National Network for Education

Renewal (NNER) found a similar result regarding the dearth of dual credit outcomes studies. The NNER comprises 16 settings in 14 states, and 33 higher education institutions and about 500 K-12 schools involved in NNER work on the simultaneous renewal of schooling and the education of educators.

An extensive search using the Internet, ERIC databases, Dissertation Abstract databases, and the researcher's campus library revealed that various claimed dual credit student outcomes are largely related to high school completion, and college enrollment, readiness, performance, retention, credits earned, and successful degree completion. A study by Marquez (1999) examined transition outcomes according to dual credit students' transfer to four-year institution, persistence, and the attainment of the baccalaureate degree, along with remediation and performance in the community college.

Among several student outcomes in college, placement in remedial course and total college-level credit hours earned are two distinctive variables quantifying success. These variables serve as measures of students' college readiness (i.e., placement in remedial course means being not college-ready), and college retention and performance (i.e., more total college level hours earned can be associated with both better retention and academic performance). Research context, design and sampling methods are presented when a study is first cited.

#### *Placement in Remedial Reading, Writing, and Mathematics Course*

Need for remediation is a measure of college readiness. Remediation is considered as the number one issue facing colleges today by researchers and practitioners (National Center for Public Policy and Higher Education, 1999) and dual credit has been claimed as a solution to such a transition issue by many authors (Brigham, 1989; Clark, 2001; Greenberg, 1989; Kleiman, 2001; Lords, 2000; Puyear, 1998; Schuetz, 2000). However, only three studies to date examined the impact of dual credit on college readiness (Crook, 1990; Marquez, 1999; Monroe Community College, 2003). Two of them (Crook, 1990; Monroe Community College, 2003) reported that students with dual credit were better prepared than non-dual credit students. Only Marquez (1999) showed more dual credit students were placed into remedial courses than non-dual credit students. Each of these studies is explicated more fully below.

An evaluation by Crook (1990) of College Now program sponsored by Kingsborough Community College in New York City showed that among 1987 entrants the average remedial credit hours earned by program participants were 5.2 compared to 7.1 for non-participants through the first academic year. Among 1988 entrants, the average remedial credit hours earned by program participants were 4.9 compared to 6.9 for non-participants. Institutional data from Monroe Community College in New York (2003) supported the positive impact of dual credit on college readiness. The comparison of dual credit students who enrolled in the college full-time after high school and other college full-time enrollees without any dual credit showed that dual credit students had higher reading placement scores than non-dual credit students during 1997-2001. For instance, in 2001, 35% of dual credit students obtained below 80% on a college reading placement test, compared to 40% of non-dual credit students. Without accounting for students' prior-academic performance, however, it is hard to say whether these outcomes were mainly derived from the program or the difference in their academic ability existed before they enrolled in the program.

In contrast, Marquez (1999) found that dual credit participants were less prepared for college than non-participants. In his study, the program participants group consisted of those who enrolled in the Achieving a College Education (ACE) at South Mountain Community College (SMCC) or the Achieving a College Education Plus (ACE Plus) program at Glendale Community College (GCC) when they were juniors in high school in the summer of 1991. Each summer, these two community colleges, located at Maricopa Community College District (MCCCD) in Arizona, admit a group of high school juniors into their dual credit programs. For this study, 324 students consisting of 161 ACE and 163 ACE Plus participants were tracked through their educational career at MCCCD and Arizona State University. They were the students expected to graduate from high school and enter into college in fall 1993. Therefore, as a comparison group, 1,112 students entering SMCC and GCC in fall 1993 were selected. Results indicated approximately 60% of dual credit participants and 45% of non-participants were placed into a reading or English remedial course. The program participants' average test scores were higher than non-participants in reading and lower than non-participants in writing and math: program participants ( $M = 42.6$ ,  $SD = 5.6$ ) compared to non-participants ( $M = 39.2$ ,  $SD = 5.6$ ) on the reading test, participants ( $M = 39.0$ ,  $SD = 5.7$ ) and non-participants ( $M = 42.9$ ,  $SD = 5.8$ ) on the writing test, and participants ( $M = 38.7$ ,  $SD = 5.9$ ) and non-participants ( $M = 39.7$ ,  $SD = 6.0$ ) on the math test. T-tests indicated significant differences between two groups on the reading test ( $t = -9.19$ ,  $p < .001$ ) and writing test ( $t = -10.34$ ,  $p < .001$ ), whereas no significant difference was found on the math test. However, this

study did not provide information on students' prior-academic performance, but it did sample average and at-risk achievers by recruiting students from all quartiles of achievement. For a better understanding of the impact of these dual credit programs on college readiness, prior-academic performance should be controlled.

#### *Total College Level Hours Earned*

Total college level hours earned measures college retention as well as academic performance. Student retention is important for measuring institutional effectiveness as the demand for institutional assessment and accountability in the use of public resources intensifies (Cohen & Brawer, 1996). The definition of student retention may vary depending on the context of each institution. Crawford (1999) defined retention as "maintenance of continued enrollment in classes throughout one semester" and "the ratio of units that students successfully-completed to the units attempted" (p. 13). Retention was defined as re-enrollment to the next academic year as sophomores (Texas Guaranteed Student Loan Corporation, 1999), and second semester enrollment (Smith, Street, and Olivarez, 2002). Sydow and Sandel (1998) defined retention as enrollment in a subsequent semester and academic achievement as completion of two-thirds of courses attempted with a 2.0 GPA or higher.

Similar to the above, different criteria were used to assess the influence of dual credit on student retention. In some studies retention was measured by the amount of credit hours enrolled and earned (Gurule, 1996; Nitzke, 2001; Washington State Board for Community and Technical Colleges, 2002). Student retention was also measured by number of continuous semesters of enrolled (Black, 1997), second semester or year return rate (Eimers & Mullen, 2003; Monroe Community College, 2003), and both second semester return rate and credit hours earned (Crook, 1990).

The influence of dual credit on college performance was measured with different criteria, too. They were course completion rate (Gurule, 1996), course GPA (Chatman & Smith, 1998), first term GPA (Monroe Community College, 2003), first year GPA (Eimers & Mullen, 2003), overall college GPA (Nitzke, 2002; Windham, 1996), the degree of drop in GPAs between high school and college (Richardson, 1999), and cumulative percentage of units passed and overall GPA (Spurling & Gabriner, 2002).

#### *College Retention*

Three studies compared college retention between dual credit students and non-dual credit students based on earned college credit hours (Gurule, 1996; Nitzke, 2001; Washington State Board for Community and Technical Colleges, 2002). Among the three studies, Gurule (1996) showed that dual credit students earned more college credits than non-dual credit students. Washington State Board for Community and Technical Colleges (2002) claimed the amount of credits earned were comparable between dual credit participants and students without such experiences. The study by Nitzke (2001) revealed that dual credit students earned less college credits than non-dual credit students. The following paragraphs describe these studies in more detail.

Gurule (1996) compared three dual credit programs in New York (City-As-School, College Now, and Middle College) with one in Arizona (ACE-Plus). They were dual credit programs, also working with at risk or average achievers. In addition, this study compared ACE-Plus program students' achievement with general students enrolled in the same community college. This study used both primary and secondary data. Primary data were collected on the Achieving a College Education-Plus (ACE-Plus) program at Glendale Community College in the Maricopa Community College District. The researcher used a dataset of 1991 ACE-Plus cohort compiled and stored in the ACE-Plus Archives. Enrollees numbered 163, and all were examined for this study. The secondary data were derived from a study by Greenberg (1987) focused on three dual credit programs in New York. The aggregate enrollees in the New York programs were 473.

A comparison of the ACE-Plus program with three dual credit programs indicated that ACE-Plus students enrolled in substantially more credit hours ( $M = 13.8$ ) than students in New York program ( $M = 3.6$ ) while in high school. The comparison of ACE-Plus program participants with overall Glendale Community College freshman not included in the participant group also showed that college credit hours registered by ACE-Plus students while in high school ( $M = 13.8$ ) were more than college credit hours registered by overall freshman ( $M = 6.7$ ) in their first

semester of college work. However, without accounting for students' prior-academic performance, it is hard to say whether these outcomes were mainly derived from the program or other factors.

The annual progress report of the Running Start (Washington State Board for Community and Technical Colleges, 2002) claimed that the amount of credits earned by program participants in 2001-2002 at the University of Washington, averaging 13.8 credits, and were comparable to that of non-participants. However, there wasn't any control for students' prior-academic performance.

Nitzke (2002) evaluated one institution-based dual credit program partnered through a Midwestern community college. He used a longitudinal time design (1993-2001) to follow the college careers of 568 students from the time they initially enrolled in dual credit programs to their completion at the community college. The comparison group was selected through stratified random sampling based on semester enrollment covering the same time period, consisted of 1,007 students who entered the college as traditionally-enrolled students without dual credit.

Results showed program participants attempted fewer course credits ( $M = 30.42$ ,  $SD = 21.102$ ) than non-participants ( $M = 34.16$ ,  $SD = 25.159$ ). Results of the Analysis of variance (ANOVA) showed statistically significant difference between the two groups  $F(1) = 8.980$ ,  $p = .003$ . In addition, program participants completed fewer credits ( $M = 28.23$ ,  $SD = 21.404$ ) than non-participants ( $M = 31.707$ ,  $SD = 25.896$ ). Results of the ANOVA showed statistically significant differences between two groups  $F(1) = 7.383$ ,  $p = .007$ . Furthermore, Ordinary Least Squares (OLS) regression analysis indicated the dual credit status had a statistically significant negative net effect on total credits completed, after controlling for student background characteristics including prior-academic performance.

Black (1997) measured college retention based on the number of continuous semesters of enrollment. He identified 350 students who had been concurrently enrolled at Arizona Western College and their high school sometime between fall 1993 and fall 1996. Of about 5,000 students who were juniors and seniors in three high schools in the Yuma area who did not concurrently enroll at Arizona Western College during the same period, 350 students were randomly selected as a comparison group. Data were drawn from the Yuma high schools and Arizona Western college databases. Students with concurrent enrollment experiences showed similar college retention pattern to the students without concurrent enrollment experiences. Both groups attended Arizona Western College a median of 2.5-2.8 continuous semesters. However, there wasn't any control for students' prior-academic performance.

Two studies measured college retention based on the second semester or second year return rate and examined retention differences between dual credit students and non-dual credit students (Eimers & Mullen, 2003; Monroe Community College, 2003). They found dual credit students excelled over non-dual credit students.

Eimers and Mullen (2003) studied 7,913 first time, full-time degree-seeking students at the four-campus University of Missouri System. The researchers sorted four groups according to type of credit: AP only ( $N = 505$ ), dual credit only ( $N = 3,135$ ), both AP and dual credit ( $N = 300$ ), and no college credit ( $N = 3,973$ ). They found that students who entered a college with dual credit only returned to their second year at a higher rate (89%) than no college credit students (76%). Results also revealed that dual credit students were already more academically able than no college credit students before entering college, showing higher ACT score (25.8 for dual credit students compared to 24.7 for no college credit students) and high school rank (82% for dual credit students compared to 73% for no college credit students). Recognizing the difference in the prior-academic performance, Eimers and Mullen conducted logistic regression analysis to control ability indicators in examining second year return rate. With academic ability controlled, results indicated that dual credit students had an increased likelihood of second-year college return compared to no college credit students. Institutional data from Monroe Community College (MCC) in New York revealed that 93% of dual credit students returned to the spring semester of 2001, compared to 81% of non-dual credit students (Monroe Community College, 2003). However, students' prior-academic performance was not controlled for.

Crook (1999) examined both retention rate and credit hours earned in an evaluation of the impact of the College Now Program on retention rate and degree credits earned over two full academic years as a follow-up study of the 1987 cohort. He also tracked the College Now program participants enrolled at City University in New York (CUNY) in 1988 to determine whether the same positive short-term impact indicated from the 1987 cohort would exist to the 1988 cohort. To investigate the longer-term impact, 463 program participants who entered CUNY in the

fall of 1987, through the spring of 1989 were selected. Among all CUNY freshman entrants in the fall of 1987 who did not participate in College Now program while in high school, 463 students were randomly selected as a comparison group. In addition, 678 program participants entering CUNY in the fall of 1988 were selected, and same number of non-participants were randomly selected to form a comparison group.

Results indicated that program participants had higher retention rates and more degree credits earned. Like the 1987 cohort, among 1988 cohort program participants were much more likely to continue their studies for a second semester than non-participants. Results also support the program's longer-term impact, showing a 76.5% retention rate for program participants after two academic years compared to 58.1% for non-participants. In addition, program participants earned more degree credits than non-participants. Among both cohorts of 1987 and 1988 entrants, program participants earned an average of about 6 credits more than non-participants after their first year in college, and among 1987 entrants, program participants earned about 13 credits more than non-participants by the end of their second academic year.

Results also revealed program participants were better academically prepared than their comparison groups even before college enrollment, showing higher high school average, total academic units completed in high school, and number of skills tests passed. Recognizing the need for controlling for prior-academic performance to examine the unbiased impact of College Now, Crook conducted logistic regression analysis and multiple regression analysis. Results showed program participants were about 11 percentage points more likely than non-participants to have returned after their first semester, and they earned an average of 4.3 credits more by the end of their first year. Results also showed program participation made a difference beyond the freshman year, showing program participants were about 14.7 percentage points more likely to return for a fourth semester and earned about 9 more credits than non-participants as of spring 1989.

#### *College Academic Performance*

Studies examining the impact of dual credit on college academic performance found that dual credit participants showed better academic performance in college than non-dual credit students (Black, 1997; Gurule, 1996; Monroe Community College, 2003; Nitzke, 2002; Richardson, 1999; Spurling & Gabriner, 2002; Windham, 1996). Three studies reported that dual credit participants' academic performance in college was comparable to that of non-dual credit participants (Chatman & Smith, 1998; Eimers & Mullen 2003; Washington State Board for Community and Technical Colleges, 2002). Interestingly, the study by Marquez (1999) showed that the academic performance of non-dual credit students excelled over dual credit students in their first term in college. About 32% of participants were in the 0.0-1.9 GPA range compared to 20% of non-participants, whereas 9.6% of participants were in the 3.5-4.0 range compared to 16.7% of non-participants. Program participants had an average GPA of 2.33 compared to 2.60 for non-participants, and the difference was significant ( $t = -3.04, p < .01$ ). As mentioned previously, this study did not account for the prior-academic performance of program participants.

Nitzke (2002) showed that the average GPA for dual credit students ( $M = 2.62, SD = .859$ ) was higher than non-dual credit students ( $M = 2.43, SD = .997$ ). Results of the ANOVA showed a statistically significant difference between two groups,  $F(1) = 14.394, p < .001$ . Ordinary Least Squares regression results indicated the dual credit status had a statistically significant net effect on GPA, after controlling for students' background characteristics including prior-academic performance.

Gurule (1996) also showed dual credit students had a higher course completion rate and higher grades than non-dual credit students. The comparative analysis of the ACE-Plus program provided by Glendale Community College in Arizona with three dual credit programs in New York indicated that ACE-Plus students showed much higher overall course completion rate than students in the New York program (85.9% compared to 69.3%). ACE-Plus program participants also had higher GPA than New York program participants. About 52% of ACE-Plus students received 3.0 or better GPA compared to 38.5% of New York program participants and 87.1% of ACE-Plus students received passing grades compared to 62.0% of the New York students. In addition, the comparison of program participants' achievement in their first semester with overall Glendale Community College freshman showed a higher course completion rate for participants (85.9%) compared to non-participants (73.1%), and the percentages of ACE-Plus students with non-passing grades (12.9% ) were lower than the percentages of overall freshman (13.7%). However, without accounting for students' prior-academic performance, it is hard to say whether these outcomes were mainly derived from the program or the difference in their prior-academic performance.

Institutional data from Monroe Community College (2003) indicates that in 2001, dual credit students had the 1<sup>st</sup> term GPA of 2.54 compared to 2.15 of non-dual credit students. However, there wasn't any control for students' prior-academic performance.

A 1993 report by the Office of Instructional Resources at the University of Florida found that the majority of students who earned dual credit before enrolling at the university had to retake courses (Windham, 1996). This finding prompted follow-up studies about dual enrollment students in 1994 at two community colleges in Florida. Pensacola Junior College investigated outcomes of students who successfully completed their dual enrollment English courses during the 1991-92 school year and transferred to the University of West Florida. Tallahassee Community College investigated all students registered in their dual enrollment courses in the fall of 1990, 1991, and 1992 and transferred to Florida State University (FSU). Windham (1996) reviewed the results of these two follow-up studies and reported that dual enrollment programs in Florida impact positively on students' college outcomes, working as an important acceleration mechanism for students. Follow-up study results by Pensacola Junior College showed that the average GPA for 52 former dual enrollment students attending UWF was the same as the average GPA for all their former students attending UWF (2.82) in fall 1992. Follow-up study results by Tallahassee Community College indicated that the overall GPA for their former dual enrollment students attending FSU from fall 1990 ( $N = 191$ ), fall 1991 ( $N = 247$ ) and fall 1992 ( $N = 192$ ) was 2.96, 3.00 and 2.86 respectively, while the overall GPA for all their former students attending FSU was 2.80, 2.75 and 2.74 respectively. However, these two follow-up studies did not control for students' prior-academic performance.

Richardson (1999) reviewed a study conducted by the University of Arizona that examined the impact of dual enrollment programs taken while in Arizona high schools on first-year grades of University of Arizona freshmen. The first year GPA of all Arizona resident freshmen enrolled at the University of Arizona in fall 1997 was examined. Among 2,351 Arizona-resident freshmen enrolled in the fall of 1997, 29% earned dual enrollment credit. Between high school and the University of Arizona, these students experienced an average drop of .56 in their university GPA from high school GPA. This was significantly less than the GPA drop of .78 for those without dual enrollment credit (Richardson, 1999). Considering dual enrollment students already outperformed about 49 SAT points higher and .12 higher on their high school GPA, regression analysis was conducted to control for students' academic ability in high school. Results supported that dual enrollment credit was positively and significantly associated with first-year GPA and changes in GPA between high school and university (Richardson, 1999). Spurling and Gabriner (2002) and Black (1997) also found that concurrent enrollment students showed higher college GPA than non-concurrent enrollment students. Each of these two studies is explicated more fully below.

Spurling and Gabriner (2002) compared 377 concurrent enrollment students who matriculated to City College of San Francisco (CCSF) to 2,274 first-time students at CCSF who graduated from the San Francisco Unified School District (SFUSD) high schools without concurrent enrollment experience at CCSF. Researchers examined 18- and 19-year old students graduating from a SFUSD high school and matriculating at CCSF between the fall 1998 and fall 2000 as a way to control for age. They found that students with prior CCSF experience owing to concurrent enrollment passed 58% of their units with a C or better once matriculated at CCSF, whereas students without prior college experience passed 53% of their units. The results suggest that concurrent enrollment students had higher GPA of 2.33, while students without concurrent enrollment had 2.10. Considering the potential influence of prior-academic performance on college outcomes measured by cumulative percentage of units passed and GPA, Spurling and Gabriner compared student groups based on the level of their college placements as a way to control for students' prior-academic performance. Students matriculating at CCSF have to take English or English as a Second Language (ESL), and the mathematics placement test. Researchers divided concurrent enrollment students grouped into 4 sub-groups including students with no basic skills placement, one basic skills placement, two basic skills placement, and no placement test taken. They also divided non-participants into the same 4 sub-groups, and compared program participants and non-participants in each group in regards to their cumulative percentage of units passed and GPA. Results showed higher cumulative percentage of units passed of concurrent enrollment students than others in most categories: participants (69%) compared to non-participants (62%) in no basic skills placement category, participants (57%) compared to non-participants (49%) in one basic skills placement, participants (35%) compared to non-participants (40%) in two basic skills placement, and participants (69%) compared to non-participants (67%) in no placement category. Concurrent enrollment participants also had higher average GPAs than non-participants in all categories: participants ( $M = 2.61$ ) compared to non-participants ( $M = 2.34$ ) in no basic skills placement category, participants ( $M = 2.25$ ) compared to non-participants ( $M = 1.93$ ) in one basic skills placement, participants ( $M = 1.76$ ) compared to non-participants ( $M = 1.73$ ) in two basic skills placement, and participants ( $M =$

2.69) compared to non-participants ( $M = 2.59$ ) in no placement category. Although variation exists in each category, overall results of this study support the positive impact of the program on students' academic performance in college.

Black (1997) indicates that concurrent enrollment students were overall better than non-concurrent enrollment students in terms of high school GPA, showing 3.1 for concurrent enrollment and 2.4 for non-concurrent enrollment. In terms of college GPA, concurrent enrollment students had higher GPA than non-concurrent enrollment students, showing 2.5 and 2.4 respectively. However, considering the higher high school GPA of concurrent enrollment students, higher college GPA would be expected.

Some studies showed no significant difference in college performance between dual credit students and non-dual credit students. Eimers and Mullen (2003) reported that dual credit students had an average of 2.92 on first year GPA, compared to 2.70 for no college credit students. However, holding entering academic ability such as ACT score and high school rank constant, multiple regression analysis results showed that dual credit students did not perform significantly better in first-year GPA. The annual progress report of Running Start also claimed that the program participants performed comparably well in two-year institutions (Washington State Board for Community and Technical Colleges, 2002).

Chatman and Smith (1998) compared the subsequent on-campus performance of students who earned foreign language college credit through dual credit program with the students who earned credit in the prior course through on-campus instruction. The students took dual credit courses from the St. Louis University 1818 program or the University of Missouri (UM)-St. Louis. In selecting a student sample for this study, researchers examined the file containing the foreign language transcript for first three courses taken by students entering into University of Missouri (UM)-Columbia for a five-year period (fall 1991 to fall 1995), and more than 8,000 student records were found. A total of 46 dual credit students were identified through St. Louis University's 1818 program. Among them, 20 took a second course and 26 took a third course in the foreign language sequence. In addition, among 100 dual credit students in the UM-St. Louis dual credit program that were identified, 39 took a second course and 61 took a third course in the foreign language sequence. Recognizing the importance for controlling differences in academic ability before college enrollment, the researchers selected samples of on-campus students whose ACT composite score distribution was similar to that of the dual credit population. The distribution of credit sources in the first course showed that 65% of students earned credit through on-campus instruction, 15% through a placement test, and 14% through the dual credit program (5% from St. Louis University, 5% from UM-St. Louis, and 4% from other institutions). The relative distributions of method by which credit was earned in the second and third courses were similar to the first course. Chi-square test results showed no significant difference in grade distribution between dual credit students through St. Louis University's 1818 program and their counterparts in both the second course ( $\chi^2 = 3.6, p = .46$ ) and the third course ( $\chi^2 = 3.0, p = .39$ ) in foreign language sequence. Combining students in either second or third course in the foreign language sequence, results revealed no statistically significant difference between dual credit students through St. Louis University's 1818 program and their counterparts ( $\chi^2 = 5.7, p = .78$ ). The same comparisons were made between dual credit students through the UM-St. Louis program and their counterparts. The Chi-square test results showed no statistically significant difference in grade distribution in the second course ( $\chi^2 = .7, p = .86$ ) and third course ( $\chi^2 = 9.4, p = .05$ ) in the foreign language sequence at UM-St. Louis. Although the p-value for the second course was nearly significant, they suggested this result was a "matter of split hairs" because "most of the difference was due to differences in the distribution of A's and B's" (p. 104). In addition, combining students in either second or third course in foreign language sequence, results also revealed no statistically significant difference between dual credit students through UM-St. Louis program and their counterparts ( $\chi^2 = 6.3, p = .82$ ). Overall, this study supports the conclusion that dual-credit courses are as effective as on-campus instruction in preparing students for subsequent instruction in the same discipline. Furthermore, considering this study investigated the subsequent performance of dual credit students at a campus that did not offer dual credit programs, the results supported the transferability of dual credit from other institutions.

#### Chapter Summary

The review of the literature showed the difference between students who had dual credit and students who do not in terms of the students' gender, race/ethnicity, and high school academic performance. More female students participated in dual credit programs than male students, White students were the most dominant group, and the

overall high school performance of dual credit students was higher than that of non-dual credit students due, at least in part, to the academic requirements for enrollment eligibility. Evidence of the influence of high school course-taking on students' college outcomes shown in several studies showed that the high school experiences of dual credit students can be one source to better understand students' outcomes at postsecondary institutions.

Review of the existing dual credit literature indicates there are few outcome studies that are rigorous to offer definitive conclusions on the effectiveness and impact of the innovation, making it difficult to measure whether dual credit is associated with college outcomes. Many outcome studies did not control for participants' prior-academic performance and without such controls, it is not possible to know whether college outcomes are attributable to dual credit or to students' academic ability. Most dual credit programs use academic performance requirements to select students. Despite the limited amount literature, some outcome studies do control for academic ability, and the results of these studies were mixed.

Five outcome studies controlled for student's prior-academic performance in examining the influence of dual credit on academic performance. Three of them (Nitzke, 2001; Richardson, 1999; Spurling & Gabriner, 2002) reported that dual credit students performed better, whereas two studies (Eimers & Mullen, 2003; Chatman & Smith, 1998) did not find any outcome differences. Among three studies that controlled for students' academic ability in studying the influence of dual credit on student retention, two of them (Eimers & Mullen, 2003; Crook, 1990) reported a higher retention rate for dual credit students than all other comparison groups, while one (Nitzke, 2001) revealed dual credit students earned less college credits than non-dual credit students. No studies controlled for prior-academic performance in investigating the influence of dual credit on remediation. Given the growing interest in dual credit and substantial new investments into dual credit programs, empirical studies focusing on student outcomes are critical to further implementation of dual credit programs.

## REFERENCES

- Adelman, C. (1999, June). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington D.C.: U.S. Department of Education, Office of Educational Research and Improvement.
- American Vocational Association. (1998). *The official guide to the Perkins Act of 1998*. Alexandria, VA: Author.
- Andrews, H.A. (2001a). The dual-credit explosion at Illinois' community colleges. *Community College Journal*, 71(3), 12-16.
- Andrews, H. A. (2001b). *The dual-credit phenomenon! Challenging secondary school students across 50 states*. Stillwater, OK: New Forums Press. (ERIC Document Reproduction Service No. ED 463 823).
- Andrews, H.A. & Marshall, R.P. (Summer 1991). Challenging high school honor students with community college courses. *Community College Review*, 19, 47-51.
- Bailey, T.R., Hughes, K.L., & Karp, M.M. (2002). *What role can dual enrollment play in easing the transition from high school to postsecondary education?* Paper prepared for the U.S. Department of Education, Office of Vocational and Adult Education. New York: Community College Research Center and Institute on Education and the Economy, Teachers College, Columbia University.
- Black, W. A. (1997). Program assessment of the success of high school students concurrently enrolled in college courses. (Doctoral Dissertation, Northern Arizona University). *UMI Dissertation Abstracts*, AAT 9724899.
- Boswell, K. (2000). Building bridges or barriers: Public policies that facilitate or impede linkages between community colleges and local school districts. *New Directions for Community Colleges*, 111, 3-15.
- Boswell, K. (2001). State policy and postsecondary enrollment options: Creating seamless systems. *New Directions for Community Colleges*, 113, 7-14.

- Bragg, D., & Reger, W. (2002). *New lessons about tech prep implementation: Changes in eight selected consortia since reauthorization of the federal tech prep legislation in 1998*. St. Paul, MN: University of Minnesota, National Research Center for Career and Technical Education.
- Brigham, F. (1989, November 18). *Concurrent enrollment: Its effect on under-achieving minority high school students and their retention rate at a predominantly white university*. Paper presented at the annual convention of the California Association of Community Colleges, Santa Clara, CA.
- Burg, E. (2002). *Border Crossings: Bringing College Now to the Classroom*. La Guardia Community College, Long Island City, NY. (ERIC Document Reproduction Service No. ED 471 856)
- Catron, R. K. (1998). The Virginia plan for dual enrollment: A historical perspective. *Inquiry*, 2, 13-21.
- Cartron R. (2001). Dual enrollment in Virginia. *New Directions for Community Colleges*, 113, 51-58
- Cesta, J. L. (2003). Dual enrollment: The effects of an accelerated academic program on community college student graduation rates and time-to-degree. (Doctoral Dissertation, University of South Florida, 2003). *UMI Dissertation Abstracts*, AAT 3079975.
- Chatman S., & Smith, K. (1998, April). Dual-credit preparation for further study in foreign languages. *NASSP Bulletin*, 82(597), 99-107.
- Clark, R. W. (2001, June). *Dual credit: A report of programs and policies that offer high school students college credits*. Seattle, University of Washington: Institute for Educational Inquiry.
- Cohen, A. M., & Brawer, F. B. (1996). *The American community college* (3<sup>rd</sup> ed.). San Francisco: Jossey-Bass, Inc.
- Crook, D. (1990). *The impact of College Now: An update: retention and academic progress among program participants who entered CUNY in fall 1987 and fall 1988*. New York: Kingsborough Community College, Office of Institutional Research and Analysis.
- Crooks, K. A. (1998). State enhancement of college-level learning for high school students: A comprehensive national policy study and case studies of progressive states (Minnesota, Utah, and Virginia). (Doctoral Dissertation, University of New York At Buffalo, 1998). *Dissertation Abstracts International*, 59, 051.
- Cunningham, C. L., & Wagonlander, C.S. (2000). Establishing and sustaining a middle college high school. *New Directions for Community Colleges*, 111, 41-51.
- Donahue, M. D. (1993). Variables associated with student success in a community college and high school concurrent enrollment program. (Doctoral dissertation, University of Texas at Austin). *UMI Dissertation Abstracts*, AAT 9400877.
- Eimers, M.T., & Mullen R. (2003). *Dual Credit and Advanced Placement: Do They Help Prepare Students for Success in College?* Paper Presented at the 43<sup>rd</sup> Annual Association of Institutional Research (AIR) Conference, Tampa, FL.
- Fincher-Ford, M. (1997). *High school students earning college credit: A guide to creating dual-credit programs*. Thousand Oaks, CA: Corwin Press.
- Gaines, B. C. & Wilbur, F. P. (1985). Early Instruction in the High School: Syracuse's Project Advance. *New Directions for Teaching and Learning*, 24, 27-36.
- Greenberg, A. R. (1989) *Concurrent enrollment programs: College credit for high school students, Fastback 284*. Bloomington, Ind.: Phi Delta Kappa Educational Foundation.

- Gurule, J. M. (1996). A study of high school to community college dual enrollment for underprepared/moderate student achievers. (Doctoral dissertation, Arizona State University). *Dissertation Abstracts International*, 57, 3A, 0990.
- Hebert, L. (2001). A comparison of learning outcomes for dual-enrollment mathematics students taught by high school teachers versus college faculty. *Community College Review*, 29(3), 22-38.
- Hershey, A., Silverberg, M., Owens, T., & Hulsey, L. (1998). *Focus for the future: The final report of the national Tech Prep evaluation*. Princeton, NJ: Mathematica Policy Research, Inc.
- Hoffman, N. (2003). College Credit in High School: Increasing Postsecondary Credential Rates of Underrepresented Students. *Change*, 35(4), 42-48.
- Hugo, E. B. (2001). Designing an effective concurrent enrollment program: A focus on quality of instruction and students outcomes. *New Directions for Community Colleges*, 113, 67-72
- Johnston, G. H., & Kristovich, S. A. R. (1998). *Looking for the dual credit student and finding the under-aged student ones*. Paper presented at the annual meeting of the Illinois Association for Institutional Research, Eagle Creek Resort, IL.
- Johnstone, D. B., & Del Genio, B. (2001). *College-level learning in high school: Purposes, policies, and practical implications*. Washington, D.C.: Association of American Colleges and Universities.
- Kentucky Council on Higher Education. (2003, October). *Guidelines for dual credit, IV-B1-6*. Retrieved October 25, 2003, from <http://www.sreb.org/programs/hstw/career/dualenrollment.asp>
- Kim, J., Barnett, E., & Bragg, D. (2003). *Dual Credit in Illinois: Results of expert panel deliberations and a Delphi study of definitions and priorities*. Champaign, IL: Office of Community College Research and Leadership, University of Illinois at Urbana Champaign.
- Kirst, M. (1998). *Improving and aligning K-16 standards, admissions, and freshman placement policies*. Stanford, CA: National Center for Postsecondary Improvement, Stanford University.
- Kleiman, N. (2001). *Building a highway to higher ed: How collaborative efforts are changing education in America*. Retrieved August 6, 2003, from [http://www.nycfuture.org/content/reports/report\\_view.cfm?repkey=10](http://www.nycfuture.org/content/reports/report_view.cfm?repkey=10)
- Kruger, L. A. (2000). An analysis of the costs and savings of the concurrent enrollment program at Salt Lake Community College (Utah). (Doctoral Dissertation, Brigham Young University, Utah). *UMI Dissertation Abstracts*, AAT 9998836.
- Lord, J. M. (2002). *High school to college and careers: Aligning state policies*. Atlanta, GA: Southern Regional Education Board.
- Lords, E. (2000, June 30). New efforts at community colleges focus on underachieving teens: Listless students take college classes while still in high school. *The Chronicle of Higher Education*. A45-A46.
- Marquez, J. J. (1999). The effect of concurrent enrollment programs on persistence, transfer, and graduation rates. (Doctoral Dissertation, Arizona State University). *UMI Dissertation Abstracts*, AAT 9937412.
- McMannon, T. J. (2000). *Dual credit: A review of the literature* (Tech. Rep. No.1). Seattle, University of Washington: Institute for Educational Inquiry.
- Minnesota Higher Education Services Office. (2004, January 10). Retrieved January 10, 2004, from <http://www.mheso.state.mn.us>

- Minnesota State Colleges and Universities. (2001). *Post-secondary enrollment options program*. St. Paul, MN: MnSCU Office of Internal Auditing.
- Mississippi Legislature. (1998). *Senate bill 2381*. Retrieved September 17, 2003, from <http://billstatus.ls.state.ms.us/1998/history/SB/SB2381.htm>
- Monroe Community College. (2003). [Dual credit tracking]. Rochester, NY: Monroe Community College, Office of Institutional Research. Unpublished raw data.
- National Center for Public Policy and Higher Education. (1999, January). *Taking responsibility: Leaders' expectations of higher education*. (National Center Report No. 99-1). San Jose, CA: Author.
- Nitzke, J. E. (2002). A longitudinal study of dual credit enrollment of high school students as an accelerator for degree completion. (Doctoral Dissertation, Iowa State University, 2002). *UMI Dissertation, AAT 3061852*.
- Oregon Joint Boards of Education. (2000). *Oregon early options study*. Retrieved December 15, 2003, from <http://www.ous.edu/aca/earlyoptions.htm>
- Orr, M.T. (1998). Integrating secondary schools and community colleges through school-to-work transition and education reform. *Journal of Vocational Education Research, 23*(2), 93-113
- Peterson, M.K., Anjewierden, J., & Corser, C. (2001). Designing an effective concurrent enrollment program: A focus on quality of instruction and student outcomes. *New Directions for Community Colleges, 113*, 23-31
- Peterson, K. (2003). *Overcoming senior slump: The community college role*. ERIC Clearinghouse for Community Colleges, Los Angeles, CA. (ERIC Document Reproduction Service No. ED 477 830).
- Pierce, D. R. (2001, June). *Student pathways through high school to college*. Denver, CO: Education Commission of the States. Retrieved September 25, 2003, from <http://www.ecs.org/c/earninghouse/26/71/2627.htm>.
- Puyear, D. (1998). *Concurrent and dual enrollment of high school students in Arizona community college: A status report*. Arizona State Board of Directors for Community College. Phoenix (ERIC Document Reproduction Service No. ED 423 930).
- Reisberg, L. (1998). Some professors question programs that allow high-school students to earn college credit. *Chronicle of Higher Education, 44*, 39-40. (Eric Document Reproduction Service No. ED 567 597).
- Richardson, R. M. (1999). *Community college and AP credit: An analysis of the impact on freshman grades*. A report prepared for the University of Arizona. Tucson, Ariz.
- Robertson, P. F., Chapman, B. G., & Gaskin, F. (2001). Systems for offering concurrent enrollment at high schools and community colleges. *New Directions for Community Colleges, 113*, 1-6.
- Schuetz, P. (2000). *Successful collaborations between high schools and community colleges*. ERIC Clearinghouse for Community Colleges, Los Angeles, CA. (ERIC Document Reproduction Service No. ED 451 856).
- Smith, A. B., Street, M. A., & Olivarez, A. (2002). Early, regular, and late registration and community college student success: A case study. *Community College Journal of Research and Practice, 26*, 261-273.
- Spurling, S., & Gabriner, R. (April 2002). *The Effect of Concurrent Enrollment Programs upon Student Success at City College of San Francisco: Findings*. San Francisco, CA: City College of San Francisco, CA, Office of Institutional Development, Research, and Planning.
- Sydow, D. L., & Sandel, R. H. (1998, October/November). Making student retention an institutional priority. *Community College Journal of Research and Practice, 22*(7), 635-644.

- Syracuse University Project Advance (2004, January). Retrieved January 31, 2004, from <http://supa.syr.edu/SupaOnline/factsheet.html>
- Tennessee Board of Regents Policies and Guidelines. (2004, January). Policy #2:03:00:00. Retrieved January 5, 2004, from <http://www.tbr.state.tn.us/>
- U.S. Census Bureau. (October, 2000). Retrieved February 15, 2004, Retrieved February 7, 2004, from <http://www.census.gov/population/pop-profile/2000/chap08.pdf>
- Washington State Board for Community and Technical Colleges. (2002). *Running Start: 2001-02 annual progress report*. Olympia, WA: Author.
- Wechsler, H. (2001). *Access to success in the urban high school: The middle college movement*. New York: Teachers College Press.
- Windham, P. (1996). *What happens to community college dual enrollment students?* Paper presented at the Annual Conference of the Southern Association for Community College Research, Panama City, Florida, August 5-7, 1996. (ERIC Document Reproduction Service No. ED 398 950).