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A longitudinal study of dual credit enrollment of high school students as an accelerator for degree completion

by

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A dissertation submitted to the graduate faculty

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ABSTRACT

Dual credit programs allow high school students to enroll in postsecondary institutions while still in high school, earning concurrent high school and college credit. Because dual credit programs can serve a variety of purposes (financial, educational, and systemic), they have gained prominence in education reform initiatives. My study evaluated one school-based dual credit program partnered through a Midwestern community college.

Two research questions guided the study: 1) Are high school students who earn early college credit more likely than traditionally-enrolled students to complete college degrees? 2) Does this form of dual credit program yield accelerated educational progress for students? I used a longitudinal time design (1993-2001) to follow the college careers of 568 students from the time they initially enrolled in school-based dual credit programs to their completion of college programs at the community college. I compared their achievement to that of 1,007 students who entered the college as traditionally-enrolled students

Using Ordinary Least Squares and Logistic Regression analyses of institutional data, I found 1) no difference in the likelihood of completion between dual credit and regular students; 2) the "jump start" function of dual credits programs varies by award type, accelerating completion for diploma students but having no significant effect for degree-seekers. Variables besides dual credit enrollment that contributed to completion and acceleration included educational goals, major area of study, and accumulative credit requirements. Variables having no significant net effects included socioeconomic status and academic preparation.

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CHAPTER I. INTRODUCTION

Education reform, which cuts cyclical swaths between liberal and conservative viewpoints, is much like the blade in Pit and the Pendulum.

Education reformers do not belong to a select group. Higher education in the early colonies was less an expression of the love of learning than of religious or national interests. While Harvard, William and Mary, and Yale were constrained by religious intent, Thomas Jefferson advocated for a university that would serve the interests of agriculture, industry, and commerce. Throughout history, reform initiatives have been proposed by businessmen, clergy, humanists, philanthropists, scientists, lawyers, Supreme Court justices, philosophers, politicians, social reformers, members of ethnic or racial groups, and, of course, educators. The sheer volume of reform initiatives demonstrates the relative importance of education in the United States.

What about this social institution merits so much attention? A combination of factors accounts for its importance. First, education has been viewed as a solution to social problems, "a cornerstone of democracy and the avenue to equal opportunity for all" (National Education Goals Panel, 1993, p. 5.). This is a trademark of American higher education. Second, confidence in the ability to produce effects resulted in the promise to make it universally available; and third, control remained local, which accounts for its autonomous individuality. For these reasons, education has been and remains the most dynamic of the five major social institutions (family, religion, polity, economic, and education), and the most closely linked with reform.

Early reforms were sparked by shifting, competing, and temporary changes in political, social and economic conditions, by the need for access, the need for a skilled workforce, the need for scientists to satisfy the national interests in transportation, construction, munitions, and gender and racial equality.

In terms of broadly applied reform, the Public School Movement was a late 1800's response to child labor practices, to the need to educate rural citizens so they might be competent and reliable workers, and the need to "Americanize" immigrants. The progressive

movement of the 1920's and 1930's ran parallel to the progressive movement of the 1890's. It was both a reaction to rigid authoritarianism and an emphasis on skills needed for socialization. For the radical conservatives of the 1950's, the progressive movement was a communist-plot. Essentialism, preached by Bestor, Hutchins, and Rickover in the 1950's, was both a reaction to the teaching of survival skills and a reaffirmation of a disciplined intellectual mission of education. Of course, the reform pendulum reversed direction again through the voices of Kohlberg, Simon, and Silberman in the humanistic movement of the 1960's and the 1970's, and back again through "A Nation at Risk" in the early 1980's (Ballantine, 1997).

The history of education in the United States is very much a chronicle of the effects of reform movements, and, considering the complexity of the institution, even a listing of recent reform efforts (Ballantine, 1997) would run to several pages. That list would include such broad areas as early childhood through postsecondary, education finance, curriculum, structure, administration and leadership, or such specialized topics as multiculturalism, technology, school climate, safety, political correctness, school choice, funding alternatives, effectiveness, accountability, or testing.

The Outcomes of Educational Reforms

When a reform produces change in educational systems, it may be local or regional in its effects. It is arguable that examples of nationwide reform are those that are legislated, such as the Morrill Act (1862, 1890), the Servicemen's Readjustment Act (1944), the Higher Education Act (1965, with limited effects), or those that are widely adopted out of need such as development of college admissions requirements and standardized curricula in the latter part of the 19th century. What the changes in educational systems look like, however, may be another matter. Since reform in education is contextual, operating upon a complex (some think chaotic) system, it often results in mixed outcomes: those that are in the stated agenda, those that are the hidden agenda, and finally those that are unanticipated or unintended consequences. For example, the Servicemen's Readjustment Act (aka GI Bill, 1944) was intended to be a welfare program for veterans, not a major expansion of higher education.

Where complex reforms are proposed, the need for careful and systematic evaluation is exponentially more important. Unfortunately, much of the evaluation is subordinated to political intent and based on inputs rather than outcomes, often producing idealistic reports that talk about the numbers served, glossing over the issue of how well they were served. *In short, perhaps the greatest weakness of most educational reform initiatives is the lack of systematic evaluation.*

A recent example is the National Education Goals Panel (NEGP), which set six goals (later increased to eight) as a benchmark to improve the nation's K-12 education system by the year 2000. The goals were intended to provide a national framework for education reform, enhancing access and educational achievement for all students (National Education Goals Panel, 1999). The role of the Panel, then, was to monitor and measure progress against a series of benchmarks for K-12 education. Multiple measures for each of the eight goals were already defined and recorded in many states, making NEGP a comprehensive reform effort as well as a showcase for a variety of "quality improvement measures," and in a very real sense the NEGP progress reports are the K-12 equivalent of Measuring Up: 2000 (National Center for Public Policy and Higher Education (NCPPHE), 2001), a "report card" for higher education. What is debatable about such report cards is whether or not selected objectives are the best measures for the goals they represent, and, more importantly, which programmatic changes actually made an impact on specific measures. The NEGP publications, for example, report regularly about the levels of the measures, but they tell little about how (or even what) programmatic changes were implemented or (more importantly) evaluated.

Has NEGP produced the effects intended? To what extent has NEGP been successful, first in achieving its own goals, and second, as a corollary, in solving social problems? A review (Dorn, 2000) of the 28 key indicators for the NEGP goals suggested little or no progress, lamenting that in fact measures of many of the indicators of success had declined, including the targeted 90% graduation rate.

Both NEGP and Measuring Up are linked to accountability reforms through their performance measures and outcomes (thus to the recently adopted practice of measuring and

quantifying), and with the tendency to equate quantifiable measures with successful outcomes. However, very few of the National Educational Goal Panel reports focus on programs that create their successes, and their successes in individual states are limited. Instead, they highlight leadership and progress over improvement.

Making Education Seamless

Recent reforms for a "seamless" educational system are central to the focus of this study. These have been proposed by a collection of quasi-private, nonprofit, and nonpartisan associations, with the most visible, the Education Commission of the States, supported by the National Center for Postsecondary Improvement (NCPI) at Stanford, the Rand Institute, and the Education Trust.

During the last ten years or so these education critics have focused attention on a "gap"' between K-12 (precollegiate) education and collegiate education. Observing that high school graduates entering colleges and universities were unprepared academically for post-secondary study, they urged measures to narrow the purported "gap." Interest in strengthening the "school-college connection" is not new among educators; Levine (1998, p. 1) observed that the "school-college connection becomes a national preoccupation roughly every 30 years." Indeed, the efforts at narrowing the gap can be documented back to the 1870's, when admissions standards and admissions testing emerged. The current situation, however, is marked by several differences.

First, early admissions standards were a matter of convenience for the colleges, and a college education was not considered essential for most of the workforce (Brubacher & Rudy, 1997). Today, education beyond high school is more a necessity than a luxury, an effect of the advances in technology, the transformation of work, the transformation of the knowledge structure, and the continuous metamorphoses of competitive skills necessary for survival in the workplace. McCabe (in Measuring Up 2000, NCPPHE, 2001) cited the impact of technology and "information-based industries that need a broadly based, highly skilled workforce" (p. 180). Similarly, the Five-Year Strategic Plan for Iowa's Community Colleges (2001) recommended proposals to address a shortage of skilled workers, increasing

employment qualifications that necessitate increased post-secondary education, changing technology that requires retraining and adaptation, and a need for lifelong education opportunities for an up-to-date workforce.

Second, high school preparation is perceived as inadequate for the task. McCabe (2001) and others have cited an NCES report (U. S. Department of Education, 1996) that estimated that while 80% of new jobs will require some postsecondary education, only 42% of today's students leave high school with the necessary skills to begin college-level work. While high school graduates are perceived as largely unprepared for the post-industrial workplace, they are correspondingly ill-prepared for post-secondary education.

Consequently, the focus on the senior year as pivotal to closing the gap is embodied in the images of the "Lost Opportunity of the Senior Year" (National Commission of the High School Senior Year, 2001), the "Senior Slump" (Kirst, 2000), and the "yawning gap" (Levine, 1998). And the proposed reforms, therefore, look for ways to "build bridges" and create a "seamless" system of education.

Making Education Seamless: Historical Context

Before the common school movement of the 1840's, American education was a disconnected system of local, regional and private institutions, and the scope of education depended on local initiative and local resources. The reforms of Mann in Massachusetts and Barnard in Connecticut (Brubacher & Rudy, 1997) created statewide elementary systems in which the content of the education was to be the same for all children of the state. Common schooling created common bonds and was intended to ameliorate the economic and religious tensions from ethnic groups. By the end of the 19th century, free elementary public education was available throughout the United States.

Though the first publicly supported secondary school was Boston Latin (founded in 1635), secondary education in the United States was marked by variety and scarcity into the 20th century, when only 10% of the eligible students were enrolled in secondary schools (Brubacher & Rudy, 1997). The function of secondary education in the late 19th and early 20th century included socialization and economic functions—preparing a workforce (Spring, 1986).

From 1920 to 1930 the percent of adolescents enrolled in high school increased from 28% to 47%, and in 1940 two-thirds were enrolled in secondary school. From that point, *public education* encompassed grades K-12.

The model of a Seamless K-16 System, as supported by the Education Commission of the States (ECS), incorporates proposals for education at all levels, beginning with early childhood and continuing through elementary, secondary, and higher education (cf., Ziebarth & Rainwater, 2000). The ECS vision includes removal of barriers in testing, assessment, admissions, remediation, and articulation that occur through all levels of education. This vision would be accomplished by reformed processes for articulation and transfer, curricular reforms to eliminate conflicting requirements, improvements in student access and achievement, teacher preparation and professional development, through accountability linked via funding to the implementation of standards and assessment, changes in governance, *and an expanded range of learning opportunities and experiences in the last two years of high school.* In effect, the Seamless Model has incorporated various initiatives that fit into the seamless construct even though many of these initiatives predate it and probably evolved for some other purpose.

Contemporary Acceleration Mechanisms: Purposes and Claims

Good examples come from mechanisms that accelerate educational progress. In the Seamless System, acceleration mechanisms are the machinery that remove the barriers between secondary and collegiate education; therefore, they epitomize the seamless vision because they are, in a real and practical sense, bridges that link secondary education with collegiate education. They include 1) Advanced Placement and 2) dual credit or postsecondary enrollment options, and 3) Tech Prep or 2 + 2 programs. All were designed as links to the next level of education or training. Tech Prep (late 1980's) was more specifically targeted at workforce training, and Advanced Placement (1950's) and postsecondary enrollment options (1970's) were developed as opportunities for students to earn college credit while in high school.

A number of factors make these programs appealing to policy makers, educators, and students. The political and economic benefits for the higher education sector (Boswell, 2001) include reduced tuition costs, improved collaboration between secondary and collegiate faculty, expanded academic opportunities for students in rural communities, and closer ties between the colleges and the communities in which they are located. For the students, the chief benefits cited are that they offer greater academic challenges to counteract the "senior slump," that they encourage more students to attend college, and finally, and most importantly, that they accelerate student progress toward a degree. The last is their *raison d'être.*

Statement of the Problem

Seamless education reform is an attempt to integrate a cluster of separate reforms with the net intended effect being system-wide reform. While the individual components of the reform may produce easily demonstrated results, such as savings of tuition dollars, many of the outcomes are intuitive parts of the construct that have yet to be tested. The most important benefits of Seamless Education mechanisms, given the core mission of higher education, are that they encourage more students to attend college and that they accelerate student progress; however, these claims have yet to be demonstrated empirically.

The situation is complicated by the complex nature of the mechanisms and what constitutes appropriate measures of success. Acceleration of credit is a good example, because there are multiple variations of programs in place, ranging from Advanced Placement to Tech Prep, including the International Baccalaureate (IB) and several categories of dual credit programs. To date, research consists of a limited amount of analysis on selected initiatives, while many have been all but ignored. Many of these initiatives have been judged successful because they have had a high and growing levels of participation, which unfortunately begs the question of whether or not they are accomplishing core educational objectives. The lack of systematic research makes it hazardous to conclude whether, in fact, the programs do what their proponents claim them to do, a situation that is more or less de rigueur for educational reform initiatives.

The purpose of the present research is to examine dual credit programs offered in high schools, including what in Iowa is identified as a League of Schools. A League is formed when a cluster of schools enter into a formal agreement with a community college to provide instruction on a high school campus. League agreements offer economic advantages in areas that are primarily rural.

In this study, I seek to answer the questions: Are high school students who earn early college credit more likely than traditionally enrolled students to complete college degrees? Do dual credit programs yield accelerated educational progress for students?

Postsecondary Enrollment Options in a Seamless System

Secondary students can earn at the same time college credit and high school credits though dual credit programs. Though terminology and individual features vary from state to state, the two main types differ in where and how instruction is offered. The Postsecondary Enrollment Option (PSEO) is normally a regular college course taught by regular college faculty on the college campus. The second, sometimes referred to as College High, is taught on a high school campus by either qualified secondary faculty or by college faculty. In the Iowa Community Colleges, dual credit programs are called Postsecondary Enrollment Options (PSEO to maintain distance from Minnesota's PEO), and where the program is offered in local high schools, usually through a consortia of local, rural districts, it is referred to as a League of Schools.

Nationally, both the League and the PSEO have been common and popular during the past decade, and a few concurrent programs have histories dating back 30 years (Clark, 2001). Enrollments in dual credit programs grew significantly during the last decade of the 20th century, and the levels of participation (number of students enrolled) and possible tuition savings (assuming transfer of credit) are easily tracked and reported. Given substantial growth and their fit with the construct, dual credit has been incorporated as a key piece in the Seamless System Initiative of the Education Commission of the States, a logical and natural development since the dual credit mechanism is by design coursework that links secondary and postsecondary education.

There are, however, several concerns about dual credit courses (Clark, 2001). First, dual credit courses are not articulated by all institutions, predictably selective colleges, but also some public universities as well. Second, College High courses (League of Schools fits this definition) are viewed as being of lesser quality, failing to provide challenging educational opportunities, failing to improve college preparation thus increasing the need for remediation, and neither increasing the number of students who matriculate nor the ability of students to persist toward meeting their educational goals.

If students who begin in dual credit (League of Schools) programs do not have a head start toward their educational goals, then inclusion as a centerpiece in a Seamless System is unjustified. In short, the effectiveness of acceleration initiatives should be validated, even more so when they become a cornerstone of comprehensive reform efforts. To date, the story of persistence and completion for these students is incomplete, and for high school based programs is unanswered, and a piece of that story will be addressed in this dissertation. The conundrum of "seamless" reforms is that on the one hand they propose acceleration mechanisms and on the other, reduction of collegiate remediation, assuming that somehow they are unrelated.

The ECS, along with other quasi-public research associations, has placed primary emphasis on the disconnects between the precollegiate and collegiate sectors of education, pointing out that the most alarming symptoms are the lack of achievement (and consequent need for remediation), delays/hiatus in educational progress (the senior slump), and the lack of persistence or attainment through the baccalaureate degree (Van de Water & Rainwater, 2000). To address these symptoms, the P-16 vision advocates an amalgam of initiatives. For the most part, these initiatives have been on the agenda of education reform for decades, and a few (admissions requirements, for example) for over a century.

A Conceptual Framework of Seamless Systems

Seamless education is a theoretical framework built around a set of concepts that are embodied in a variety of programs; unfortunately, very few of these programs intended to address issues are tested. Seamless education attempts to sew up the disconnects and the gaps

between collegiate and precollegiate education. Levine (1998) noted that the underlying concern centered around how students do not advance from one system to the other, pointing to low achievement, lax discipline, poor teaching, weak standards and overlaps, gaps and inadequacies of curriculum.

The purpose of such a system (Mabry, 1988) is that it allows a student to advance from one level to the next without wasting time, effort, or money. This process involves local communities and states trying to create a "seamless system of education" in which all levels of schooling — preschool through college — educate as one system instead of several, and associated initiatives most commonly are named K-16, P-16 or P-20 systems (Ziebarth & Rainwater, 2000). Seamless K-16 systems allow students to move more smoothly between traditional elementary and secondary schools into higher education. Because it affects all levels of education, the seamless vision connects to multiple agendas, and policymakers (those who would influence policy) offer a complex of arguments for the Seamless System and its components.

Models of the system have been constructed to clarify components at the various levels and their interrelationships, and in some cases they have been constructed to emphasize the barriers that must be removed, various issues that must be addressed, or in a positive sense, the outcomes that might be expected for the various levels of the new system's components (cf., Haslam & Rubenstein, 2000; National Science Foundation, 1995). Implicit in the state efforts is the intent to hold colleges accountable by linking state resources to performance. Further, a corollary of the creation of partnerships between higher education and K-12 demands adjusting the reward system to recognize the contributions of local schools, teachers, and students.

A sample of publications from the Education Commission of the States includes progress reports with exemplary practices from various states. For example, the California Report (Venezia, 2000) summarized legislation implemented to require policy development (e.g., in promotion and retention), a Public Performance Accountability Program with an

Academic Performance Index linked to funding, and a requirement that all schools improve by 5% per year.

The higher education components that present challenges to the vision of a seamless system include articulation, assessment and the need for remediation, admissions policies, curricular content and standards for student learning, teacher preparation and evaluation, access and equal opportunity, as well as issues related to funding and governance, all of which are hot topics (Van de Water & Rainwater, 2000). Thus while K-12 has been challenged (Haslam & Rubenstein, 2000) to eliminate the "general track" and make courses challenging, higher education has been challenged to accept admissions criteria and simplify transfer and articulation. Many of these issues have been addressed, some since the beginning of higher education in the U.S., but critics point out that the approach has been piecemeal, failing to address issues of institutional turf and autonomy (Van de Water & Rainwater, 2000).

Definition of Terms

With dual credit programs recognized in all of the states, the nuances specific to individual programs fill volumes. Since my study focuses only on dual credit in Iowa and relies upon student records, the following definitions apply.

Dual credit Programs	Programs that enable high school students to enroll in postsecondary institutions while still in high school, earning concurrent high school and college credit.
Postsecondary Enrollment Options	The Iowa Code, Chapter 261C makes provision for Iowa high school students to earn college credit while still enrolled in high school. Under the Postsecondary Enrollment Options Act, eligible students are defined as eleventh or twelfth grade students or any ninth or tenth grade student who is identified, according to a school district's gifted and talented criteria and procedures, as a gifted and talented student. School districts participating in the postsecondary enrollment options program are required to pay a tuition reimbursement fee to the

	postsecondary institution providing the course, in the amount equal to the lesser of actual costs of tuition, textbooks, materials, and fees for the course taken or the sum of $250.
League of Schools	The League of Schools is a joint program between the community college and consortia of community schools. To set up a League, the schools and the college enter into a 28E agreement to offer dual credit courses at consortia locations. Other stated purposes include offering students a wider range of course offerings, while sharing facilities, personnel, equipment, and curricula, and at the same time, compensating for declining resources within school districts.
28E Agreement	Chapter 28E (Joint Exercise Of Governmental Powers) of the Iowa Code (1999) is a mechanism that allows public agencies in Iowa to enter into cooperative agreements with other agencies (public or private) to provide joint services and facilities. The agreements provide details about the duration of the agreement, the organization of the created administrative entity, financing and budget arrangements, dissolution of the agreement, and other relevant matters. Chapter 28E is intended to have a broad application.
Enrollment Status	**League Students** are enrolled for dual credit in classes that are offered on the high school campus through a consortia formed between a community college and a local school district(s). **PSEO Students** are students enrolled for dual credit in classes offered at a postsecondary campus. **Regular Students** are students whose first enrollments are at the college level.
Time To Award	The number of semesters an individual student spends earning a degree after matriculation. It is sometimes used as a measure of

acceleration, persistence, or retention.

Coursework — Each course has been recorded by section and program, and for each student, the grade or disposition of that course is noted.

Significance of This Study

The significance of this study lies in the fact that despite the attention that this current education reform has generated, virtually no longitudinal research has been undertaken to examine its success in terms of its core educational mission. The purpose of this study will be to fill that void.

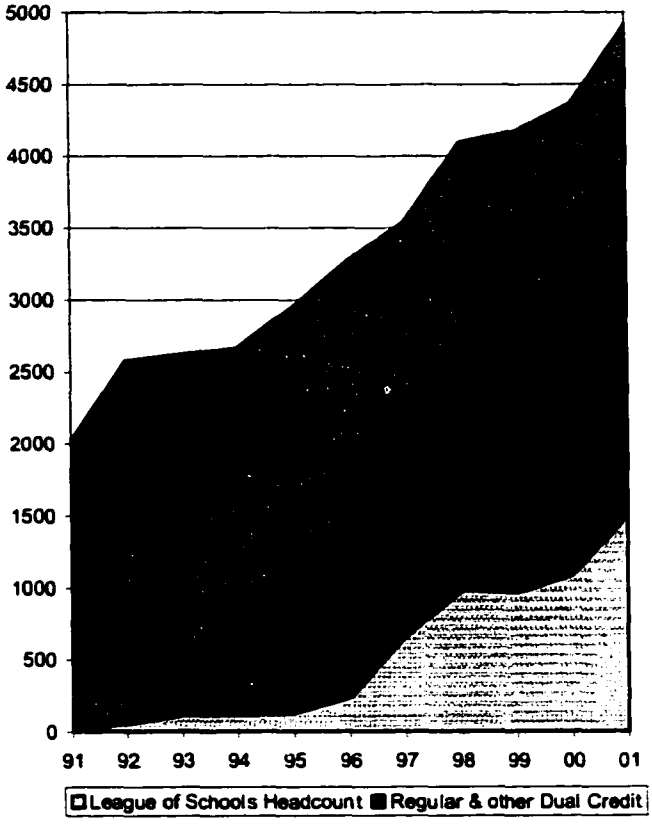

Figure 1. Unduplicated headcount enrollments for Regular and League students at Erewhon Technical College 1991-2001.

Significance may be viewed locally, regionally, or nationally. Locally, dual credit options account for approximately one-fourth of the credit enrollments at Erewhon Technical College (ETC), the focus of the present research. In the fall of 2000, 101 students were enrolled in PSEO courses, while 1,192 students were enrolled for dual credit in one of six League of Schools. For fiscal 2000 in the state of Iowa (FY 2000), the college dual credit offerings (the League of Schools and PSEO) accounted for about one-fifth of total state PSEO enrollments.

For fiscal 1997, Florida (1998) reported a dual credit headcount of 27,887 enrolled for nearly 200,000 credits, while enrollment for earned credit (Advanced Placement, for example) was 3,117 with 24,654 credits. In its tenth year, the

Washington dual credit program, Running Start, reported 13,276 (7,767 FTE) students enrolled, increasing from the 3,350 full and part-time enrollments in 1992-93 (Crossland, 1999). The Oregon Early Options study (Oregon University System, 1998) reported that 14 community colleges and 3 universities participated in college high, working with about 175 high schools, enrolling 6,368 students in the most recent year. In Arizona, Puyear (1998) reported approximately 9,000 students enrolled for dual credit in 1996. Andrews (2000) speculated that most of the 123,039 part-time, younger than 18, students enrolled in higher education (reported by NCES) were enrolled in community colleges for dual credit.

The significance of this study also resides in the role dual credit programs play in current efforts at educational reform, such as that promoted by the Educational Commission of the States. Though the Oregon Early Options report (Oregon University System,1998) listed dual credit programs in about 40 states, a recent check of the Dual Credit Database at ECS showed that all 50 states have some sort of dual credit program, demonstrating considerable momentum and support for the concept. The history of reforms that target the disconnect is mostly a one-way street with changes made at the secondary level as a result of dicta from higher education. The vision of a P-16 or K-20 Seamless system has the potential, considering the nature and extent of the support for the concept, to fuse separate, formerly autonomous levels together, dissolving policies, budgeting and even governance structures that are barriers to the consensus needed for K-16. What makes this movement especially potent is that it links together research through organizations such as NCPI, political organizations, state higher education officers, and (often in a leadership capacity) governors who have a national following. It is also linked to other reform initiatives, such as performance funding, equity, and a variety of similar initiatives that are targeted at K-12 systems.

CHAPTER II. LITERATURE REVIEW

Approach

Most of what has been written about dual credit programs (where students can enroll in postsecondary institutions while still in high school, earning concurrent high school and college credit) is historical narrative, recounting its inception and growth, or prescriptive, offering models and guidelines for implementing new or improving existing programs.

This chapter will review some of those perspectives, but its primary purpose is to identify what types of research questions have been asked about dual credit programs. Much of the literature about dual credit programs has been published in state-level reports, commission publications (such as the ECS), a handful of dissertations and research reports. That literature will be measured against what has been presented as the goals of dual credit programs.

Historical Perspectives

There is no definitive historical account of where or how dual credit began. Collins (1980) thought the first was an innovative program at Jamestown Community College in 1978, though Dekalb Community College (Mabry, 1988) in Illinois started its dual credit program in 1972, about the same time as Project Advance (Daly, 1985), which developed at Syracuse University in response to a request by seven high schools that were seeking to offer their seniors more challenging courses, a solution to declining senior motivation. In some states, dual credit was an offshoot of Tech Prep (1991-1992) and 2+2 programs (Catron, 1998). Of the statewide programs, Minnesota's Postsecondary Enrollment Options is often cited as the first such effort (Andrews, 2000; Boswell, 2001; Puyear et al., 2001). Model statewide programs cited are generally those in Minnesota, Washington, Utah (Boswell, 2001) or Virginia, Arizona, Massachusetts (Puyear et al., 2001). Aside from that, individual state programs have been chronicled by a number of writers (Catron, 2001, Spring; Cunningham & Wagonlander, 2000; Jordan, 2001; Puyear et al., 2001; Woolcot, 2001).

How To: Practical Perspectives

Another part of the "literature" of dual credit is in the "how to" genre, consisting of advice about how to construct a model dual credit program and what its components should be. These are published as guidelines from individual state systems, and several authors have summarized the goals, staffing, marketing, course development, faculty evaluations, all emphasizing the need to focus on quality (Chapman, 2001; Peterson et al, 2001). The Education Commission of the States supports an online searchable database for each of the states; it describes state policies (including citations) and rationale, payment of tuition and fees, the source of credit earned, and the advantages, disadvantages, and unique characteristics of each statewide arrangement. According to the ECS website, all fifty states have adopted policies regarding dual or concurrent enrollment.

Goals of Dual Credit Initiatives

The goal-purpose statements are the measures against which dual credit programs should be measured. In states where dual credit has been initiated as part of a statewide initiative, the goals of the programs are a function of the educational mission, but also the political, social, and economic roles of the educational system. While some of the goals can be measured with a straightforward audit, others are less obvious.

Model statements of goals frequently cited include Virginia (Catron, 1998, 2001, April, 2001, Spring; Puyear et al., 2001), Utah (ECS), and Minnesota. Catron (2001) cited the Virginia purpose in several publications, including her dissertation.

> The purpose of the *Virginia Plan for Dual Enrollment* is both to provide a wider range of course options for high school students and to avoid the unnecessary duplication of programs, in the academic, fine arts, and vocational subject areas where appropriate. As such, the plan promotes rigorous educational pursuits and encourages learning as a lifelong process; it recognizes that high school students who accrue college credit are more likely to continue with their education beyond high school than those who do not. The plan also offers a direct cost benefit to the Commonwealth of Virginia,

especially as it avoids the unnecessary duplication of facilities and equipment, and to the individual families of the high school students (Appendix A, p. 136).

The "cost benefit" is typically realized when a secondary school, for example, can enroll its students in college credit classes that are equipment intensive, without the capital expense for equipment. Classes that require computers and software (publishing applications or drafting), science labs, or vocational equipment are common examples.

The Minnesota Auditor's program evaluation report (Minnesota Office of the Legislative Auditor, 1996, p. ix) acknowledges that the Minnesota PEO program was intended to "promote rigorous academic pursuits and provide a variety of options" for juniors and seniors, but adds this disingenuously disarming observation in the Executive Summary, "Policy makers hoped that the competition from colleges and universities might force secondary schools to become more responsive to the needs of students and parents."

The following is a summary list of the rationale common to the various reports, where they are presented either as goals, benefits, or outcomes, and where they are seldom ranked as primary or secondary. A basic list of the rationale would contain at least these goals:

1. **Accelerated educational progress for students.** This assumes that the student will continue into postsecondary education, and thus spend less time as a matriculated student before completion.
2. **A wider range of course options** for high school students, and "relief of high school senior boredom" (Oregon University System, 1998). This includes courses that are not available when funding is insufficient.
3. **Reduced tuition costs for students/parents.** States vary on whether a school district or student is responsible for tuition costs. Also, dual credits that transfer would not have to be repeated again in college.
4. **Belief that high school students who earn early college credit are more likely to continue with their education beyond high school.** Most of the reform advocates point to the need for higher skill levels that are demanded in the

workplace and equate that with education beyond high school. Persistence, graduation, and completion are the most common measures of this and Goal 1.

5. **Promotion of rigorous educational pursuits and learning as a lifelong process.**
6. **Elimination of unnecessary duplication**, including programs, facilities, and equipment, thus a savings to students, their families, and the taxpayers.

The Utah Board of Regents policy (2001) aimed for high quality educational opportunities and a more challenging 12th grade; however, Utah's dual credit initiative, often recognized as exemplary, is noted less for its focus on academic achievement than the need for a program to help the state save money on education, deal with the "baby boom echo," and get students into the workforce (Boswell, 2001; ECS, 2001).

Alternate readings and rationale are provided through organizations, such as the National Alliance for Concurrent Enrollment Partnerships (NACEP), which insist that the "wider range of options" be rigorous courses only for well prepared seniors, and they would add to the list:

7. **Enhancing the professional development of participating faculty.**

To this list, the Oregon Report (1998) added:

8. **Productive interaction between high schools and colleges and enhanced college-community relations.**
9. **Opportunities to address equity concerns (social equity).**

The final two are also contained in ECS documents that include goals that cross the political spectrum. For the most part they have not been measured or evaluated, and will not be considered further in this study. The goals critical to this study are Goal 1 (acceleration of education progress) and Goal 4 (improve persistence and completion rates).

Framework of Seamless Reforms

The basic purposes, especially increased educational opportunities, accelerated credit, and potential tuition savings, sparked the dual credit initiatives in the 1970's. In the 1990's

dual credit became an important remedy in educational reform that targeted the entire educational system, especially proposals for a "Seamless" P-16 system, with perhaps the weakest link the high school to college transition.

Two Educational Systems: Alike yet Apart

The connections between higher education and K-12 education seem obvious. Timpane and White (1998) cataloged a number of similarities; both are interdependent and almost codependent, integral components of the knowledge industry, somewhat fragmented, typically serve a defined region and are somewhat restricted in their supply of students, serve the same populations, share a commitment to students and student success, and are politically and socially influential. Though they serve essentially the same purpose, K-12 originally was considered essential while higher education was ornamental (not necessary for a skilled workforce in the industrial age); finally, both must adapt to the changes in the societal and economic structures. Of course, the secondary system always has been secondary to the dictates of higher education in curriculum, instruction, and athletics.

They have existed, however, on separate planes. Reforms, such as those of the National Educational Goals Panel (or the Nation at Risk), typically target K-12. Historically, higher education focused on K-12 systems when graduating seniors did not measure up to the standards or expectations of the university, and discussion was about admissions requirements or responsibility of remediation (Brubacher & Rudy, 1997). Thus, interactions were often the result of initiatives from higher education, while reforms (with a few exceptions, even in the last 20 years) focused on changes in secondary education. Reform of higher education, on the other hand, was frequently directed at teacher training or at the delivery or appropriateness for remedial education (Breneman & Haarlow, 1998; Brubacher & Rudy, 1997; Timpane & White, 1998).

The Current Status

Recently, however, that has changed. Previously, most of the reforms targeting the transition from secondary school to college originated from higher education and its concerns about academic preparation, standards, or the appropriate content of the curricula, while the

changes occurred at the secondary level. In spite of those efforts, the current appraisal (Kirst, 1998; Levine, 1998) is that there is a "yawning gap" between a high school senior and a college freshman. In the past decade the new advocates of reform are organizations and associations, quasi-public entities that include politicians, regional and national bureaucrats, and scholars. They have provided leadership in educational reform that has targeted the "gap" between secondary and higher education, often referred to as a disconnect between the two levels (Kirst, 1998).

Recent Calls for Reform: Bridging A Yawning Gap

With education beyond the senior year a given, and with a gap between the preparation of secondary students and the needs of students entering higher education, a plethora of reforms have targeted what they characterize as a yawning gap or a gaping chasm of the senior-freshman transition, with the primary goal of strengthening the linkages between collegiate and precollegiate institutions. What those reforms have suggested is closely aligned with the goals originally developed for dual credit programs. They suggest that collegiate and precollegiate education explore ways to improve the prospects for success of the students, meet the demands of accountability, and operate more economically (cooperative arrangements, faculty sharing, curricular coordination, faculty development, inter-institutional exchanges).

Dual Credit

The argument for dual credit encompasses several of the goals (Goals 1-4) and assumes that high school students, especially juniors and seniors, need and are capable of additional challenge (Andrews & Marshall, 1991; Andrews, 2001). Encouraging qualified high school students to enroll concurrently in college credit not only helps bridge the gap between high school and college, but also makes the senior year more productive. In addition, dual-enrollment credits ostensibly help students progress faster through their college education, saving the state and themselves money, while freeing up opportunities for other students.

The Players

Advocates for the Seamless P16 system come from an interlaced collection of independent, nonprofit, nonpartisan organizations, agencies, and public officials. They include:

- **The Education Commission of the States (ECS)** is a bipartisan interstate compact formed in 1965 to help governors, legislators, state education officials and others identify, develop, and implement policies to improve student learning at all levels.
- **National Center for Public Policy and Higher Education** analyzes and promotes public policies concerning higher education. The Center, established in 1998, addresses its comments to policymakers, business and civic leaders, and educators. One publication series, "Perspectives in Public Policy: Connecting Higher Education and the Public Schools," promotes policies designed to strengthen linkages between higher education and the schools. Reports in the series are addressed to policymakers, business and civic leaders, and educators. A second publication, Measuring Up 2000 (NCPPHE, 2001), is a comprehensive report card for higher education on a state-by-state basis. Again, its agenda includes linking different levels of education, and it looks at issues of affordability, access, cost, and efficiency.
- The **National Commission on the High School Senior Year** examined the experiences of the "senior year," and identified a series of key issues that should be addressed (Kirst, 2001).
- Founded in 1954, the **State Higher Education Executive Officers** (SHEEO) consists of chief executive officers of statewide coordinating and governing boards of postsecondary education from 49 states and Puerto Rico. In 1996 SHEEO and ACT co-sponsored a study in a student transitions project, a comprehensive attempt to collect data on state level strategies through linkages. The State Strategies To Support Successful Student Transitions initiative was completed in 1998 and followed by Building Statewide K-16 Systems for Student Success in 2000. This

three-year K-16 project was co-sponsored and funded by the U. S. Department of Education to build and strengthen connections across the four federal programs within each state through K-16 partnerships.

Status of Research

Key Publications

Considering individual goals (1-9 above), and that dual credit is an ongoing, evolving educational program, it is reasonable to expect both formative and summative evaluation, with the former positioned to measure short-term successes against both short- and long-term goals. Also, the goals could be categorized as core or as peripheral to the educational mission.

Much of the literature consists of state reports (Catron, 1998; Crossland, 1996, 1999; Florida Community College System, 1998; Minnesota Office of the Legislative Auditor, 1996; Oregon University System, 1999; Puyear, 1998; Puyear et al., 2001), as mentioned above, developed with limited purposes. These are quantitative studies, primarily descriptive, with a basic list of variables that includes levels of participation measured in terms of the numbers of students, with additional information on grade level, age, gender, number of courses enrolled in, and credits earned. Courses and credit hours are transformed with a variety of cost-benefit formulas and used to report system expenses or savings based on average costs, thus a measure of economic impact. Up a level, other studies (Goodman & Howat, 1999; Harding et al., 2001; Johnston & Kristovich, 1999; Windham, 1997, 1998) used grades for either individual sections or cumulative GPA to describe qualifications of students or to infer quality of instruction by tracking GPA though sequential courses. In a few cases, time-to-degree is used as a measure of acceleration, persistence, or retention. Analysis is primarily descriptive, with scattered examples of analysis of variance.

Perception studies (Catron, 2001, April; Heath & Lewis, 2000; Johnson, 1999; Project Advance, Syracuse University Project Advance, 1998), on the other hand, look at the impact of dual enrollment on students, faculty, administrators, educational systems, and sometimes parents. Data are gathered through surveys, structured interviews, case studies, and focus groups. For the most part, these data consist of self-reports that evaluate quality of instruction

and courses, ease of transfer, various measures of satisfaction, and measures of process, such as qualifications of faculty. Where surveys were reported, the analysis was exclusively descriptive.

The thickest report is from Minnesota (Minnesota Office of the Legislative Auditor), which like most system (statewide) reports is descriptive. The review of the Minnesota Postsecondary Enrollment Options Program (1996) reported 1) numbers and types of students, courses and course completion, regional distribution of and enrollment in courses, and indicators of student success (grade point average and completion rate) using secondary data, and 2) measures of participant satisfaction collected using surveys. The Minnesota study was limited only to students who left their schools to take the courses, not those whose courses were scheduled on the high school campus.

Goodman et al.(2001) recently published a longitudinal study of dual credit programs in Florida, focusing on the impact of dual credit programs on baccalaureate attainment for students who enrolled in dual credit and those who qualified for remediation, a curious combination. The study used multivariate analysis (PROBIT) to develop a model to predict degree completion over a six-year timeframe. In terms of level of analysis, it is the most comprehensive study to date.

Limitations

A major limitation of these studies, other than the level of analysis, is that comparisons are often between groups that have crucial dissimilarities. Students enrolled in dual credit can be defined by age, while "native" students may be traditional and nontraditional in age. In many states they are qualified for dual credit based on academic record (GPA), class rank, admissions test scores, or faculty recommendations. These criteria may be less than, equal to, or greater (more selective) than the qualifications of the students in the control group. Further, though reports include the demographics of dual enrolled students (e.g., Crossland, 1999), there is no assurance that comparison groups have similar demographics. In short, "regular student" is a term that is rarely defined.

Goals Reviewed

Goals 2 and 6. Reduced Tuition and Elimination of Duplication. Though secondary administrators in Minnesota expressed concern about the educational and fiscal effects, the Audit reported that the PEO program saved parents and students in Minnesota about $11 million. Similarly, Crossland (1999) reported that Running Start resulted in savings in Washington State of $12.5 million to students and $25 million to taxpayers.

The assumption behind these reports, however, is that credits transfer and the students do not waste time or money retaking courses. Though Crossland (1999) did not mention it in his state report, Boswell (2001) referred to concerns in Oregon about courses that would not transfer. This was a major issue in the popular press (Reisberg, 1998), and it emerged in the qualitative studies (Catron, 1998; Johnson & Kristovich, 1999). Kummerer (2000) identified the potential for "double dipping" based on enrollment in facilities funding in the community colleges of Arizona.

Goal 5. Promotion of rigorous educational pursuits. While the measure of success of dual credit programs is often the level of participation (Florida, Washington, and Iowa relied on the number of students enrolled and credits earned), the measure of quality (academic rigor) of dual credit programs in most quantitative studies (archival data) is the grade point average and the comparison of GPA in a population of students enrolled in dual credit to that of the population of regular students in the same timeframe (Crossland, 1999; Goodman & Howat, 1999; Harding et al., 2001; Windham, 1998). Peterson et al. (2001) also reported comparable grade point averages from a stratified random sample of dual enrolled students. Studies from the University of Arizona and Arizona State University (Puyear et al., 2001) suggested that students who had enrolled in dual credit fared better when transferring to the university system than did native community college students. Harris (1995) found no difference in achievement (grades) for courses taken at high school locations compared with those taken at a college campus. The limitation of such grade comparisons, however, is that most dual credit admissions are limited to higher achieving students, whereas there would be a greater range in the students found in the entire university student population.

Syracuse University's Project Advance "1998 Impact Study" used a survey instrument[s] to evaluate the program's influence on students, teachers, participating high schools, professional development, its effects on decision makers in the participating schools, and to foster interaction. It replicated a 1987 survey, with surveys sent to five groups—counselors, principals, teachers, seniors and freshmen—a total population of 8,000, with responses by 37 percent overall. Responses included self-reports of grade point average, credit transfer, and intent to attend graduate school. The student response section summarized responses of student views that dual credit enrollment contributed to improved study habits and improvement in other measures that infer academic rigor.

Goal 4. Increased likelihood of attendance and completion of college. Puyear (1998; Puyear et al., 2001) suggested in state reports that dual credit programs improve both high school graduation rates and the rate of continuation to college, citing studies conducted at the Maricopa Community College District. Goodman and Howat (1999) reported that retention of a cohort beginning in the fall of 1996 and continuing through 1998 was higher for those with dual credit. Almost 80% of students with credit were retained in Fall 1998, compared to 65% of students without credit. By type of acceleration mechanism, students with mixed credit including dual enrollment had the highest retention rate (84.5%), closely followed by International Baccalaureate (82.9%) and mixed credit excluding dual enrollment (82.6%). The lowest rates were for students with department exam credit or CLEP credit only. Windham (1998) reported that of the 1991-1992 cohort, about 70% enrolled in either the university or community college systems in Florida.

Goal 1. Accelerated Progress. Accelerated progress implies progress toward a goal, whether it be a diploma, associate degree, or baccalaureate degree. Reports of degree attainment are limited. Crossland (1999) reported that of the 1993 Running Start cohort (n = 88), 41% had graduated in four years, a rate about ten percent higher than regular university students. Though Goodman and Howat (1999) reported about retention rates of Florida dual credit programs, retention falls short when measuring progress, especially when stated in temporal measures toward retention. Considering their stated purpose of evaluating

acceleration mechanism, the GPA and retention measures are inadequate. Windham (1997, 1998) tracked a 1991-1992 dual credit cohort in Florida, reporting subsequent enrollment in either the state university system or the community college system (about 70%), grade comparisons, repeated courses, but not completion or time to degree.

Jordan et al. (2000) conducted focus group interviews of Running Start students enrolled at Western Washington University. They reported a concern by some students about delays in time to degree which they attributed to poor advising at some community colleges, which included instances in which classes needed to be retaken.

Location

One issue that has been mentioned is the importance of location, either where dual credit courses were offered or the educational provider of dual credit courses. Location is important in the Washington studies, none of which include enrollments for classes taught on the high school campus. This is the case for Harding et al. (2001) even though an estimated 3,500 students enrolled in "College High" courses. Harding et al. (2001) noted that the literature depicts some liabilities when courses are provided at high school sites: lack of difficulty maintaining a serious atmosphere; excessive workload for the high school teacher; teacher-dominated class discussions; and territorial jealousy displayed by high school teachers of "regular" classes. Crossland (1999) likewise did not track students enrolled in College High courses in Washington. Harris (1995) evaluated the effect of location, but observed no difference between the enrollment or outcomes for students at high school campuses from those at college campuses. Though the initial intent of the interviews by Burns and Lewis (2000) was to compare locations, they too were unable to reach any conclusions (N = 6). Goodman and Howatt (1999, pp. 14-15) concluded that even though community college students appeared "to perform less well than students using other acceleration methods, they perform similarly to students who took the initial course at the university." Catron (1998) cited a number of problems with the development of the Virginia dual enrollment plan, including poor climate at high school locations. On the other hand, it appears that all of the Project Advance courses offered by Syracuse University are offered at 114 high school sites.

Burns and Lewis (2000) studied the effect of location on educational experience. All participants felt that enrolling was a positive experience, and some felt that it increased their academic independence if enrolled at a college campus, while several on the high school campus thought it caused them to take the course more seriously. The study did not draw significant conclusions about the effect on satisfaction.

Studies of retention, persistence, attrition

The first part of my research question deals with (degree) completion, a subject of prolific research in higher education, with corollary foci on retention, persistence, and attrition. The models developed through these studies have contributed to the understanding of the college experience, and for this study these perspectives find relevance in the identification of variables.

The most prominent model comes from Tinto (1975, 1987, 1993), whose interactionist theory balances the importance of integration between the formal (academic) and informal (social) aspects of the college experience. The formal aspects include the academic goals and offerings at the college, while the informal include the institution's goals in the cultural or societal sense and the day-to-day social interactions at the college. Tinto (1998) asserted that what is important within both frameworks is "involvement," which is fostered through interaction with other students and faculty, and the consequential "positive" feedback and increased integration for the student. Tinto (1998) cited a number of well-known studies that support this conclusion (e.g., Astin, 1984; Mallette & Cabrera, 1991; Nora, 1987; Pascarella & Terenzini, 1980; Terenzini & Pascarella, 1977).

The models developed in those studies place the spotlight on the institutional systems (academic and social) that promote student involvement, and have been supported by a number of empirical studies (Pascarella, Smart, & Ethington, 1986; Stage, 1989; Voorhees, 1987). Other studies have focused on the effects of the related variables. This long list includes support services (advising and counseling) (Bean, 1980; Wilson et al., 1997), academic-related services (tutoring), interaction with students and faculty (e.g., Astin, 1984; Mallette & Cabrera, 1991; Nora, 1987; Pascarella & Terenzini, 1980; Terenzini & Pascarella, 1977), and how that

interaction validates the student experience, particularly the nontraditional student community college experience (Rendon, 1994, 1998). The evidence suggests that academic and social integration are more important to persistence in the four-year rather in the two-year colleges (Braxton et al., 1997; Pascarella & Chapman, 1983). However, as Tinto (1998) suggested, those effects appear to be student specific and fail to describe the underlying process of persistence. The same is true, for example, of the relative influence or primacy of either social and academic integration, where primacy becomes student-dependent and thus varies perhaps as an endogenous variable for one student and an exogenous variable for another student (Tinto et al., 1994).

Most of the previous research focused on traditional or nontraditional students, with traditional students equal to high school graduates who have matriculated at a specific institution, and with nontraditional students who are at least 25 years old. The concept of institutional fit in this research tends to focus on only one institution, which contradicts the emergence of multi-institutional attendance patterns (Adelman, 1999; Carroll, 1989; McCormick, 1997). Even studies of attrition among nontraditional students (e.g., Bean & Metzner, 1985) focused on one institution.

Another problem comes with the construct "persistence." Adelman (1999) faulted much of this research on retention because the temporal definition of persistence is ambiguous, and thus a second-year student could have as few as 11 credits or as many as 32 credits. Further, Adelman challenged other research that focused on grades and continuation beyond the first year as outcomes (dependent variables), along with studies that focus on "psychological" variables (defined as intent, attitude, influences, commitments and perceptions) because most cannot be affected by "those who can best steer students toward degree completion" (p. 39).

Students enrolled in dual credit courses are neither traditional nor nontraditional college students, at least in terms of models based on institutional interaction. Their differences include their dual enrollment status, non-matriculation at a single institution, lack of a high school diploma, multi-institutional attendance patterns, probable status as transfer

students, and (for League of School students) the locations where they attend class at local high schools. Further, there is much about these students, because they may meet admissions standards but not be admitted, that is not recorded by the collegiate institution. The effect on my study is that prior research will validate the use of selected variables, exclusive of their role within the context of a model.

Variables that are supported in previous studies include the following.

Academic performance and preparation have a direct effect on retention, with the positive impact of good performance the focus of some studies (Hanson & Swann, 1993) and the negative results of poor performance in others (Moline 1987; Nora, 1987). The use of GPA as a proxy for academic integration is consistent with Cabrera, Nora and Castaneda's (1993) study in which they demonstrated that academic integration is expressed indirectly through GPA. *Course taking patterns,* at both the secondary and collegiate level, influence completion and "transfer" performance (Adelman, 1999; Reis, 1995).

Adelman (1999, Sect. II, p. 6) observed, "One of the most persistent variables in the persistence literature measures educational aspirations." Do they reflect students' aspirations, expectations, or anticipations? His analysis of High School and Beyond data found "a very clear and dramatic linear relationship" between completion of bachelor's degrees and anticipated education plans. My measures are clearly "expectations" more than specific "plans." Thus my interpretation of their ability to shape student achievement will be approached cautiously. I expect that responses "Earn a degree" or "Transfer" will have effects similar to that found by NCES.

The contribution of *socioeconomic status* to educational attainment has been the subject of extensive research in several disciplines (Haveman & Wolfe, 1995). Socioeconomic status is positively related to the likelihood that students will complete a four-year degree within six years (Tinto, 1993; U.S. Department of Education, 1998). While financial aid is a factor in students' persistence in higher education (Moline, 1987), lack of adequate financial support often causes students' premature departure (Astin, 1975; Mohr et al., 1998). At the very least, finances have an indirect effect on persistence, and thus are exogenous variables. (Cabrera,

Nora, & Casañeda, 1992; Tinto, 1993). Summaries of financial aid information then can serve as a proxy for socioeconomic status.

My study of two of the goals of dual credit programs includes many of the variables used by other researchers and described here. These, and additional variables, are described in the following chapter which presents my research design and method.

CHAPTER III. METHODS

The purpose of this study is to investigate the academic achievement of students enrolled in school-based dual-credit programs, those which enroll high school students in postsecondary institutions. Specifically, the study is designed to determine if dual-credit programs improve the likelihood that students will earn college degrees. My data allowed me to track students' progress from their initial enrollment as high school students in one community college system (Erewhon Technical College) to their enrollment as regular students at that community college. This chapter presents the hypotheses that guided my study, the design used to test the hypotheses, and a description of the variables that were analyzed and the methods employed for their analysis. I also describe the community college setting, the dual-credit system, and students whom I studied.

The research focuses on two goals that are typically offered by dual-credit programs (Clark, 2001), degree completion and acceleration. The first is that *high school students who earn early college credit are more likely than traditionally-enrolled students to complete college degrees.* Discussions of student progress often associate completion with persistence and, in some contexts, retention. The importance of completion, in fact, is advocated by Adelman (1999, II, p. 1) when he concludes that "Completion transcends persistence."

In addition, proponents of dual-enrollment programs argue that an important effect of dual-enrollment is acceleration, since the dual credit programs "accelerate" students' educational progress in college; in other words, dual-credit programs purportedly provide students with a "jump start," and that is a second focus of my research. The idea of the accelerated program is that it helps a student reach critical credit thresholds (equivalent to the first, second year of college and so on), and like persistence, it may be thought of as number of credits accumulated and patterns of accumulation, as in miles traveled for a frequent flyer. If this is true, I expect that *students who begin their college studies while in high school will complete their degree programs in a less time than* students whose college studies begin after high school graduation.

This study also investigates other effects of dual-enrollment programs. I was interested in learning: 1) what personal and organizational background factors predict the likelihood of students enrolling in school-based dual credit programs, compared to regular students; 2) the effect of enrollment status in predicting the number of semester credit hours attempted and those completed; and 3) the effect of enrollment status in predicting cumulative grade point average. Finally, I was interested in learning what is the unique effect of enrollment status, compared to other variables, in predicting completion.

The following null hypotheses were formulated and guide this research:

Hypothesis I: There is no significant difference in the rate of degree completion between college students who earn early college credit as League students and those who do not.

Hypothesis II. There is no significant difference in the Time to Award between college students who participated in dual-enrollment programs while in high school and those who did not.

Hypothesis III. Personal and organizational background factors do not vary significantly by enrollment status as League or Regular student.

Hypothesis IV. The number of semester credits attempted and completed do not significantly vary by enrollment status as League or Regular student.

Hypothesis V: Cumulative grade point average does not significantly vary by enrollment status as League or Regular student.

Hypothesis VI: There is no significant difference between League and Regular students in the number of semesters taken after matriculation to complete 30 credit hours.

Hypothesis VII: Enrollment status as League or Regular student does not significantly predict completion, net the effects of other variables tested.

DESIGN

I used a longitudinal time-design to follow the college careers of students from the time that they initially enrolled in school-based dual credit programs to their completion of

college degrees at community college or universities. This is a study of the population of dual-enrolled students, and the unit of analysis is the student.

PROCEDURES

The primary focus of this research is students enrolled as school-based dual-credit students (henceforth referred to as "League students") in one community college and who subsequently enrolled as regular students in the community college.

Erewhon Technical College and Its School-Based Dual-Credit Program

Erewhon Technical College is a fast-growing Midwest community college. It was organized in the late 1960's as a vocational-technical school to serve six rural counties. In the early 1970's, Arts and Sciences courses were added to the curricula.

The League concept was initiated as a "vocational education cooperative" in 1991 (Appendix I) to maximize declining resources by sharing facilities, personnel, equipment and curricula. The first curricular areas were health occupations and industrial technology, and the partners focused on putting the mechanism into place. In essence, my paraphrase of the purpose is that the League served students by expanding course offerings, by increasing access to postsecondary education, and by offering the opportunity for advanced placement in career programs. In 1992, the college began offering postsecondary education to students in the college district.

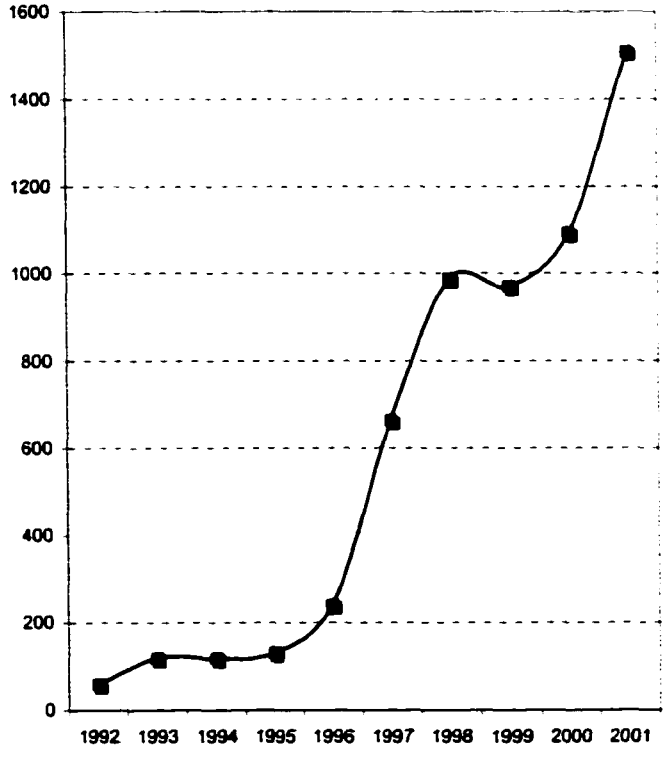

Figure 2. Fall Headcount enrollments for League of Schools at Erewhon Technical College 1991-2001.

The present research investigates the most popular program, League of Schools. As Figure 1 depicts, League enrollments have increased almost every semester since the program's inception. By Fall 2001, League students comprised 94 % (1,507) of all dual credit students (1,602) and 30.6 % of the total college population (4,920).

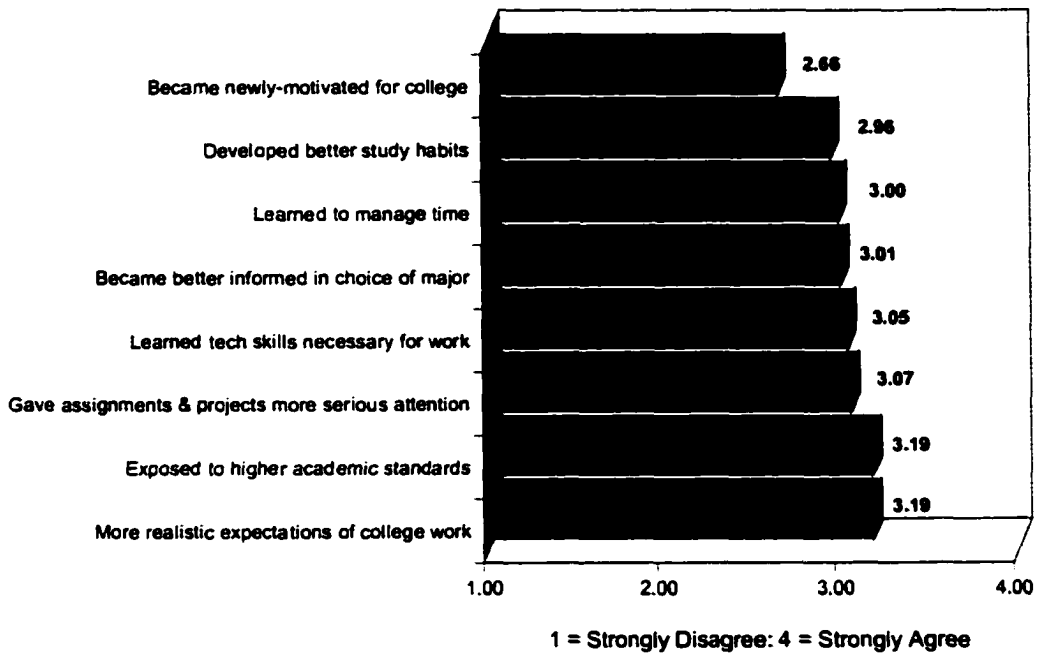

Figure 3. Reponses from students describing how League classes influence study behaviors.

In August 2001 the College's Institutional Research office mailed a survey (Appendix II) to 1,199 students who were enrolled in the College's League classes during Fall 2000 and Spring 2001 semesters. The purpose of the project was to learn students' evaluation of the value of their League courses. At appropriate intervals, we followed up the initial mailing with a reminder postcard and a second copy of the survey. Ultimately, 186 (1.6 %) students returned completed surveys, a disappointing but not unexpected response rate, given that the population was high school students.

Sixty-eight percent of the survey respondents (Figure 3) reported taking League classes in order to get a "jump start" on earning a college degree, and 61% enrolled to "learn the particular skills taught in a class." Students reported that, as a result of taking dual-credit

courses, they "had more realistic expectations of college work"(87%), "learned to manage time more effectively" (85%), and "were exposed to higher academic requirements and standards" (84%); 92% gave a "good" or "excellent" rating to their League of Schools experience.

Subjects of this Research

This study is of all League students who first enrolled in college courses between the Fall 1993 and Summer 2001 semesters and then matriculated to the college as regular students. These students were identified by their "status codes" in the college's MIS system. Paper records kept by the college's High School Division supplemented the MIS data to ensure reliability. Transcript data were extracted from the institutional database of the community college and include academic and demographic information throughout students' contacts with that community college. Transfer reports from three state universities, one private four-year college, and a national tracking service provided information on students after their transfer to other institutions, ending in Spring 2001, and these data were hand-entered. Transfer data were helpful in distinguishing between students who continued at another institution from those who dropped out. In sum, my study uses data from seven academic years, or twenty-two semesters, for a total of 568 League students.

This study is also of students who entered the college for the first time as traditionally-enrolled, that is, Regular (not dual credit) students. I drew a proportionate stratified random sample based on semester enrollment covering the same time period for these students from the same institutional database and extracted comparable academic and demographic information. I selected only first-time students who had graduated from high school the previous Spring semester. University and private college transcript data were also available for them. This sample served as a control group (1,007) to which dual enrolled students were compared.

Data Resources

Retrieving reliable data from the Erewhon's MIS system, from "residual" data files, and from the paper document files presented me with considerable challenges. For example, assessment tests have been computer-based for over a decade; yet student records for

assessment are accessible online beginning with test dates for the year 2000. For the two years before that, 1998 through 1999, student records were printed in tables and stored in a notebook. The notebook includes 10 separate printouts of varying length, each one arranged alphabetically. Finding assessment results in the notebook meant reviewing each of the printouts against the master list. In addition, the assessment center maintains paper copy files for some, but not all, students in a series of filing cabinets in a storeroom not far from the assessment center. Copies of assessment results, along with recommendations, are sometimes included in the student admissions file, but for historical purposes those admissions files are kept in three different areas. Current files are in one storeroom near the Enrollment Services Offices, and successively older files "archived" in several other storage areas. "Archived" files are in cardboard boxes, arranged roughly by year and then by last name, in a more remote storage area. I considered those records important, however, because they included not only assessment scores but also, in some cases where it was recorded, information about previous academic experiences and parent education.

Data recorded in the MIS system presented a different set of challenges. For example, program names were inconsistently assigned, and occasionally the program award type was inaccurate (in some, credits for certificates were identified as associate degree programs). For about 5% of the study population, the "last date attended" preceded the "first date attended," and in other cases the "last date attended" reflected noncredit continuing education rather than credit enrollment. The fields designated for assessment records in the MIS system also contain scores for nurse aide licensure, or 10-key proficiency tests. I discovered inconsistencies when calculating variables such as "attempted" and "completed" credits, where the ratio of completed: attempted was as high as 6:1. Ultimately, I checked individual electronic records for reliability of exported data, and I checked many of the variables against chronological printed records of courses enrolled, credits earned, and grades received for every student in my database.

Certainly, problems with access to data describing variables are not a unique characteristic of my study. Horn and Kojaku (2001) excluded two-year institutions from their

study of persistence through college, noting that two-year institutions do not report or track high school course taking data for the majority of secondary students. Similarly, I found that high school transcripts were only sporadically included among Erewhon's admissions paper files, and that high school completion and type (diploma, GED) was not consistently entered in the MIS database.

Enrollment in Cohorts

During the study period, students entered, stopped out, dropped out, and/or completed their programs of study. Some transferred to different institutions, while others continued their study after the study period ended. To conceptualize my study population, it is useful to examine the flow of students throughout the study period. Table 1 displays my population by the academic year that students first enrolled in classes (though they may have enrolled in one of three academic semesters during the academic year).

Table 1. Among the study participants, number and percent enrolled for each academic year by Regular and League STATUS.

	STATUS		
ACADEMIC YEAR	MATRICULATED LEAGUE	REGULAR	TOTAL
AUG 15 1993 - JAN 1 1995	8	26	34
	1.4%	2.6%	2.2%
MAY 15 1995 - JAN 1 1996	20	141	161
	3.5%	14.0%	10.2%
MAY 15 1996 - JAN 1 1997	82	174	256
	14.4%	17.3%	16.3%
MAY 15 1997 - JAN 1 1998	129	231	360
	22.7%	22.9%	22.9%
MAY 15 1998 - JAN 1 1999	201	163	364
	35.4%	16.2%	23.1%
MAY 15 1999 - JAN 1 2000	106	153	259
	18.7%	15.2%	16.4%
MAY 15 2000 - JAN 1 2001	22	119	141
	3.9%	11.8%	9.0%
Total	568	1007	1575
	100.0%	100.0%	100.0%

League of schools students are, by their very definition, different from regular students or traditional students in postsecondary education. In addition to enrollment in dual credit classes taught on their own campus, there are other differences. Table 2 displays background information on the students in this study.

Table 2. Number and percentage distribution of Regular and League students by selected background characteristics and by STATUS.

		League	Regular	Total	Sig. Diff*
Status		568	1007	1,575	
		36.1%	*63.9%*	*100.0%*	
Male		319	447	766	V = .113***
		56.20%	*44.40%*	*48.6%*	
Female		249	560	809	
		43.80%	*55.60%*	*51.4%*	
Total		568	1007	1575	
Mean Age at Start		17.38	18.31		*t* = -26.0***
	17	7	2	9	
		1.23%	*0.20%*	*0.57%*	
	18	39	28	67	
		6.88%	*2.78%*	*4.26%*	
	19	143	118	261	
		25.22%	*11.72%*	*16.58%*	
	20	177	173	350	
		31.22%	*17.18%*	*22.24%*	
	21	114	211	325	
		20.11%	*20.95%*	*20.65%*	
	22	55	206	261	
		9.70%	*20.46%*	*16.58%*	
	23	23	158	181	
		4.06%	*15.69%*	*11.50%*	
	24	8	102	110	
		1.41%	*10.13%*	*6.99%*	
	25	1	9	10	
		0.18%	*0.89%*	*0.64%*	
Total		567	1007	1574	
Race: White		498	891	1389	
		95.77%	*95.40%*	*95.53%*	
Race: Other		22	43	65	
		4.23%	*4.60%*	*4.47%*	
Total		520	934	1454	
Location: Metro		389	907	1296	χ^2 = 116.06***
		68.49%	*90.07%*	*82.29%*	
Location: Rural		179	100	279	
		31.51%	*9.93%*	*17.71%*	
Total		568	1007	1575	

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Students in this study are defined by their STATUS. They are either Matriculated League, or simply League, or Regular students who entered the college directly from high school and did not participate in school-based dual credit education. Regular students out-numbered League students by almost than two-to-one. This ratio is comparable to that of the general college population in Fall 2001 semester.

Gender. Table 2 reveals that difference by gender between League and Regular students are significant ($V = .113$, $p < .001$). More males (56 %) than females were League students, while females comprised the majority (56 %) of the Regular student group. Examining these differences by academic year of first enrollment revealed that the gender balance of the Regular students remained in favor of females over the seven periods, at one point reaching 70 % in the first period (AUG 15 1993 - JAN 1 1995) and a low of 52 %. In contrast, the League student gender balance for the seven year period shows five periods with a higher percentage of males, one equal, and one female. This difference is explained by the comparatively large proportion of vocational and technical League course offerings. Table 3 displays the ratio of Arts and Sciences to Vocational Technical courses completed by male and female League and Regular students.

Table 3. Number and percentage distribution of credits earned into categories of Academic Focus by League and Regular Status and by Gender.

		STATUS		
Gender		**Matriculated League**	**Regular**	**Total**
Males	Arts & Sciences: Voc Tech Equal	5	40	45
		1.6%	*8.9%*	*5.9%*
	Arts & Sciences Higher	125	180	305
		39.2%	*40.3%*	*39.8%*
	Vocational Technical Higher	189	227	416
		59.2%	*50.8%*	*54.3%*
	Total Males	319	447	766
Females	Arts & Sciences: Voc Tech Equal	7	45	52
		2.8%	*8.0%*	*6.4%*
	Arts & Sciences Higher	170	366	536
		68.3%	*65.4%*	*66.3%*
	Vocational Technical Higher	72	149	221
		28.9%	*26.6%*	*27.3%*
	Total Females	249	560	809

Start Age. League students began taking college classes at 17.38 years, on the average, with a range of 13 to 20 years of age. Regular students, on the other hand, began at a mean age of 18.31 years with a range of 16-19. Thus, while the difference in Start Age is significant (t = -21.74, $p < .001$), it is also possible to compare the ages at which the two groups begin as regular students; that is, the age at which League students matriculated compared with the Start Age of Regular students. Regular students began at an average age of 18.31 years, and League students matriculated at an average age of 18.41 years. This is still a significant difference but in the other direction (t = 3.381, $p = .001$). Looking at the data that way also tells us that the average League student attended dual-credit classes for about a year before matriculating, at least to the community college. In other words,

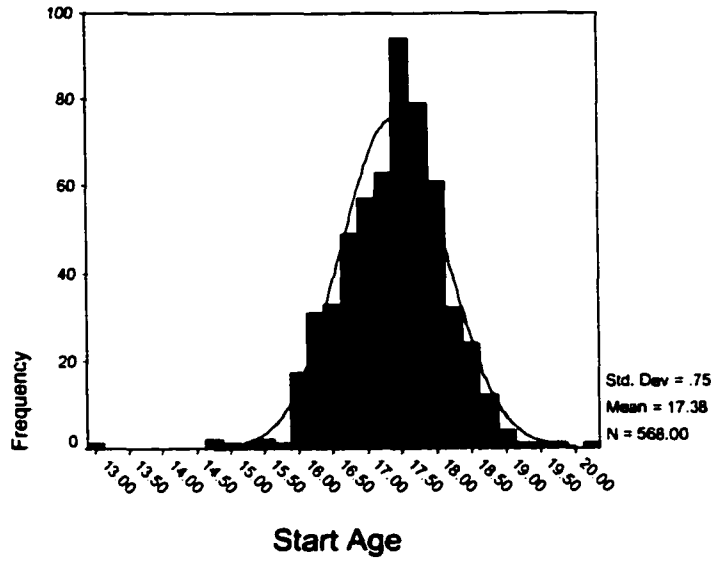

Figure 4. Distribution of Start Age for League students enrolled in school-based dual credit classes.

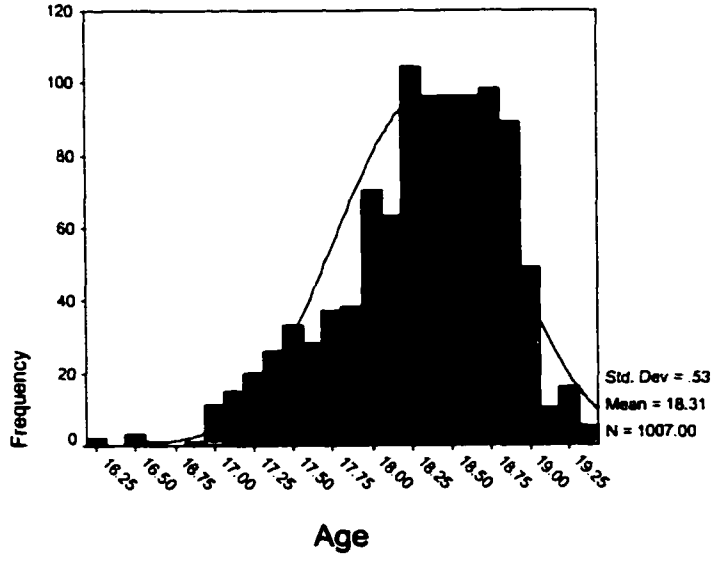

Figure 5. Distribution of Start-Age for Regular students in college classes at ETC.

the variances of the two groups, though still significantly different, are less so (Start Age $F = 50.361$, $p < .001$; Matriculation Age $F = 5.505$, $p = .019$).

For this longitudinal study, then, several frames of reference might be considered for the age at which the students entered the study and for important markers along the way that indicate their progress. Figure 4 displays the Start-Age distribution for Regular students, Figure 5, the Start-Age distribution of League students, and Figure 6 shows the distribution of Matriculation Age for League Students.

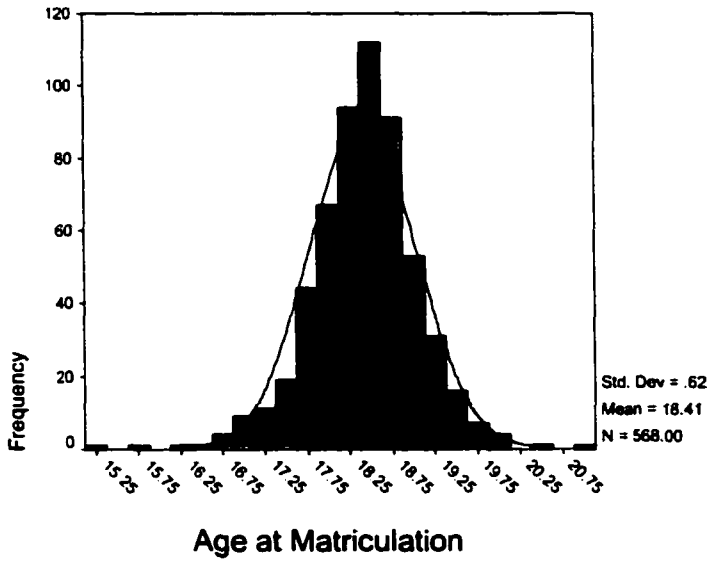

Figure 6. Distribution of Matriculation Age for League Students at ETC.

Race. The percentage of racial and ethnic minorities in the overall College population approaches ten percent, but fewer than five percent of my subjects are non-White. Race, therefore, was seldom used as a variable in the analyses.

Attendance Center. I collapsed data representing several schools in the League consortia into two categories. Those within the metropolitan area became Metro, while those in the rural areas became Rural. Again, there are significant differences between League and Regular students, with a significantly higher proportion of League enrollments in the rural areas, compared to Regular students. This is due to the relatively large number of Vocational Technical League courses offerings in non-Metro schools.

In sum, compared to Regular students, a higher percentage of League students were male than female, from rural than metro areas, and enrolled in Vocational Technical courses than in Arts and Sciences. More League females than males were enrolled in Arts and Sciences courses, and the mean credits they earned are higher than that for males. At the same time,

males were three times more likely to be enrolled in technical courses, and they earned more credits in these.

CONSTRUCTION OF VARIABLES AND ANALYSIS

Local transcript and demographic data were extracted from the institutional database onto an Excel spreadsheet. Additional variables were hand-entered. These include placement exam scores, transfer data, and student outcomes. A variety of student outcomes were possible during the study period. I coded these outcomes as "matriculated" "continued," "stopped out," "dropped out," "transferred," or "completed." Every semester was coded to reflect student standing as of that semester.

Matriculate represents the first semester that students enrolled as Regular students in the college. All subjects matriculated from high school.

Transfer refers to leaving the college to attend another institution of higher education.

Stopout. I operationalized stopout as three or more semesters during which students were not enrolled between semesters in which they were enrolled either at the community college or another higher education institution, e.g., transferred. Semesters during which students were re-enrolled following stopping out were coded "continued."

Dropout. Semesters during which students who were once enrolled but failed to continue, transfer, or complete during the study period were coded "dropout."

After cleaning, the data were downloaded to SPSS for analyses. I first examined frequencies distributions, measures of central tendency, and standardized residual plots on demographic data to determine their normality. Pearson's r on all variables revealed their bivariate relationships and served as a preliminary step in detecting multicollinearity between study variables. One-way Analysis of Variance (ANOVA) or t-tests were conducted on most variables to check for significant differences.

I recoded a number of variables and constructed several others. A description of these variables follows as they are introduced into the analysis of each hypothesis.

Hypothesis I: *There is no significant difference in degree completion in the proportion of college students who earn early college credit as League students and those who do not.*

Completion. Completion (DEGR1RCD) is a key independent variable in this research and represents students having fulfilled all of the necessary requirements to receive some type of award. This community college offers several types of awards, and this variable was coded to represent each award type. "Degree" refers to completion of programs designed to typically require two-years of study. They are Associate of Arts (A.A.) and Associate of Sciences (A.S.) degrees to students majoring in General Studies, and Associate of Applied Sciences (A.A.S.) degrees to students majoring in Vocational Technical programs.

"Diplomas" are awarded for fulfilling the requirements of typically one-year Vocational Technical programs. "Certificates" represent completion of Vocational Technical programs designed for less than one year of study.

Although some students received more than one type of award, my analysis selected the highest award. I constructed a dichotomous variable (DEGRLOG) which combined the various student outcomes. I coded completion as '1' for 'completed' and collapsed all other outcomes into the category '0' for 'did not complete.' My purpose was to prepare the data for logistic regression, which requires a categorical level dependent variable.

Testing Hypothesis I, that completion rates between League students and Regular students do not differ significantly, required performing a cross-tabulation to compare the proportion of all League students who completed their programs to the proportion of all Regular students who completed. I then selected from the database only students who completed their programs and performed a cross-tabulation of the variable STATUS (League or Regular) by categories of completion. Cramer's *V* was used to determine statistical significance.

Hypothesis II. *There is no significant difference in the Time To Award between college students who participated in school based dual credit programs while in high school and those who did not.*

Time To Award (TIMETO). This variable is central to testing Hypothesis II, which states that dual credit programs provide no advantage in reducing the length of time taken to complete. TIMETO is thus a temporal measure of student activity until completion, transfer,

or dropout. It represents the time from first enrollment as a regular student to the last date of attendance or completion. Following McCormick (1999), the values this variable takes are in number of months, that is, 30-day increments. Regular students were measured from the first date of attendance. For League students the variable measure was from the matriculation date to the last date, excluding semesters as a League student. Higher values of TIMETO translate into increased time to complete a award; lower values translate into efficient learning.

Matriculation Date (MATRIC). League students in this research experience entry into the community college system at two points. The first is at the high school with their enrollment in dual credit courses. The second is after completing high school and at that point at which they matriculate as Regular college students. I included a separate variable for League students, Matriculation Date (MATRIC), which records the date of matriculation. I used this in calculations such as TIMETO where I wanted to know the duration of time as a regular (matriculated) student. The rationale for this was to determine if there was an ostensible advantage toward maintaining acceleration for students to have participated in dual enrollment.

Cumulative Grade Point Average. CUMGPA is calculated on all attempted college credit courses, including dual credit courses.

Award Type describes academic program by its level of academic award. It has as categories: certificate program (coded '1'), diploma program ('2'), degree program ('3').

Academic Credits Hours Accumulated. CMPLCRED sums all college level credits earned with a passing grade.

Academic Preparation (ACADPR). This constructed variable derives from performance scores on a wide variety of standardized college admissions tests. The college's Computerized Placement Test (CPT) is required of all first-time students unless they present alternative admissions test scores. I obtained scores from ACT, SAT, Iowa Tests of Educational Development (ITED), ASSET, and CPT from a variety of sources. Ten percent of CPT scores were obtained from the college's MIS, ten percent "on-line" from the CPT vendor, 50 % from archived hardcopy files, and 30 % from non-archived electronic files. Using available

concordance tables, I transformed scores into CPT mean scores or ACT composite scores: ASSET was translated into CPT scores, SAT scores into ACT scores, and in a handful of cases, ITED scores were transformed into CPT scores. I then calculated z-statistics to standardize CPT, ACT, and their equivalents' scores, and I reduced them to one variable, ACADPR, which is the mean of the combined z-statistics and a measure of students' academic preparation. It is a continuous-level variable (M = .0191. SD = .9761). Interpret a students' ACADPR score of "1" as being slightly more than one standard deviation above the average, or mean, score; a score of "-1" is slightly less than one standard deviation below the mean. In more familiar terms, the mean for the combined z-statistics (-0.02) is the equivalent to 19 on the Composite ACT score.

Developmental Education. The college's Computerized Placement Test (CPT) is used to detect student need for remediation. All students whose CPT score is below designated "cut scores" are advised, but not required, to enroll in developmental education classes. I created a dichotomous variable, DEVEDLG (labeled ABOVE CPT CUT), to distinguish students whose math or verbal CPT scores qualified them for developmental education classes (coded '0') from those whose scores were above the cut level (coded '1'). A second variable, LOGDEVED (labeled ENROLL DEV ED), was pulled from transcripts to identify students who actually enrolled in developmental education classes (1 = did enroll; 0 = did not enroll).

Parents' Education (PRNTED). These data were obtained from students' responses to demographic questions presented on CPTs. Response categories are 1) grade school or less, 2) some high school, 3) high school diploma or equivalent, 4) business or trade school, 5) some college, 6) associate's degree, 7) bachelor's degree, 8) some graduate or professional school, and 9) graduate or professional school completed. I hand-entered these data into my database because the college does not enter them into its MIS. I then created a new variable to represent parents' highest education level, PRNTED, by selecting the higher of mother's or father's education level or the sole datum when only one parent's education level was presented.

First Generation Student (FRSTGEN) is a dichotomous variable coded '1' for students whose mother and father completed high school or less. When either parent completed more schooling than high school, the variable is coded '0'.

Educational Goals. When applying for Admission to the community college, students are asked to indicate one "Reason for attending" the college. The admission application provides ten response categories that I collapsed into four, which are presented in Table 4.

Table 4. Original Categories of student goals recorded in the student information system and the Collapsed Categories used for the varible Goals in this analysis.

COLLAPSED CATEGORIES	ORIGINAL CATEGORIES
Personal goals	Self improvement/improve basic skills
	Personal interest
	Explore courses to decide on a career
Professional	Prepare to change careers
	Prepare to enter job market
	Meet certification/licensure requirements
	Improve skills for present job
Graduate from community college	Earn degree, diploma, or certificate
Transfer	Transfer to another college/university
Undecided	Undecided

Major Emphasis and Academic Focus. The college divides its curriculum into two categories, 1) Arts and Sciences and 2) Vocational Technical. Based on a student's major program, Major Emphasis identifies which of the two categories that major has been assigned. Academic Focus, on the other hand, is based on actual credits completed. Data for this variable resulted from extracting students' recorded major programs of study from the institutional database and categorizing those into two major areas, Arts and Sciences and Vocational Technical. There were significant differences between the levels of Status ($V = .664$, $p < .001$). Transcript data were used to calculate in which area, Arts and Sciences or Vocational Technical, credit hours were accrued. In some cases the hours accumulated were equal. The relationship between Status, Major Emphasis, and Academic Focus is presented by Status in Table 5.

Table 5. Number and percent of hours accrued in Academic Focus areas by Major and by League and Regular Status.

	LEAGUE			REGULAR		
	Major Program			Major Program		
Arts & Sciences/ Voc Tech Hours Accrued	ARTS & SCI	VOCTECH	Total	ARTS & SCI	VOCTECH	Total
EQUAL HRS	3	9	12	48	36	84
	1.1%	3.2%	2.1%	9.2%	7.6%	8.5%
ARTS & SCI	239	54	293	437	104	541
	85.4%	19.1%	52.0%	84.2%	21.9%	54.5%
VOCTECH	38	220	258	34	334	368
	13.6%	77.7%	45.8%	6.6%	70.5%	37.1%
Total	280	283	563	519	474	993
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

$\underline{V} = .664$; $\underline{p} < .001$

Received Need-Based Financial Aid (RECD FIN AID) was drawn from the financial aid files of the college's MIS database and indicates if students ever received state or federal need-based financial aid. Financial support from scholarships are not considered "need-based," but support by the Job Training Partnership Act is. This variable was coded "0" for no need-based aid and "1" for aid.

Enrollment Intensity. RATACRS (labeled Enrollment Intensity) is the product of total attempted credits while a regular student to the total number of months enrolled as a regular student. This variable is analogous to TIMETO except that its value describes how many credits are earned per 30 day period of regular enrollment.

In his comparative analysis of educational progress of students in different types of institutions, McCormick (1999) measured the pace at which students moved through their programs of study. In his study, the time for students to accumulate credits to reach various thresholds was a proxy for "Enrollment Intensity."

Status x Enrollment Intensity. This interaction term measures the compound effect of Status and Enrollment Intensity. It is the product of STATUS (Regular students = 0, League = 1) and Enrollment Intensity. [1]

[1] For comparison purposes, I also computed a product using Regular equal 1 and League equal 2, which had essentially the same effect in relevant equations.

Hypothesis III. *Personal and organizational background factors do not vary significantly by enrollment status as League or Regular student.*

Socioeconomic Background. I computed students' socioeconomic backgrounds from two variables, PRNTED and total family income. Total family income on 1,017 cases was drawn from the financial aid files of the college's MIS. I removed four outliers and had income data on 64 % of my population. Many cases had data on both family income and parent's education; others had one or the other, while some had none. Since income is a function of education, I used the cases with data both on parent's education and income (n = 635) to calculate the median income of each category of parent's education. I imputed these values into those cases with education but no income data. This method yielded income data on an additional 294, an increase in the proportion of the population with income data to 83 % (n = 1,307). It also increased the number of cases with both parent's education and income data to 929, or 59 %. The bivariate relationship between parent's education and the new income variable is moderate and statistically significant ($r = .235$, $p < .001$).

To create a scale for socioeconomic background from parent's education and income variables, I calculated z-statistics on father's education, mother's education, and the new income variable and reduced them to one variable, SESMEW2. Each student's score on this variable is the mean of the combined z-statistics. This is a continuous-level variable with a population mean of .0045 and standard deviation of .8622. Interpret a student's SESMEW2 value of –1.09 as about 1¼ standard deviations below the mean SESMEW2 of the population, while a score of 2.12 means that, on my socioeconomic scale, the student is between the 95th and 99th percentile. The calculation of SES is often in quartiles or quintiles (cf., Adelman, 1999; Haveman & Wolfe, 1995; Horn, 1998; Warburton et al., 2001), which transforms a potentially continuous variable into categories. For my study, I maintained SES as a continuous variable (cf., Pedahzur, 1982, p. 458).

Hypothesis IV. *The number of semester credits attempted and completed do not significantly vary by enrollment status as League or Regular student.*

Total Attempted Credits measures the credit hours for courses in which students enrolled but from which they were withdrawn prior to last date attended. This variable includes credits for courses in which students enrolled but failed.

Total Completed Credits is the total of all credit hours for the courses in which students enrolled and completed with a passing grade, either a standard letter grade or a Pass (Pass/Fail). Thus cumulative grade point is calculated on Total Attempted Credits which includes courses failed, while Total Completed Credits does not.

Ratio of Completed Credits (CMPLRATO) is the ratio of Total Completed Credits to Total Attempted Credits, and thus a measure of efficiency in completing credits.

Time to 30 Credits. I calculated two variables to measure time to the 30 credit threshold in semesters. CREDSUM1 is a count of the number of semesters during which students were actively enrolled to accumulate 30 credit hours. CREDSUM2 counts the number of semesters to reach 30 credits, less the number of semesters spent as League students. For both variables, the lower the number, the faster the pace at which students progressed, or, the greater the enrollment intensity.

Hypothesis V: *Predictions of cumulative grade point average do not significantly vary by enrollment status as League or Regular student.* Hypothesis V was tested with variables previously described.

Hypothesis VI: *Predictions of completion do not do not significantly vary by enrollment status as League or Regular student.*

Hypothesis VI (and VII) was also tested with previously described variables, with one exception.

Parents' Education x Educational Goals. This interaction term measures the compound effect of Parents' Education, with nine intervals of data, across levels of Educational Goals, with five intervals of data.

Patterns of Analysis

I used a variety of statistical methods as appropriate for the levels of analysis required by the different hypotheses. Generally, analysis of frequencies was conducted on all variables.

Bivariate relationships were examined using cross-tabulations, one-way analysis of variance (ANOVA), and Pearson's r, depending on the level of the data.

In some cases, my analysis relied on graduated students, in most other instances on the total population. For the 30 credit threshold in Hypothesis VI, my analysis included only those students who reached that level. In yet another variation, I was looking for fundamental differences between League and Regular students, both graduates and those who had not.

Multivariate analyses follow the research literature and initial estimates included all variables that other researchers have found as significant predictors. When variables yielded insignificant effects, I reduced the models and re-ran the equations without them. The results of the various equations are presented in tables, but I discuss in the text only the most parsimonious models (those with the fewest number of variables and which most reduced the unexplained variance in the dependent variable, e.g., the largest R^2).

When the dependent and independent variables were continuous level, I used the Ordinary Least Squares (OLS) procedure. With a continuous-level dependent variable and a mixture of continuous and categorical level independent variables, I employed the Linear Regression procedure (Hypotheses II, IV, V, and VI), entering continuous variables together in the first block and dummy variables one block at a time. Significance of dummy variables was indicated by incremental changes in the R^2.

With categorical level dependent variables, I used Logistic Regression. For the tables describing logistic models, I included the unstandardized coefficients for each step of the equation, along with the Odds Ratio (Exp(B)), and, in the final step of the model, the Wald Statistic with its significance. For each step of the equation I also present the Model chi-square and Block chi-square, along with the percentage of total cases correctly predicted (from the Classification Table), and I include the percentage of cases predicted for the League category of the dichotomous variable (an indicator of the model's predictive quality). In addition, I manually calculated Lambda-p (for each step in the equation), a proportionate reduction of error (PRE) statistic not included in SPSS output (Menard, 2001). Similarly, I also calculated Phi-p which describes the predictive efficiency for the total model, and R^2_L, advocated by

Menard (2001) as a preferred indicator of how much in independent variables included reduce variation, or the proportional reduction in the –2LL (the proportionate reduction in the log-likelihood measure).

The discussion and analysis of findings for these seven hypotheses is presented next in Chapter IV.

CHAPTER IV. DISCUSSION AND ANALYSIS

My research is focused on seven hypotheses about the educational attainment and progress of the participants in the League of Schools, a school-based dual credit program offered at Eerewhon Technical College. I have organized this chapter around those seven hypotheses. Within each hypothesis, I noted descriptive variable information and described the statistical tests applied. My analysis alternatively uses all of the cases in my study or appropriate subpopulations, most often graduates, or both.

Chapter III presented the demographics of the study group. Here it is appropriate to describe important subsets of that general population. Graduates/completers' demographics are summarized in Table 6. This includes those students who earned either a certificate, diploma, or degree. Between the League and Regular students there are significant differences in Age, Gender, Location of School District, Academic Preparation, and their subsequent status with regard to remedial education[2]. The differences in gender for graduates, with League students predominantly male and Regular students more evenly balanced, reflect those of all students in the study. Similarly, about one-third of the League graduates are from rural areas, while only one in ten of the Regular students are from rural areas.

Though there is no significant difference in major emphasis (Vocational Technical vs. Arts and Sciences) between League and Regular graduates, 85% of the League students graduated with major programs in the Vocational Technical category, compared with 78% for Regular students. Between the two groups there was no significant difference in GPA, but League graduates scored significantly lower on the Academic Preparation scale (for graduates, $\underline{M} = -.0327$, $\underline{SD} = .9578$). Based on Major Emphasis, the mean GPA for Arts and Sciences graduates ($\underline{M} = .4732$, $\underline{SD} = .913$; $n = 59$) was significantly higher than that of Vocational Technical graduates ($\underline{M} = -1703$, $\underline{SD} = .925$; $n = 217$; $\underline{F}(1,274) = 22.574$, $\underline{p} < .001$). Though only 12% of the graduates enrolled in remedial courses, just over half (51.3%) scored

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[2] In general College literature refers to Developmental Classes or Developmental Education. I have used the term "remedial" here because it reflects usage in much of the current research.

below the cut points on either the math or the verbal assessment tests. Students who earned at least 30 credits are a subset of this, and the table with their demographic characteristics appears with the discussion of Hypothesis VI.

Table 6. Number and percentage distribution for selected background characteristics by Regular and League Status.

Graduated Students	League	Regular	Total	
	81	229	310	
	26%	*74%*	*100%*	
Mean Age at Start	17.42	18.33	18.09	$F = 151.528$, $p < .001$
Mean Age at Matriculation	18.53	18.33	18.38	$F = 10.099$, $p = .002$
Sex				
Male	62	108	170	$V = .259$, $p < .001$
	76.5%	*47.2%*	*55%*	
Female	19	121	140	
	23.5%	52.8%	45%	
Metro	51	209	260	$V = .338$, $p < .001$
	63%	*91.3%*	*83.9%*	
Rural	30	20	50	
	37%	*8.7%*	*16.1%*	
Mean GPA	2.94	3.06	3.03	
Mean GPA while League	3.03			
Total Family Income	$42,473	$46,869	$45,693	
First Generation	23	54	77	
	48.9%	*40.0%*	*42.3%*	
Major Emphasis (Arts & Sci.)	12	55	67	
	14.8%	*24%*	*21.6%*	
Major Emphasis (VT)	69	174	243	
	85.2%	*76%*	*78.4%*	
Academic Preparation	-.2658	.0543	-.0327	$F = 6.216$, $p = .013$
Received Financial Aid	54	150	204	
	66.7%	*65.5%*	*65.8%*	
Remediation Recommended Verbal CPT	27	47	74	$V = .138$, $p = .027$
	39.1%	*25.0%*	*28.8%*	
Remediation Recommended Math CPT	36	87	123	
	65.5%	*54.5%*	*57.2%*	
Remediation Recommended Verbal or Math CPT	44	98	142	
	58.7%	*48.5%*	*51.3%*	
Enrolled in Developmental Ed	10	26	36	
	12.3%	*11.4%*	*11.6%*	

RESULTS

Hypothesis I: Degree Completion

Hypothesis I: There is no significant difference in the rates of degree completion between college students who earn early college credit as high school students and those who do not.

I used a series of cross tabulations to test this hypothesis. First I tested the difference in completion rates by Status. As explained previously, completion categories tracked in this database include certificate, diploma, associate degree, and bachelor's degree.[3] The cross tabulation revealed that a significant relationship exists between student status and completion. Overall, a higher proportion of Regular students (22.7%) completed than did League students (14.3%), and the relationship was statistically significant ($\underline{V} = .102$, $\underline{p} < .001$). The hypothetical assertion that there is no difference is rejected.

Table 7. Number and percentage distribution of awards earned by Status.

		STATUS		Total
		Matriculated League	Regular	
DEGREE TYPE	certificate	3	1	4
		3.7%	.4%	1.3%
	diploma	38	63	101
		46.9%	27.5%	32.6%
	associate	39	148	187
		48.1%	64.6%	60.3%
	bachelor	1	17	18
		1.2%	7.4%	5.8%
Total		81	229	310
		100.0%	100.0%	100.0%

$\underline{V} = .244$, $\underline{p} < .001$

Additionally, the analysis indicates that the type of degree earned by each group also varies significantly. Within both groups, more students earned Vocational Technical degrees (diplomas, certificates, and A.A.S. degrees) than Arts and Sciences degrees. League students particularly favored this emphasis. A slightly higher percentage of League graduates (85.2%)

[3] Bachelor's degree was recorded for students in the database where that information is reported back to Erewhon by transfer institutions, and only for those students who had matriculated at the community college and then transferred.

than Regular graduates (76.0%) ($\underline{V}$ = .098, $\underline{p}$ = .084) enrolled in a Vocational Technical emphasis. Of all completers, only 28.4% were League students.

This may reflect the traditional emphasis placed on college credit Vocational Technical programs in high schools, particularly in rural areas, and League students may continue this course of study after their matriculation to the college. But Rural League students are no more likely than Metro League students to complete Vocational Technical degrees (80.0% compared to 88.2%). And even after matriculation, fewer League than Regular students continued their Vocational Technical programs to the highest level of award. A significantly higher proportion League completers received diplomas (46.99%), while 64.9% of Regular Vocational Technical students completed Associates degrees, ($\underline{V}$ = .246, $\underline{p}$ = .002).

Given the Vocational Technical preference among League students, it is not surprising that 76.5% of League completers were male. But that line of reasoning fails upon discovery that the distribution of gender among Regular completers, who also prefer Vocational Technical majors, is more equally divided (males, 47.2%; females, 52.8%).

Since the types of degrees completed by most League students require fewer credit hours than do the types of degrees completed by Regular students, it is reasonable to expect that League students complete their degrees more quickly. Hypothesis II tests this expectation.

Hypothesis II. Time To Award

Hypothesis II. There is no significant difference in Time To Award between college students who participated in dual credit programs while in high school and those who did not.

In colleges, educational "time" is normally measured in semesters or quarters, and quarters and semesters are measured in the amount of time a student spends in the classroom, usually in terms of hours, weeks, or months. Though ambiguous at best, time is more easily defined than "learning." Thus the dependent variable in this analysis is TIMETO, a constructed variable measuring months to graduation for Regular students from their first date of attendance, and for League students from their matriculation date.

I initially examined the relationship between STATUS (Regular, League) and TIMETO by conducting a one-way analysis of variance. For Regular vs. League students, the test of difference for TIMETO was significant (F (1, 308) = 8.212, p = .004) [with a small effect size (η^2 = .026)]. League students spent less time earning an award (M = 24.6, SD = 10.369) on the average than did Regular students (M = 29.47, SD = 13.977). For League students, the minimum was 7 months, the maximum 48; for Regular the minimum was 4 months, the maximum 84. The error bar in Figure 7 displays the means for each group of students. For League students who graduated, Time to Award (TIMETO) was significantly accelerated and the null hypotheses is rejected.

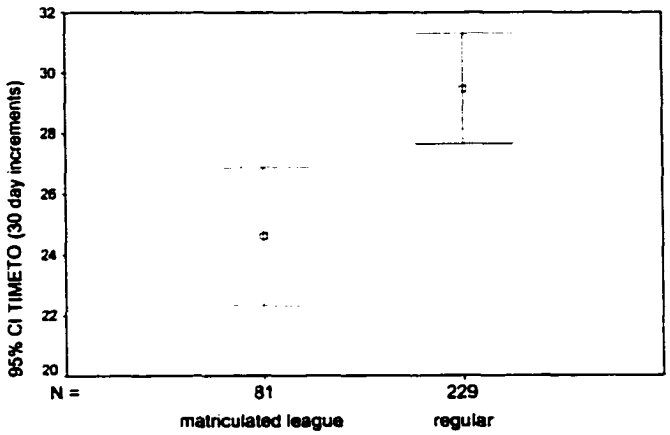

Figure 7. Mean Time to Award for Regular and League Students.

Controlling for Award Type and looking only at students who earned diplomas (n = 101), the mean Time to Award for League students (M = 19.34, SD = 9.477) was significantly less than that of Regular students (M = 26.3, SD = 14.99) (F (1,99) = 6.591, p = .012). However, for students who earned degrees (n = 187) there was no significant difference in the means of the study and control groups (League M = 29.26, SD = 8.584; Regular M = 30.35, SD = 12.072). So, for those who earned diplomas, the null hypothesis is rejected; but for those who earned degrees, there is no difference.

With differences in TIMETO for League and Regular students confirmed, I regressed TIMETO against multiple predictors in an Ordinary Least Squares (OLS) equation. For this discussion, I divided the predictors into two categories: demographic and academic. Descriptive statistics are presented in Table 8.

Table 8. Descriptive Statistics for independent variables entered in OLS regression equation predicting Time to Award with cases selected for graduates.

	N	Minimum	Maximum	Mean	Std. Deviation
TIMETO	310	4	84	28.20	13.288
GPA	310	1.48	4.00	3.0261	.54415
ACADPR	276	-2.09	2.34	-.0327	.95783
ENROLL INTENSITY	310	.18	7.24	2.5499	.93450
SES	288	-2.23	3.50	-.0930	.81532
DUMLEAG	310	.00	1.00	.2613	.44005
Goals					
DUMPROF	310	.00	1.00	.0484	.21493
DUMGRAD	310	.00	1.00	.6581	.47513
DUMTRANS	310	.00	1.00	.1677	.37424
DUMUNDE	310	.00	1.00	.0677	.25171
Award Type					
AWARD EQ DEGREE	310	.00	3.00	2.1387	1.35942
AWARD EQ DIPLOMA	310	.00	2.00	.4968	.86555
AWARD EQ CERTIFICATE	310	.00	1.00	.0387	.19321
Major Emphasis (DUM TECH)	310	.00	1.00	.7839	.41227
RECD FIN AID	310	.00	1.00	.6581	.47513
FIRST GENERATION STUDENT	182	.00	1.00	.4231	.49541
ENROLL DEV ED	310	0	1	.12	.321
ABOVE CPT CUT	207	.00	1.00	.3140	.46525
DUMMY FEMALE	310	.00	1.00	.4516	.49846
Valid N (listwise)	162				

Though I selected predictor variables based on an extensive body of research about educational progress and attainment, my choices were guarded because much of that evidence is based on investigations of students at four-year institutions, not on the "largely ignored student constituency" of the community college (Pascarella, 1999, p. 13). Demographic variables included Socioeconomic Status (SES), Gender, First Generation Student (FRSTGEN), Age At Matriculation, Receipt Of Need-Based Financial Aid, and Attendance Center (categorized as Rural or Metro). Except for the last, these are common demographic variables used to control analyses of academic achievement, persistence, and progress. I looked for an effect of attendance center, expecting that students who live in a rural area might have less access to classes, and thus a longer time to completion than a metro student.

In my study, SES is an additive variable that combines parent education and total family income. I substituted the dichotomous variable RECD FIN AID (1 = Received Need-based Aid) for SES. In some instances, this seemed appropriate because negative factors, such as economic hardship, such as a large family or debt, mitigate the otherwise positive influence of income and education embodied in SES. Similarly, first generation status was a proxy for Parents' Education.

Academic variables included Academic Preparation (ACADPR); GPA at the college (a proxy for academic success/academic integration); Award Type, which describes the length or level for each student's declared major; Major Emphasis, that is, Vocational Technical or Arts and Sciences; Educational Goals; two variables that measure need for and enrollment in remedial courses (Above CPT CUT = 1, 0 = Remedial Classes Recommended; ENROLL DEV ED, 0 = not enrolled, 1 = enrolled), Enrollment Intensity, and STATUS (League or Regular). Academic Focus (VOTEC DUMMY, 1 = Technical) defines whether the major is classified as Vocational Technical; the reference category was Arts and Sciences (DUMAS). Historically, technical programs at Erewhon have required more time in class or lab, thus a commonly held assumption is that Technical students progress more rapidly than do Arts and Sciences students and are more likely to complete a program.

In sum, I entered fifteen predictor variables into the equation, sometimes testing individual variables in earlier more comprehensive models, and testing them again in later reduced models. Generally, continuous variables were entered together in block 1 of a model, and categorical variables were entered in successive separate blocks. While this is a standard practice in regression to isolate the effect of dummy variables, I found it helpful in the reduced models for isolating the unique effect of continuous variables as well.

In Table 9, I present the final blocks of three separate models/equations. The Graduate Model (1) is the final step for an equation selecting just graduated students (N = 310).

Table 9. OLS regression models predicting Time To Award for all graduates, graduates with degrees, and graduates with diplomas.

	All Graduates (N = 310)	Graduates w/Degree (N = 187)	Graduates w/Diploma (N = 101)
(Constant)	45.742***	62.095***	64.195***
	5.120	4.335	5.432
GPA	-0.683[a]	1.348	-2.168
	1.134	1.370	1.664
	-0.032	0.056	-0.092
ACADPR	0.748	-0.759	3.558***
	0.879	0.761	1.026
	0.059	-0.060	0.243
ENROLL INTENSITY	-11.353***	-14.660***	-11.855***
	0.832	0.926	1.045
	-0.804	-0.902	-0.817
SES	0.246	-0.810	
	1.096	1.127	
	0.015	-0.050	
AWARD TYPE	4.497***		
	1.061		
	0.224		
DUMMY FEMALE	-0.783	0.708	-3.691
	1.256	1.302	2.162
	-0.034	0.031	-0.142
DUMLEAG	-1.069	0.279	-2.083
	1.406	1.465	1.998
	-0.041	0.010	-0.077
DUMPERS	0.813		
	3.760		
	0.012		
DUMPROF	-0.695		
	2.990		
	-0.014		
DUMGRAD	0.861		
	2.013		
	0.035		
DUMTRANS	-2.301		
	2.439		
	-0.072		
ABOVE CPT CUT	0.077		
	1.600		
	0.003		
DUM TECH	-0.207	1.337	
	1.819	1.510	
	-0.008	0.053	
Recd Fin Aid	1.912	1.836	
	1.153	1.296	
	0.082	0.073	
First Generation Student	0.320	0.939	-3.443
	1.498	1.477	1.852
	0.014	0.041	-0.129
Enroll Dev Ed	4.224*	0.344	6.812*
	1.640	1.950	2.582
	0.137	0.010	0.196
R Square	0.677	0.773	0.803
Adj. R^2	0.641	0.750	0.773

[a] B, Std. Error, Beta *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$

The first column of Table 9 presents results for all graduates. Of the three significant variables (Enrollment Intensity, Award Type, and Enrollment in Developmental Education), only Enrollment Intensity decreased Time To Award, as I expected it should, while Enroll Dev Ed and Award Type increased Time To Award (with positive coefficients).

The significance of Award Type, moreover, raised several issues. The intervals of the variable were inappropriate for comparisons because each identified different lengths of Time to Award. Thus, while they might be highly associated with the dependent variable, their effects should be viewed cautiously.

Selecting on levels of Award Type, then, I re-entered the equation for graduates who earned a degree. Table 9 presents the final iteration of that model (Graduates w/Degree), finding that for those students who earned a degree only one variable (Enrollment Intensity) was significantly associated with Time To Award (an Associate Degree, $n = 187$), while Enrolling In Developmental Education was not. The final model of Table 9 contains the results for Graduates with Diplomas. Selecting on students who earned diplomas required entering the variables in successive equations to allow for reduced numbers ($n = 101$). Enrollment in remedial courses had a significant positive coefficient ($\underline{b} = 6.812$, $\underline{p} < .05$); thus enrolling in remedial courses adds almost seven months of time before earning a diploma, typically a one-year major. Academic Preparation also became significant in the Diploma model, displaying a positive coefficient, inferring somewhat obtusely that higher scores in Academic Preparation are associated with increased Time to Award for graduates who earn a diploma.

The insignificant effect of STATUS on Time to Award in all of the estimations (DUMLEAG) seemed counterintuitive. To investigate the relationship further, I conducted additional analyses. First I ran separate simple linear regression equations with TIMETO as the dependent variable and Enrollment Intensity, the persistently significant predictor, as the independent variable, for only League students and only Regular students.

Enrollment Intensity (RATATCRS) was a better predictor for Regular than for League. Each additional credit hour attempted per month reduced their Time to Award by more than

15 months (b = -.15.427, p < .001, SE = .675). An attempted credit hour for League students, however, shortened their Time to Award by about nine months (b = -8.897, p < .001, SE .937).

Next, I regressed TIMETO against Enrollment Intensity and STATUS (DUMLEAG), selecting only Degree graduates and then only Diploma graduates. In the third iteration of each, I added an interaction term, the product of STATUS and Enrollment Intensity.

Table 10 displays the results. For both Degree and Diploma graduates in the additive model Enrollment Intensity had a significant net effect on Time to Award, but when the interaction term was added to the equation, the significance of Enrollment Intensity was dramatically reduced and the effects of STATUS and the interaction term became strong, both in size and statistical significance. Clearly the effect of Enrollment Intensity on Time to Award worked differently for Regular students than for League.

Table 10. OLS regression models with interaction term Status X Enrollment Intensity predicting Time to Award for graduates with a degree and graduates with a diploma.

Coefficients	Degree Model			Diploma Model		
Block	1	2	3	1	2	3
(Constant)	66.724***	66.667***	71.213***	48.763***	48.818***	61.585***
	1.649	1.656	1.788	2.163	2.173	2.497
ENROLL INTENSITY	-13.690[a]***	-13.711***	-2.367	-9.665***	-9.547***	4.003*
	0.596	0.598	2.284	0.768	0.802	1.987
	-0.861	-0.862	-0.149	-0.785	-0.775	0.325
DUMLEAG		0.537	-17.329***		-0.958	-25.882***
		1.054	3.624		1.815	3.755
		0.019	-0.618		-0.034	-0.928
STSXENRO			-6.530***			-9.481***
			1.274			1.314
			-0.941			-1.263
R^2	0.741	0.741	0.773	0.616	0.617	0.750
Adj. R^2	0.739	0.738	0.770	0.612	0.609	0.743

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

In both models in Table 10, the coefficient for Enrollment Intensity was constant in strength and significance through two iterations of the equation; however, with the addition of the interaction term (STSXENRO), the coefficient for Enrollment Intensity declined in significance from p < .001 to p < .05 in the Diploma Model, while the coefficient declines from b = -9.547 in Block 2 to b = 4.003 in Block 3. Figure 8 graphically displays the interaction between Enrollment Intensity and TIMETO over the different levels of STATUS.

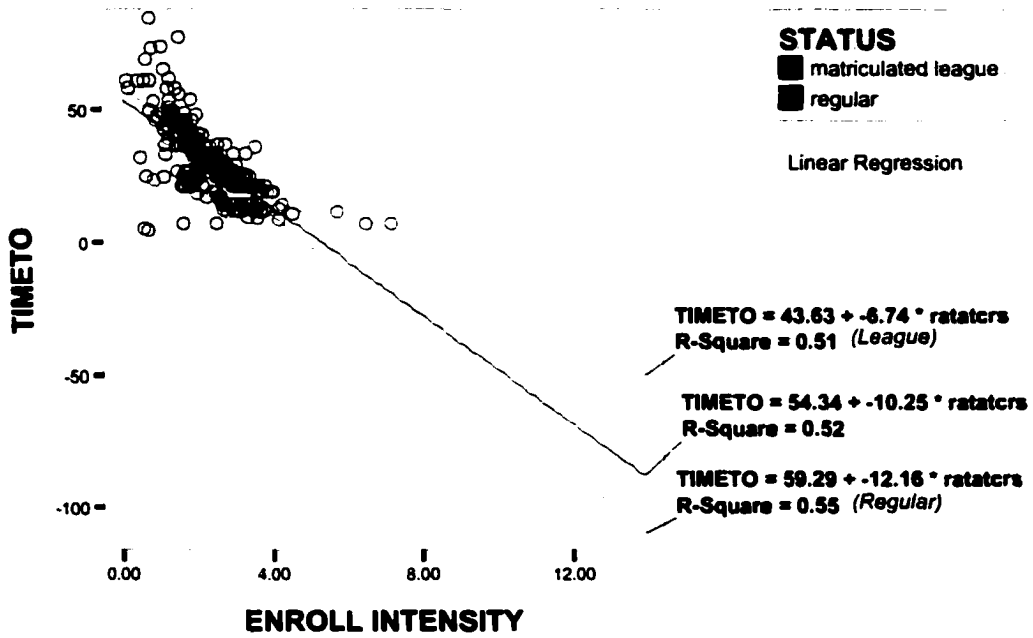

Figure 8. Scatterplot displaying Enrollment Intensity regressed on TIMETO across levels of STATUS.

Time to Award, then, was influenced not just separately by Enrollment Intensity, that is, completing credits in a consistent and efficient manner, but by factors that interact with Enrollment Intensity, notably Status, controlling for the type of award which prescribes temporal parameters. These are more potent influences than are Academic Preparation, financial condition, parents' education, SES, overcoming educational deficits (developmental education), or gender.

Hypothesis III. Factors Predicting Status

Hypothesis III. Personal and organizational background factors do not vary significantly by enrollment status as League or Regular student.

I tested the effect of several background variables on students' participation in dual-credit programs, or STATUS (0 = Regular; 1 = Matriculated League). My independent

variables are: Race (white = 1; other = 0); Sex (SEXCAT, Male = 1;Female = 0, reference category); Attendance Center (LOCATION, Metro = 1, Rural = 0, reference category); level of Academic Preparation (ACADPR, range = -2.49 to 3.06); students' stated Goals (GOALCAT, Personal Goals = 1, Professional Goals = 2, Graduate from WITCC = 3, Transfer = 4, and Undecided = the reference category), Received Need-Based Aid (RECD FIN AID, 1 = No Need-based Aid, 0 = received need-based financial aid), and Socioeconomic Status (SES). Summary statistics for these variables are displayed in Table 11.

Table 11. Descriptives for pre-college attributes entered as predictors of STATUS in a logistic regression equation.

Continuous Variables	N		Missing	Mean	Median	Std. Deviation	Minimum	Maximum
ACADPR		1251	324	-0.019	-0.049	0.976	-2.494	3.065
SES		1307	268	0.004	-0.105	0.862	-2.231	4.705
Categorical Variables			**Frequency**	**Valid Percent**				
GOALCAT	Personal Goals		150	10.04				
	Professional Goals		102	6.83				
	Graduate From WITCC		601	40.23				
	Transfer		442	29.59				
	Undecided		199	13.32				
	Total		1494	100.00				
RACE	White		1389	95.53				
	Other		65	4.47				
	Total		1454	100.00				
	System Missing		121					
First Generation Student	First Generation HS Or Less		319	34.34				
	Total		929	100.00				
RECD FIN AID	Recd Fin Aid		710	45.08				
	Total		1575	100.00				
LOCATION	Metro		1296	82.29				
(Attendance Center)	Rural		279	17.71				
Sex	Male		766	48.63				
	Female		809	51.37				

I used logistic regression to model the relationships between the variables of interest. Of the 1,575 cases in my study, 1,494 were used in this analysis (indicator coding for dummy variables). I entered the variables using block entry, with the ordinals in the first block; thus five equations were estimated in the initial run. The significance levels of SES (Socioeconomic

Status), Academic Preparation (the two ordinals), and RACE prompted their removal from the final model. The results are presented in Table 12.

Goals were included because the response data are intrinsically interesting and because League student responses differed from those of Regular students. Although I assumed that students had identified an education goal prior to enrollment, I am uncertain about when those goals were recorded for League students. Over the course of the seven cohorts, it appeared that some goals had been recorded at first enrollment while others were recorded when the League students matriculated from dual to a regular status.

Table 12. Logistic model for pre-collegiate predictors of STATUS.

	Dependent Variable: Status (League =1, Regular = 0)									
	Block 1		Block 2		Block 3		Block 4			
	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	Wald	Sig.
Constant	-0.880	0.415	0.428	1.534	1.5210	4.5770	1.3110	3.7100	33.7349	0.0000
FNAIDLOG	0.613	1.845	0.639	1.895	0.4201	1.5221	0.3886	1.4749	9.3132	0.0023
Location: Metro			-1.615	0.199	-1.5829	0.2054	-1.6343	0.1951	100.0050	0.0000
GOALS									164.9511	0.0000
Goals: Personal					0.7076	2.0292	0.6998	2.0133	7.5829	0.0059
Goals: Professional					-0.6895	0.5018	-0.7455	0.4745	8.1502	0.0043
Goals: Graduate					-1.6949	0.1836	-1.7291	0.1774	84.5721	0.0000
Goals: Transfer					-1.2830	0.2772	-1.2484	0.2870	44.2977	0.0000
Sex: Male							0.5447	1.7242	19.2285	0.0000
Model Chi-Square [df]	31.7[1]		157.071[2]		343.611[6]		363.103[7]			
Block Chi-Square [df]			125.371[1]		186.540[4]		19.941 [1]			
p	0.000		0.000		0.000		0.000			
Prediction: League % Correct	0.00%		31.40%		50.80%		56.30%			
Prediction: Total % Correct	63.10%		69.30%		73.40%		74.80%			
Proportional Change in Error	0.00%		16.88%		27.95%		31.58%			

*The Wald statistics (with significance levels) from the final block indicate relative effect of the variables.

Received Need-based Aid (RECD FIN AID) also represents a pre-enrollment condition. Though it seems reasonable to associate SES and qualifying for need-based aid, SES was a more complex construct with standardized scores, while Received Need-Based Aid was limited to income and family characteristics, and it was categorical (Yes, No). More importantly, the variable RECD FIN AID did have a significant effect on STATUS in preliminary iterations of the equation (not displayed here), while the composite SES did not.

Each block of the model after Block 1 increased the efficiency of predicting STATUS and the combined (Block 4) effect is *moderately* strong (λ_p = .32).[4] The model in Block 4 resulted in a reduced error in predicting STATUS by 32%. Other PRE measures showed similar improvements. Phi-p for Block 4 showed a reduction (ϕ_p = .44), while for the R^2_L, the proportional reduction in –2LL (-2 Log-Likelihood) was .184.

In Block 1, RECD FIN AID produced a modest improvement in the Odds Ratio, but it did not improve the prediction error. That is, Block 1 with RECD FIN AID allowed me to predict 63% of the cases correctly (λ_p = .17), but those cases were exclusively Regular students and none of the League cases were predicted correctly. RECD FIN AID in Block 1 suggested that a student who did not qualify for financial aid had an Odds Ratio (the odds of being a League student divided by the Odds of being a Regular student) of 1.845 of being a League student. The negative coefficient of the variable Location (Block 2) tells us that if a student were from a metropolitan area, the predicted STATUS would be Regular; conversely, a rural student was more than five times as likely to have League Status. Goals had the largest effect and thus provided the best predictors; however, only "Personal" and "Undecided" resulted in a positive improvement in the Odds Ratio, while "Professional," "Graduate," and "Transfer" Goals decreased the likelihood that a student would be a League participant. Students who listed the latter would most likely be Regular students.

The Blocks indicate a ranking of effects in this order: Goals, Location, Sex, and, lastly, Financial Need. Within Goals, a student response of "Personal" or "Undecided" (the reference category) improved the Odds Ratio and the ability of the model to predict League Status, though both were marginally significant, while "Professional," "Graduate," and "Transfer" result in decreases in the Odds Ratio. The addition of Location in Block 2 increased the percent of correct predictions (69%), the ability to predict League STATUS correctly (31%), and a reduction in error (17%); further, the addition of Goals in Block 3 increased the percent of correct predictions (73%), the ability to predict League STATUS correctly (51%), and a

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[4] Lambda-p is the ratio of (errors without the model – errors with the model) to errors without the model, a statistic that represents proportional reduction of error (PRE).

reduction in error (28%). If a student came from a rural area, was male, and enrolled for Personal Goals or was Undecided about goals, he was more likely to be enrolled in League classes. In sum, because the equation was able to predict STATUS, the null hypothesis that there is no difference in background between Regular and League students is rejected.

Hypothesis IV. The Number Of Attempted And Completed Credits

Hypothesis IV. The number of attempted and completed credits do not significantly vary by enrollment status as League or Regular student.

Since credit accumulation is a criterion for all levels of completion (certificate through degree), I gathered data for the Total Attempted Credits (TOT ATT CREDS) and the Total Completed Credits (TOT COMPL CREDS). My first test of the relationship of each of the two variables by STATUS employed a one-way analysis of variance. Including all students (N = 1,575) in the analysis, League students, on the average, attempted fewer credits (M = 30.42, SD = 21.102) than Regular students (M = 34.16, SD = 25.159). In addition, League students completed fewer credits (M = 28.23, SD = 21.404) than Regular students (M = 31.707, SD = 25.896). The results of the ANOVA showed significant difference between the two groups in credits attempted (F = 8.980 (1, 1573), p = .003), as well as a significant difference in completed credits (F = 7.383 (1, 1573), p = .007).

Selecting students by Award Type revealed a significant difference in the completed credits only for students in degree programs. The mean for League students (M = 28.2591, SD = 22.406) was significantly less than the mean for Regular students (M = 32.3665, SD = 26.533; F (1, 1290) = 7.685, p = .006). Similarly, the means for attempted credits were also significantly different (League M = 30.56, SD = 22.123; Regular M = 34.85, SD = 25.752; F (1, 1290) = 8.825, p = .003).

Selecting only the cases of those students who graduated (N = 310), I again used a one-way analysis of variance to the test that same relationship. Selecting only graduated students, as expected, raised the average of attempted credits for League students while lowering the standard deviation (M = 61.47, SD = 17.78); my analysis produced a similar result for Regular

students (M = 63.51, SD = 18.084). That pattern continued in total completed credits, where League students completed fewer credits (M = 60.74, SD = 18.479) than did Regular students (M = 62.77, SD = 18.108). The differences in attempted and completed credits for students who graduated, however, were not significant.

I extended the analysis by computing a new variable to show the ratio of completed credits to attempted credits. Using the entire population (N = 1,575), the Completed:Attempted Ratio (CMPLRATO) for League students (M = .9067, SD = .1878) was significantly different from that of Regular students (M = .8603, SD = .2751) (F (1,1573) = 12.832, $p < .001$). When only graduates were selected, the mean for League graduates (M = .9944, SD = .0168) was slightly lower than that of Regular students who graduated (M = .9890, SD = .0469), but the difference was not significant. I recomputed the variable selecting on students who earned more than 10 credits (cf. Adelman, 1999,p. 79), but the change was minimal and did not affect the previous analysis.

Overall, League students attempted and completed fewer credits than regular students. This was a consistent finding if I selected on categories of Award Type or on graduates. Within any of these contexts, the null hypothesis is rejected.

Next, I tested several predictors against total completed credits in an ordinary least squares (OLS) regression equation. Using all students, nine variables explain 46% (R^2) of the variation in the dependent variable Total Completed Credits. The variables entered in the original equation included Academic Preparation (ACADPR), socioeconomic status (SES), grade point average (GPA), and Enrollment Intensity. I also entered a series of dummy variables to represent the following categories: Gender (Female the reference category), League STATUS, Educational Goals (Undecided the reference category), Qualifying For Developmental Education (ABOVE CPT CUT), Award Type (Certificate the reference category), Received Financial Aid (RECD FIN AID), and Major Emphasis (Vocational Technical the reference category).

Table 13 displays the results of six regression equations to emphasize the differences between graduates and all students, with Total Completed Credits the dependent variable in all cases.

The effects of Academic Preparation and Gender were not significant in either model. Variables with insignificant net effects were dropped from subsequent models. Four examples of variables that contributed to the effects of the first equation (all students, N = 1,575) but were removed from the equations for graduated students (N = 310) include: Grade Point Average, First Generation Student, League STATUS, And Socioeconomic Status. In the first equation being a First Generation Student translates into an increase of credits earned (about 4), as did STATUS as a Regular student. Although an increase in socioeconomic status also equates to more credits earned, Receiving Financial Aid results in almost an 8 unit increase in completed credits. Both Award Type and Education Goals have small but significant associations with the dependent variable. Educational Goals accounted for a small change in the $\underline{R}^2 = .03$ ($\underline{F}$ (4, 920) = 11.495, $\underline{p} < .001$), while for Award Type the change in $\underline{R}^2 = .007$ ($\underline{F}$ (4, 915) = 5.618, $\underline{p} = .004$). In the second equation for graduated students, I removed educational goals but the contribution and effect of Award Type increased, with the change in $\underline{R}^2 = .288$ ($\underline{F}$ (2, 271) = 57.357, $\underline{p} < .001$).

For all students, GPA had the strongest significant effect on Completed Credits, net the other variables in the model. Each one-point increase in GPA predicted an increase of 11 Completed Credits. Compared to Vocational Technical students, Arts and Sciences students completed 8 fewer credits. The unique effect of Enrollment Intensity was also statistically significant; an increase of one credit per month was associated with an increase in Total Completed Credits of about 8 credits. Other significant variables were Received Financial Aid and Degree Award Type. Altogether, the reduced model (equation 2) explained 45% of the variance of the dependent variable.

Table 13. OLS regression models for all students and for graduates predicting Total Completed Credits reported through the final iteration of consecutive equations.

Model	All Students		Graduates Model			
	1	2	1	2	3	4
(Constant)	-20.475***	-21.793***	37.467***	40.020***	50.633***	54.146***
	3.829	3.706	9.438	6.367	4.870	4.327
GPA	11.343***	10.662***	0.232			
	0.699	0.658	2.250			
	0.438	0.414	0.007			
ENROLL INTENSITY	7.435***	7.922***	3.035*	3.045*	1.549	
	0.646	0.615	1.460	1.386	0.995	
	0.314	0.338	0.146	0.147	0.079	
SES	3.600**	3.568**	1.071	0.959		
	1.169	1.140	2.138	2.086		
	0.104	0.103	0.043	0.039		
ACADPR	0.103		1.882	1.849	1.494	1.514
	0.743		1.312	1.233	0.885	0.888
	0.004		0.104	0.102	0.085	0.086
DUMLEAG	-4.108**	-3.570**	1.945	0.791		
	1.407	1.370	2.644	2.469		
	-0.081	-0.070	0.050	0.020		
DUMPERS	-4.787	-3.039	-8.052			
	2.521	2.436	7.498			
	-0.059	-0.038	-0.078			
DUMPROF	-0.179	1.957	1.806			
	2.857	2.771	5.757			
	-0.002	0.021	0.025			
DUMGRAD	4.932**	5.892**	1.594			
	2.011	1.961	3.952			
	0.099	0.118	0.044			
DUMTRANS	1.019	1.163	1.535			
	2.077	1.993	4.670			
	0.018	0.021	0.033			
Recd Fin Aid	6.948***	7.593***	5.707*	5.746*	3.643*	3.986*
	1.343	1.307	2.265	2.226	1.731	1.721
	0.142	0.155	0.161	0.162	0.101	0.111
AWARD EQ DEGREE	4.149***	4.302***	6.268***	6.175***	4.660***	4.866***
	0.931	0.920	1.804	1.779	1.423	1.421
	0.195	0.201	0.491	0.484	0.369	0.386
AWARD EQ DIPLOMA	3.199*	3.124*	-1.229	-1.439	-5.113*	-4.874*
	1.551	1.536	2.792	2.748	2.217	2.217
	0.085	0.083	-0.060	-0.071	-0.257	-0.245
DUM A+S	-7.599***	-8.170***	-8.800**	-8.658**	-9.924***	-11.021***
	1.601	1.539	3.248	3.018	2.255	2.147
	-0.155	-0.167	-0.220	-0.216	-0.241	-0.267
First Generation Student	3.776*	3.791*	3.524	3.089		
	1.691	1.651	2.870	2.777		
	0.074	0.074	0.102	0.090		
Enroll Dev Ed	2.791	3.369*	7.862*	8.043**	8.390***	8.076**
	1.565	1.446	3.164	3.105	2.539	2.537
	0.050	0.059	0.166	0.170	0.163	0.157
dummy male	0.209					
	1.308					
	0.004					
R2	0.462	0.454	0.392	0.384	0.401	0.395
Adj. R^2	0.452	0.445	0.335	0.346	0.385	0.382

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

Of these, only the Arts and Sciences Emphasis and Award Type Degree persisted in significance for graduates, with the Arts and Sciences emphasis having the strongest net

effect. Enrolling in Developmental Education (remedial coursework) also has a significant effect on Completed Credits.

When graduated students (Graduates Model) were selected for analysis of Completed Credits in an OLS equation, percent of variation of the model explained ($R^2 = .395$) after chance decreases when compared to the model for all of the participants ($R^2 = .454$); this model also included fewer variables, five compared to the ten of the first equation. The most significant variable in this model was Award Type which predicted significantly better than other variables in the model, R^2 change = .288, F (2,271) = 57.357, $p < .001$). Since it was consistent with other equations that selected on graduated students, the strength of this association did not surprise me. While GPA influenced the variable TIMETO with graduated students selected, that influence dissipated in this equation. On the other hand, Academic Focus emerged with the second strongest beta (-.267), though both contributed almost equally to the explanation of the variance. Enrollment Intensity, surprisingly, declined in significance through the iterations of the Graduates Model, while the significance of Major Emphasis (represented by DUM A+S) continued to increase as variables were eliminated to improve the model. Note the R^2 change = .052, F (1, 270) = 22.578, $p < .001$). In effect, the negative beta weight (-.267) told me that selecting a 1) Vocational Technical major 2) that leads to a degree were more influential characteristics in completing credits at this college. Finally, the effect of Financial Aid did not surprise me, nor did the effect of Developmental Education, with a positive coefficient ($b = 8.067$) and a slight but significant contribution to the R^2 change (.023, F (1, 269) = 10.132, $p = .002$). My preliminary explanation is that though a smaller percent of graduates compared to nongraduates enrolled in developmental courses, that the 12% of graduates who enrolled in developmental education completed 8 credits more than other students who graduated.

Across both models, variables that contributed positively to the completion of credit were the Award Type Degree, a vocationally oriented major (the negative coefficient of DUM A+S), Enrolling in Developmental Education, and Receipt of Need-based Aid. For graduates, the coefficient for ENROLL DEV ED more than doubled, while that of RECD FIN AID was

about half that for all students. At the same time, several variables with significant effect in the equation for all students (GPA, Enrollment Intensity, SES, STATUS, and First Generation Student) were not significant in the equation for graduates.

Hypothesis V: Cumulative Grade Point Average

Hypothesis V: Cumulative grade point average does not significantly vary by enrollment status as League or Regular student.

Grade point average is a proxy for academic integration (Pascarella & Terenzini, 1991), suggesting a successful adjustment to a particular college, along with its culture and expectations. Commonly studied variables that affect grades include personal attributes, such as personal motivation, organization, and study habits; as such, GPA reflects acquired skills, work habits and attitudes. Other influences come from the college, through instruction, and services that provide advising, counseling, remedial, or support programs. Much of the effect has been measured during the first year, especially that of developmental programs. Finally, other factors that have been shown to have a positive effect on GPA are precollege aspirations (here educational goals), high school achievement, and academic ability (here Academic Preparation), and social status.

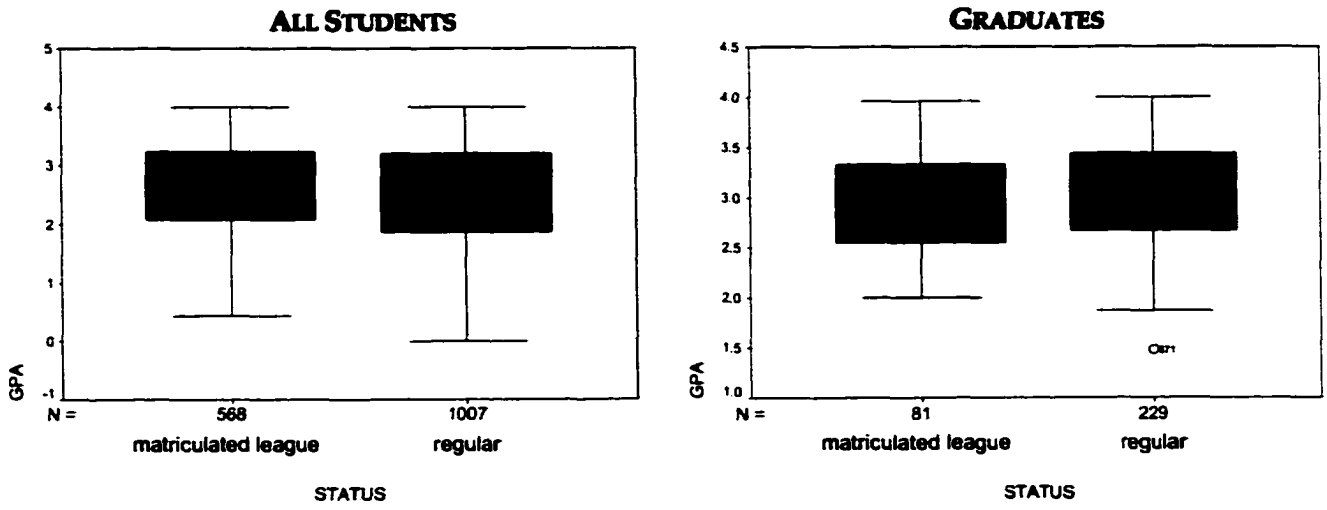

Figure 9. Mean GPA for all students and graduates by Status.

GPA is important because it signifies academic success and because it contributes to continued academic success. I tested the relationship between group membership, League and Regular, against academic achievement as evidenced by grades using one-way analysis of variance. The independent variable was STATUS and the dependent variable was the cumulative Grade Point Average. The ANOVA, conducted on all cases (N = 1,575) yielded statistically significant results (F (1, 1573) = 14.394, $p < .001$). On the average, the GPA of League students was higher (M = 2.62, SD = .859) than that of the Regular students (M = 2.43, SD = .997). The null hypothesis is rejected.

Conducting an ANOVA on graduates (N = 310) revealed that both League and Regular graduates had higher mean GPAs than did all students. The average GPA for graduated League students was lower (M = 2.94, SD = .513) than that of graduated Regular students (M = 3.06, SD = .553). The difference, however, was not significant and for students who graduated the null hypothesis is accepted.

Table 14. Descriptive statistics for independent variables entered into an OLS regression model predicting Grade Point Average.

	N	Minimum	Maximum	Mean	Std. Deviation
GPA	1575	.00	4.00	2.4964	.99706
SES	1307	-2.23	4.70	.0045	.86216
STRTAGE	1575	13	20	17.97	.761
ACADPR	1251	-2.49	3.06	-.0191	.97608
ENROLL INTENSITY	1575	.06	13.89	1.7535	1.12266
DUMLEAG	1575	.00	1.00	.3606	.48034
dummy female	1575	.00	1.00	.5137	.49997
VOTEK EMPH DUM	1575	.00	1.00	.4044	.49094
AS VT EQ DUM	1575	.00	1.00	.0616	.24048
A & S Dummy	1575	.00	1.00	.5073	.50011
Enroll Dev Ed	1575	0	1	.19	.393
First Generation Student	929	.00	1.00	.3434	.47509

Next, I regressed GPA on a series of predictors in an OLS regression equation. I am presenting two equations here, including each block. The first is the equation for GPA for all students, and the second for graduates. I entered one variable at a time (per block) in order to examine the change in the adjusted R^2's. Table 15 presents the results in sequential blocks for all students; Table 16 presents results for graduates only.

The OLS results for all students held some surprises, especially in the strong influence of the ASVRAT variable (ARTS SCI EMPH DUM & AS VT EQ DUM, VOTECH the reference category); its contribution to R^2 was substantial both in effect and significance, F (2, 1241) = 134.571, $p < .001$. Initially, it was surprising that Major Emphasis, the "companion" variable that described the type of major (Arts and Sciences vs. Vocational Technical), lacked the same effect, and I suspect it was because students who had equally divided credits had a lower GPA and fewer earned credits, as demonstrated in the scatterplot in Figure 10. This lowest regression line describes students who attempted but failed to accumulate credits, and their grade point average dilutes the variable which defines Academic Focus into two categories.

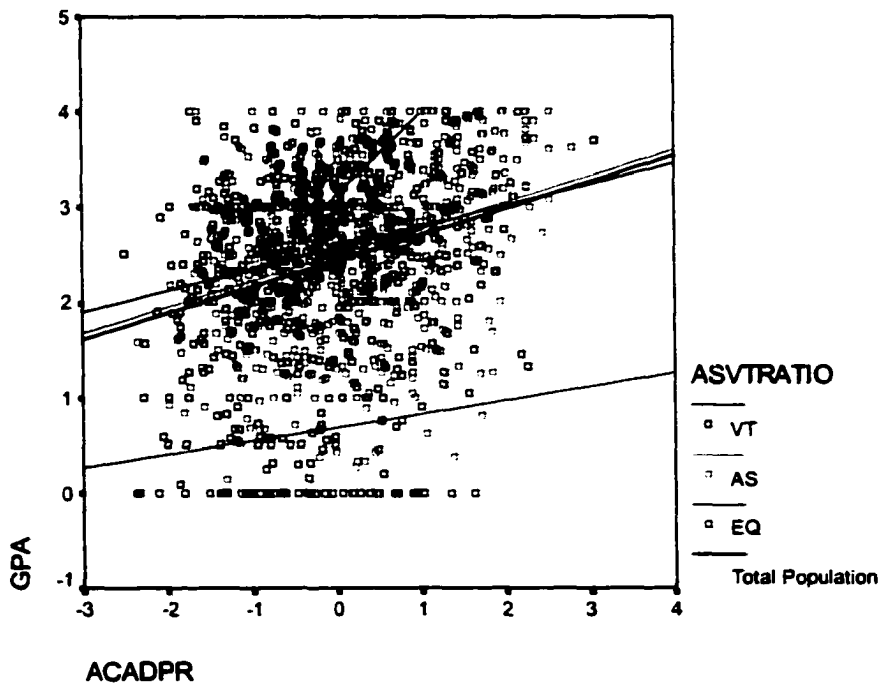

Figure 10. Scatterplot with regression lines displaying the relationship of GPA to Academic Preparation across levels of Academic Focus.

All of the variables across the blocks for all students had significant net effects on the dependent variable, GPA. I suspect that Enrollment Intensity both influences and is a function of GPA; hence I included the interaction term across STATUS to explore its effect. Also, it follows that enrolling in developmental education is negatively associated with GPA. Finally, STARTAGE reflects a negative influence only to the extent that as age increased, GPA

declined. I reminded myself that the mean GPA of League students, the youngest group, was just over 3.0 while in League, but that, on average, it declined after they matriculated and became regular students. The interaction term LEAGXENR supported that trend with a negative coefficient, that is, as Enrollment Intensity increased for League students, GPA declined.

I again ran the OLS regression equation selecting only graduates. I included the same independent variables as were included in the estimate of GPA for all students. Only those variables yielding significant results were retained. ACADPR was clearly the most influential before entering the interaction term. Although ACADPR had been absent from equations in previous hypotheses, it contributed to GPA, making GPA endogenous to its influence.

STATUS had a statistically significant net effect on GPA. Specifically, League graduates' GPAs are about a half-point higher than the GPAs of Regular graduates. Status also had an effect on GPA in the way that it interacted with Enrollment Intensity. For League students, each additional credit per month reduced GPA by .07 points. But it had the opposite effect on Regular students, improving their GPA by about 0.14 points. As expected, Academic Preparation positively affected GPA, after controlling on the other variables. Altogether, these four variables reduced the unexplained variance in GPA by about 17%.

For all students and for just graduates, SES and First Generation Student showed no effect. Enrollment Intensity was a predictor in the equation for all cases, and in the first model of the graduate equation. Although STRTAGE was significant in the first equation, it began and ended with marginal significance in the graduate equation, thus it was dropped. Having enrolled in developmental education had a negative and significant coefficient in the first equation, and no significant effect in the second, and so again, it was dropped. Normally, I expect that enrolling in developmental classes would increase the number of attempted and completed credits, hence the Time To Award, but I did not expect it to be a significant negative predictor of GPA for all students.

Table 15. OLS regression model predicting GPA for all students.

GPA	Model For All Students							
	1	2	3	4	5	6	7	8
(Constant)	2.437***	2.091***	4.697***	4.278***	5.034***	4.963***	4.421***	4.123***
	0.026	0.051	0.619	0.794	0.790	0.785	0.789	0.717
ACADPR	0.276***	0.275***	0.265***	0.268***	0.256***	0.225***	0.221***	0.201***
	0.027	0.026	0.026	0.026	0.026	0.027	0.027	0.025
	0.282	0.280	0.270	0.273	0.261	0.229	0.225	0.204
ENROLL INTENSITY		0.186***	0.188***	0.188***	0.342***	0.331***	0.341***	0.257***
		0.024	0.023	0.023	0.033	0.033	0.033	0.031
		0.209	0.212	0.211	0.386	0.373	0.384	0.290
STRTAGE			-0.145***	-0.123**	-0.180***	-0.171***	-0.149***	-0.118**
			0.034	0.043	0.043	0.043	0.043	0.039
			-0.112	-0.095	-0.138	-0.132	-0.115	-0.091
DUMLEAG				0.056	0.563***	0.552***	0.591***	0.378***
				0.066	0.103	0.102	0.102	0.093
				0.028	0.283	0.277	0.297	0.190
LEAGXENR					-0.301***	-0.299***	-0.294***	-0.215***
					0.047	0.047	0.046	0.043
					-0.372	-0.370	-0.364	-0.266
Enroll Dev Ed						-0.254***	-0.284***	-0.199***
						0.063	0.063	0.058
						-0.110	-0.123	-0.086
dummy female							0.221***	0.213***
							0.051	0.047
							0.115	0.111
ARTS SCI EMPH DUM								-0.003
								0.051
								-0.002
AS VT EQ DUM								-1.619***
								0.103
								-0.394
R Square	0.079	0.123	0.135	0.136	0.163	0.174	0.187	0.332
R Square Change	0.079	0.044	0.012	0.000	0.027	0.011	0.013	0.145

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

Table 16. OLS regression model predicting GPA for graduates.

	Block 1	2	3	4
(Constant)	3.038***[a]	2.894***	2.899***	2.705***
	0.030	0.094	0.095	0.115
ACADPR	0.200***	0.203***	0.199***	0.194***
	0.031	0.031	0.032	0.031
	0.361	0.365	0.359	0.350
ENROLL INTENSITY		0.055	0.059	0.136**
		0.034	0.035	0.043
		0.090	0.096	0.222
DUMLEAG			-0.055	0.499**
			0.068	0.202
			-0.046	0.419
LEAGXENR				-0.206**
				0.071
[a] B, Std. Error, Beta				-0.524
R Square	0.130	0.138	0.140	0.166
R Square Change	0.130	0.008	0.002	0.026

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

Hypothesis VI: Enrollment Intensity

Hypothesis VI: Enrollment Intensity and credit thresholds do not significantly vary by enrollment status as League or Regular student.

The degree, the traditional measure of academic achievement, is defined by credit, distribution, and grade requirements; however, academic achievement has also been explained recently in terms of specific credit thresholds, levels of 30, 60, 90, and 120 credits. In addition to being obvious grade levels, these levels are associated with economic benefits (Zucker & Dawson, 2001), with progress toward a bachelors degree (McCormick, 1999), or in studies of the relative importance of those thresholds, with educational attainment (Pascarella & Terenzini, 1991). Where there is a mix of educational aspirations, such as those for the students at Erewhon Technical College, the 30 credit threshold, or the first year of college, is a legitimate measure of academic progress, perhaps the only measure of educational progress. For this study I adopted the 30 credit threshold, incorporating it into an alternative completion hypothesis which states that there is no difference between the League and Regular students in the average time to reach the 30 credit threshold.

For my analysis I computed variables to identify 1) whether or not a student reached that 30 credit threshold and 2) the amount of time in which that happened. The first variable is CRDSMYN, a dichotomous variable calculated on total completed credits for those who reached the 30 credit threshold and those who did not. The second variable is CREDSUM2 which measures the time elapsed. For Regular students, the period measured is from first start date to the semester in which 30 credits were earned, and for League students the period is from the matriculation date (MATRIC) to the threshold semester. In that respect, CREDSUM2 is similar to TIMETO in that the predictive influence of independent variables is in a negative direction. In my study, slightly fewer than half (242) of the 568 League students (42.6%) reached the 30 credit plateau, compared with 469 for the Regular (46.6%).

Selected demographics for those students who reached the 30 credit threshold are presented in Table 17. It is reasonable to consider how these students compare with graduates. The two groups were different in several dimensions. The ratio of male to female of League

graduates was about 3:1, while for the 30 credit group it was just 2:1; for Regular students, it was more evenly distributed for both groups. Scores on the Academic Preparation scale were higher for the 30 credit League students compared to the League graduates, and that held true with the 30 credit Regular group as well. Consequently, only 50% of the 30 credit League group were below the cut score in one of the two assessment categories, compared to 59% of the League graduates, while the distribution for Regular students was about equal. For the 30 credit group, first generation students comprised about one third of the 30 credit group for both League and Regular, while for League graduates that was 49% and for Regular graduates 40%. Of the League graduates, about 15% were enrolled in Arts And Science majors, compared to 40% for the League 30 credit group. For Regular graduates, 24% enrolled in the Arts and Sciences, compared to 40% of the 30 credit group.

To evaluate the relationship between STATUS and time to completion of 30 credits, (CREDSUM2) I used a one-way analysis of variance, testing the hypothesis that there would be no difference in the number of semesters to reach the 30 credit plateau between League and for Regular students. The average time to 30 credits for League students ($\underline{M}$ = 14.21, $\underline{SD}$ = 3.877) was higher than the average time for Regular students ($\underline{M}$ = 13.08, $\underline{SD}$ = 4.461), a statistically significant difference, $\underline{F}$ (1, 709) = 10.669, $\underline{p}$ = .001. I therefore rejected the null hypothesis.

Considering the parity between League and Regular students in the variable measuring Enrollment Intensity, this result was contrary to my expectation. In a one-way analysis of RATACRS (Enrollment Intensity) for all students, for example, the measure for League students ($\underline{M}$ = 1.801, $\underline{SD}$ = 1.3464) was not significantly different from that of Regular students ($\underline{M}$ = 1.726, $\underline{SD}$ = .9736). With graduated League students ($\underline{M}$ = 2.824, $\underline{SD}$ = 1.0972), the difference between Regular graduates ($\underline{M}$ = 2.452, $\underline{SD}$ = .8514) was significant ($\underline{F}$ (1, 308) = 9.718, $\underline{p}$ = .002). Further, it is contrary to the analysis of TIMETO in which the graduated League students completed in significantly less time than Regular students.

Table 17. Number and percentage distribution of Regular and League students by selected background characteristics and by Status for students who reached 30 credit threshold.

	STATUS			
	MATRICULATED LEAGUE	REGULAR	TOTAL STUDY	
MALE	153	202	355	
	63.2%	43.1%	49.9%	
FEMALE	89	267	356	
	36.8%	56.9%	50.1%	
	242	469	711	V = .191, p < .001
GPA	2.80	2.84	2.83	
Total Family Income	48732.44	47139.95	47677.95	
ACADPR	-.0572	.1103	.0535	
	217	423	640	F = 4.362 p = .037
AS Major	97	186	283	
	40.1%	39.7%	39.8%	
VT Major	145	283	428	
	59.9%	60.3%	60.2%	
Below Cut CPT Verbal	67	87	154	
	33.2%	21.9%	25.7%	N = 600, V = .122 p = .003
Below Cut CPT Math	91	176	267	
	52.6%	49.7%	50.7%	N = 527
BELOW CPT CUT	109	198	307	
	50%	46.8%	47.8%	N = 642
Enroll DevEd	37	88	125	
	15.3%	18.8%	17.6%	
First Generation	52	104	156	
	35.4%	34.0%	34. 4%	N = 453
Recd Fin Aid	128	297	425	
	52.9%	63.3%	59.8%	V = .101, p = .007

For broader perspective, I entered an OLS regression equation with CREDSUM2 as the dependent variable and a series of background and academic variables as the predictor variables, especially those commonly related to credit production. The results are presented in Table 18.

Within the mix of continuous variables entered into the equation, none were even weakly correlated with CREDSUM2. The categorical variables were entered into the OLS equation in separate blocks as dummy variables. The variables entered into the equation

reflected academic and background variables associated with academic progress. Table 18 presents the final blocks from four of those equations.

Table 18. OLS regression models predicting Time To Complete 30 Credits.

	Model 1	Model 2	Model 3	Model 4	Contribution to R^2
(Constant)	19.593***	19.597***	18.531***	15.655***	
	2.708	2.706	2.635	0.979	
ENROLL INTENSITY	0.500	0.497	0.473	0.459	.008***
	0.260	0.260	0.247	0.247	
	0.102	0.102	0.096	0.093	
SES	0.316	0.328			
	0.207	0.202			
	0.062	0.064			
GPA	-0.613	-0.606	-0.562	-0.745***	.007***
	0.342	0.341	0.316	0.276	
	-0.087	-0.086	-0.077	-0.103	
ACADPR	-0.079	-0.082			
	0.193	0.193			
	-0.018	-0.018			
COMPL TO ATTEMPT RATIO	-3.918	-3.996	-3.529		
	3.089	3.072	3.002		
	-0.058	-0.059	-0.050		
DUMLEAG	3.271***	3.290***	3.647***	3.675***	.015***
	0.996	0.992	0.917	0.917	
	0.362	0.364	0.392	0.395	
LEAGXENR	-1.458***	-1.463***	-1.367***	-1.372***	.015***
	0.394	0.393	0.365	0.365	
	-0.426	-0.428	-0.388	-0.390	
Recd Fin Aid	-0.094				
	0.363				
	-0.011				
Enroll Dev Ed	0.629	0.637	0.823	0.846*	.009**
	0.459	0.457	0.430	0.429	
	0.057	0.057	0.071	0.073	
DUMPERS	1.449	1.460	1.580*	1.530	.050***
	0.843	0.842	0.798	0.797	
	0.078	0.078	0.082	0.079	
DUMPROF	1.201	1.198	1.131	1.121	
	0.838	0.837	0.787	0.787	
	0.064	0.063	0.059	0.059	
DUMGRAD	-1.899***	-1.910***	-1.880***	-1.894***	
	0.525	0.523	0.497	0.497	
	-0.222	-0.224	-0.213	-0.215	
DUMTRANS	-0.822	-0.818	-0.614	-0.636	
	0.571	0.570	0.539	0.538	
	-0.084	-0.084	-0.061	-0.063	
dummy male	-0.955***	-0.951***	-0.955***	-0.958***	.010***
	0.353	0.352	0.338	0.338	
	-0.112	-0.111	-0.108	-0.109	
R^2					.116

[a] B, Std. Error, Beta

*$p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Variables that did not have the effect I expected included SES, ACADPR, and Enrollment Intensity. Because Enrollment Intensity measures attempted credits against time in a manner similar to the dependent variable (CREDSUM2), I expected a significant effect from Enrollment Intensity. Even though Socioeconomic Status figures prominently in numerous studies of educational attainment, I was less surprised by its removal because it had no effect in previous analyses. Finally, though ACADPR contributed to the equation for GPA, it was without effect in the equation for CREDSUM2.

Table 19. OLS regression models predicting Enrollment Intensity for all students and for students who earned at least 30 credits.

	Model—All Students (N = 1,575)					Model—Students Earning 30 Credits (N = 711)				
	1	2	3	4	5	1	2	3	4	5
(Constant)	1.236***	1.122***	1.263***	1.125***	1.083***	1.523***	1.497***	1.604***	1.444***	1.398***
	0.084	0.110	0.111	0.115	0.119	0.169	0.185	0.181	0.183	0.185
GPA	0.256***	0.259***	0.272***	0.264***	0.261***	0.273***	0.264***	0.293***	0.291***	0.282***
	0.032	0.032	0.032	0.031	0.032	0.059	0.058	0.057	0.056	0.057
	0.228	0.230	0.241	0.235	0.232	0.191	0.185	0.205	0.204	0.198
ACADPR	-0.065*	-0.049	-0.050	-0.027	-0.054	-0.052	-0.029*	-0.017*	0.006**	-0.027*
	0.032	0.032	0.032	0.032	0.038	0.037	0.038	0.037	0.037	0.043
	-0.058	-0.045	-0.045	-0.025	-0.049	-0.057	-0.032	-0.019	0.006	-0.030
DUMPERS		-0.069	-0.089	-0.098	-0.095		0.018	-0.055	-0.100	-0.095
		0.123	0.121	0.121	0.121		0.168	0.163	0.162	0.162
		-0.019	-0.024	-0.026	-0.026		0.005	-0.015	-0.027	-0.025
DUMPROF		-0.316*	-0.349*	-0.423**	-0.428**		-0.139	-0.166	-0.245	-0.250
		0.140	0.139	0.139	0.139		0.172	0.167	0.166	0.166
		-0.071	-0.078	-0.095	-0.096		-0.036	-0.043	-0.063	-0.064
DUMGRAD		0.306***	0.297***	0.217**	0.221**		0.173	0.189	0.092	0.096
		0.088	0.087	0.088	0.088		0.103	0.100	0.102	0.102
		0.140	0.136	0.099	0.101		0.100	0.109	0.053	0.055
DUMTRANS		0.018	0.026	0.102	0.100		-0.110	-0.063	-0.010	-0.015
		0.095	0.094	0.095	0.095		0.114	0.111	0.111	0.111
		0.007	0.011	0.042	0.041		-0.055	-0.032	-0.005	-0.008
dummy female			-0.331***	-0.294***	-0.295***			-0.409***	-0.369***	-0.370***
			0.058	0.059	0.059			0.067	0.067	0.067
			-0.153	-0.136	-0.137			-0.235	-0.212	-0.213
DUM TECH				0.298***	0.305***				0.306***	0.318***
				0.067	0.067				0.077	0.077
				0.138	0.141				0.172	0.179
ABOVE CPT CUT					0.094					0.124
					0.073					0.080
					0.043					0.071
					0.197					0.123
Model Summary	1	2	3	4	5	1	2	3	4	5
R Square	0.048	0.077	0.101	0.115	0.116	0.033	0.054	0.107	0.129	0.132
Adj. R Square	0.046	0.073	0.095	0.109	0.109	0.030	0.045	0.097	0.118	0.120
R2 Change	0.048	0.030	0.023	0.014	0.001	0.033	0.021	0.053	0.022	0.003
F Change	31.252	9.989	32.074	19.754	1.670	10.799	3.524	37.783	15.825	2.389
df1	2, 1248	4, 1244	1, 1243	1, 1242	1, 1241	2, 637	4, 633	1, 632	1, 631	1, 630
Sig. F Change	0.000	0.000	0.000	0.000	0.197	0.000	0.007	0.000	0.000	0.123

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

Four variables had persistent statistically significant net effects on the dependent variable: STATUS, Status x Enrollment Intensity, the Goal "Graduate," and Gender. Omitting the Completion: Attempted Credits ratio in Block 4 exposed the significant effect of GPA. Educational Goals accounted for the largest change in the $R^2 = .050$, $F(4, 701) = 0.758$, $p < 001$. Of its component dummy variables, only Graduation had a negative coefficient ($b = -1.894$) combined with a significant effect ($t = -3.813$, $p < .001$); that is, students who declared graduation as a goal would have reduced time to the 30 credit threshold, while students with personal goals would have increased time to goal ($b = 1.530$) with a marginally significant effect ($t = 1.919$, $p = .055$). Gender contributed only .01 to the explanation of R^2, ($F(1, 700) = 8.017$, $p = .005$), while GPA contributed slightly less (.007, $p = .007$). Students with a higher GPA decreased the time to 30 credits, while Enrollment Intensity distributed its effect across the levels of Status, which contributed, by itself, .015 to the R^2 ($t = 4.006$, $p < .001$) ($F(1, 707) = 11.299$, $p = .001$). The interaction term, LEAGXENR (League x Enrollment Intensity) had a negative coefficient ($b = -1.372$; $t = -3.754$, $p < .001$) and therefore indicated a decrease in time to 30 credits for League students, which doesn't fit the earlier mentioned analysis of variance.

Variables associated with Enrollment Intensity for all students were GPA, Goals, Gender, and Major Emphasis. Of those, the academic variables, especially GPA, had the greatest effect. Goals resulted in a greater change in the R^2, and of those Graduation (Undecided is the reference category) was the only goal with a positive coefficient resulting in an increase in the dependent variable; likewise, Academic Major had a positive coefficient for students enrolled in vocational majors (DUM TECH), while being Female had a negative coefficient, with a net effect of reducing Enrollment Intensity. Comparing this to the equation for students who reach 30 credits, I saw that GPA retained its significance, and Academic Preparation (ACADPR) had a significant but negative effect, such that a unit increase in ACADPR resulted in a slight but significant decrease in Enrollment Intensity. Though introducing the categorical variable Goals resulted in an increase in R^2, individual dummy variables did not assume the same significance as in the equation selecting for all students.

Table 20. Two OLS regression models predicting Enrollment Intensity for graduates, with the second equation containing an interaction term for Parents Education X Goals.

Model	1	2	3	4	5	1	2	3	4	5	6
(Constant)	1.551***	1.376***	1.554***	1.147**	1.202**	1.512***	1.340**	1.500***	1.068*	1.129**	1.830***
	0.392	0.416	0.397	0.417	0.413	0.399	0.430	0.411	0.429	0.424	0.500
GPA	0.316**	0.336**	0.320**	0.350***	0.289**	0.323**	0.345**	0.331**	0.365***	0.305**	0.335**
	0.115	0.113	0.107	0.106	0.108	0.118	0.115	0.110	0.108	0.109	0.108
	0.203	0.216	0.205	0.224	0.186	0.206	0.219	0.211	0.232	0.194	0.213
PRNTMEW	-0.011	-0.002	0.015	0.023	0.025	-0.007	0.002	0.017	0.025	0.029	0.417**
	0.031	0.030	0.029	0.028	0.028	0.031	0.031	0.029	0.029	0.028	0.155
	-0.026	-0.004	0.036	0.054	0.059	-0.016	0.005	0.040	0.061	0.069	0.995
DUMPERS		0.299	0.216	0.094	0.121		0.297	0.227	0.074	0.089	-1.686*
		0.401	0.381	0.376	0.372		0.420	0.400	0.395	0.390	0.795
		0.060	0.044	0.019	0.024		0.060	0.046	0.015	0.018	-0.343
DUMPROF		-0.305	-0.210	-0.228	-0.256		-0.308	-0.202	-0.245	-0.288	-1.808**
		0.317	0.301	0.296	0.292		0.340	0.325	0.318	0.314	0.672
		-0.086	-0.059	-0.064	-0.072		-0.087	-0.057	-0.069	-0.082	-0.512
DUMGRAD		0.222	0.254	0.162	0.156		0.216	0.260	0.137	0.116	-0.875
		0.213	0.202	0.201	0.199		0.247	0.235	0.234	0.231	0.450
		0.128	0.146	0.093	0.090		0.122	0.147	0.077	0.065	-0.495
DUMTRANS		-0.432	-0.363	-0.239	-0.303		-0.440	-0.360	-0.249	-0.333	-0.708*
		0.249	0.236	0.237	0.235		0.280	0.267	0.264	0.263	0.298
		-0.195	-0.164	-0.108	-0.137		-0.200	-0.163	-0.113	-0.151	-0.321
dummy female			-0.501***	-0.457***	-0.474***			-0.489***	-0.433***	-0.451***	-0.407***
			0.112	0.111	0.110			0.114	0.113	0.112	0.112
			-0.306	-0.279	-0.290			-0.297	-0.263	-0.274	-0.247
DUM TECH				0.403**	0.449**				0.439**	0.485**	0.542***
				0.148	0.148				0.152	0.151	0.150
				0.211	0.235				0.228	0.252	0.282
ABOVE CPT CUT					0.271*					0.284*	0.308**
					0.119					0.120	0.119
					0.162					0.169	0.183
PRNTXGLS											-0.121*
											0.048
											-1.062
						Model					
Model Summary	1	2	3	4	5	1	2	3	4	5	6
R Square	0.042	0.141	0.231	0.263	0.285	0.043	0.143	0.228	0.265	0.289	0.316
Adjusted R Square	0.031	0.110	0.199	0.228	0.247	0.032	0.112	0.195	0.230	0.250	0.275
R Square Change	0.042	0.098	0.090	0.032	0.022	0.043	0.100	0.085	0.037	0.024	0.027
F Change	3.862	4.890	19.977	7.392	5.205	3.836	4.863	18.319	8.352	5.561	6.489
df1	2, 175	4, 171	1, 170	1, 169	1, 168	2, 171	4, 167	1, 166	1, 165	1, 164	1,163
Sig. F Change	0.023	0.001	0.000	0.007	0.024	0.023	0.001	0.000	0.004	0.020	0.012

[a] B, Std. Error, Beta *p ≤ .05; ** p ≤ .01; *** p ≤ .001

In the first equation for graduates, GPA retained its significance, but Academic Preparation did not. I replaced it with the background variable for Parents' Education and found in the first model that although it did not attain significance, it did influence the R^2 of the equation, though not in the block in which it was entered, but in subsequent blocks, or so it appeared. The categorical variables for Goals and Gender, overall, had the greatest impact

on the R^2, with Female again resulting in a negative coefficient. A vocational Major (Vocational Technical with Arts and Sciences the reference category) produced a positive coefficient, increasing Enrollment Intensity, as did scoring Above The Cut Score on the assessment battery (ABOVE CPT CUT). For the final model I tested several interaction terms and found the effect of Parent Education X Goals to be significant, though it too was a negative coefficient.

Hypothesis VII: Enrollment Status As League Or Regular Student

Hypothesis VII: Enrollment status as League or Regular student does not significantly predict completion, net the other effects of other variables tested.

My hypothesis here extends the first presented in this chapter, that there is a difference in the rates of completion for League and Regular students. The current hypothesis focuses on the factors that contribute to graduation. Graduation, in my study, was defined by earning an award for a prescribed course of study documented in the official publications of Erewhon Technical College. This included several types of certificates, diplomas, associate degrees, and, in a handful of cases, bachelor's degrees reported from public institutions. To this point, I estimated variables that provided measures of academic achievement and accelerated progress within the context of completion. In this analysis, I identified thirteen predictor variables to be regressed against my dependent variable, GRADUATION (0 = no, 1 = yes), in a series of logistic regression equations (see Table Next).

For this analysis I selected all but the most recent cohort, excluding from the analysis those students who only recently matriculated, because it is unlikely they would be able to earn an award, and that event would most likely occur, if at all, after the timeframe of this study (cf., Allison, 1984; DesJardins & Pontiff, 1999; Willett & Singer, 1991). Selecting on cohorts prior to the last academic year of the study (Academic Year 2000-2001) limited the analysis to 1,434 cases. Of the thirteen independent variables, 5 were continuous, and the remaining 8 were categorical (design) variables.

Table 21. Descriptive statistics for variables entered into logistic equation predicting Graduation.

	Reference Category	N	Minimum	Maximum	Mean	Std. Deviation
GPA		1434	.00	4.00	2.5069	.98481
ACADPR		1131	-2.49	3.06	-.0211	.97831
ENROLL INTENSITY		1434	.06	13.89	1.7307	1.13950
SES		1191	-2.23	4.70	.0058	.86012
COMPL TO ATTEMPT RATIO		1434	.00	1.00	.8770	.24812
GOALCAT	Undecided	1358	1.00	5.00	3.3196	1.08629
AWARD TYPE	Else	1415	1.00	5.00	1.3936	.97193
SEXCAT	Female	1434	1.00	2.00	1.5181	.49985
MAJOR EMPHASIS	VT	1434	1.00	2.00	1.5021	.50017
ENROLL DEV ED	Enroll Dev Ed	1434	0	1	.18	.385
FIRST GENERATION STUDENT	First Gen	839	.00	1.00	.3421	.47469
RECD FIN AID	Rec'd Aid	1434	.00	1.00	.4456	.49721
STATLOG	League	1434	.00	1.00	.3808	.48574
GRADUATE YN	Dependent V	1434	.00	1.00	.2127	.40935
VALID N (LISTWISE)		757				

Again, I entered all variables, including the continuous variables, on a block basis; that is, multiple equations were estimated, with the final equation containing seven blocks. Initially, I removed variables on the basis of significance levels: Sex, Enrolled in Developmental Education, First Generation, and Received Financial Aid. My decision to remove Socioeconomic Status, Academic Preparation, and Completion Ratio was complicated by their ambiguous and conditional effects. SES, for example, is often associated with educational attainment (Haverman & Wolfe, 1995), and though its effect was not statistically significant, the presence of SES seemed to improve the ability of the model to predict the dependent variable. With either ACADPR or SES in the model, the Odds Ratio for CMPLRATO (the Attempted: Completed Ratio) was increased tenfold. However, SES was not significant, even when entered as an interactive term with ACADPR. Ultimately, SES was removed because its effect lacked significance and because its removal clarified the unique effects of other variables.

CMPLRATO was a consistent performer with a reasonable coefficient, Odds Ratio, and optimum significance ($p > .01$) in early iterations of the regression equation. As one of five continuous variables in the equation, it seemed to be a reasonable indicator of whether or not

students would graduate; that is, a student was likely to complete a course in which he/she enrolled. The obverse is that the student enrolled in courses, dropped some, and maybe moved from a full-time to part-time status, thus increasing Time To Award. Further, completion ratios have been tested in other studies (cf., Adelman, 1999) and their relevance to educational attainment established. However, in my study the variable for the completion ratio oscillated wildly.

Neither correcting several data errors nor checking for interaction explained CMPLRATO's erratic behavior. Although its wildly fluctuating values did not change the overall performance of the model, my objective was to develop an uncomplicated model. I observed, furthermore, that its presence did not improve the model, while removing it allowed the other variables and the model to settle, and, more importantly, removing it resulted in a reduction of prediction error and clarified the unique relationships of the other variables.

For my final seven block model, each block of the model increased the efficiency of predicting status and the combined (Block7) effect is strong (λ_p = .36) Further, for the model in Block 7, Φ_p = .54 PRE) and $\underline{R^2_L}$ = .356 ($\underline{R^2_L}$ is a surrogate $\underline{R^2}$ for the proportional reduction in –2LL).

GPA has the largest effect ($\underline{F}$ (1) = 105.943, $\underline{p} < .01$), the largest Odds Ratio, and is thus the best predictor, with Enrollment Intensity, with eventually the second largest Wald statistic, coming in the second block. Other predictors, ranked according to Wald and Odds Ratio, are Major Emphasis (Arts and Sciences or VoTech), STATUS (League or Regular), Educational Goals, and Award Type (whether degree, certificate, diploma).

The results from Block 1 indicate that with each unit increase in GPA was a corresponding increase in the Odds that a student would graduate, beginning at 3.4 in block 1 and ending with 5.1 in Block 7. However, as noted with Block 1, the total predictive efficiency decreased slightly, though the differentiation, or ability of the model to identify graduates increased, which reflected the relative size of the two categories. Block 2 introduced Enrollment Intensity, predicted 81.2% of the cases correctly (λ_p = .209) and, more importantly,

improved prediction of Graduates to 42.6%. Improvements in the model chi square are reflected in the ultimate ranking of variables in the model.

ACADPR, as I expected but do not completely understand, had an Odds Ratio less than 1, and thus increases in ACADPR translated into a lower odds of graduation. A corresponding decrease in ACADPR would result, given that that a student met other conditions of other variables, in an increase in the likelihood of graduation.

Block 4 introduced Educational Goals, and it confirmed what I expected about the levels of this variable; that is, for students who declared an intent to graduate, the Odds Ratio in Block 4 was 4.79. Similarly, students who enrolled for Personal Reasons, had less than even Odds of graduation.

The likelihood of completion is greater for students enrolled in Diploma programs (Odds Ratio = 1.964 in Block 7) and less for those in Certificate programs (.489). Further, an Arts and Sciences emphasis reduces the likelihood of completion (Odds Ratio = .273). Finally, for Status, the model told us that Regular students had an Odds Ratio of 1.927, and were thus more likely to graduate than were League students.

Many League students did not enroll with the intent of graduating, but rather for personal or undecided reasons. While I may question that, it was consistent with these students' low graduation rate, and it was a significant difference by STATUS ($\underline{V}$ = .393, p. <.01).

While predictors of graduation were important to me, how this model defined the effects of variables (in reference to graduation), including League and Regular Status, was more important. This analysis of Hypothesis VII, then, confirmed the differences in completion for Regular and League students. The analysis revealed which predictor variables contribute to the likelihood that graduation will occur, further defining the differences between the two groups.

Table 22. Logistic equation predicting graduation (completion) for all students.

	Block 1		Block 2		Block 3		Block 4		Block 5		Block 6		Block 7			
	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	B	Exp(B)	Wald	Sig.
Constant	-4.531	0.011	-6.196	0.002	-6.704	0.001	-7.728	0.000	-7.934	0.000	-8.282	0.000	-7.687	0.000	162.722	0.000
WCUMGPA	1.214	3.368	1.168	3.216	1.349	3.854	1.467	4.336	1.509	4.523	1.527	4.604	1.599	4.950	113.094	0.000
RATATCRS			0.846	2.330	0.846	2.329	0.758	2.135	0.745	2.106	0.764	2.146	0.680	1.974	54.700	0.000
ACADPR					-0.369	0.691	-0.286	0.752	-0.277	0.758	-0.306	0.736	-0.247	0.781	6.022	0.014
GOALCAT															22.337	0.000
Personal							-0.386	0.680	-0.562	0.570	-0.471	0.624	-0.491	0.612	1.009	0.315
Professional							0.801	2.227	0.718	2.050	0.640	1.896	0.419	1.520	0.847	0.357
Graduate							1.567	4.791	1.523	4.585	1.287	3.622	1.038	2.823	10.241	0.001
Transfer							0.205	1.228	0.272	1.312	0.086	1.090	0.397	1.487	1.252	0.263
MAJORCD															12.458	0.002
Certificate									-0.333	0.717	-0.207	0.813	-0.716	0.489	3.195	0.074
Diploma									1.052	2.863	1.142	3.133	0.675	1.964	7.137	0.008
STATLOG(Regular)											0.605	1.830	0.656	1.927	10.038	0.002
MAJRPRG(Arts & Sciences)													-1.299	0.273	31.789	0.000

Model Chi-Square [df]	167.062[1]	300.800[2]	317.281[3]	378.768[7]	396.342[9]	413.329[10]	440.346[11]
Block Chi-Square [df]		137.737[1]	16.482[1]	61.478[4]	17.573[4]	16.987[1]	27.017[1]
p	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Prediction: Graduate % Correct	16.2%	43.0%	46.0%	52.8%	53.6%	53.2%	55.8%
Prediction: Total % Correct	74.5%	81.1%	82.1%	83.6%	84.2%	83.6%	84.8%
Proportional Change in Error	0.00%	21.51%	26.04%	32.08%	34.72%	32.08%	36.98%

*The Wald statistics (with significance levels) from the final block indicate relative effect of the variables.

OUTCOMES

In the final section of this chapter I discuss briefly the "Outcomes" for the students in this study from several points of view. First, I divided the groups into two unduplicated categories, 1) those who appeared to have terminated their association with ETC, and 2) those who were continuing students at the end of this study. Of the League students, one-fourth continued as students during the final data collection period, the summer of 2001. Significantly fewer Regular students, about one in fifteen, continued during the same period.

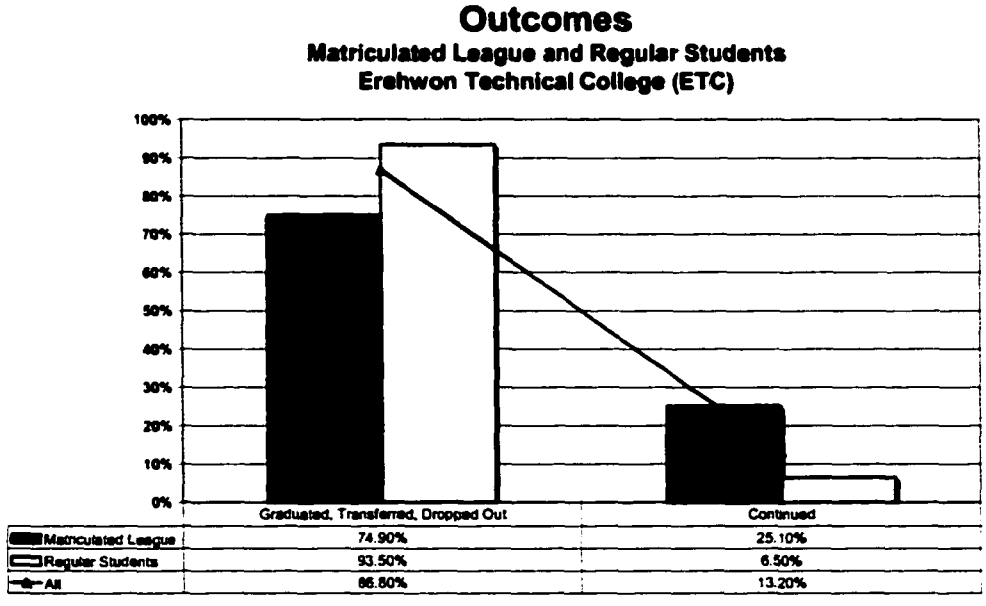

Figure 11. Outcomes (Graduation, Transfer, Dropout, Continued) for League and Regular students who matriculated at Erewhon Technical College.

In the second view, my Outcomes are duplicated; that is, students who reached the 30 credit threshold might have transferred, graduated, dropped out, or continued. The significantly different outcomes here, in addition to graduated and continue, were stopout and transfer. The greatest difference between the League and Regular students was that almost two-thirds of the League students stopped out one semester or more ($\underline{V}$ = .385, $p <$

.001). This was predictable, especially considering the Goal choices that League students expressed when they first enrolled. Also, one in four League students transferred to another college, a significant difference compared to one in three for Regular students (V = .099 $p < .001$). Finally, it is also worthwhile to note that over 40% of League and Regular students reached the 30 credit threshold.

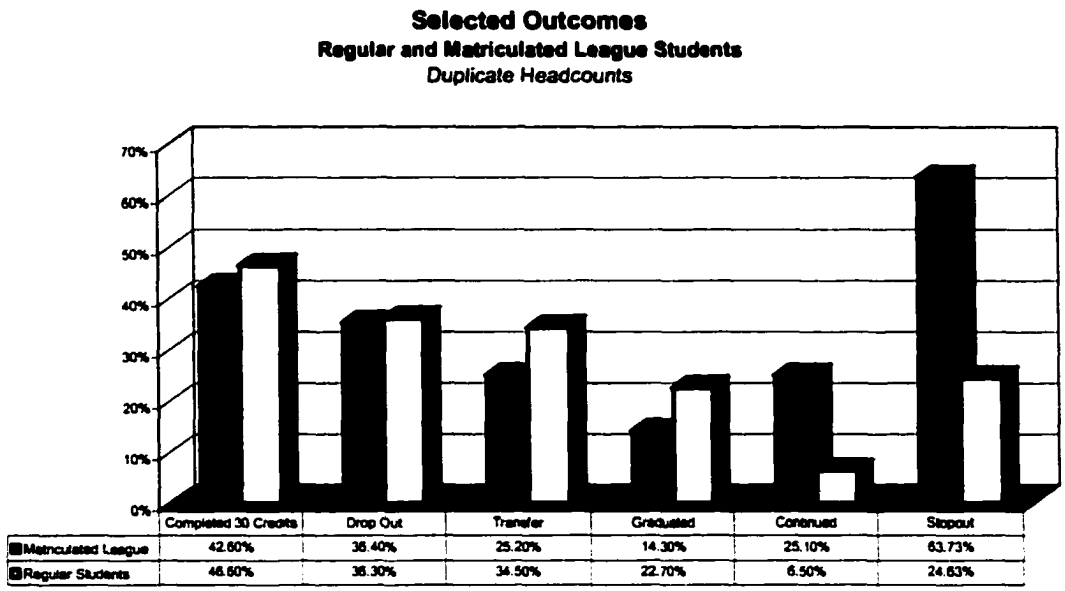

Figure 12. Disaggregated Outcomes for League and Regular students at ETC.

CHAPTER V. CONCLUSIONS, OBSERVATIONS

The context of this study comes from nationwide initiatives that have promoted dual credit courses. Dual credit programs come in many varieties, and they are offered for a great many purposes. Dual credit is included in K-16 systemic reform, in Tech Prep to serve the "forgotten half" with workforce preparation, and in Advanced Placement (exam prep) to earn college credit through final tests. For associations, state agencies, and even state legislators, dual credit is a vehicle of the "reform" agenda. Within the multiple options that comprise the program, my study focused on a species of dual credit, a school-based program offered by a specific community college.

Proponents of dual credit programs tout

- savings for families, schools, colleges, state and local governments, and, hence "taxpayers,"
- improved use of time spent learning,
- enhanced opportunities to enroll and succeed in college,
- improved articulation between levels of education (seamless systemic reform),
- improved access to college education, and
- increased interaction between faculty at the successive levels of education, hence opportunities for professional growth and development.

Concerns (Clark, 2001) are often based around the potential failure of dual credit to perform as expected, thus **not** provide access, **not** reduce duplication of coursework and thus **not** contribute the improvement of educational efficiency. Some fear that dual credit programs create confusion about curricula, and that learning might not be equivalent to what is expected, that college level courses are dumbed-down, or that vocational courses are student holding rooms until graduation, or that they are replicas of existing college courses but without substance or effect.

My study focused on the companion outcomes of 1) degree attainment and 2) accelerated progress toward that end. In this chapter I will 1) comment briefly on the findings of my study, 2) present observations about this specific school-based program within a broader context, 3) describe how this study related to the research process, 4) discuss again the limitations of my study and potential topics for future research, and 5) offer thoughts about how this information might be useful to the college offering these programs.

Degree Completion. ***Enrolling in a school-based dual credit program does not guarantee completion.*** Completion, whether of a 4- or 2-year degree, certificate, or diploma, is associated with improved earnings and employment opportunities, and thus completion has become a national indicator of postsecondary educational health. At the same time, tracking and reporting graduation and progress toward graduation has become more difficult with complex multi-institution attendance patterns.

The tests of Hypothesis I demonstrated that enrolling in a school-based dual credit program does not guarantee completion. Initially I expected that the completion rate for League students would exceed that of the control (Regular) group; further, I expected that it might also be compared to national rates. The outcome, however, was contrary to my expectations, perhaps because the original purpose of the League initiative was to provide dual credit (college level) vocational technical courses in rural school districts. The goal of completion was subordinate to the goal of providing access. In fact, conditions that improve completion seem to conflict with conditions that promote access. Subsequently, the proportion of all League students who graduated was less than two-thirds of that for Regular students. The differences in completion were the most dramatic in degree programs, where the proportion of League students who graduated with degrees was half compared to that of Regular students. This is especially significant since three-fourths of all League graduates were enrolled in degree programs (77%), while seven-eighths of the Regular graduates were in degree programs.

Within both categories of STATUS, the major emphasis for students enrolled in diploma programs was vocational simply because all diploma programs are vocational. While the associate degree is offered for both types of major, the only award for arts and sciences programs is the associate degree. For those enrolled in degree programs, the balance of enrollments favored the arts and sciences at about 2:1 ratio(arts and sciences: vocational technical) for both League and Regular students, but of the League graduates, seven of eight were enrolled in vocational technical majors equally divided between degree and diploma programs. Three of four Regular graduates, on the other hand, were enrolled in vocational technical programs, with three of four enrolled in degree programs. The major emphasis that produced graduates at this college was vocational technical.

The comparative scores on academic preparation provided additional perspective about the program. The scores for League students, including all students and graduates, were lower than the scores of their Regular student counterparts, and the differences were significant. It seemed reasonable to infer that League students were less likely to enroll in college, an inference supported by their low scores in academic preparation and also by the uncertainty of their educational goals (about two-fifths declared their goals as either Undecided or Personal). While the League program appeared to fail the test of improved completion rates, the nature of the participants suggests an alternative benchmark which measures the rate of completion for underprepared students instead of "traditional" college students. In effect, the League appears to have increased participation and access for a previously underserved demographic. Additional discussion of this unanticipated difference will be a recurring topic in the discussion of Hypotheses III-VII.

Testing Hypothesis II, I focused on the Time to Award, since, after all, students who start college classes earlier might be expected to finish earlier. Overall, League students met this expectation. Within the subset of those who earned a diploma, ***League students completed in significantly less time than Regular students, but for those who completed degrees there was no significant difference.*** The key for understanding the Time

to Award emerged in the comparisons between the diploma and the associate degree. For students enrolled in two-year, associate degree majors, participation in League did not lower the Time to Award. For students earning a diploma, however, participation in League decreased Time to Award. For both League and Regular students, the majority of the Awards earned were vocational technical, whether degree of diploma. For League, however, a larger than expected proportion earned diplomas; again, diplomas were awarded only to vocational technical completers. I found it noteworthy that most of the graduates were vocational technical, even though the distribution between majors (arts and sciences vs. vocational technical) favored arts and sciences, with more League and Regular students enrolled for a ratio of about 2:1. For League and Regular graduates, again, those ratios are better than 3:1 in favor of vocational technical majors.

To better understand both the differences and the non-differences, I entered a series of variables into a multivariate equation. Looking at all of the graduates, League and Regular combined, three variables were significant in their effects on Time to Award, and of those, Enrollment Intensity, the number of credits completed per month, consistently reduced Time To Award, while Enrolling in remedial classes and Award Type increased Time to Award. Compared to League students, a significantly greater proportion of Regular students enrolled in remedial courses, although for both groups the percent of graduates with remedial courses was not significantly different. Those students who took remedial courses and eventually graduated were enrolled about four months longer to complete their credit requirements.

Those equations suggested, furthermore, the relative importance of Award Type, which prompted me to select on the subcategories. Selecting on Award Type had limitations because of the low graduation rate, about one in five of those in my total database, or one in four Regular students and one in six League students. With Time To Award as the dependent variable, I observed an interaction between levels of Status and Enrollment Intensity. This finding is significant because it supports the effects of League

status and it spotlights the interactive nature of the Status and Enrollment Intensity, in effect a more complex relationship than I first thought.

To this point in my analysis, Completion and TIMETO have both been measured against STATUS, the category that differentiates between League participants and the control group of the study. Enrollment Intensity assumed more importance than purely academic variables, such as GPA, or academic-background variables, such as Academic Preparation, or of academic-support variables, such as Financial Aid. The analysis told me through the interaction term that differences in Status affected Time To Award.

One way that I understand the main effect of Enrollment Intensity is to regress to the factory analogy; that is, to liken educational systems (that count credits as a qualification for a degree) as factories. In this analogy, students are line-workers, rewarded for the number of pieces they can produce (earn) in a month, with an additional premium for consistent performance over, on the average, a 24-month period. Though my analogy may seem arcane, and out of step with current ideology, it nevertheless is based on a realistic premise: The acquired trait of persistence (or consistency) mediated all of the other variables available for analysis in this study.

In Hypothesis III I examined STATUS as the dependent variable in a logistic equation to identify pre-existing conditions that determine how League was different from Regular Status. In my study, League students were likely to be different from Regular students in gender, that is, League students were more likely to be male, from a rural school district, with a lower score on the scale that measures Academic Preparation, and motivated to enroll by personal goals, or lack of, as in undecided. Choice of major, in this analysis, was classified as a post-admissions choice, while goals were a pre-existing condition.

It is reasonable to ask whether the prominence of variables that differentiated League matriculated participants inferentially describes the League program. Initially, for example, League partnerships were formed to offer vocational education. Does it follow,

then, that students with lower levels of academic preparation were separated into a vocational track conveniently provided by the community college rather than prepared for "college"? That idea was supported by the levels of enrollment in rural areas in vocational programs, and by the dearth of assessment data as a precondition to allowing secondary students to enroll in college level classes offered by a community college. An alternative explanation is that the program provided a chance for these students to explore, to find their niche, albeit their choices were limited to vocational offerings in the first years of the League partnerships.

Two additional factors that call into question the underpinnings of the program are the subsequent investigation of grade point average and choice of major. Two separate studies of grading, my study and the study of perceptions cited in Chapter III, both suggest that grading for League students does not equal the grading practices in the "regular" community college classes. In my study, the GPA for League students dropped after matriculation, though it would be reasonable to expect that as students progress in a collegiate sequence that GPA would improve. Further, a recent look at grades showed differences in the level and distribution of grades received between League and the control group in my study, supporting anecdotal reports or concerns about grade inflation for courses that were school-based. I might interpret these differences to suggest that the level of school-based offerings was not equivalent to what was offered at the college. Similarly suspect were the differences in GPA for technical students compared to those in the liberal arts. Should I expect, based on my study, that the average vocational technical student would have a lower GPA? Alternatively, academic support services such as tutoring, in theory, bolster grades, and if this were true, I would expect the GPA to increase when a student matriculated. I would also expect the GPA to improve as the student goes further into the program. For League students it does not.

Accumulation of Credits. In order to graduate, students must complete a specified number of credits. In my study, Regular students in degree programs completed more

credits than did League students, and in the total group Regular students completed more credits. There was no difference between the two groups through several iterations of the one-way analysis of variance when I controlled for completion or for the type of award for a major program. This was demonstrated by the negative and significant coefficient for League students in the OLS equation for Total Completed Credits, $\underline{b} = -4.108$; when I selected for graduates, both significance and strength disappeared.

Arts and Sciences students earned fewer credits than vocational students, but receipt of financial aid and enrolling in a degree program tended to increase the number of credits earned. That is no surprise since degree programs involve twice as many credits as diploma majors and as much as four times as much credit as a certificate major. Enrolling in remedial courses also increased the number of regular credits earned, a finding common to numerous studies of credits and attainment in higher education.

In addition, the Goals frequently selected by League students, Undecided and Personal Goals, also had negative coefficients. Further, participation in League was associated with enrollment in diploma programs which also limited the potential for accumulating credits. This trend held, however, in analyses selecting for graduation, the 30 credit threshold, and even in total enrollment.

Grade Point Average. Grade Point Average was an important predictor of Total Completed Credits for the total group of students. League students appeared to get a "jump start," since the average GPA for the credits students earned while in the League (school-based programs) was 0.4 points, almost one-half grade higher than their cumulative GPA. Though League students had a higher GPA as a total group than did Regular students, the difference was not significant when selecting only graduates.

A subset with a low GPA were those student who accumulated an equal number of vocational and Arts and Sciences credits, regardless of major program (Figure 10). In this group, League students may have been exploring courses because they had a higher

GPA and a higher credit accumulation (GPA = 1.9, 11.4 credits) than similar Regular students (GPA = .5, 4.5 credits).

The variable GPA provided one of the few instances in my study where pre-college or background variables contributed an effect to an equation when Academic Preparation was significantly associated with increases in the grade point average. The second instance occurred in the analysis of Enrollment Intensity, where the model of graduated students changed with the inclusion of Parent Education. The latter was also the second instance where an interaction term significantly modified the main effect of other variables in the equation (the interaction between Status and Enrollment Intensity). While Status had a statistically significant effect on the GPA of League students, the effect of Status x Enrollment Intensity was different for League than for Regular students.

Overall, background variables showed no effect in the presence of the academic and other variables in the study. SES simply was not a factor at this level of education, even though many studies have focused on the effect of background (cf., Havemann & Wolfe, 1995). With my students, League and Regular alike, background variables were just less important than the educational experience itself. Thus SES may exert an influence over the lifetime and it may contribute to student success in K-12, but it had little to do with my study. Academic Preparation, on the other hand, did not fit neatly as a background variable, because it represented the ability to perform knowledge-specific or skill-based tasks on a criterion referenced-test.

Thresholds, Awards, and Intensity. In Hypothesis VI, I introduced the 30 credit threshold as an alternative to Award Type. The curricula of Erewhon Technical College includes multiple levels of awards nested within over 4 dozen major fields of study, which added to the complexity of my study. Since there were only a handful of certificates awarded to my participants, my first threshold was the diploma or, alternatively, 30 credits, which is roughly equivalent either to a diploma or to the completion of the freshman year of college. Overall, nearly half (45%) of the study population reached the

threshold. Surprisingly, although Time To Award was less for League students, Time to 30 credits was less for Regular students. Compared to Time To Award, a limited amount of the variance ($R^2 = .116$) was explained by Enrollment Intensity, GPA, Status, Enrolling in Developmental Education, Goals, and Gender, and the interaction term, Status x Enrollment.

Why is this result different from Time To Award? My conclusion is that League students enrolled in shorter programs, thus the aggregate time to diploma/degree was less. When controlling for diploma programs, the League experience gave them a head start, as did the curricula, which were more likely to be Vocational Technical and of shorter duration for a diploma program. But in terms of the longer programs, there was no significant difference between the two groups in Time To Award, in spite of the "jump start" from participation in League. And again, the introduction of the interaction term was significant within this equation. Of those variables, the most important was Goals, and the two categories that were associated with decreased time to 30 credits were the intent to Transfer and the intent to Graduate (negative coefficients), precisely the areas that were associated with Regular status.

Enrollment Intensity is worth further consideration, especially as a predictor where the dependent variable was Time to 30 Credits (CREDSUM2). This is yet another demonstration of the complexity of the problem, explaining the increases in variance when controlling for student outcomes in the models, increasing from $R^2 = .116$ for all students to just $R^2 = .132$ for students reaching the 30 credit threshold, to $R^2 = .285$ for graduates. Key variables were GPA, Goals, Major, and Gender. That is, increases in GPA were associated with increases in Enrollment Intensity. Personal Goals were associated with increases in Intensity, as was Graduation; but Professional Goals were associated with a decrease in Intensity. Transfer Goals (for all students) were associated with an increase of Intensity, but for those who earned 30 credits and for graduates, it was associated with a decrease in Intensity. It is conceivable, then, that students who intended

to transfer were first at the community college "testing the waters." Oddly enough, increases in Academic Preparation were associated with increases in Enrollment Intensity for all students and for those who earned 30 credits, but Academic Preparation increases had no association with Intensity for those who graduated. When I dropped it from the equation and tested other variables for effect, I was surprised to find that Parent Education exercised a dramatic impact on the model for graduates, adding roughly .07 to the model R^2 even though the coefficient for Parent Education itself was not significant. That type of sudden or dramatic increase has been, in my study, the product of interactions. Parent Education interacted with Goals. In effect, I read their interaction coefficients and effect on the R^2 as a significant contribution to understanding completion in this community college. Moreover, both Goals and Parent Education are preconditions for enrollment, that is, background variables in effect.

What contributes to completion, graduation within the various categories of Status? In Hypothesis VII, I entered variables into a logistic equation with Graduation as the dichotomous dependent variable. The variables in the final iteration of the equation were, in this order of importance or effect, GPA, Enrollment Intensity, Goals, Major, Award Type, and finally, Status.

COMMENTARY

School-based dual credit programs may be evaluated, in part, according to their stated purposes. The League concept at Erewhon Technical College was initiated as a "vocational education cooperative" in 1991 to maximize declining resources. Partner schools focused on sharing facilities, personnel, equipment and curricula, with the first curricular offerings in health occupations and industrial technology. The stated purposes were to expand course offerings, increase access to postsecondary education, and offer opportunities for "advanced placement" in career programs. The agreements detailed the inputs, facilities, financial structures, equipment or hardware, but they did not address

evaluation or outcomes in the sense that "outcomes" have been defined in the last decades of the twentieth century.

Evaluation has consisted of reports on the number and makeup of partnerships, total enrollments, enrollments disaggregated by school and by major emphasis, and by financial statements showing total expenses, direct and indirect expenses, and net income (usually a loss) for each year. In short, evaluations have been status reports, perhaps cursory and casual, and I suspect that the tendency has been to avoid "tinkering" with a program that "works."

Though acceleration (advanced placement in career programs) was a stated goal, none of the documents speak of placement history in ETC, or of transfer, nor do they report any modifications to improve placement. These are typical, I suspect, of many such agreements throughout Iowa; the stated intent was to provide fiscally sound, smoothly operating programs that adhered to legislated requirements for agreements between public bodies. It is appropriate, however, to test the program on educational outcomes that are recognized within the education community, especially when these outcomes are part of the language of reform and accountability initiatives, the yardstick against which such programs may be measured in the future.

The question, "How does the program measure up?" does not have a simple answer. League participation did not increase rates of completion (graduation). League students did not outpace regular students in either the percent graduating or in the percent reaching the 30 credit threshold. In terms of rate, accelerated time to completion, the time as a matriculated student was less for League participants in diploma programs but not in associate degree programs. Given the goals of students enrolled in League programs, that was not surprising. On the one hand, the student-stated educational goals suggest a lesser degree of commitment and/or motivation than that of Regular students. League students were often undecided about why they enrolled, or they enrolled for personal reasons. On the other hand, their lower level of Academic Preparation implies a

longer Time To Award. For every analysis in this study, enrolling in remedial courses or even falling below an assessment cut score was associated with a longer Time To Award. Under these circumstances, it might be reasonable to argue that League students were, in fact, a different type of student, except that the total number of credits they accumulated by type of award was essentially the same.

That the students were less well-prepared academically, along with anecdotal evidence, suggested a tendency by some schools to use vocational courses as a surrogate for remedial courses even in the college level school-based programs. Yet again, the grade point averages for League students in League classes were higher than the grade point averages for the same students who matriculate and become regular students. In the view of critical observers, this makes a case for grade inflation and for a non-equivalent curricula.

From another point of view, I saw a potentially successful program. My study shows that the League improved access for less advantaged groups of individuals, thus it satisfied the commonly stated goals (Clark, 2001) of expanding access to college for students whose plans likely did not go beyond finishing high school. The main pieces of evidence were the initial levels of Academic Preparation, the high percentage of first generation students, and, inversely, the lack of clear goal statements, plus the choice of major emphasis. Granted, their grade point averages declined after matriculation, but there still remains the fact of completion or of attainment of a specific threshold. Specifically, four out of five graduates in this study, both League and Regular, were in Vocational Technical programs. League students were significantly lower in measures of Academic Preparation, they came from rural areas, and most were undecided or have personal goals, that is, they were not sure about going to college. By "testing the waters," a portion of those apparently found something of value in the technical college programs. Before I concede that the graduation rate is low, or embarrassing, I must acknowledge that I lack a reasonable yardstick against which that rate should be measured.

From a different point of view, I might argue that the League classes are a disservice to the regular college curriculum, because those students were earning credits possibly devalued by grade inflation, or perhaps through a watered down curriculum. Thus League programs, if not fixed, have the potential of diminishing the value of the credential on campus, which they would not do, if the composite of course rigor and resulting grades were that much better.

To make either assertion without further study is simply politicizing what might be very promising school-based programs, with an unbalanced relentless focus on oversimplified statistics.

Limitations and Specifications

I anticipated that this study would be limited by access to certain variables, and, indeed, that was the case. Those included: ACT scores, since many of these students do not submit ACT scores; high school rank and GPA, which seemed not to be required under current admissions policies (those policies may vary by major). I also anticipated limited access to records of League students who enrolled directly in the university system. Currently, university admissions offices report progress for "Transfer" students but not for students who enroll in dual credit courses and enroll subsequently in the university system without becoming a "regular" student at the community college. Also, state-wide data were not "accessible" because they lacked consistency, and my study remains single-institution research. Thus lack of data describing comprehensive patterns of attendance both for alternating or simultaneous institutions was also a limitation, particularly for the transfer outcome.

A number of students start in League, over four times those who matriculated, yet ETC does not know about their history of attendance at other institutions. The university system, for example, reports back on students who had matriculated at ETC and later transferred, but not on those enrolled as secondary students only in League or PSEO classes. Assuming that all students with earned dual credits could be accurately extracted

from the computer information system, tracking their enrollment history would be a complex and costly project.

My study was limited by factors that I do not know, what I could not learn from the data within the parameters of this study. For example, remedial education is not mandated for students who scored below the cut points in math or verbal skills, and apparently a great number of those students did not enroll in remedial courses. I would like to know, but do not, what strategies were used to compensate, whether it was the tutoring software, tutoring, or simply retaking the assessment tests until achieving a passing score. I do not know if contextual issues, such as student housing, student life, counseling or advising affected the completion or Time To Award of the students in my study. I do not know if the students have a high school diploma, an equivalency diploma, or if they did not complete high school, since this information is not generally required for admission and because it was not consistently recorded in the hard files or in the electronic database. Marital status and dependents were not part of the database, though for this college that may not be a reasonable expectation.

In terms of limitations of methods or analysis, attrition and reduced numbers are a concern of any longitudinal study (cf., Desjardins & Pontiff, 1999) where lower than expected numbers, especially within certain award types, create variance problems within levels of analysis. Also, I am concerned that levels of analysis employed do not account for recursiveness of variables where effects are not just in one direction, or where the coefficients may vary over time.

This longitudinal design suffers from the inadequate handling of "censored" data. Censoring takes place when the outcome (graduate, stopout, dropout, for example) was not known for an individual during the period of observation, most often where some students continued, remained enrolled beyond the final observation period (Summer semester, 2001). Known as right censoring, this may cause estimation problems such as

severe bias or loss of information when standard regression techniques are used to estimate longitudinal events (Allison, 1984).

Both recursiveness and "right censoring" suggest the need for additional analysis that is beyond the scope of this study. That, for example, is a good reason to pursue this database with event history analysis.

Research, Accountability, and the Status Quo

The level of educational attainment of League appeared to be less than for Regular students, and this lack of consistency suggests the need for improved coherence between systems.

My study is constituted in the research process as much as it is with the students and programmatic subject matter I have reported on to this point. What I did not realize when I began was that the data had not been managed. Much, in fact, was unsystematically discarded, at the worst, or warehoused, at the best. One instance that typified this occurred when, waiting to meet with assessment staff, I overheard a conversation with a young woman who was returning to the college to pursue a second career. The young woman did not understand why, if she had taken the assessment battery five years ago and if she earned a degree in one program, she should have to be tested again to enter another. The staff member explained that until just recently they did not keep scores for more than three years, thus the college had no record of her previous testing. Nor for that matter, did the college value any of the demographic information that comes from the background questions that accompany the assessment test. So, for this study, I located and literally resurrected much of that information from old servers and electronic files, reconfigured it, and recycled it.

There are two major problems that ought to be addressed by Erewhon Technical College if the college is interested in improving programs and services.

1. The first is that the college did not establish or follow systematic, informed procedures for collecting data. I found that key data elements

were collected, at best, on individual students, haphazardly, with no effort or apparent concern that it (that data) be accessible for analysis, evaluation, or for decision making.

2. The second problem is the level of commitment to evaluation and improvement.

Adelman proposes that dual credit is "one answer" to the question about how higher education might improve or help provide equitable opportunity to learn for secondary students. Dual credit is one of the answers in his tool box; unfortunately, the ETC tool box for dual credit is like the tool box in many garages, it is half empty and in a state of disarray.

The endemic suspect data that I encountered in my study is symptomatic of several trends. The first trend is that the value of evaluating outcomes of programs and services at two-year colleges seems to be at odds with the entrepreneurial spirit that gets needed programs up and running. Since colleges are not the "business" world, a program that is running, albeit off-track, is better than no program at all. The second trend is that the information systems, the databases, at too many colleges have been enslaved by the technocrats of the computer world. At ETC, when searching for electronic data, I discovered example upon example of data elements that were ignored because there was no convenient "field" to enter them(such as computer placement scores and background data), data that were coded and entered with inconsistent guidelines, or data that were just entered inaccurately. Until recently, decisions about data at this college were made by persons lacking the background needed to understand policy issues and lacking training in research or analysis.

LESSONS AND RECOMMENDATIONS

My first premise is that educational institutions, in this case school districts and colleges, share responsibility for the programs that they offer, and that responsibility

extends to outputs and outcomes. This implies the obligation to document what has been done in a way that is useful. Completion and Time to Award have long been a part of databases, and if outcomes are to be understood, other data must also be collected. The nature of the following recommendations implies that they would result in improvements to the current system.

1. First, the college, with this study and the data assembled to support it, has the opportunity to examine the League, its school-based offerings, to evaluate the mission of the program, its target or client audience, and what programmatic improvements to implement to better serve the interests of the partnerships and of the client students. The college has an historical commitment to "serving the underserved," providing programs and services not available in the college district. As the League partnerships have evolved, a significant portion of their offerings appear targeted at academically disadvantaged students, unwittingly, I suspect. However, this revelation, that many of its students are potential candidates for developmental support, aligns itself with current discussion about mandated developmental/remedial education. It also raises important questions about curricular content. On the one hand, are the courses offered, whether vocational or in the liberal arts, equivalent to those offered on campus? If they are not, the college should consider modifying its curricular offerings rather than (in effect) having two standards for the same course.
2. The college should apply without exception the same standards for admissions for League classes as for regular classes, including prerequisites and entrance testing. League students in this study started attending classes without completing an admissions form and when they registered for classes as regular matriculated students, some were still not required to complete an admissions form. League

students should complete an admissions form, even though it is inconvenient, and they should meet appropriate assessment standards.

3. The college should document admissions to the programs and document student progress. In the current system, it is difficult to identify the current status of a student (League or Regular), to tell when a student first enrolled and under what conditions, when the student last attended classes, whether or not the student failed or withdrew from classes and under what circumstance (multiple codes for withdrawal).
4. The college should incorporate into its database appropriate information that is useful for reporting, research, and evaluation, which it should willingly and intelligently use.
5. Decisions about data, what data are to be kept and how, should reside only with those who can appropriately make decisions based on principles of research and evaluation.
6. Initiatives, such as the League partnerships, should plan and implement strategies for evaluation and continuous improvement. They should report the results of those evaluations within the college governance structure and to partners in the initiative.
7. While the admissions process should consistently incorporate data from standardized testing and prior academic performance, it should also articulate additional standards that allow it greater flexibility to adapt to a wide range of student needs.
8. The college should assure that articulation of performance standards are expectations of college level work.
9. The college should track completers and the timeframe within which they attain success, levels of completion, and where and how they transfer.
10. The college should utilize the assessment data (revitalized for this study) and some of the findings of this study as the college continues to discuss its developmental

education policies. It should incorporate data from its own students along with those from prominent national studies.

Further Research

Scholars, such as Pascarella (1999), lament that community colleges are neglected within the body of research, even though about half of the nation's freshmen begin at that level. Part of that neglect is the inability to get data from two year institutions because they do not collect it. Questions for additional research include:

Can other types of data, such as studies of student engagement, answer additional questions about League participants, their study habits, attitudes, and motivations?

The data here should be interpreted using other types of analysis, such as event history, to further clarify the importance of variables over time.

For the existing dataset, employment data might be sought to further identify the benefits/outcomes of participation in a League program, including employment concurrent with enrollment as well as subsequent employment.

Additional study might include efforts that incorporate data from other colleges for students in this study and for those who bypass community college after League and Postsecondary options.

Finally, this data would support a study of developmental education testing and how the results of test scores are associated with long term student outcomes, not just for those in this study but for others throughout the college as well.

Final Comment

Finally, though I did not intend that this study would be exploratory, I came to realize that many of the students in this specific program were atypical, that they were dissimilar from "traditional college students" and because of the rural and vocational emphasis of some League partnerships, theses students might be different from those in other dual credit programs. Consequently, the college must be conscientious as it applies standards and procedures adopted in different contexts. For example, a persistence

remedy from a four-year institution might not wear well at a two-year college, and, for that matter, even within two-year institutions, a "remedy" (e.g., mandated remedial courses) that works with one constituent group might not work at all with another.

For years the mantra of two-year institutions has been "One size does not fit all." However, these colleges cannot know what "size" fits their constituents if they do not record appropriate measurements.

APPENDIX I

A VOCATIONAL EDUCATION COOPERATIVE:

A PRELIMINARY PLAN

EREWHON TECHNICAL COLLEGE

EREWHONVILLE AREA REGIONAL VOCATIONAL CENTER

August 1991
A Vocational Education Cooperative: A Preliminary Plan

Before the attached proposal could be drafted a lot of things needed to be worked out. Working with four individual educational agencies (i.e., Erewhonville Community School District, Erewhonville Job Corp, Erewhon Technical College, and the Crawford County Superintendents Association) meant that several initial brainstorming sessions needed to be held. From these preliminary conversations five basic areas of decisions were agreed upon:

1. That the preliminary plan should be drafted so that each of the governing boards of these organizations could examine the plan and individually make the decision as to the extent of their participation.

2. The preliminary plan will begin in the areas of Industrial Technology and Health Occupations as early as August 1992.

3. As the plan unfolds, each of the other vocational areas will be examined as to what opportunities might exist for further joint ventures.

4. Questions concerning scheduling, programming, budgeting, facilities, equipment, staffing, and advanced standing or credit will need to be resolved as the program evolves.

5. Once the preliminary concept is approved, discussions of implementation strategies will be conducted with the appropriate staff members of each agency.

EREWHONVILLE AREA REGIONAL VOCATIONAL CENTER

August 21, 1991
Collaboration Plan
Erewhon Technical College
and
Erewhonville High School

HISTORICAL PERSPECTIVE

With unprecedented challenges ahead, schools of the future must not merely help students achieve academically in school, but prepare them to lead fulfilling lives after graduating as well. Educators throughout the country are on the verge of a new chapter in shaping better schools. The call to "restructure" out schools comes from a broad spectrum of stakeholders.

In a state where educational and occupational training of its youth and adult populations has long been recognized as a major priority, Iowa has faired well compared to other states. However the contents of the 64-page Conditions of Education Report in 1990 indicate that Iowa may have reached a plateau in the quality of our system, if substantial changes are not made in the structure of how we educate our students.

In order for the state to remain in the forefront of educating an advancing changing work force, its educational system must provide programs which result in a competent and productive population that is well trained and able to adopt to a wide variety of challenges. These programs and services must be delivered in a manner that will encourage all individuals that desire and/or could benefit form such training to participate. A comprehensive and diverse quality vocational education must be assured to all citizens of the state.

To this end the Iowa Legislature passed Senate File 449 which includes the establishment of basic vocational competencies. This legislation also requires that instruction be competency based, articulated with post-secondary programs of study and must include field, laboratory, or on the-job training.

The Department of Education has also called for school districts throughout the state to initiate business/education partnerships that examine the skills needed for work. A national survey of employers has identified seven skilled groups that are crucial to being successful in the work place. These include:

Learning-to-Learn
Listening and Oral Communication
Competence in Reading, Writing, and Computation
Adaptability: Creative thinking and problem solving
Personal Management: Self-esteem, goal-setting, & motivation
Group Effectiveness: Interpersonal skills
Organizational Effectiveness & Leadership

The Crawford County Superintendents Association has requested that cooperative vocational offerings throughout the county be examined and possible cooperative ventures be investigated. Eight area school districts joined a cooperative vocational venture in May of 1991 that primarily was established as an avenue to deal with the Carl Perkins vocational funding.

At the local level the Erewhonville Community School Board, this year, established as two of its five major goals the examination and development of a comprehensive K-12 student at-risk program, and a thorough investigation of its existing non-college bound curricula.

Coupled with the above movements is the construction of the Erewhon Technical College regional facility in Erewhonville that will be fully available in September, 1992. The additional possibility of linkages through the utilization of the Erewhonville Job Corps programming makes the timing of our investigation into cooperative vocational programming perfect.

PROPOSAL

That Erewhonville High School and Erewhon Technical College join together to provide educational programming in the area of vocational education for the students of Crawford County and surrounding area.

RATIONALE

Collaborative efforts are being sought to provide optimal educational opportunities to all students of the Erewhonville Community High School and the surrounding communities and to utilize the advantages available by pooling resources.

POSSIBLE COURSE OFFERINGS AND INSTRUCTIONS SITES

Health Occupations - New Facility
Health Exploratory Unit
EMT

Nurse's Aide - (Certified)
Home Health Aide
Child Care

Metal Technology (Welding and Foundry) - Erewhonville Job Corps

Electrician - Erewhon Technical College New Facility
Electronics - Erewhon Technical College New Facility

Plumbing/Heating/Sheet Metal - Erewhon Technical College New Facility
Heating/Air Conditioning - Erewhon Technical College

Construction Trades - Erewhon Technical College New Facility

Auto Mechanics - Erewhon Technical College TBA
Small Engines - Erewhon Technical College TBA
Diesel Engines - Erewhon Technical College TBA
Auto Body Erewhon Technical College TBA

Architectural Drafting - Erewhonville High School
Mechanical Drafting/Mechanical Drawing - Erewhonville High School

Power and Energy (Intro. Course for H.S. or Fundamentals of Mechanics at Western Iowa Tech)

Robotics - Erewhonville High School

Car Maintenance - Erewhonville High School

Home Economics - Erewhonville High School
Culinary Arts
Parenting

Agricultural Technology - Erewhonville High School
Ag Science I
Ag Science II
Ag Science III
Ag Science IV

Business Education/Marketing - Erewhonville High School

Accounting I	Marketing
Accounting II	Record Keeping
Accountting III	Shorthand

Business Law
Typing I
Data Processing
Typing II
Entrepreneurship Word Processing
Management of Small Business

SCHEDULING

Courses would be taught in the afternoon during two 90 minute time blocks:

Block A: 12:00 p.m. - 1:30 p.m.
Block B: 1:45 p.m. - 3:15 p.m.

Each class would meet daily and be worth two semester credits toward LEA High School diploma. Upon successful completion, credit or advanced standing would be given toward an Associate Degree from Erewhon Technical College.

TRANSPORTATION

When needed, the Erewhonville Community School and other participating secondary schools would provide transportation to the appropriate site.

FINANCIAL AVENUES AVAILABLE

The Erewhonville Community Schools will pay tuition to Erewhon Technical College for each student enrolled. A minimum enrollment of 13 students per course is required. If the enrollment is fewer than the minimum, Erewhonville Community Schools will pay the tuition necessary to equal the amount for 13 students. When appropriate, courses with fewer than 13 students may not be taught.

SUPPLIES AND EQUIPMENT

Erewhon Technical College will provide the needed equipment for each course. Erewhonville High School will loan the existing equipment to Erewhon Technical College to assist in outfitting the program.

CURRICULUM

The competency-based curriculum will be jointly agreed upon and will meet all state standards outlined by the Department of Education, including performance

assessment of skills and identify specific competencies in mathematics, written, and oral language.

STAFFING

Students from Erewhonville High School must be instructed by personnel having valid Iowa Vocational Certificate in the area of instruction. At the minimum, if two instructors are provided for a course, one must have a valid certificate.

TIME LINES

October, 1991 - Approval by the Erewhonville Community School Board

January, 1992 - Course enrollment determined by Erewhonville High School

April, 1992 - Staffing completed

May, 1992 - Curriculum completed

July, 1992 - Facilities and equipment in place

THE APPARENT ADVANTAGES OF THIS PROGRAM

1. Expanded vocational opportunities.
2. Better vocational opportunities due to state of the art equipment.
3. Fully articulated vocational program with Erewhon Technical College/Erewhonville Job Corps/Buena Vista College.
4. Possibility of students receiving several hours of advanced standing college credit for free before completing high school.
5. Addressing the employment needs of the community.
6. Increased linkage between business and education.
7. Address district goals for students.
8. Possible reduction in high school drop-out rate.
9. Possible increased cooperation between county schools in vocational education.
10. Eliminate duplication in equipment, instruction, and personnel.
11. Program meets and exceeds Senate File 449.
12. Improve utilization of facilities at Erewhonville High School and Erewhon Technical College.
13. Possibility of playing part in the stimulation of economic development within the community.
14. Potential for financial benefits through cooperation funding, sharing, and grants.

APPENDIX II

2001 SURVEY OF LEAGUE OF SCHOOLS STUDENTS

EREWHON COMMUNITY COLLEGE

INSTITUTIONAL RESEARCH OFFICE

HIGH SCHOOL/COLLEGE DUAL-CREDIT ENROLLMENT – Student Survey

Our records indicate that, as a high school student, you once were or currently are enrolled in one or more courses for dual credit, that is, you took courses for which you received both high school and college credit. We are interested in your experiences as a dual-enrolled student.

First, why did you enroll in classes for dual-credit? Check as many of the reasons listed below as apply.

to get a jump start on earning a college degree	to learn the particular skills taught in a class
many friends also enrolled	high school teacher's and/or counselor's encouragement
was not aware it was a dual-credit class	Other _____

The statements below suggest possible influences that your participation in dual-credit courses had on you. Think about those classes *in general* and check a response indicating your opinion on each statement: **SA**=Strongly Agree, **A**=Agree, **D**=Disagree, **SD**=Strongly Disagree, **NA**=Not Applicable.

As a result of taking classes for dual-credit, you:	**SA**	**A**	**D**	**SD**	**NA**
developed better study habits					
learned to manage time more effectively					
had more realistic expectations of college work					
became better informed in choice of college major					
gave class assignments and projects more serious attention					
were exposed to higher academic requirements and standards					
became motivated for college, when before you were not					
learned the technological skills necessary for chosen field of work					

Please rate...	**Excellent**	**Good**	**Fair**	**Poor**	**NA**
the quality of instruction you received in dual-credit courses.					
the facilities in which the classes are held.					
your overall experience with dual-credit courses.					

	Yes	**No**
Would you recommend to a high school student that she or he take courses for dual-credit?		
Do you plan to enroll or will you re-enroll as a traditional college student at Western Iowa Tech		

Why or why not? _____

Thank you for completing the survey. Please fold it so that the colleges address appears on the front, and mail it back to us by **Sept.5th**

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