Enhancing adult student persistence: The relationship between prior learning assessment and persistence toward the baccalaureate degree

by

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CHAPTER ONE: INTRODUCTION

Adult students follow many paths to college. They often return to college later in life after having left college as a traditional student. Many come to college for the first time several years after high school. Often they approach college after some change in their work, family, or personal situation. Adult students experience college in addition to the rest of their life. Their college connection comes within a web of other connections.

> Adult students are examples of centrifugal growth, of academic growth towards outward roles and experiences. Adults do experience the inward journey of intellectual and personal development, but they also have an outward journey of self-efficacy. They significantly impact the daily lives of their children, their families, their fellow workers, and their communities. These individuals translate and apply the knowledge and skill of the undergraduate experience to their daily world of adult life. The undergraduate classroom, the family gathering, and the workplace staff meeting are all of equal importance in a teaching-learning exchange. As adults, they value and wish to learn expertise from the undergraduate experience, but they also view themselves as experts in their own domains of life. Adults do not live apart; rather, they are a part of their world. (Kasworm, 1990 p. 366)

These connections and experiences make them both very committed to learning *and* more likely to leave college. They have higher grade point averages *and* they are more likely to drop out. They actively participate in classroom dialogues *and* have trouble trying to balance the demands of work and family and school. They experience life changes that fuel a return to college and that paradoxically also stall or block their persistence.

Outcomes from college

Completion of the college degree does matter. Adult students who complete their objective report greater self-esteem, tolerance of opposing views, greater capacity for critical thinking, an orientation toward learning as a practical tool, and a wide range of new interests (Cupp, 1993). Growth in knowledge and skill is one of the most important outcomes from completion of college. Astin (1993) reports that outcomes for traditional age students from college graduation include a positive self-image that arises out of a greater sense of social and academic competence as well as a greater level of concern for social and environmental justice. It seems reasonable to suggest that the results for non-traditional students are similar.

The economic pay-off from college completion is dramatic. In an economy shifting toward the knowledge sector, the presence of a college degree matters. Another way of stating this advantage is: with each increment of education, annual compensation rises. In Table 1 the average annual compensation for all people age 25 and up in 1997 rises dramatically with each increment in education.

The projected lifetime earnings from age 25 to normal retirement at age 65 would be $654,960 higher for women who complete the college degree over those who are high school graduates and $866,920 higher for men.

Table 1 - Mean earnings of people 25 years old and over, by education and gender

Education level	Men	Increase in Annual Income	Women	Increase in Annual Income
High school graduate	$25,453		$13,407	
Some college	$30,536	20.0%	$17,153	27.9%
Associate's degree	$32,930	7.8%	$21,073	22.9%
Bachelor's or higher	$47,126	43.1%	$29,781	41.3%
Bachelor's degree or higher increment over high school		85.1%		122.1%

Note*:* These data are for 1997 and are adapted from the U.S. Bureau of the Census. http://www.census.gov/hhes/income/histinc/p13.html

Nontraditional students who come to college with some college in their background will find the differential to complete their degree is $663,600 for men and $505,120 for women. When this analysis is restricted to full-time, full-year workers as is seen in Table 2, the gender gap in the education advantage changes. In Table 2, the projected lifetime earnings for full-time, full-year workers from age 25 to normal retirement at age 65 would be $638, 840 higher for women who complete the bachelor's degree or higher over those who are high school graduates and $889, 400 higher for men. Nontraditional students who come to college with some college in their background will find the differential to complete their degree is $700,200 for men and $468,120 for women.

It is reasonable to believe that the advantage enjoyed by workers with college degrees will continue to grow in the years ahead as the decline in manufacturing jobs and the growth of information sector jobs continues. College completion has personal, economic, and social consequences that outweigh the costs of attendance.

Table 2 - Median income in 1997 for full-time, full year workers by education and gender

Education	Men	Change	Women	Change
High school graduate	$31,215		$22,067	
Some college	$35,945	15.2%	$26,335	19.3%
Associate's degree	$38,022	5.8%	$28,812	9.4%
Bachelor's or higher	$53,450	40.6%	$38,038	32.0%
Bachelor's or higher increment over high school	$22,235	71.2%	$15,971	72.4%

Problem statement

Despite the advantages of degree completion and the growth of programs intended to help adult students gain their degree, adult students find it difficult to persist to graduation. They face a series of barriers arising from: their situation at work and home, their level of confidence and goal commitment, their interaction with the college or university, and their level of academic preparation and (occasionally) capacity. Cross (1981) examined three types of barriers to learning: **dispositional, institutional**, and **situational**. This typology (with the addition of **academic performance**) will be used to organize the research on persistence factors in the literature review. Researchers have identified factors within each element of this rubric as having an impact on persistence.

Many adult students overcome the barriers. The background factors (gender, age, high school record, etc.) are simply not changeable. Adult educators have searched for ways to help adult students persist. One intervention that has grown dramatically since the 1970's has been the use of prior learning assessment (PLA). Colleges commonly provide prior learning assessment (PLA) to adult learners. "PLA is a process whereby any learning…acquired before the assessment and…not…transcripted by a college is evaluated

to determine whether it is comparable with what is taught in college and, if so, is recognized by the award of college credit" (Lamdin, 1992). The two forms of PLA are the course specific form (or challenge form) and the portfolio form. The portfolio form is the focus of this study.

Students who complete the portfolio form of PLA persist at higher levels than do students who are eligible and do not complete the portfolio. In addition to the increased credits the portfolio completers gain, it is argued by Burris (1997) and others that the portfolio completion process has the potential to change both the learner and the relationship of the learner to the college. It may be true that this change leads to greater persistence. Other studies report that an improved self-concept, greater confidence, and a feeling of social and academic integration seem to be products of the portfolio completion process. The affective factors will not be the focus of this study but they are suggestive of reasons for the higher persistence of students who complete the PLA portfolio. This study will develop a model that will enable the comparison of persistence among eligible students who complete the portfolio or do not complete the portfolio.

The key research questions can be summarized as follows:

- Do each of the variables of gender, age, high school performance, number of prior credits, and participation in the PLA portfolio process predict persistence?

- Do students who are similarly situated (gender, age, high school performance, number of prior credits) persist at higher rates if they complete the PLA portfolio process?

The study will use logistic regression to control for a set of the background factors associated with persistence in order to assess the unique contribution of the PLA portfolio to persistence. The background factors are gender, age (at time of start), high school performance (rank in high school), and number of prior college credits. In addition, the study will include the outcome measure of grade point average attained in college. By the selection of a sample of only part-time degree seeking students, the factor of intensity of study (full-time v. part-time) is removed from consideration.

Site selection

Simpson College was chosen because it is the workplace of the researcher. Permission for use of this data was obtained from the college president. The adult learning program of the college is typical of such programs at private liberal arts colleges and has been in existence for nearly twenty years. Data for the college under study were compared to national data in an earlier unpublished paper (O'Brien & Pearson, 1996) and the population was similar in most respects to that profiled in a study of the 1989-90 class of older undergraduates by the National Center for Education Statistics (Choy, Premo, & Maw, 1995). One caution: Simpson students had much higher rates of employer support in the form of tuition reimbursement (81% in a spring, 1999 survey) than the national sample. The researcher was unable to find published studies on the effect on persistence of employer support. It is likely that employer support has an impact on persistence, as do other grant forms of financial aid.

Ethical considerations

The primary ethical consideration would be to maintain confidentiality of student

files, especially those related to academic progress and financial aid. Removal of names

from the file for each student and replacing them with a file number has enabled

confidentiality.

Validity and reliability

The entire target population is included in this study. The key question for

generalizability will be whether there are anomalies at Simpson that would make the results

of little value in understanding trends at other colleges. Such anomalies may include the low

rate of participation in the PLA portfolio process (published reports include only two

colleges on the rate of participation and the Simpson data is similar in this regard) and the

high rate of employer tuition support for the Simpson adult students (81% reported tuition

reimbursement in a Spring, 1999 survey). The rules for the PLA portfolio process vary from

institution to institution and there may be aspects of the Simpson program that may limit

generalizability.

Validity refers to the "appropriateness, meaningfulness, and usefulness of the specific

inferences researchers make based on the data they collect" (Fraenkel & Wallen, 1996, p.

153). Validity and reliability arise, in part, through the instrument used to collect the data.

Since the primary form of evidence upon which this study is based are the student transcripts,

instrumentation is only a concern if the transcripts are inaccurate. The author is not aware of

any reports of inaccurate transcripts at this institution.

Another validity concern that arises is the choice a researcher makes in choosing one

form of data over another to represent a construct. In this study, the researcher has chosen

high school rank as the data which measures a construct called "prior academic performance." This is not the only way of measuring prior academic performance. Alternate measures that were partially available were ACT or SAT test scores from high school and the high school grade point average. These were rejected as inappropriate (for reasons explained in the section titled "Choices among data forms for variable construction" on page 87). It has been argued that more contemporary measures of academic preparation and capacity are needed for adult students (see the section entitled "Prior measures of academic performance" on page 38). The longitudinal nature of this study precludes the development of that type of data. Thus, the choice of high school rank ends up being the best choice among several possible to represent prior academic performance.

Simpson College does not fully transfer vocational and technical credits, so the variable of "prior credits" may reflect a class bias against working class students, who are most likely to submit such credits for transfer. The variable of "contemporary grade point average" may reflect a bias in favor of this part-time student group because the part-time students at this college exhibit a higher GPA than the full-time students.

It is possible to criticize the categorization of gender into the two categories of male and female, but that debate is not the purpose of this research and this is a commonly accepted construction of the variable. This researcher is not aware of relevant issues for the age variable.

Limitations

There are a number of limitations inherent in this study. It is clear from the literature that the type of goals and the clarity of those goals influence the persistence of adult students

in higher education. Motivation matters in persistence. There are many influences on motivation. This study does not measure goals or goal clarity or the factors that influence motivation. This study does not measure how many times the adult students found situational or dispositional or institutional barriers too difficult to overcome. Dispositional and institutional barriers are not included in the study. The situational barriers of work intensity, children, life changes, and finances are not included. This is a longitudinal study of outcomes and suffers from all of the limitations of such a study.

We do not know if participation in the portfolio form of PLA causes greater persistence. This study does not address that question. If PLA participation is significant after controlling for other variables, it is plausible to argue that only the most committed students pursue PLA credits and PLA participation is, at best, a proxy for a high level of commitment. It is equally plausible to argue that PLA participation leads to greater commitment and to a new self-perception that is powerful in supporting persistence in college. It seems possible that that both of these assertions are at least partially true.

Summary

Adult students do not persist at the same rates or in the same way as traditional age undergraduates. They experience a variety of barriers in their quest to complete the college degree. Their persistence is a significant national issue. This study will assess the contribution that prior learning assessment makes to adult student persistence. In Chapter Two, the scope of adult participation in higher education is examined along with a detailed analysis of the problem of persistence. The literature on adult student persistence will be organized using the Cross typology and divided into factors within the typology. The

chapter ends with the theoretical basis for prior learning assessment and common processes

involved in PLA. Chapter Three takes up methodological issues and provides an overview of

the population involved in the study.

CHAPTER TWO: LITERATURE REVIEW

This chapter provides a profile of adult students in higher education, reviews their persistence and the barriers to their persistence. The subject of prior learning assessment is explored. The final portion of the chapter presents a model that attempts to explain the influences on adult student persistence.

A profile of adult students in higher education

In Table 3 it can be seen that adult students are nearly a majority of college students. Public 2-year colleges serve a student body that is largely adult. The doctoral granting institutions are the bastion of traditional age undergraduate students. Female, black, and American Indian students participate in education as adults at higher rates than do male, Asian Pacific Islander, Hispanic, and white students.

Table 3 – Distribution of undergraduates according to age, gender, ethnicity, and type of institution: 1989–90

		Age	
		Under 24	24 and up
Total		57.7	42.3
Gender	Male	61.5	38.5
	Female	55.0	45.0
Ethnic	American Indian	52.8	47.2
	Asian/Pacific Islander	63.2	36.8
	Black, non-Hispanic	51.9	48.1
	Hispanic	59.6	40.4
	White, non-Hispanic	57.9	42.1
Public	Less-than-2-year	40.0	60.0
	2- to 3-year	43.8	56.2
	4-year non-doctoral	67.4	32.6
	4-year doctoral	75.0	25.0

Table 3 – continued

Private non-profit	Less-than-2-year	24.5	75.5
	2- to 3-year	65.8	34.2
	4-year non-doctoral	68.2	31.8
	4-year doctoral	78.8	21.2

NOTE: Adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 6). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

The prevalence of nontraditional students

The proportion of students who delay enrollment in college for two or more years after high school has been growing. Using this criterion for defining nontraditional status, nontraditional students are the current majority and their proportion has increased in every sector as shown in Table 4.

Table 4 - Percentage of older-than-typical undergraduates: 1986, 1989, and 1992

	1986	1989	1992
Total	53.9	56.2	59.2
Level of institution			
Less-than-2-year	76.8	80.6	80.3
2-year	72.1	74.1	75.2
4-year or more	38.7	39.6	43.9
Control of institution			
Public	57.0	59.1	61.5
Private, not-for-profit	36.2	37.0	43.4
Private, for-profit	70.3	74.3	76.4
Institutional type			
Public			
Less-than-2-year	79.4	81.7	84.8
2-year	73.2	74.8	75.6
4-year nondoctorate-granting	47.3	47.4	52.0
4-year doctorate-granting	35.8	36.5	38.7

Table 4 – continued

Private, not-for-profit			
Less-than-4-year	54.8	58.3	70.4
4-year nondoctorate-granting	38.1	38.8	46.9
4-year doctorate-granting	29.7	29.3	33.3
Private, for-profit	70.3	74.3	76.4

NOTE: "Older than typical" is defined as students 20 or older in their first year, 21 or older in their second year, 22 or older in their third year, or anyone 23 or older. Adapted from "Nontraditional undergraduates: Trends in enrollment from 1986 to 1992 and persistence and attainment among 1989-90 beginning postsecondary students. (NCES 97-578)" by Horn, L., Carroll, D., 1997, (p. 6). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

Any way this is defined, the share of traditional students in higher education (those who go to college directly from high school) has been declining relative to the presence of "nontraditional" students. Colleges are serving a more diverse student population.

The NCES data reported in Choy et al. (1995) presented a comprehensive picture of older undergraduates as of the 1989-90 academic year. Adult students (defined here by age 24 and above) were far more likely to be married (57%) and to have children (53%) than were traditional age students (7% married, 4% with children). As shown in Figure 1, adult students were concentrated in the community colleges – 59% of the adult students attended a public two-year college. They were more likely to be enrolled in a program that does not lead to a degree or formal award (25% as opposed to 14% of the younger undergraduates).

Nine percent of all adult students received employer aid (Choy et al., 1995). Employer aid was the primary form of aid for exclusively part-time students (McCormick, 1995). Among those employed full-time, sixteen percent received employer aid (Choy et al., 1995) and this type of aid was more heavily concentrated among workers with higher
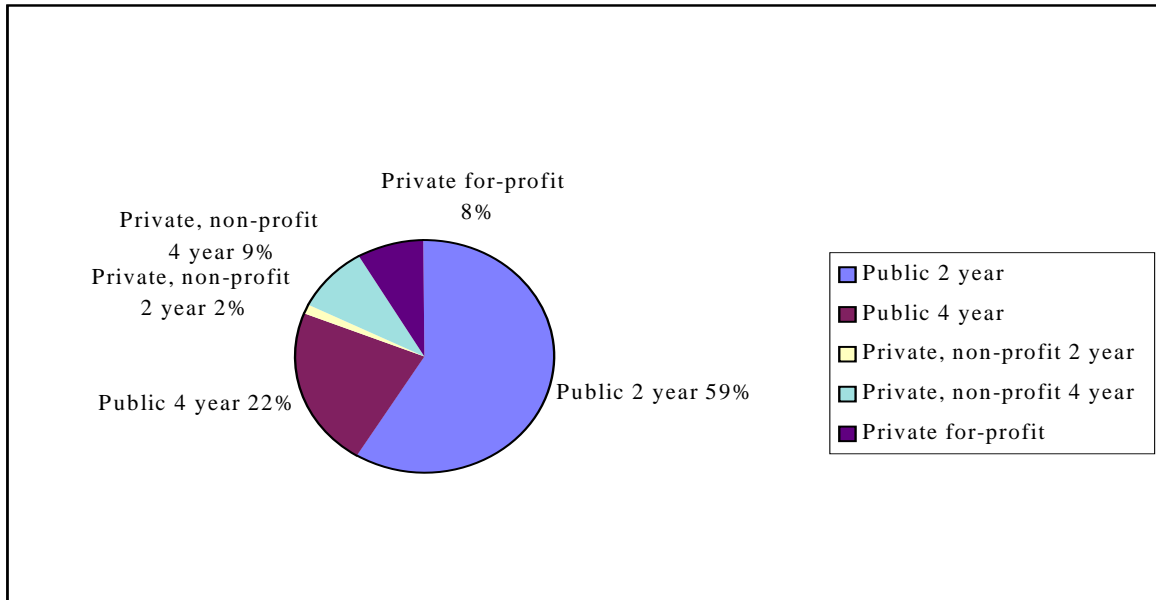
Figure 1 - Distribution of adult students among higher education sectors

NOTE: Adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 29). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

incomes. Seventy-five percent of adult students placed their role as worker ahead of their role as student.

A high share of adult students entered college without a high school degree (9% had the GED and 3% had no high school diploma). Students from this group were especially likely to attend a for-profit institution.

Sector trends in nontraditional student enrollment

Nontraditional student enrollment peaked in 1989 and began to level off in 1992. This is consistent with demographic projections that suggested that the baby boom generation would pass out of the prime age (24-35) for nontraditional college enrollment as

the 1980's ended. The nontraditional student composition began to change over this period according to Horn and Carroll (1997). Students who were defined as moderately nontraditional (see "Age and nontraditional status" on page 17 for a definition) increased between 1989 and 1992 (from 28 to 31%), but the highly nontraditional share declined from 26 to 23%. Private non-profit four-year colleges increased their share of the nontraditional students, especially among moderately nontraditional students. The community colleges gained in enrollment from moderately nontraditional student but lost a significant share of highly nontraditional students. Nontraditional students are an increasing share of all sectors in higher education and comprise a majority of students in the community colleges.

Persistence among nontraditional students in higher education

Adult students are much more likely to leave and not re-enroll (here denoted as "stay-outs") than are traditional age students. In Figure 2, nearly half of first-time beginning students age 24 and older who were seeking the baccalaureate degree in 1989 were "stay-outs" when interviewed in 1992.

Adult students stay-out much more frequently than do traditional age students. They also engage in the behavior known as "stop-out" somewhat more often than do traditional age students. Taking a semester or two off and re-enrolling at the same college was fairly common among adult students (24% in Figure 2) and slightly less common among traditional age students (19% in Figure 3). Only one in four of the traditional age students became stay-outs, while almost half of the adult students were stay-outs three years after enrolling. acute. The persistence of adult students is a significant research issue.

**Percentage distribution of 1989-90 first-time beginners age 24 and older seeking
a bachelor's degree according to status in 1992**

Completed
2%

Continuosly enrolled
29%

Left but did not
reenroll
45%

Left but reenrolled
24%
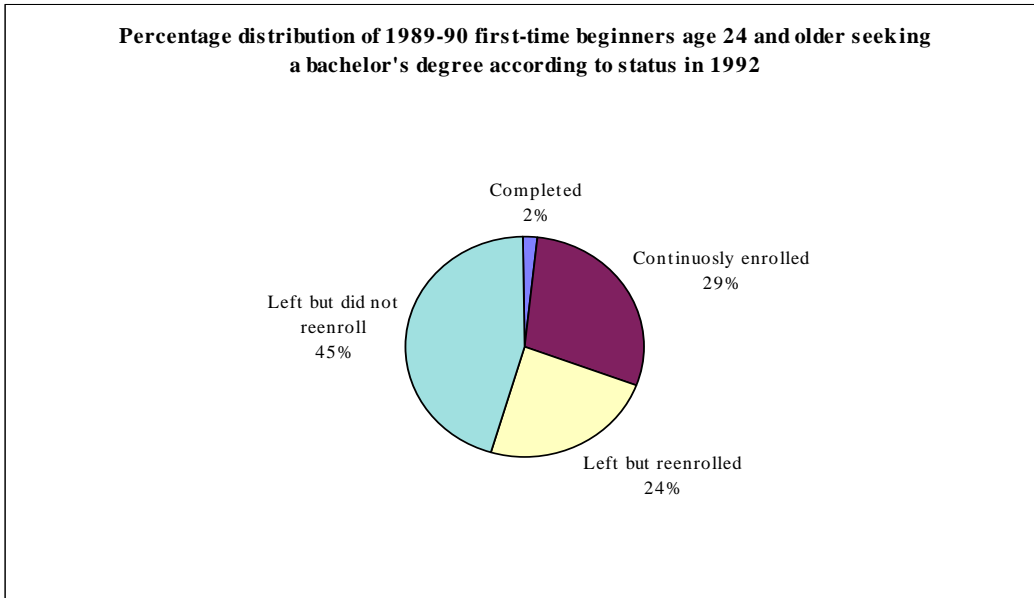
Figure 2 - Persistence among adult students seeking the bachelor's degree 1989-1992

Completed
1%

Left but did not reenroll
23%

Continuosly enrolled
57%

Left but reenrolled
19%
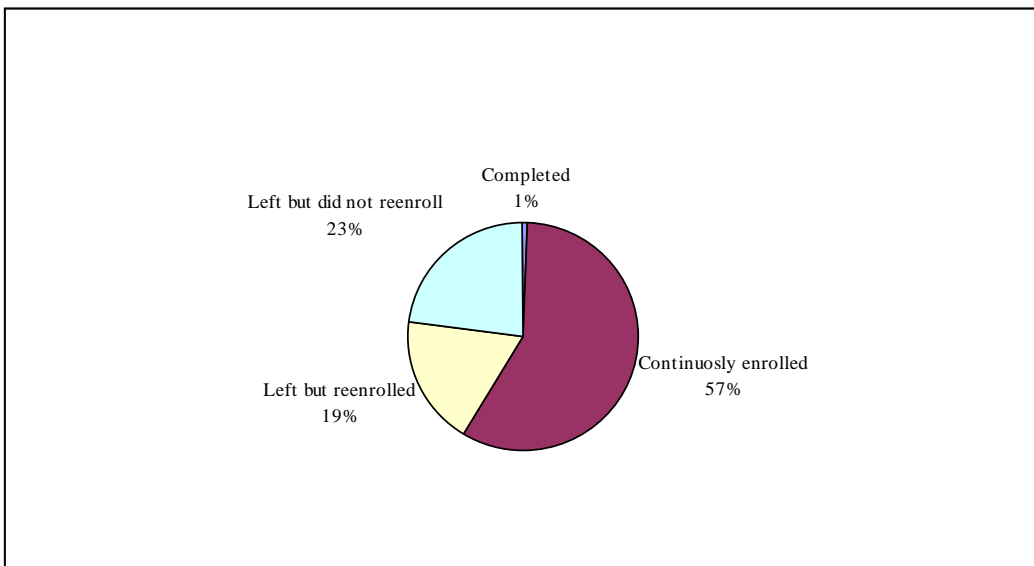
Figure 3 - Persistence among traditional age students 1989-1992

NOTE: Figure 2 and 3 adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 40). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

Age and nontraditional status

Age alone does not adequately define nontraditional status. In Horn and Carroll (1997), the definition included seven criteria that are used to categorize students on a scale of nontraditional status from minimally nontraditional to highly nontraditional.

A nontraditional student was identified by the presence of one or more of the following seven characteristics: delayed enrollment into postsecondary education, attended part time, financially independent, worked full time while enrolled, had dependents other than a spouse, was a single parent, or did not obtain a standard high school diploma. A nontraditional student was further characterized as minimally nontraditional (one characteristic), moderately nontraditional (2 or 3 characteristics), or highly nontraditional (4 or more characteristics). (Horn & Carroll, 1997, p. i)

Extending the previous analysis in which age alone was used as a proxy for nontraditional student status, students who were highly nontraditional using this NCES rubric were far more likely to leave than were students who are traditional or minimally nontraditional. In Table 5, a solid majority of the highly nontraditional beginning students from 1989-90 had not attained their degree objective and were no longer enrolled.

Highly nontraditional students (those who work full-time, attend college part-time, have children, and entered college as adults) are most likely to become stay-outs.

Those originally seeking a bachelor's degree from the 1989-90 cohort were more likely to stay-out or to have shifted their degree objective downward the more nontraditional characteristics they possessed.

Table 5 - Persistence of 1989 beginning degree-seeking students, by nontraditional status

	Attained any degree	No degree, enrolled in 1994	No degree, not enrolled in 1994
Total	52.3	13.1	34.7
Traditional	63.8	14.1	22.1
Nontraditional	43.3	12.2	44.5
Minimally nontraditional	51.8	13.3	34.8
Moderately nontraditional	40.6	10.9	48.5
Highly nontraditional	33.3	12.3	54.3

NOTE: Adapted from "Nontraditional undergraduates: Trends in enrollment from 1986 to 1992 and persistence and attainment among 1989-90 beginning postsecondary students. (NCES 97-578)" by Horn, L., Carroll, D., 1997, (p. 27). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

In Table 6, only 11.2% of the highly nontraditional students had completed their degree five years after beginning their study. Taken together with those who were still enrolled, less than one in three remained committed to (or had achieved) their goal. Compare this with the traditional students in which 3 of 4 remained committed to (or had achieved) the goal of the bachelor's degree. Adult students who work full-time, study part-time, have children, and no longer depend on their parents have a steep and difficult path to the baccalaureate degree.

As students take on more of the commitments of adult life, the more likely they are to fail to achieve their goal as a student. Full-time work, part-time study, parental commitments, and delayed college entry are key markers for persistence difficulty.

Table 6 - Persistence of degree-seeking 1989 beginning students by nontraditional status

Bachelor's degree objective	Attained degree objective	Did not attain degree objective		
		Enrolled toward degree objective in 1994	No change in objective, not enrolled in 1994	Changed degree objective
Total	44.5	21.2	24.7	9.6
Traditional	53.9	19.7	19.2	7.2
Nontraditional	31.3	23.2	32.5	12.9
Minimally nontraditional	42.4	22.5	26.6	8.6
Moderately nontraditional	16.9	25.4	40.7	17.0
Highly nontraditional	11.2	21.7	42.1	25.0

NOTE: Adapted from "Nontraditional undergraduates: Trends in enrollment from 1986 to 1992 and persistence and attainment among 1989-90 beginning postsecondary students. (NCES 97-578)" by Horn, L., Carroll, D., 1997, (p. 29). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

When students interrupt their studies

Nontraditional students are most at risk to interrupt their studies in the first year. Table 7 indicates that the rates of withdrawal still remain high in the second and third years. The effect of situational barriers - the situated nature of adult learners - seems to exert an influence on withdrawal throughout the college career. Students who have obtained their degree objective or were continuously enrolled over the period of study are defined here as "persisted". Students are at greatest risk to stop-out or stay-out in the first year. The data in Table 7 indicates that nontraditional students remain at substantial risk throughout their program.

Table 7 – <u>Enrollment continuity of degree-seeking 1989 students by nontraditional status</u>

		Annual rates of attrition (first interruption)			
	Persisted	First year	Second year	Third year	Fourth year or later
All objectives	45.3	28.4	16.3	17.5	8.8
Traditional	56.8	16.2	12.2	14.8	8.8
Nontraditional	36.0	38.3	20.7	20.6	8.8
Bachelor's objective	52.3	19.1	12.5	17.3	10.8
Traditional	58.9	13.6	10.0	15.8	10.0
Nontraditional	42.3	27.2	17.0	20.1	12.4

NOTE: "An interruption is defined as leaving without returning, a downward transfer (e.g., 4-year to 2-year institution with or without an interruption), or a period of interruption of more than 4 months (stop-out) and then returning to the same level or higher institution" Adapted from "Nontraditional undergraduates: Trends in enrollment from 1986 to 1992 and persistence and attainment among 1989-90 beginning postsecondary students. (NCES 97-578)" by Horn, L., Carroll, D., 1997, (p. 31). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

Stopping out, staying out, reducing the goal

Among the bachelor's degree seeking students who interrupt their studies, more than half return either to the same college or to a two-year college. In Table 8, stay-out is most common among nontraditional students. The abandonment of the goal altogether is most common for the nontraditional student.

Both traditional and nontraditional students in Table 8 who initially sought the bachelor's degree are equally likely to stop-out (defined as having left for four or more months and having returned to the same college). Stay-out (leaving college and not returning to any college) is more common among nontraditional students.

Table 8 - <u>Type of interruption of studies among degree-seeking 1989 beginning students</u>

	Downward transfer	Stop-out	Stay-out
Total	31.4	26.4	42.3
Traditional	39.6	28.0	32.4
Nontraditional	27.1	25.5	47.4
Bachelor's degree objective	38.3	30.5	31.3
Traditional	41.5	31.5	27.0
Nontraditional	34.8	29.4	35.8

NOTE: Adapted from "Nontraditional undergraduates: Trends in enrollment from 1986 to 1992 and persistence and attainment among 1989-90 beginning postsecondary students. (NCES 97-578)" by Horn, L. and Carroll, D., 1997, (p. 36). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

The behavior of downward transfer (transferring from a four-year college to a two-year college) is more common among traditional age students. It appears that traditional age students find it easier to persist even when their goals have undergone a significant shift.

Non-traditional students are far less likely to complete their initial degree objective than are traditional age students. They are most likely to drop out in the first year, as are traditional age students. However, non-traditional students remain more likely than traditional age students to stop out throughout their college experience. The persistence of adult students is an important topic for adult education practitioners and researchers.

Factors in Persistence

In this section, a model of adult student decision-making is presented and the barriers to persistence identified in the published research are explored.

Adult students develop an intention to change fueled by changes in their life at work or at home. They seek to enter or re-enter higher education. Spanard (1990) presents a

model for understanding the "path of adult problem solving that leads to reentry, retention, and degree completion" (p. 337).
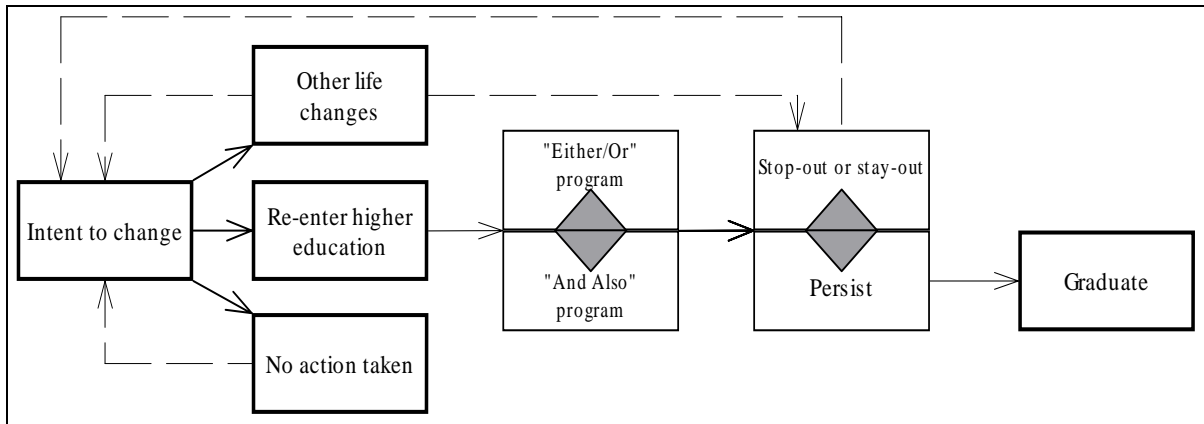
Figure 4 – Spanard's model of adult problem solving in higher education

Figure 4 presents a model indicating that a desire to change arises for the student and she decides to enter or re-enter higher education. The student chooses to experience college in two different paths. Those who make a complete change in their life participate in a program labeled "Either/or" – meaning that they give up the work and other connections they have made in favor of full-time study. Those who fit college into their life typically study in a program labeled here as "And Also." These students maintain the connections of their life (particularly work) and fit study into a crowded life. Life changes can impact the decision making at any time. Other factors affect the decision to persist. This model will be further developed later in the literature review, and used to organize the factors in persistence such as situation, disposition, institution, and academic preparation and performance.

Barriers

There are many factors that affect the adult student's progress through the path to graduation. Adult students in higher education do not persist to graduation in the same manner or at the same rates as traditional age students. Adult students experience a variety of barriers in their quest for the benefits of higher education.

Dispositional barriers include lack of confidence. This shows up as self-doubt when a student drops a course after a difficult exam. Having goals and a strong commitment to those goals is a highly important issue for adult students.

Institutional barriers for adult students include courses scheduled only in the day or services only available during the day or lack of flexibility in dealing with the adult student's multiple responsibilities. Adult students experience institutional barriers related to their status as part-time students that can prompt them to withdraw.

Situational barriers for adult students include: sufficient funds to pay for their course or books, a spouse or family member opposed to their studies, personal or family health, the birth of a child, or the loss of a family member through death or divorce. For the adult student, work is most often the primary way in which they will spend their time with college being the "and also" activity. A siege of overtime, extended travel, or a boss who is in direct opposition may stop a student from completing their studies.

Adult students proceed through their course of study in a manner different from traditional age students. They are likely to have credits from more than one source, study part-time more often, and have gaps in their enrollment. Students take a semester off in response to family or work or academic events. Most traditional age students are degree

seeking. A significant share of adult students is not degree-seeking, enrolling in one or two courses or a set of courses leading to a certificate to improve their chances at promotion or gaining a better job. After these students have attained their goal, it is not appropriate to say they have become "stay-outs."

College programs for adult learners have focused on lowering institutional barriers in a variety of ways. Many colleges offer evening, weekend, and accelerated courses. Many colleges accredit a student's learning from life experience through the use of portfolios. Many adult learner programs work directly with students in orientation programs and study skills courses and through cohort admission to help them to develop strengths (confidence, comradeship, etc.) which overcome the dispositional barriers. Case studies indicate that these efforts at lowering barriers are helpful.

The most intractable problems seem to be those rooted in the student's situation (work, children, health, significant others, and poverty). The single mother who works may struggle to find childcare in the evening so that she may attend class. Parents must be creative to gain the support of their spouse or to persuade their older children to take over more of the family roles when mom or dad is going to class. Full-time work and part-time study are not changeable for most adult students. Despite these real situational barriers, McGivney (1996) reminds educators that students report situation barriers during exit interviews when the real reason may lie in poor academic performance or dissatisfaction with the course or college. Adult educators should not turn the very real situational barriers into excuses for inaction on efforts to help adult students persist.

Academic barriers affect student progress. Adult students come to higher education with a variety of academic backgrounds. Some return to college after a gap of several years

well prepared for any academic challenge they face. As a group, they tend to have higher grade point averages. However, a significant number did not enter college after high school or left college as a traditional student because they were unprepared or unable to meet the academic demands of college. The subsequent experiences of many (but not all) of these adults at work and in other areas of life have prepared them well for college. Those who left high school unprepared and whose prior experiences have not helped them overcome these academic barriers struggle to persist in college. Academic preparation and performance are barriers to persistence.

Many of the studies reported in this review build on the work of Tinto and Pacarella and Terinzini, who have studied the retention of traditional students. The path analysis model of adult student persistence proposed by Bean and Metzner (1985) was followed with their 1987 study that supported some aspects of the model. Their proposed model has been used widely with a variety of audiences to study persistence among sub-groups of the adult student population. The remainder of this section uses the Cross typology of barriers found in situation, institution, and disposition, coupled with academic performance to organize the published research.

Situational barriers

Situational barriers developed in the literature are the age of the student, gender, the presence of children in the family, marriage, ethnicity, socioeconomic status (SES), life changes (such as loss or change of a job, divorce, or illness of the student or a partner), work intensity, finances, financial aid, tuition cost, and debt.

Age

Age has been found in a number of studies to be a factor associated with persistence. In general, these studies found that younger students are more likely to complete their studies and that older students were more likely to achieve higher grades. Bean and Metzner (1985) predicted that age would be a factor. In their 1987 study they found that older students did not have a significantly different rate of persistence. Farabaugh-Dorkins (1991), McGivney (1996), Snyder (1990), and Webb (1989) all found that younger students are more likely to finish. One contrary study (which did not control for other factors), found that students age 26-32 persisted at a rate of 42% while those aged 33-39 persist at a 56% rate (Holm, 1988).

The longitudinal study by Horn and Carroll (1998) found that stay-outs (as opposed to stop-outs and completers) tend to be older. Another longitudinal study (Martin, 1990) found that students who were stay-outs were the youngest group. This study also found that students who were in the middle age of the cohort were most likely to be completers and those who still remained enrolled (defined as persisters) were the oldest portion of the cohort.

The perplexing aspect of age is that older students tend to have higher grades but drop out more often. Kasworm (1990) found that age is positively associated with grades. Data from Simpson College (Pearson & O'Brien, 1996) also suggested that adult students achieve higher grades than do younger students. Higher GPA is a factor positively associated with persistence. Theoretically, one would expect that older student equals higher GPA equals greater persistence. The results suggest otherwise. Older students seem less likely to persist.

Gender

Adult women are more likely than are adult men to persist to graduation. The strength of association between gender and completion varies in the studies, but gender is a factor in most published studies that have adequate sample size and statistical techniques (Choy et al., 1995; Farabaugh-Dorkins, 1991; Horn & Carroll, 1997; McCormick, Geis, Vergun, Horn & Carroll, 1995; McGivney, 1996; Swift, 1987; Webb, 1989). The Bean and Metzner 1987 study did not find a significant association between persistence and gender. The other contrary studies seem to be explained by the sample. In a study of adult students at a women's college (Losty, 1982) there was no difference in the persistence rates of men and women. However, the number of men present in the sample was too small to reach reliable conclusions. Shields (1994) found no effect from gender, although total sample size may have had an influence on this conclusion (N=97). Gender is likely to be associated with persistence.

Children

The number of students seeking a bachelor's degree who have children peaked in 1989 and declined in 1992. This is consistent with demographic predictions that suggest a decline through the 1990's in the size of the cohort that is at the prime age for adult participation in college. This may also be the result of delays in child-rearing until later years. The data presented in Table 9 indicate that only in the non-profit less-that-4-year and in the four-year non-profit non-doctoral sector did the number of students with children increase consistently over the period. This might reflect a shift of students who are parents away from the public sector toward the non-profit sector.

Table 9 - <u>Students with dependents other than a spouse: Fall 1986, 1989, and 1992</u>

	1986	1989	1992
Total	19.9	22.2	20.0
Public			
Less-than-2-year	41.4	43.9	34.1
2-year	29.3	32.5	26.8
4-year non-doctorate-granting	15.2	14.9	15.2
4-year doctorate-granting	10.0	9.5	8.1
Private, not-for-profit			
Less-than-4-year	20.4	24.1	29.5
4-year non-doctorate-granting	13.5	15.5	17.6
4-year doctorate-granting	8.4	7.4	8.1
Private, for-profit	31.9	37.9	36.2

NOTE: Adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 22). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

An early study by Weidman (1985) found that students who report less trouble with children were more likely to persist. Similarly, Byrd (1990) found that students with three or more children perceived more situational barriers to completion. Horn and Carroll (1998), Kent State (1993), McCaffrey (1989), McGivney (1996), Mercer (1993), and Shields (1994) all found that the presence of children was negatively associated with persistence.

One contrary study (Mercer, 1993) found no difference in persistence based on marital status or for the presence of children when controlling for other factors. Another (Hanniford & Sagaria, 1994) study reported that women who had children were *more* likely to complete.

The combination of young mothers and young children appears to have a negative impact on persistence. In Hanniford and Sagaria (1994), school age children were more of a

barrier than older children. Older children apparently slow down but do not stop progress toward the degree. Their study also found that women who were married throughout were more likely to be still seeking their degree than to graduate. Younger moms (Scott, Burn, & Cooney, 1996) reported more maternal role conflicts. Children can be a factor in persistence but their effect may be mediated through the age of the parent, gender, and marital status.

Ethnic origin

Ethnic origin appears as a factor in persistence in education studies. However, the studies that have considered the impact of ethnic origin among adult students have produced contradictory results. Bean and Metzner (1985) predicted ethnic origin to be a factor but their 1987 study did not find this variable significant after controlling for other factors. Byrd (1990), Horn and Carroll (1997), Losty (1982), and Webb (1989) found race or ethnic origin to be a factor in persistence. The studies by Choy et al. (1995) and St. John and Starkey (1995) found no ethnic background variable significant when controlling for other factors. It seems unlikely that ethnic origin is, by itself, a significant factor in adult student persistence.

Socioeconomic status

Socioeconomic status plays a complex role in the persistence of adult students. One marker for low socioeconomic status is "first generation to attend college." Adult students who are the first generation in their family to attend college (like traditional age first generation students) are more likely to leave before completing their studies (Choy et al., 1995; Horn & Carroll, 1998). Figure 5 indicates that older students are far more likely than traditional age students to be "first generation" students.

Two of three students in Figure 5 who are age 40 and above report their parent's

highest attainment was high school or less, while only one in three of traditional age students
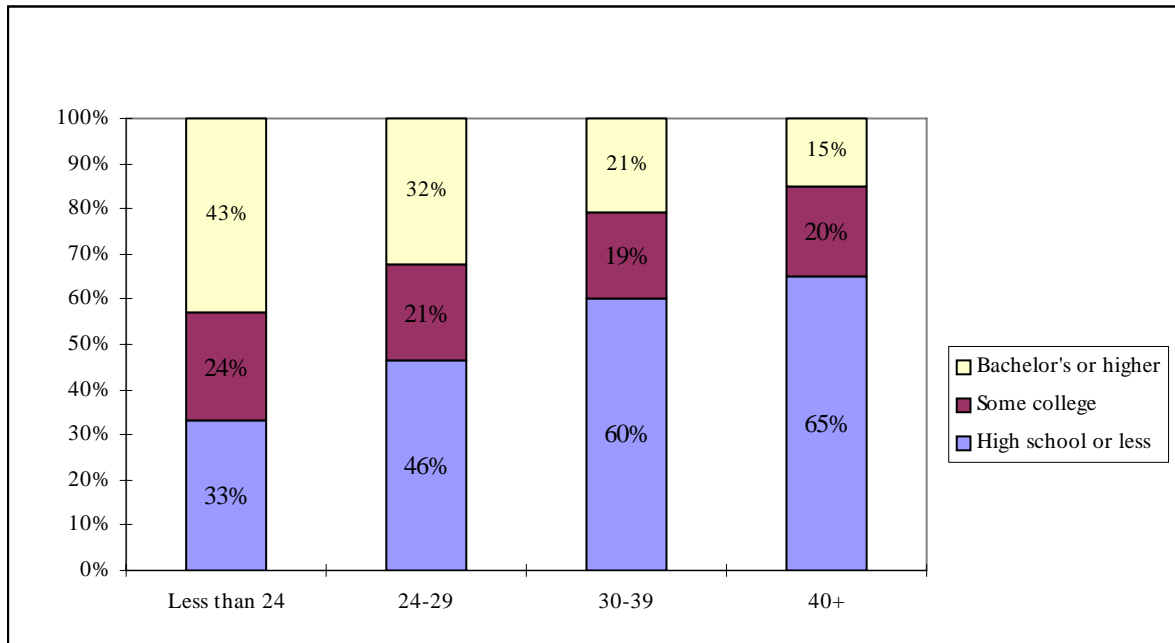
Figure 5 – Parent's level of educational attainment by age of student

NOTE: Adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 9). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

report parents whose highest attainment was high school or less. As the age of the student

increases, the less likely it is that the parents attained a college degree.

Using the direct measure of income level, Hanniford and Sagaria (1994) found that

women from the two higher income quartiles were more likely to be persisters while women

from lower quartiles were more likely to be either completers or stay-outs. One possible

interpretation of this finding is that relative wealth enables a more leisurely approach to

college completion.

One National Center for Education Statistics study defines socioeconomic status (SES) as a "composite variable combining parents' education and occupation, dependent student's family income, and the existence of material possessions in respondent's home. Applies to first-year students whether or not they are beginning students" (Horn & Carroll, 1998, p. 57). In their study, which included all beginning U.S. higher education students, SES was not significant when other variables are controlled. This study finding did not isolate adult students.

Higher educational attainment among family and friends is positively associated with persistence (Tinto, 1993). In Scott et al. (1996) women who held low pay jobs tended to be married to men who also held such jobs and these women reported a lack of support from the family, lack of money and adequate preparation, and greater weight from family responsibilities. It was through these factors that persistence was negatively affected.

Socioeconomic status, as measured by spousal and parental educational attainment, appears to be a significant factor in the persistence of adult students.

Life changes

A significant life change will often trigger a return to college. Events such as divorce, marriage, childbirth, children leaving home, loss of a job or promotion, or gaining a new position will impel a student to return to college and finish a long-delayed goal. Aslanian (1989) documents this role of life changing events triggering participation. Work is the most likely contributor followed by family events. Unfortunately, these events can cut both ways, knocking students off the persistence track. In Mercer (1993), more crises impelled a return to school *and* crises often resulted from the return to school. Divorce was

found to be a factor negatively associated with persistence in Choy et al. (1995), Hall (1997),

Harrington (1993), and McCormick et al. (1995). The only contrary study (Losty, 1982)

found that marital status or changes in status had no significant association with persistence.

Life changes can have an impact on the persistence of adult students in higher education.

Marriage

The role of marital status *per se* in persistence is not entirely clear. The adult student

who is single seems to have a better chance of persisting (Mercer, 1993). The Bean and

Metzner (1985) model suggested that family responsibilities would influence persistence but

they did not find this to be a factor in their 1987 sample. Marriage has only a limited effect

in Hanniford and Sagaria (1994).

The role of marriage in persistence seems to vary based on the education level of the

partner. Support from the partner (Scott et al., 1996) is positively correlated with the

partner's level of education. The association in the data is that the less-educated the partner,

the less support the student will perceive. Lack of support is associated with a lower level of

persistence. Ultimately, the stance of the partner toward the student's educational aspiration

is more important than marital status.

Work

Approximately one in four students of all ages work full-time (Choy et al., 1995).

Students of all ages who try to combine full-time work with study place their goal of

completion at greater risk the more hours they work. Full-time work is negatively associated

with persistence (Byrd, 1990; Christensen, 1991; Cuccaro-Alamin, 1997; Farabaugh-

Dorkins, 1991; Ganiere, DeBusk, & Talbert, 1991; Hanniford & Sagaria, 1994; Harrington, 1993; Horn & Carroll, 1998; Kent State, 1993; McCormick et al., 1995; McGivney, 1996; Mercer, 1993; Naretto, 1995; Scott et al., 1996; Stolar, 1991). A divergent outcome is reported in three studies (Horn & Carroll, 1997; Losty, 1982; Shields, 1994). Lack of employment altogether or a change in employment (Hanniford & Sagaria, 1994; Zajkowski, 1997) or loss of a job (McGivney, 1996; Tyler, 1993) also seems to be negative. In general, those who work part-time seem to do best at fitting study and work together. Full-time work, at a minimum, acts to delay completion (Hanniford & Sagaria, 1994).

In Figure 6, full-time work is associated with lower levels of completion for students of all ages. Two aspects of work play a role in persistence. The level of education of the work group is positively associated with persistence. If the student is part of a work group in which most are well-educated, the student is more likely to persist (Vann & Hinton, 1994). Conversely, students who belong to a work group in which most are either manual workers or
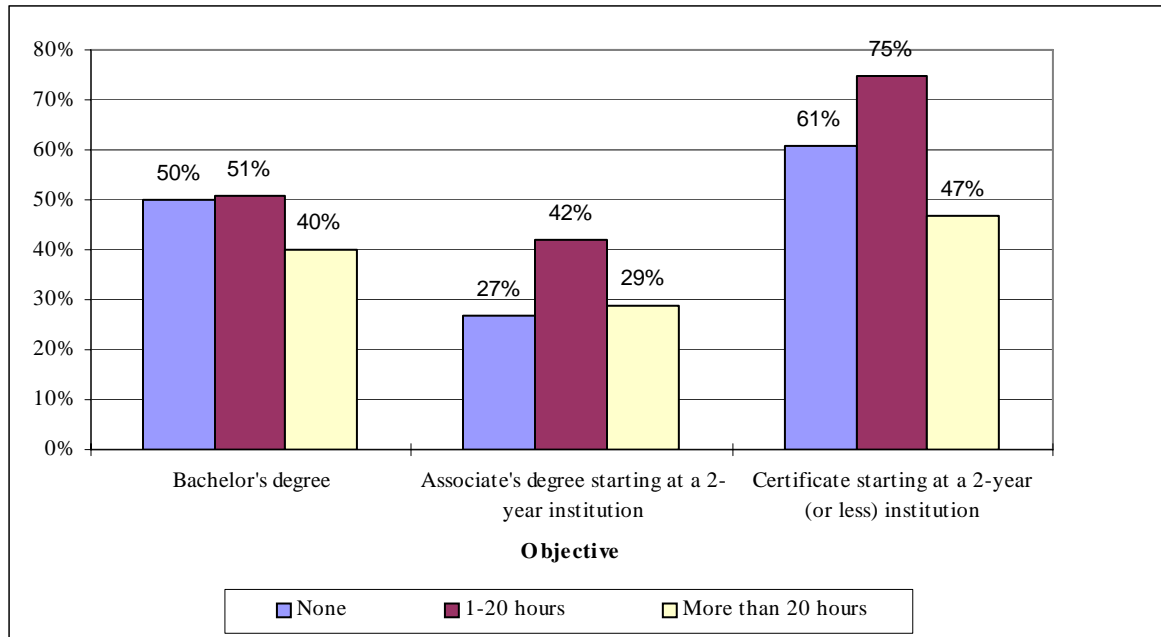
Figure 6 - The impact of work intensity on persistence by degree objective for all students

NOTE: Adapted from "Postsecondary persistence and attainment. (NCES 97-984)." by Cuccaro-Alamin, S., 1997, (p. 22). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

have a low level of education are less likely to persist (McGivney, 1996). Further, employer support (especially financial support) was found as a positive factor in course completion in one study of distance learners (Zajkowski, 1997).

Work influences persistence through the amount of time available for study, the presence of courses at times and places available, enrollment intensity (how many credits per term the worker/student can attempt), resources available for tuition, and through the amount of emotional support the adult student receives.

Finances

In exit surveys, adult students who leave college often say they cannot afford it any longer. It is possible that the student is actually saying, "I am not doing as well as I thought" *or* "my husband is opposed" *or* any of a host of other reasons they choose not to share. This loss of motivation through the encounter with barriers may raise the relative cost in the mind of the student. The adult student calculates whether it is worth it to pay tuition and spend time studying now. Expressed reasons for departure are difficult to trust. Many of the studies report cost as a reason for departure. Bean and Metzner (1985) suggested in their model that finances would be a factor and then did not find it to be a factor in their 1987 study. Christensen (1991), Ganiere et al. (1991), Hall (1997), Horn and Caroll (1997), Kent State (1993), Losty (1982), McCaffrey (1989), Mercer (1993), Rogers et al. (1988), Stolar (1991), and Zajkowski (1997) all have suggested that finances or low income were a factor in persistence. A related set of studies support the idea that students who are better off are more likely to persist. Adult students persisted at higher rates if they reported higher income (Choy et al., 1995; Losty, 1982), more financial security (Kowalski & Cangemi, 1983), or that finances were not much of a problem (Mercer, 1993). Men express fewer financial problems than women (Ryder et al., 1994), but they do not persist as often as women. Students who work at low skill jobs (Scott et al., 1996) report more money problems than do other groups of students.

Money certainly has an impact on adult students. The influence of money may be overstated in persistence studies unless money crises (such as the loss of a job) occur after studies have been initiated. See the section at page 47 for a discussion on the complex process of goals and commitment. The student's expression of "financial difficulty" can be

very real financial difficulty that stops persistence or it can be an expression of declining commitment.

Financial aid

Astin's work (1993) suggests that, for traditional students, state and federal need-based financial aid displays "no discernible impact on traditional student development" (p. 368). This finding overturns Astin's earlier finding (1975) that grants and scholarships were positive and loans were negative. Astin's 1993 work concludes that merit-based awards have a significant effect for traditional students.

The role of financial aid for adult students is also complex. Receiving financial aid is generally positive for persistence among adult students (Christensen, 1991; Cuccaro-Alamin, 1997: Kasworm, 1990: McCormick et al., 1995: Weidman, 1985). However, specific groups of students respond in divergent ways to types of financial aid. Receiving institutional aid was a negative persistence factor for adult students in public four-year colleges (Shields, 1994) but not at private colleges. For full-time adult students, financial aid is consistently positive (Starkey, 1994). For part-time adult students, the type of aid (grants were positive, loans more negative) is crucial.

Financial aid varies in its association with persistence among higher education sectors. It is a negative factor for adult students in the public 2-year and public 4-year sector, but is positive in the private non-profit 4-year sector.

Adult students do not receive aid as often as traditional students, in spite of broad eligibility (St. John & Starkey, 1995). The primary form of aid among adult students who attend exclusively part-time is employer tuition reimbursement (McCormick et al., 1995). In

this study, grant aid (from the employer, the college, or the government) generally plays a positive role in persistence. Loans play a more ambiguous role.

College costs

Adult students are more sensitive to tuition cost than are traditional students and this shows up as a persistence factor (Christensen, 1991; Hall, 1997; Kasworm, 1990; St. John & Starkey, 1995; Starkey, 1994). This is especially evident among part-time students. Higher than average tuition was associated with stop-out and stay-out among adult students in Starkey (1994).

Debt

Taking on college debt is positively associated with persistence (Cuccaro-Alamin, 1997) for most adult students but a negative factor (St. John and Starkey, 1995) in public colleges for adult part-time students. Adult students are willing to borrow money (Zito, 1991) if they are entering a major with a high starting salary. This can be a positive factor in persistence.

Situational barriers - a summary

There are many factors that affect the persistence of adult students that are beyond the influence of the college or university. The situational influences of age, gender, educational attainment of spouse and parents, life changes, full-time work, and the availability of grant aid appear to be significant variables associated with persistence.

Academic record

The academic barriers are marked by prior measures of academic performance (primarily high school rank or GPA and SAT/ACT scores), by contemporary GPA, the amount of prior credits achieved, and by enrollment intensity.

Prior measures of academic performance

Adult educators may not know how to predict the future academic performance of adult students reliably from the prior academic record. Some studies suggest that prior performance is predictive of adult student persistence. Kowalski and Cangemi (1983) found "greater intellectual and academic ability" among those who persist. In Bean and Metzner's 1985 model high school performance was suggested as a factor in persistence. The Bean and Metzner 1987 study did find that high school performance was a key factor in persistence. They concluded, "…the attrition of nontraditional students is most likely to be due to poor academic integration. It is characterized by inferior academic abilities or performance and a low level of commitment to the educational process" (p. 30-31). This type of finding was echoed in Stahl and Pavel (1992) and Webb (1989).

Other studies have attempted to determine if the high school record might signify different things for subsets of adult students. Among those who were not employed (Rogers et al., 1988; Ryder et al., 1994) the level of academic preparation was cited as a barrier while it was not cited as a problem among those who were employed. Students who did not graduate from high school and have the GED (Horn & Carroll, 1997) are less likely to persist. Students who delay original entry to college after high school are less likely to persist (Horn & Carroll, 1997, 1998; Tyler, 1993). Part-time attendance is often associated with lower persistence. Part-time attendance is more common among students who have a

poor high school record and also among first generation students (McCormick et al., 1995).

Students who have poor prior performance (Scott et al., 1996) report family and money

problems most often as reasons for departure.

Other researchers have argued for more contemporary measures of academic

preparation and for a different process of interpretation. Contemporary placement exams in

Weidman (1985) were predictive of persistence in a job-training program. Contemporary

SAT and ACT test scores should be interpreted carefully, according to Kasworm (1990).

Older students performed at lower levels on math tests than traditional students do but this

had no affect on persistence. Older students performed higher on the verbal portion of the

SAT in her study. Kasworm suggested that contemporary grades are a better measure of

student ability than test scores.

Contemporary GPA

The contemporary grade point average (GPA) of students is positively correlated with

persistence. The Bean and Metzner (1985) model hypothesized that GPA would be a factor

in persistence and in their 1987 study, GPA was positively related to persistence. A wide

range of other studies supports this conclusion (Farabaugh-Dorkins, 1991; Ganiere et al.,

1991; Horn & Carroll, 1998; Kasworm, 1990; McCaffrey, 1989; Mercer, 1993; Naretto,

1995; Snyder, 1990; St. John & Starkey, 1995). In Shields (1994) no effect was found from

GPA.

Cuccaro-Alamin, Choy, and Carroll (1998) conducted a study of students of all ages

and found that a high GPA was positively associated with persistence. Those with "A's and

B's" persisted at a 73% rate, "B's and C's" at a 54% rate, and "Mostly C's and lower" at a 37% rate.

A low GPA is associated with a lower rate of persistence. Students with D and F averages do not persist.

Prior credits

Simply put, students who have more prior college credits are more likely to persist to graduation. This relationship has been found in many studies including Christensen (1991), Hanniford and Sagaria (1994), Harrington (1993), Holm (1988), Martin (1990), McCaffrey (1989), and Simmons (1995). The exceptions (Mercer, 1993; St. John & Starkey, 1995) failed to account for non-degree-seeking status or for graduation. St. John and Starkey did find an association between "credits completed" and persistence except at the senior class level. The more college experience the student possesses, the more likely she or he will be to persist.

Enrollment status

Part-time enrollment in higher education has grown dramatically since 1970 in absolute terms and relative to full-time enrollment. Between 1970 and 1990, the share of part-time students grew from 28% of the total to 42%. There were five million part-time students in 1990 (McCormick, 1995). Two of three students aged 30 and above were part-time. The mean age of part-time students was 31 in 1990.

Part-time status serves a wide range of needs. This body of students includes students seeking only a course for professional development and those seeking a degree while balancing work and family.

> Part-time attendance meets the needs of a wide range of students for whom full-time attendance may not be practical or feasible, thereby permitting postsecondary institutions to be accessible to the widest possible array of students. For example, the part-time student population includes students who are casual course takers, taking only one or two courses for personal enrichment, but not seeking a degree; returning students who want to complete a degree or upgrade their skills, but who cannot afford to give up their jobs to do so; teachers who take courses for professional development, concurrent with full-time employment; high school graduates seeking a degree, but whose employment or family circumstances do not permit full-time attendance; previously full-time students whose remaining degree requirements constitute less than a full load; and, finally, students who are unsure about their educational plans, who want to try out postsecondary education at a lower cost and with less disruption than full-time attendance would require. By allowing students to attend part time, institutions meet a variety of needs and extend educational opportunity to students who otherwise might be dissuaded from participation or shut out of the system entirely. (McCormick, 1995, p. 3)

The movement back and forth between full-time and part-time status occurs frequently as students who near graduation accelerate a job search or as part-time teacher education students move into a full-time status as they engage in student teaching.

Choy et al. (1995) detailed the presence of part-time students in higher education. In Table 10 we can see that part-time students are prevalent at community colleges and are a growing presence at four-year non-doctorate colleges.

Part-time status has become much more common. The data in Table 10 indicate that in all sectors (except the 4-year doctorate granting institutions) the share of students that are part-time increased over the period 1986-1992. The effect of part-time status on persistence is generally negative. Adult students who are able to enroll on a full-time basis persist at much higher levels than do part-time students.

Table 10 - Undergraduates who attended part time: Fall 1986, 1989, and 1992

	1986	1989	1992
Total	37.8	38.7	42.2
Institutional type			
Public			
Less-than-2-year	29.0	31.3	50.8
2-year	63.8	65.4	66.2
4-year non-doctorate-granting	27.7	26.5	31.1
4-year doctorate-granting	20.7	19.7	20.4
Private, not-for-profit			
Less-than-4-year	29.9	21.3	45.9
4-year non-doctorate-granting	22.4	22.8	28.4
4-year doctorate-granting	17.6	14.2	18.5
Private, for-profit	16.1	16.5	21.8

NOTE: Adapted from "Profile of older undergraduates: 1989-90. (NCES 95-167)" by Choy, S., Premo, M., and Maw, C., 1995, (p. 20). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics.

The model proposed by Bean and Metzner (1985) included enrollment status as a factor in persistence. This part of their model was supported by substantial evidence. The

more hours the student takes per term, the more likely they are to persist (Bean & Metzner, 1987; Choy et al., 1995; Christensen, 1991; Cuccaro-Alamin et al., 1998; Hall, 1997; Harrington, 1993; Horn & Carroll, 1997; McCormick et al., 1995; McGivney, 1996; Mercer, 1993; Naretto, 1995; Simmons, 1995; St. John & Starkey, 1995; Swift, 1987; Weidman, 1985).

Academic record - summary

Adult students who had a poor high school background, few or no prior college credits, a low contemporary GPA, and study part-time are highly likely to stop-out and stay-out. Those who did well in high school, attended college for some time, have done well in current studies, and attend full-time are more likely to graduate.

Disposition

Mature attitudes, a sense of self-control, clear motivations, self-discipline, endurance, flexibility, confidence, and willingness to sacrifice are the hallmarks of adult students who are likely to complete their educational goal. It is important to recognize that motivations change over time for students. The complex web of interactions with significant others and the college affects these motivations (West, 1995). The dynamic nature of this process was underlined by Kasworm (1990) who indicated that student's initial motivation is often extrinsic – focused on rewards. The longer the student is enrolled, the more likely self-improvement became a motive. McCormick et al. (1995) studied these initial motivations and asserted that part-time students were not as concerned with job change as were full-time adult students. The part-time adult students were more concerned with upgraded skills and

increased income in their current job. Motivation is most fragile in the first semester

(McGivney, 1996) and most students drop out in the first year of attendance and often early

in the semester.

Maturity, greater self-awareness, self-motivation, self-discipline, interest in school,

and flexibility are factors in persistence (Kowalski & Cangemi, 1983). The model developed

by Bean and Metzner from their review of the literature in 1985 emphasized study habits,

satisfaction with the college, and lack of self-reported life stress as elements in persistence,

but their 1987 study did not find these factors to be significant.

Adult educators recognize the ways in which students' mastery of three areas of

competence as students will affect their capacity to persist. MacKinnon-Slaney (1994) built

a model of adult persistence in learning that stressed the interactive impact of personal,

learning, and environmental issues on persistence. It is easy to think of students only as

learners. MacKinnon-Slaney's model of student role competency (Figure 7) is designed to

remind adult educators that students are also citizens of a college and home community.

The student's expertise as a learner must also be balanced with competence as a

participant and a healthy growth of self. They must grow in self-awareness, mastery of

learning, and use of the institution.

- Self-awareness: This is seen as "a robust sense of self, hardy academic self-concept, self-
  assurance in academic situations, a healthy dose of achievement motivation, and a certain
  degree of confidence in managing the bureaucracy" (p. 270).

Personal issues
- Self-awareness
- Willingness to delay gratification

• Clarification of career and life goals	
• Mastery of life transitions	
• Sense of interpersonal competence	

Learning issues
- Education competence
- Intellectual competence
- Political competence

Environmental issues
- Information retrieval
- Awareness of opportunities and impediments
- Environmental compatibility

Persistence
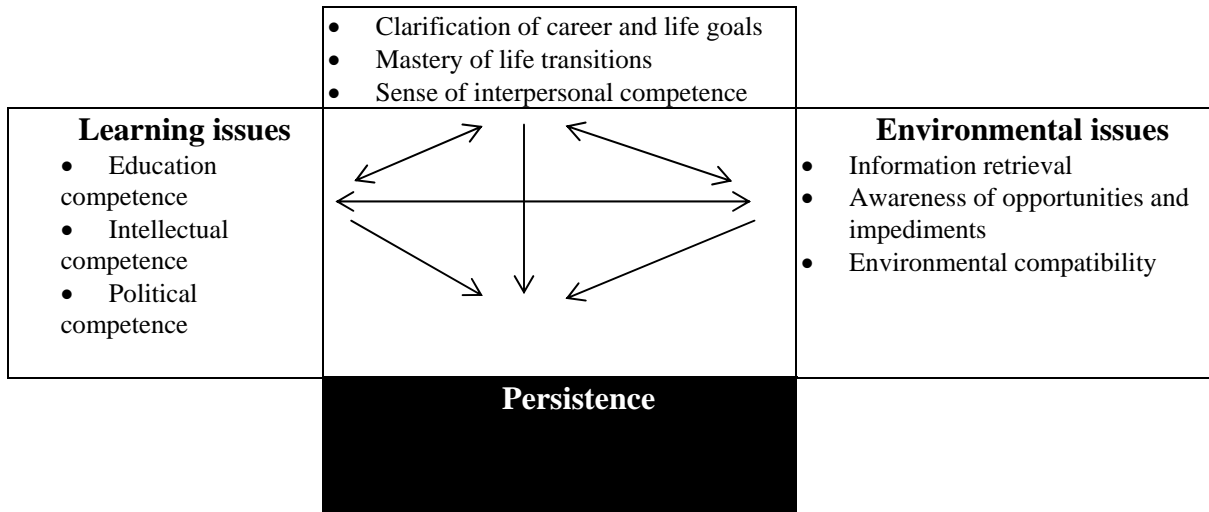
Figure 7 **-** MacKinnon-Slaney model of student role competency

- Delay gratification: Students who are willing to delay gratification have a belief in self and a belief in the efficacy of education.

- Clarification of career and life goals: It is important for students to nourish all three orientations to education (goal, activity, and learning), but especially to develop strong commitment to the goal orientation. Students who do not have clear goals are not likely to persist.

- Mastery of life transitions - seeking education often accompanies or is associated with the onset of other transitions in life (e.g. birth of child, death in family, divorce, new marriage, new job or loss of one). Students must master these transitions.

- Sense of interpersonal competence: Students must learn to manage the politics of life in the classroom.

- Educational competence: The skills of reading, listening, writing, using computers, library and database research, managing time, studying, and making oral presentations are central to success in college.

- Intellectual and political competence: benefiting from cue seeking or cue aware behavior (i.e. knowing when the faculty member really desires discussion).

- Information retrieval: understanding what questions to ask and when (decoding the special language of academic life).

- Awareness of opportunities and impediments: The bureaucracy and the red tape of many colleges loom large for adult students because of limited time and money.

- Environmental compatibility: Mattering, physical facilities, staff attitudes.

These areas for growth have an interactive effect on persistence. Each challenge overcome, each act that builds the relationship with the college leads to greater persistence, which leads back to more growth.

In the literature, researchers have sought to clarify the role of confidence, satisfaction, goals, enrollment motivation, social integration, and sources of support in affecting student motivation and persistence.

Confidence

Confidence is a major theme in studies of motivation. Rogers et al. (1988) found that women reported fear of failure while men did not report such fears. Lack of confidence is associated with stay-out behavior (Christensen, 1991). Mercer (1993) reported that more positive self-assessment and internal locus of control were positively associated with persistence. Adults reacted strongly to a poor grade in Cupp (1993). Adult students may set

unreasonable standards for their success that may undermine confidence. Confidence in the ability to complete was strongly associated with persistence in Hall (1997). The decision of an adult student to return to college must be seen as an act of courage.

Satisfaction

If students view education as useful and are satisfied with education, they are more likely to persist (McCaffrey, 1989). Dickeson and Noel's (1992) study of adult students suggested that those who reported a medium level of self-reliance, a high level of enjoyment of learning, and willingness to sacrifice were more likely to persist. Zajkowski (1997) reported that distance learning students who saw the course fee as a good investment were more likely to persist to course completion.

Goals

The study of how goals affect persistence is really about how expressed goals impact commitment. It takes commitment to work through all of the barriers and complete a college degree. Cini and Fritz (1996) attempted to determine the key factors within the construct "commitment." For adult students, the level of perceived rewards, the type and amount of personal investment (money and time), and a lack of alternatives would account for 35% of the variance in students' commitment to their studies.

The type of goals, the clarity of these goals, and strength of students' attachment to the goals are predictive of persistence. In the Bean and Metzner (1987) study and in a study by Farabaugh-Dorkins (1991) "intent to leave" was the strongest factor in predicting whether a student will fail to persist. This is not a particularly subtle finding. Intent to graduate

without any break (Mercer, 1993; Shields, 1994) or "intent to stay" is predictive of

persistence. In the Hanniford and Sagaria (1994) sample, higher persistence was found

among those whose education goals at age twenty-five (25) included the bachelor's degree.

Finally, some students leave because they have met their goals (having enrolled for particular

courses) (Stolar, 1991). Any study of persistence needs to take care to properly classify

degree seeking and non-degree students in order to take student goals into account.

Goal clarity

Studies by Christensen (1991), Farabaugh-Dorkins (1991), Hall (1997), Harrington

(1993), Kowalski and Cangemi (1983), and Stahl and Pavel (1992) found that certainty about

educational goals was positively associated with persistence. Students who were selective in

school choice and had higher aspirations persisted (Kowalski & Cangemi, 1983). The Bean

and Metzner (1985) model included educational goals and strength of commitment to those

goals but did not find this factor significant in the 1987 study.

Goal clarity can be measured by the presence of several markers. One marker for

clarity of goals is declaration of major. This was seen as a factor in the Bean and Metzner

(1985) model and in Christensen (1991) and Swift (1987). Another marker for goal clarity is

to examine late course registration. A student who registers late or is unable to decide on a

major is more likely to stop-out or stay-out (Johnson & Pritchard, 1989).

Enrollment motivation and persistence

Students who have initial motivations for enrollment that include extrinsic goals

(getting a new job, moving up at work, etc.) tend to have a higher level of persistence.

Students who have more than one type of motivation also demonstrate higher levels of

persistence. Mercer (1993) suggested that having both "goal" and "learning" motivations was associated with higher levels of persistence. Gordon (1992), Rogers et al. (1988), and Simmons (1995) identified the type of motivation for enrollment as a factor. In these studies, greater persistence was found among students who enrolled in order to: work toward a degree, get a better paying job or promotion, upgrade skills, or to prepare for a career change. In other words, a set of motivations that include job-related concerns is positively associated with persistence. The type of enrollment motivation matters in persistence.

Social integration

The study of persistence among traditional age students has stressed the importance of social integration in persistence (Tinto, 1993). Traditional age students who become involved on campus and make friends, join clubs, and participate in activities are far more likely to persist. It is important to re-work this concept to address the persistence of adult students. In two early studies (Kowalski & Cangemi, 1983; Weidman, 1985), social integration with others on campus was a factor associated with persistence. In the Bean and Metzner (1985) model, social integration was suggested as a factor in persistence. Their 1987 results did not support that part of the model.

Some of the recent studies indicate that social integration (as defined by Tinto) is not a factor (Dickeson & Noel, 1992; Martin, 1990) or that it must be re-defined to prove helpful in understanding persistence by adult students. Ashar and Skenes (1993) redefine social integration (in the context of cohort admission) to mean that students who were well connected with their classmates and who were in homogenous cohorts were more likely to persist. In this study, adult students were admitted in cohorts and took the same courses

together over their degree program. If the cohort was relatively homogenous in age and employment, the students persisted at higher rates. If students rated their cohort as friendly and cohesive, they persisted at higher rates. In a study of job training participants by Vann and Hinton (1994), members of in-class cliques were more likely to stay while those who are socially isolated were more likely to leave. The unit of analysis for social integration for adult students should be with classmates, not the dormitory or the college-wide social context. From this framework for adult students, it is possible that social integration is positively associated with persistence.

Academic integration was a factor identified by Horn and Carroll (1998) as positively associated with persistence in a sample composed of both traditional and nontraditional students. To measure academic integration, they used student responses to questions about how often they participated in the following activities: "attend career-related lectures, participate in study groups with other students, talk over academic matters with faculty, and meet with advisor concerning academic plans" (p. 52). Students who were isolated both from the resources of the college and from other students are less likely to persist.

Sources of support

In exit surveys, many adult students leaving their studies indicate they had trouble with their husband, children, or boss and they decided to give up their studies on the basis of this lack of support. Consistent with the finding that students depart most frequently in the first semester, emotional support is most important during the transition period for new students (McGivney, 1996; Ryder et al., 1994) and it becomes less important as the "student persona" becomes more secure in subsequent semesters.

Losty (1982) asserted that the level of spouse and child support for the student's new role has no significant impact on persistence.

A larger array of studies (Bean & Metzner, 1985, 1987; Christensen, 1991; Harrington, 1993; Kowalski & Cangemi, 1983; Rogers et al., 1988; Swift, 1987; Weidman, 1985) has found that family support is positively associated with student persistence. Family support is more likely among students who have well-educated partners (Scott et al., 1996). Support from family and friends and flexibility from the employer have a positive impact on persistence. Students who have multiple role conflicts seem less likely to persist (Tyler, 1993).

Other sources of support are also important. The college has resources that are important to the student. A feeling of support from the advisor (Hoffman, 1991), faculty members (Scott, Burns, & Cooney, 1993; Tinto, 1993) and other students is positively associated with persistence. The workplace was another potential source of support found by Tinto (1993).

Support from the significant others in the adult student's life in important in persistence.

Disposition - summary

Students who have clear goals, a variety of enrollment motivations, develop self-confidence, connect with others from the college, feel satisfied with their education, and have support from those who are important in their life are likely to persist.

Institutional

A wide variety of studies have examined the impact of institutional culture and practices on student persistence. The relationship with the academic advisor and the faculty are clearly important. Christensen (1991), Didelot (1991), Holm (1988), Johnson and Pritchard (1989), Kerka (1995), Martin (1990), McGivney (1996), Shields (1994), and Swift (1987) all found that good use of academic advising and regular contact with the advisor and/or faculty were factors associated with persistence. Bean and Metzner (1985) suggested this as a part of their model but it was not significant in the 1987 study.

Instruction factors that are positively associated with persistence include course availability (Bean & Metzner, 1985), quality of instruction, use of adult education technique (Martin, 1990; McGivney, 1996), and less opportunity to transfer (Bean & Metzner, 1985; Hall, 1997).

Better use of campus resources and greater capacity for problem solving are positively associated with persistence (Christensen, 1991; Weidman, 1985). One finding of Christensen was that students who used more strategies for earning credit were more likely to persist. This was somewhat contradicted by Ganiere et al. (1991) in which students who had taken more independent studies courses did not persist as often. Finally, students who saw the campus as convenient (Christensen), viewed the campus community positively, spent a sufficient amount of time on campus (Naretto, 1995), and participated in study skills courses (McGivney, 1996) persisted at higher rates.

Choice of major

The influence of choice of major on persistence seems to vary from sample to sample. One study (McGivney, 1996) found that agriculture, music, medicine, arts, language, and

education students were least likely to leave and students in technical and science subjects most likely to leave. Scott et al. (1996) found those whose studies were in business, law, and economics were more likely to leave. Choice of major does not seem to be a consistent factor in persistence.

Institutional barriers summary

Colleges and universities that wish to enhance adult persistence provide caring and accessible advisors and instructors, a variety of schedules, classes at convenient locations, and a friendly environment in which adults connect with each other. Enhancing the social and academic integration of adult students is a key strategy.

Barriers: A summary

Adult students confront institutional, dispositional, situational, and academic barriers in their path to graduation. Adult educators may have limited ability to influence the impact of these barriers. One intervention that has a growing acceptance has been the recognition of prior learning built from life and work experience.

Prior learning assessment

This section provides a practical and theoretical introduction to the practice of prior learning assessment. John Dewey serves as the intellectual progenitor of the prior learning assessment movement and this section addresses his view of the role of experience in education. Next, the practice of prior learning assessment (PLA) in higher education is explored. The process and outcomes from PLA complete this section.

Adult students are "situated learners" and come to the college with experience. Adult educators must understand the role of their experience in their education. In the classroom, skillful teachers of adults invite the adult student into dialog, building on their experience as a rich classroom resource. For a reflection on the broader role of experience in education, it is useful to turn to John Dewey.

John Dewey on experience and its role in learning

In Democracy and Education, John Dewey put forward a model for how humans think and explored the implications for educators.

Dewey used the term experience to mean the interaction of mind with the physical universe, the world of things. He distinguished between experience and "mere" activity in this manner: "Mere activity does not constitute experience" (p. 146). Experience is trying while mere activity is undergoing. Experience implies mindfulness, thinking, predicting, and reflecting.

This conception of experience and its importance in education is central to Dewey's conception of education. His technical definition of education:

> It is that reconstruction or reorganization of experience which adds to the meaning of experience, and which increases the ability to direct the course of subsequent experience. (1) The increment of meaning corresponds to the increased perception of the connections and continuities of the activities in which we are engaged…(2) The other side of an educative experience is an added power of subsequent direction or control. (p. 82)

This definition of education places thinking in the role of research. This research

serves to make sense or insight out of a perplexing or confusing situation. "All thinking is

research and all research is native, original, with him who carries it on, even if everybody

else in the world already is sure of what he is still looking for" (p. 155). If thinking is

defined and used in this way in education, it has powerful implications for the choice of

subject matter, educational method, and techniques for holding interest and maintaining

discipline. Dewey placed the active construction of knowledge (thinking as research), that is,

the process of acquiring knowledge, as a primary role for education and was directly critical

of Plato for the legacy of putting knowledge, that is, the product or idea that is wholly

independent of the individual acquiring it, ahead of the learning that comes out of thoughtful

experience. He allied himself with Bacon and other philosophers of science. "While the

Greeks made knowledge more than learning, modern science makes conserved knowledge

only a means to learning, to discovery" (p. 156).

Dewey's model of thinking or reflective experience is rooted in the scientific method.

Reflective experience involves (p. 157)

1) perplexity, confusion, doubt

2) conjectural anticipation

3) careful survey

4) elaboration of the tentative hypothesis

5) acting on the hypothesis (testing it).

When educators engage learners in thinking we are helping learners to make sense of

the learners' experience or a classroom experience that comes from their world. "Thinking is

the accurate and deliberate institution of connections between what is done and its

consequences" (p. 158).

> Thinking involves all of these steps - the sense of a problem, the observation of
>
> conditions, the formation and rational elaboration of a suggested conclusion, and the
>
> active experimental testing. While all thinking results in knowledge, ultimately the
>
> value of knowledge is subordinate to its use in thinking. For we live not in a settled
>
> and finished world, but in one which is going on, and where our main task is
>
> prospective, and where retrospect - and all knowledge as distinct from thought is
>
> retrospect - is of value in the solidity, security, and fertility it affords our dealings
>
> with the future. (p. 158)

Education's value lies in the way in which it helps learners to make sense of and gain

from experience. "The measure of the worth of any social institution...is its effect in

enlarging and improving experience" (Dewey, 1916. p. 9). For Dewey, education is a

process of learning through experience. Experience is at the heart of education and at its

best, "the educational process is one of continual reorganizing, reconstructing, transforming"

(p. 54) understandings built from experience. The cultivation of this habit (the active stance

toward life, fully engaged in learning from the richest sources which are our own

experiences) is a primary purpose of education. "The inclination to learn from life itself and

to make the conditions of life such that all will learn in the process of living is the finest

product of schooling" (p. 56). Dewey's ideas are intended for learners of all ages.

"Education means the enterprise of supplying the conditions which insure growth, or

adequacy of life, irrespective of age" (p. 56).

Prior learning assessment and Dewey

The experiential learning movement used Dewey's conceptions to build a cycle of learning that involves four steps: experiencing, reflecting, theorizing, and applying/experimenting. It was from the experiential learning theory that the modern practice of prior learning assessment (in which adult students receive credit for learning from work and other experiences) for adult students was built. Hamilton (1992) suggested that Dewey is the progenitor of the practice of prior learning assessment. The experiential learning movement is affiliated with traditional schooling and provides academic credit for practical, "real life" experiences. Smith and McCormick (1992) valued the connection that Dewey built between experience and learning. They agreed with Dewey that learning is not inherent in all activities. They disagreed that experience is *required* for learning to occur, arguing that experience is frequently necessary, but not always. They suggested that learning from experience can often be equivalent, if not superior, to college-level learning.

The practice of prior learning assessment

The experiential learning movement takes on tangible form in the practice of prior learning assessment. There are two primary forms of prior learning assessment (PLA): course-specific PLA and the broader portfolio form.

In course-specific PLA, also called the "challenge" form, the adult learner either "tests out" of a specific course or assembles documents to demonstrate that she has acquired the equivalent and specific body of knowledge that a student who has passed the course should possess. An example of this form would include a computer programmer who demonstrates competence in a programming course by writing a program in the computer lab

and completing the final exam normally given in the course. Another example would be the police officer who serves as the departmental spokesperson and "passes out" of a course in public relations by assembling a portfolio of television and newspaper clips and writing a paper on the public relations process as applied to the public agency. The course-specific PLA form helps experienced adult students to avoid taking a course that would be redundant. The course-specific form of PLA enables students to concentrate their studies in areas in which they need to learn (often by broadening their theory base) and gaining credit for the technical knowledge they already possess. This process allows students to bring into their academic credential the non-formal learning they already possess.

Portfolio form of prior learning assessment

The portfolio form of PLA allows students to assemble a portfolio to document the learning that they have gained from their work, personal, and community experiences. This is a contemporary application of Dewey's conception of education at its finest. "The educational process is one of continual reorganizing, reconstructing, transforming" (p. 54) understandings built from experience. In a typical process, the student submits the portfolio to the evaluators who read the portfolio, conduct an interview of the student, and award credit based on how the portfolio documents the learning built through experience. The portfolio form of PLA has grown dramatically since the first survey conducted by the Council on Adult and Experiential Learning (CAEL) in 1974. In 1974, CAEL reported that forty (40) institutions had PLA programs. In 1991 CAEL conducted a survey of higher education (Fugate & Chapman, 1992) and reported that eighty-five percent (85%) of the

colleges (1,474 of those responding) had some form of PLA. Six hundred thirty-one (631) of the colleges and universities reported that they used the portfolio form of PLA.

The rules and methods of portfolio PLA

Smith and McCormick (1992) suggest requirements for credit to be granted from the portfolio process. The student must: demonstrate that learning has occurred from the experience, demonstrate that the learning is college-level, and articulate the nature and extent of the learning to the satisfaction of the evaluator. The most widely accepted standards for PLA process are articulated by Urban Whitaker (Walter, 1995, p. 96):

1) Credit should be awarded only for learning and not for experience.

2) College credit should be awarded only for college-level learning.

3) Credit should be awarded only for learning that has a balance appropriate to the subject matter and judged by academic experts.

4) The determination of competence levels and of credit awards must be made by appropriate subject matter and academic experts.

5) Credit should be appropriate to the academic context in which it is accepted.

6) Credit awards and their transcript entries should be monitored to avoid giving credit twice for the same learning.

7) Policies and procedures applied to assessment, including provision for appeal, should be fully disclosed and prominently available.

8) Fees charged for assessment should be based on the services performed in the process and not determined by the amount of credit awarded.

9) All personnel involved in the assessment of learning should receive adequate training for the functions they perform, and there should be provision for their continued professional development.

10) Assessment programs should be regularly monitored, reviewed, evaluated, and revised as needed to reflect changes in the needs being served and in the state of the assessment arts.

Urban Whitaker's formulation of the first standard (no credit for experience, only for learning) would not be consistent with Dewey's definition of experience. However, the emphasis on credit for the learning obtained from the experience is entirely consistent with the philosophy expressed in Democracy and Education.

Who participates in PLA?

Surveys of participants in prior learning assessment have indicated that the mean age is in the 30's (age 31-39). Students were largely white (87%), female (59%), and part-time students (86%) seeking the bachelor's degree (87%) (Freers, 1994; White, 1995). Most students begin the PLA process for a very pragmatic and goal oriented reason. They accelerate their progress toward the degree and can save on tuition (Burris, 1997).

PLA processes

A student begins the process by reflecting on her life. Students prepare a timeline and build sections for work, family, community, church, travel, and hobbies. They are encouraged in workshops or courses to look at learning through work or community experience and reflect on the role of that learning in their life (Dagavrian & Walters, 1993).

"The process of portfolio development involves the student's retrospective examination of his life experiences as an adult to identify and describe the various types of learning. Reconstructing one's life can bring to the surface a realization of how much learning has taken place over a lifetime, outside of an academic setting" (Burris, 1997, p. 10).

This "reorganizing, reconstructing, transforming" (Dewey, p. 54) process has important cognitive and affective outcomes for students. Indeed, Burris argues that it is a transformative learning experience. The process of reflection, writing, and validation has a powerful effect on the student. This effect strengthens or enables goal clarity, academic integration, and persistence.

During the period of portfolio development, the relationship with an academic advisor or key faculty member is important. Respondents in Burris (1997) suggested the following aspects of the advisor's behavior in the relationship were important: mentoring, friendship, enthusiasm, encouragement, support, availability, and believing in the student. This relationship builds academic integration, a key element in persistence.

A common problem found in PLA portfolio programs has been low utilization. Under-utilization of the portfolio process happens because of an ambivalence toward PLA (from faculty and administration because some perceive the process lacks academic integrity), a lack of publicity, and low levels of support for students while in the portfolio assembly phase (Fisher, 1991; Topping, 1996). Students who did not utilize the process felt it required too much work. They also reported a lack of confidence in the credit-worthiness of their experiences (Fisher, 1991).

Outcomes from the portfolio form of PLA

The outcomes summarized here are greater persistence, affective and cognitive outcomes, and increased self-awareness.

Enhanced persistence

Two studies have suggested an association between the portfolio form of PLA and persistence. Freers (1994) found PLA completers at a community college went on to finish a bachelor's or higher at a 71% rate, far higher than those who had not completed the portfolio. Snyder (1990) found that community college students who applied for PLA credits after one year of study persisted at higher rates and this was a significant factor in the logistic regression equation. In the Snyder study, students could apply for PLA credits at the beginning of their studies. Students who applied at the beginning did not persist at as high a rate as those who had waited.

Affective outcomes

Students who complete the portfolio speak of satisfaction, pride, a new perspective, a feeling of accomplishment, and appreciation of the process for saving time and money (Boornazian, 1994; Dagavrian & Walters, 1993; Fisher, 1991; Freers, 1994).

Burris (1997) found that students value the process of portfolio completion for its contribution to strengthening values. The values cited by the students were independence, freedom, choices, learning, tenacity, hard work, nonconformity, pride, aspiration, and goal commitment.

Increased self-awareness

The steps in the process of the portfolio which involve reflecting, organizing the reflections, and receiving affirmation from the college in the form of credits awarded has the potential to make very positive changes in self-concept. A well-structured PLA process changes students' thinking not only about their pasts, but about the present and their futures as well (McGinley, 1995). Increased self-awareness (Sheckley & Weil, 1994), increased self-confidence and individual growth (Freers, 1994), and changes in how students view their past fears and limitations (McGinley, 1995) are found in studies of PLA participants. The adult students suggest that the PLA portfolio preparation is "full of revelations" (Burris, 1997, p. 116). "The person I am is now coming out…[the person] that I always was has surfaced" (p. 127). "What I did there was assess my whole life and…realized my capabilities" (p. 121). Students who finish the process are usually quite proud and speak of the portfolio as something they are excited to share with children and other family members.

Cognitive outcomes

One cognitive outcome of the portfolio process is a realization of the value of prior learning (Burris, 1997; McGinley, 1995). Students gain academic and organizational skills in the portfolio development and writing process (Burris, 1997). The PLA portfolio process certifies readiness for further learning and gives students a forum to investigate the structure of college-level learning through its requirement that they equate their learning from experience to the structure of the curriculum (Dagavrian & Walters, 1993).

PLA summary

The PLA portfolio process is derived from Dewey's conception of the finest educational practices. A rigorous process enables a solid and defensible assessment of prior

learning.   A well-run PLA portfolio process enhances adult student persistence through improving self-concept, increasing satisfaction, strengthening values and the relationship with the college, and by building cognitive skills.

Conclusions

Adult students experience a series of barriers in their path through higher education. The situational, academic, institutional, and dispositional barriers provide a great challenge that a majority of part-time adult students are unable to overcome. The PLA portfolio process is one key intervention that enables students to overcome the barriers.

The Spanard (1990) model of adult problem solving in higher education presented at page 22 provides a useful framework that is revised here as a way of organizing the findings from the literature. In the proposed Figure 8 model, factors that influence decision making by adult students are organized temporally. Background variables (or situational barriers) affect the intent to change and influence the decision to persist directly and indirectly through the outcome or process variables. The background variables presumed to be relevant are: age, gender, educational attainment of spouse and parents, work intensity, high school performance, and prior college credits. Life changes influence the intent to change and may influence the decisions reached at each stage in the model. The outcome or process variables (contemporary grade point average, enrollment status, financial aid, relationship with the college, and dispositional elements) directly influence the decision to persist and the decision to participate in the PLA portfolio process. Participation in the PLA portfolio affects the relationship with the college and the dispositional elements of the model *and* directly affects

persistence. The complex interplay of background, motivation, academic performance, PLA portfolio participation, and life changes affects adult student progress throughout the process.

In the research that follows, this model is not directly tested. Each of the items seems well-established in the literature with the exception of PLA. The elements of this model that *are* present in the subsequent research are marked in the figure with an asterisk and are the background variables of age, gender, high school performance, and number of prior college credits. Also present in the subsequent research are the outcome or process variables of participation in the PLA portfolio process and contemporary grade point average. Enrollment status is indirectly present as a variable by the selection of a sample that included only part-time students. One of the purposes of this study is to determine if the inclusion of the variable of PLA portfolio participation is warranted in future research efforts with the proposed Figure 8 model.
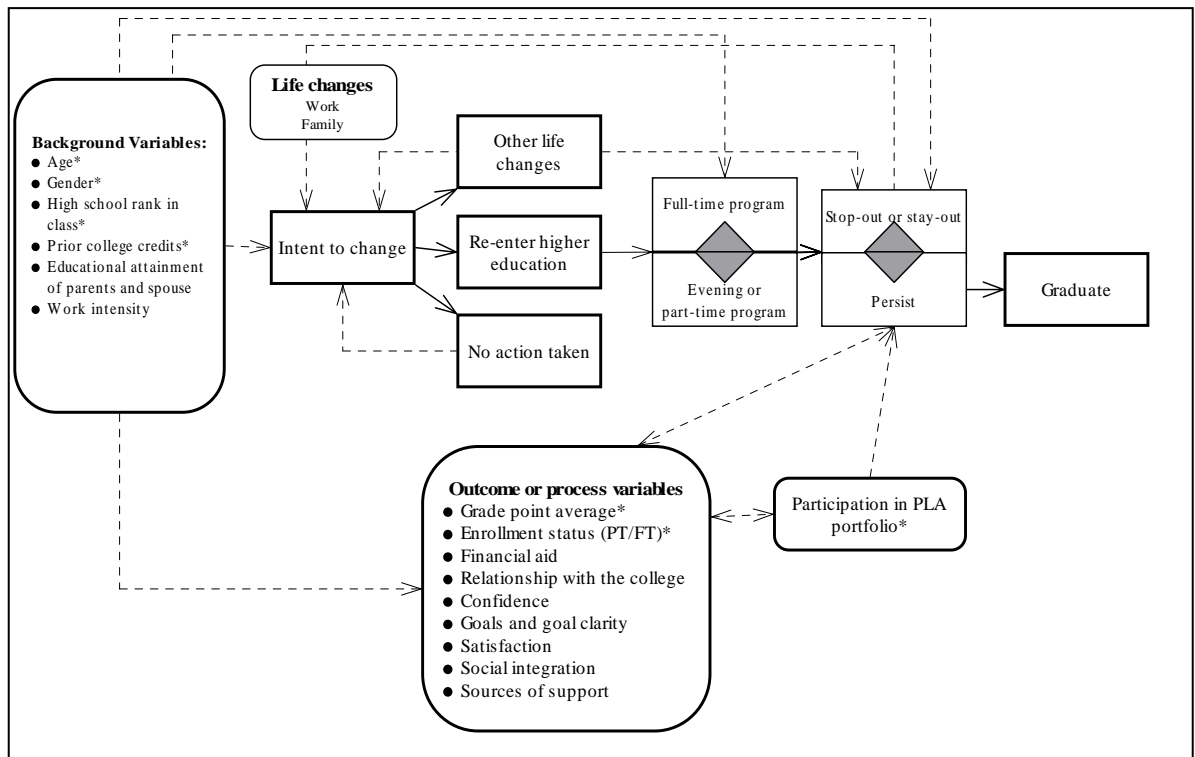
Figure 8 - Pearson's model of influences on adult student persistence in higher education

CHAPTER THREE: METHODS

The study analyzes the association of the use of the PLA portfolio with the persistence rate of adult degree-seeking students who were studying part-time at Simpson College, a Midwestern liberal arts college. Logistic regression in SPSS is used to determine the contribution of PLA to a model that seeks to predict the likelihood of persistence. The logistic regression model (LRM) includes the variables of age, gender, high school performance, number of prior college credits, and Simpson grade point average. This LRM does not directly test the model proposed in Figure 8 but introduces prior learning assessment as a variable for inclusion in future efforts to understand adult student persistence.

Difficulties in the study of persistence of adult students

Adult student persistence is difficult to study. Categorization is one of the difficulties. Adults attend college as part-time and as full-time students. They come to college to meet a degree objective or to take a course for professional development. Properly categorizing these distinct bodies is difficult. The time frame of analysis presents another problem. Because adults are situated learners, they may stop-out from time to time. A fall-to-spring "retention" model does not capture the student who stops out and returns. The definition of "adult" or "nontraditional" student may produce divergent results across studies. The use of age 24 and above has been extensive in NCES studies and this construction of the variable does a good job of capturing a complex of nontraditional characteristics. It is useful to go further than reliance on self-report to understand persistence. Self-reported reasons for departure may obscure more fundamental academic or institutional problems.

Categorization

The data from Simpson College (a Midwestern, private non-profit four-year college of approximately 2,000 students) illustrate the problem of categorization. In Table 11, data about all new students entering in the 1991-1992 and 1992-1993 academic years are displayed in five groups: full-time freshmen who enter from high school, full-time traditional age students who transfer from another college, full-time adult students (defined here as age 24 and up), part-time adult students who declared degree-seeking status (matriculated), and the students who have enrolled in one or more classes for credit but did not declare degree-seeking status.

Table 11 - Outcomes as of 1997 for Simpson College students beginning in 1991-1992

New Students Category	Year of Entry	Persist	Non-Persist
Traditional freshmen degree-seeking	1991	60.6%	39.4%
	1992	62.0%	38.0%
Traditional full-time transfer degree-seeking	1991	66.0%	34.0%
	1992	61.1%	38.9%
Adult full-time degree-seeking	1991	81.8%	18.2%
	1992	71.4%	28.6%
Adult part-time degree seeking	1991	49.4%	50.6%
	1992	55.3%	44.7%
Adult part-time non-degree	1991	0.0%	100.0%
	1992	0.0%	100.0%

Students who have graduated or have remained enrolled as of 1996-97 are classified as "persist" in this table. At this college, adult students who are part-time and degree-seeking have a five or six year persistence rate which is 10% to 15% below that of all full-time students and 15% to 30% below that of full-time adult students. Further, the portion of the new student population that is part-time and does not declare an intention to seek a

degree does not persist. This group included many students who started at Simpson intending to explore the possibility of a degree and subsequently abandoned that goal at the college.

This group also included a large number of students who met their educational goal by taking one or more classes in a particular topic such as computer programming or management or writing. Their failure to persist to a degree cannot be interpreted as a stay-out.

Self-reports

The college conducts an informal exit interview with any matriculated student who does not return after one semester of absence. Students generally do not mention academic problems in these interviews. However, it is evident that academic performance has some impact on their failure to persist. While the percentage varies in each entry year cohort and in each category, between 3% and 13% of the students who are classified as non-persist were receiving failing grades. Self-reports of reasons for departure should be honored but treated with skepticism before determining adjustments in the system (Kerka, 1995). This research will rely on demographic and academic variables present within the student record.

Longitudinal analysis

This study will use a longitudinal approach to track the progress of students. This approach enables the researcher to capture changes in the student's status (movement from part-time to full-time and back) and to distinguish properly between stop-out and stay-out.

The context

The population for this study consists of part-time degree-seeking students at Simpson College. The research focus was on the impact on their persistence of the use of (or failure to use) the portfolio form of prior learning assessment. The PLA process standards articulated by Urban Whitaker (see the section titled "The rules and methods of portfolio PLA" at p. 59) are followed at Simpson College. As practiced at Simpson College, adult students are eligible to apply for portfolio credits if they: are a freshman or sophomore,[1] are degree-seeking, and have five or more years of work experience or the equivalent in volunteer or community experience.

Students gain elective credits from this process. Students pay a fee of $50 to have their portfolio considered but pay no charge per credit. The portfolio is evaluated by a committee of full-time faculty chosen from the five academic divisions of the college. The college provides a workshop three times a year to help the students begin the process.[2] The academic advisors provide individual consultation to students as they make progress on assembling the portfolio. There is no course specifically designed to help students through the process. The process is optional. 14% of the eligible students have applied for the PLA portfolio credit (a percentage similar to that reported in other studies). Most of those who have applied for the credit have done so after one year of study. The mean number of credits awarded in the process at Simpson College is fourteen (14). This portfolio may be submitted at any time prior to the completion of 64 credits (in any combination of transfer or Simpson

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[1] They possess fewer than 64 credits and are age 25 at the time of application for PLA credits.
[2] The portfolio workshop is outlined at http://www.simpson.edu/dal/portfolio/life_experience/index.htm

credits) and is limited to a total of 24 credits possible.[3] A student who has 40 or fewer prior

credits may receive up to 24 credits in this process while a student who has achieved 50

credits could receive up to 14 credits.

Eligible students who complete the portfolio persist at much higher rates than those

who do not complete the portfolio. A total of 623 part-time students in Table 12 were

eligible for PLA portfolio credits over the period 1982-1992. Only one in seven (14.3%) of

those participated in the program.

Table 12 - Persistence rates by portfolio participation

Persist	PLA portfolio credits			
	Yes		No	
Yes	67	75.3%	207	38.8%
No	22	24.7%	327	61.2%
	89		534	
	14.3%		85.7%	

Among those who received PLA credits, three of four persisted, while only slightly more

than one in three persisted among those who were eligible and did not apply for the portfolio

credit. This is a notable difference in the persistence rates. The research will focus on

whether this portfolio form of prior learning assessment remains a significant factor in

persistence when other factors are controlled.

Since full-time students persist at much higher rates (see section titled "Enrollment

status" found on page 40) the study will focus on part-time degree-seeking students. The

sample of part-time students at this college included students who were under age 24 but

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[3] Such credits are further limited in that the aggregate of all prior college work, other non-traditional credits, and life experience credits cannot exceed 64 credits.

they were not coded as eligible for the prior learning assessment if they did not stay long

enough to reach age 25 and still have fewer than 64 credits.

Sample

The sample includes all part-time, degree seeking students who were eligible for the

PLA portfolio credit during their enrollment period. Those who were enrolled in credit or

non-credit courses but did not declare as degree seeking are excluded. Persistence is defined

as continuous (not necessarily consecutive) periods of enrollment and/or graduation. In this

manner, students who stopped out but subsequently returned have been classified as

persisters. Part-time students are defined as those enrolled for fewer than 12 hours per term.

Data files were generated from student records maintained by the college registrar and were

aggregated over several years to achieve sufficient sample sizes for analysis. Because the

study is longitudinal in nature, the data set starts in 1982 (the earliest date on which PLA

portfolio credits were awarded) and ends with students who entered in 1992. The year 1992

was chosen as the end date because an analysis of the students who had entered in 1992 and

earlier indicated that the students from this group who had not yet graduated as of 1998 had

exhibited a stable pattern of persistence. This pattern is exhibited in the following table. In

this table "persist" means that the student was still enrolled but had not yet graduated. The

categories of "persist" and "graduate" will be combined later in order to build a dichotomous

logistic regression model of persist/non-persist.

Table 13 - <u>Graduation and persistence rates 1982-1998</u>

Initial year at Simpson		Nonpersist	Persist	Graduate	Total
82	Count	7	1	20	28
	% within initial year	25.0%	3.6%	71.4%	
83	Count	17		15	32
	% within initial year	53.1%		46.9%	
84	Count	37	1	40	78
	% within initial year	47.4%	1.3%	51.3%	
85	Count	39	1	43	83
	% within initial year	47.0%	1.2%	51.8%	
86	Count	71	1	53	125
	% within initial year	56.8%	.8%	42.4%	
87	Count	55		55	110
	% within initial year	50.0%		50.0%	100.0%
88	Count	44		51	95
	% within initial year	46.3%		53.7%	
89	Count	59	3	68	130
	% within initial year	45.4%	2.3%	52.3%	
90	Count	56	2	52	110
	% within initial year	50.9%	1.8%	47.3%	
91	Count	61	12	64	137
	% within initial year	44.5%	8.8%	46.7%	
92	Count	54	5	45	104
	% within initial year	51.9%	4.8%	43.3%	
93	Count	47	15	38	100
	% within initial year	47.0%	15.0%	38.0%	
94	Count	63	21	32	116
	% within initial year	54.3%	18.1%	27.6%	
95	Count	46	52	28	126
	% within initial year	36.5%	41.3%	22.2%	
96	Count	57	61	7	125
	% within initial year	45.6%	48.8%	5.6%	
97	Count	33	84	1	118
	% within initial year	28.0%	71.2%	.8%	
98	Count	4	58	1	63
	% within initial year	6.3%	92.1%	1.6%	
Total	Count	750	317	613	1680
	% within initial year	44.6%	18.9%	36.5%	

Based on an analysis of Table 13, 1992 was chosen as the last year for inclusion of beginning students. The entering students from 1992 and earlier who were still enrolled or had graduated in 1998 were clearly persisters. Six years is a common measure of persistence to degree.

The remaining data set was coded with a dichotomous variable of persist or not, collapsing the graduate and persist categories seen in Table 13. To be clear about the target group for this study, the new student file for each year was divided as shown in Figure 9.

Degree-seeking			Non-degree
Full time			
Traditional freshmen and transfer	Adult full-time	Part-time	

All part-time degree seeking students, (completed at least one credit)			
Freshmen	Transfers	Freshmen	Transfers
Eligible for PLA credits (less than 64 credits, age 25 and up, 5 years work experience)		Not Eligible for LEP (too young or accumulated more than 64 credits)	

Gender	Age at time of start
Rank in high school	Number of prior credits
Simpson grade point average	
Variables	

Completed PLA portfolio	Did not complete portfolio

Outcomes	
Persist (graduate or enrolled)	**Non-persist**

Figure 9 - Data sorting for entering Simpson College students

The variables available for this data set that were identified in the literature included gender, the age of the student at the time of first enrollment, high school rank, number of outside credits, Simpson grade point average, and participation in the prior learning assessment (PLA) portfolio process.

From the literature review, the available variables are expected to influence persistence as indicated in Table 14. Each of these items was extracted for each part-time degree-seeking student. In the section that follows Table 14, descriptive information on each variable is presented.

Table 14 - Included variables and expected effect

Variable	Expected effect
1. Gender	Women more likely to persist
2. Age	Older students less likely to persist
3. High school rank	Students who placed higher within their high school would be more likely to persist
4. Prior credits	More prior credits would be positively associated with persistence
5. Contemporary GPA	Higher GPA would be positively associated with persistence
6. PLA portfolio participation	Participation will be positively associated with persistence

Descriptive data on variables

Gender

Women comprise two of three of the eligible students (67.2% in Table 15) in this sample. This share is similar to the current population of part-time students at this college. In Table 3 on page 11, males over age 24 comprised 38.5% of all males in higher education, while females comprised 45% of all female participants. This college exhibits a similar

pattern with greater participation from adult women than from adult men. From the

literature, we would expect gender to be a factor in persistence with women more likely to

persist among adult part-time students.

Table 15 – Descriptive data for gender

	Frequency	Percent
Female	418	67.2%
Male	204	32.8%
Total	622	100.0%

Grade point average

The students who comprise this sample exhibit a mean grade point average (almost

3.3 GPA in Table 17) that is approximately 10% higher than the average for all students at

this college. The range is from D(1.0) to A(4.0). The distribution of student GPA's is

negatively skewed (-1.071). A sizeable share of the students exhibits high GPA's. In Table

17 the twenty-fifth percentile is a B- average. The 50th percentile is a B+ average.

The sample lacks normality in the distribution of grade point averages. In Figure 10

the normal curve line against the actual distribution indicates the level of skewness and

kurtosis is probably outside the bounds of a normal distribution. This is important in the

choice of statistical methods. Discriminant analysis has an assumption of normality in each

of the variables while logistic regression does not assume a normal distribution. From the

literature review, we would expect grade point average to be positively associated with

persistence. The concentration of this sample at the upper end of the distribution may limit

the utility of the GPA as a predictor.

Table 16 – <u>Descriptive statistics for grade point average</u>

Statistic	Value
Mean	3.229
Median	3.331
Mode	4.0
Std. Deviation	.563
Skewness	-1.071
Kurtosis	1.259
Range	3.0
Minimum	1.0
Maximum	4.0
Percentiles	
25th	2.946
50th	3.331
75th	3.652
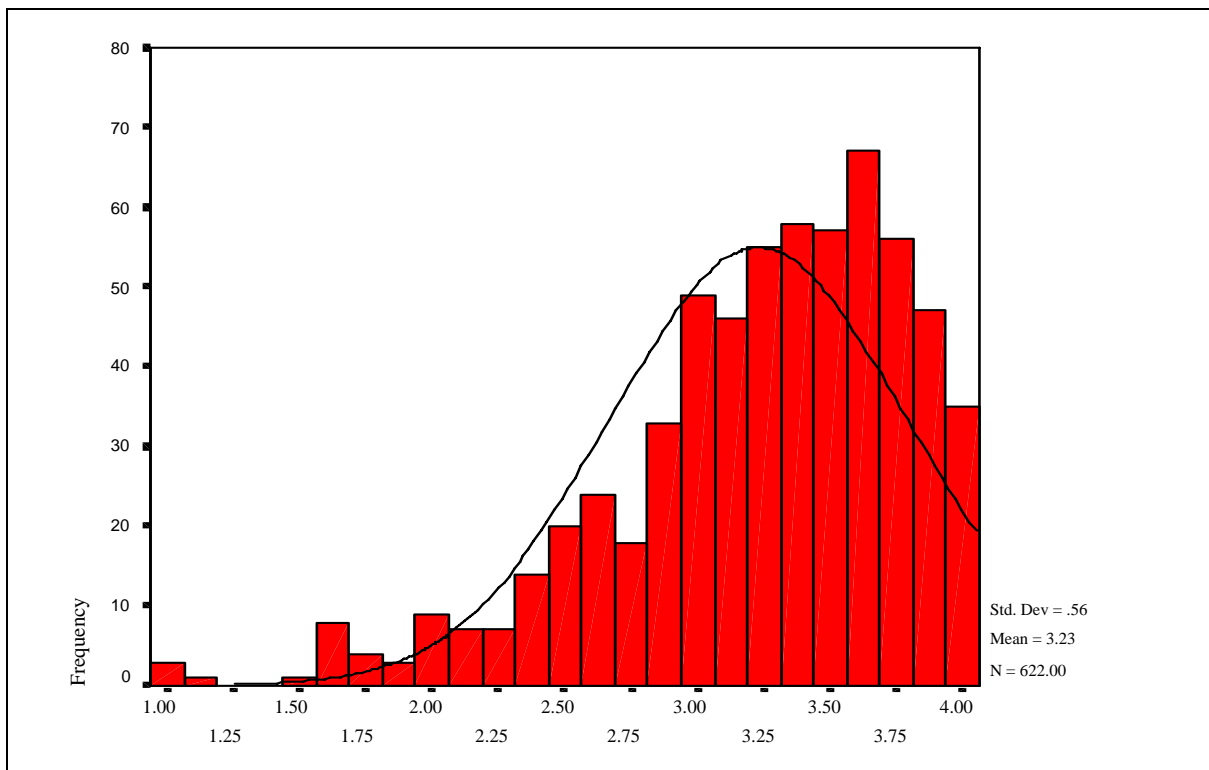
<u>Figure 10</u> - GPA distribution

Prior credits

"*Prior credits*" is defined here as credits transferred from another college or

university plus any credits awarded for nontraditional learning from sources recognized by

the American Council on Education (ACE) such as LOMA (Life Office Management

Association), ABA (American Banking Association), CPCU (Chartered Property and

Casualty Underwriters), the College Level Examination Program (CLEP), or military credits.

This variable does not include any credits awarded for the PLA portfolio.

The mean number of credits transferred was 29.15 for this sample. The range for the

sample is attenuated (with a range of 0-63.67) because the sample was chosen for eligibility

for the PLA portfolio. The PLA rules at Simpson College restrict eligibility to students with

fewer than 64 credits.

Table 17 – Descriptive statistics for prior credits

Statistic	Value
Mean	29.1523
Median	28.5800
Mode	0
Std. Deviation	21.6424
Skewness	.0100
Kurtosis	-1.4460
Range	63.67
Minimum	0
Maximum	63.67
Percentiles	
25th	7.9175
50th	28.5800
75th	50.0000

A sizeable portion of the group transferred no credits. Indeed, the mode in Table 17

is 0. The distribution is far from normal. As noted earlier, this has a further impact on the

choice of statistical methods. This lack of normality is seen in Figure 11 with the somewhat

L-shaped curve.

Nearly 20% of the students in Figure 11 brought no credits when they entered the

college. The literature would lead to an expectation that students with more prior credits

should exhibit greater persistence and students with few or no credits should exhibit lower

persistence.
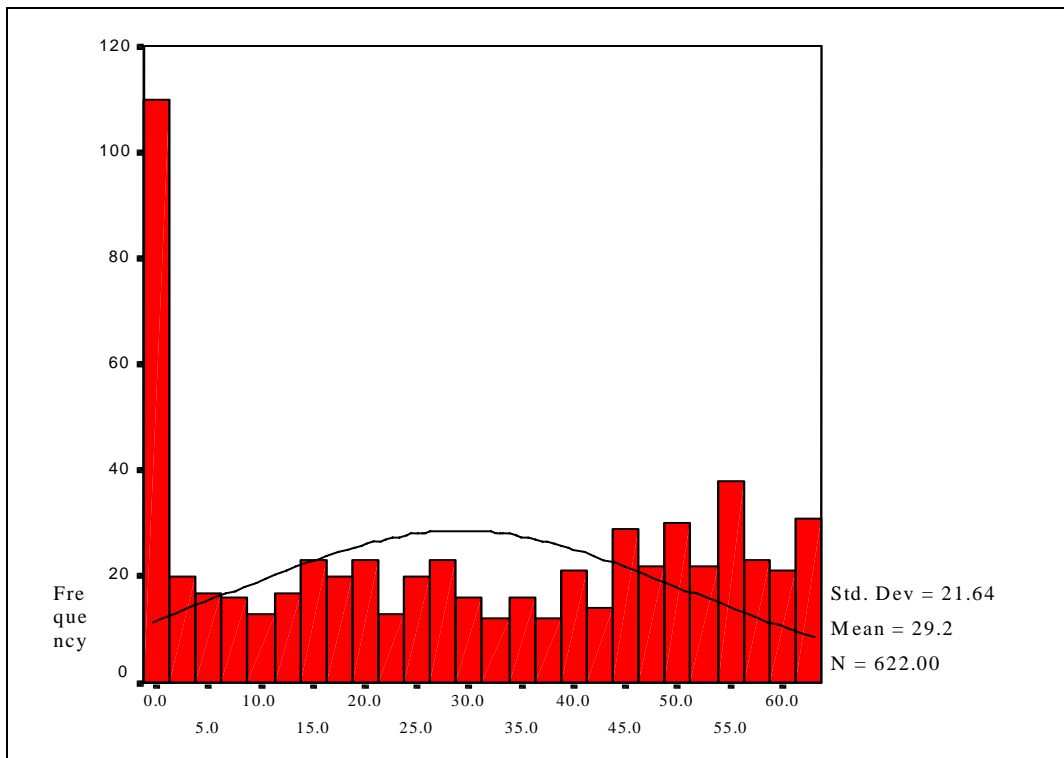
Figure 11 - Outside credits distribution

Age

The range in age is from 22 to 60 years. The lower end reflects the students who

were not initially eligible for the PLA portfolio due to age but remained at Simpson long

enough to become eligible. The results in Table 18 indicate that age 26 is the most common

beginning point but the mean is age 33.

Table 18 - Descriptive statistics for age

Statistic	Value
Mean	33.11
Median	32.00
Mode	26.00
Std. Deviation	6.97
Skewness	.8260
Kurtosis	.2330
Range	38
Minimum	22
Maximum	60
Percentiles	
25th	27
50th	32
75th	37

In studies of adult participation in education, the rate of participation declines in

higher education as the student gets older. The age distribution of this sample seen in Figure

12 reflects that pattern, with the greatest participation occurring in the younger ages.

Figure 12 indicates that the distribution of age is also not likely to be normal. Age is

negatively associated with persistence in most of the literature. In other words, published

research indicates that older students are less likely to persist and that younger students are

more likely to persist.
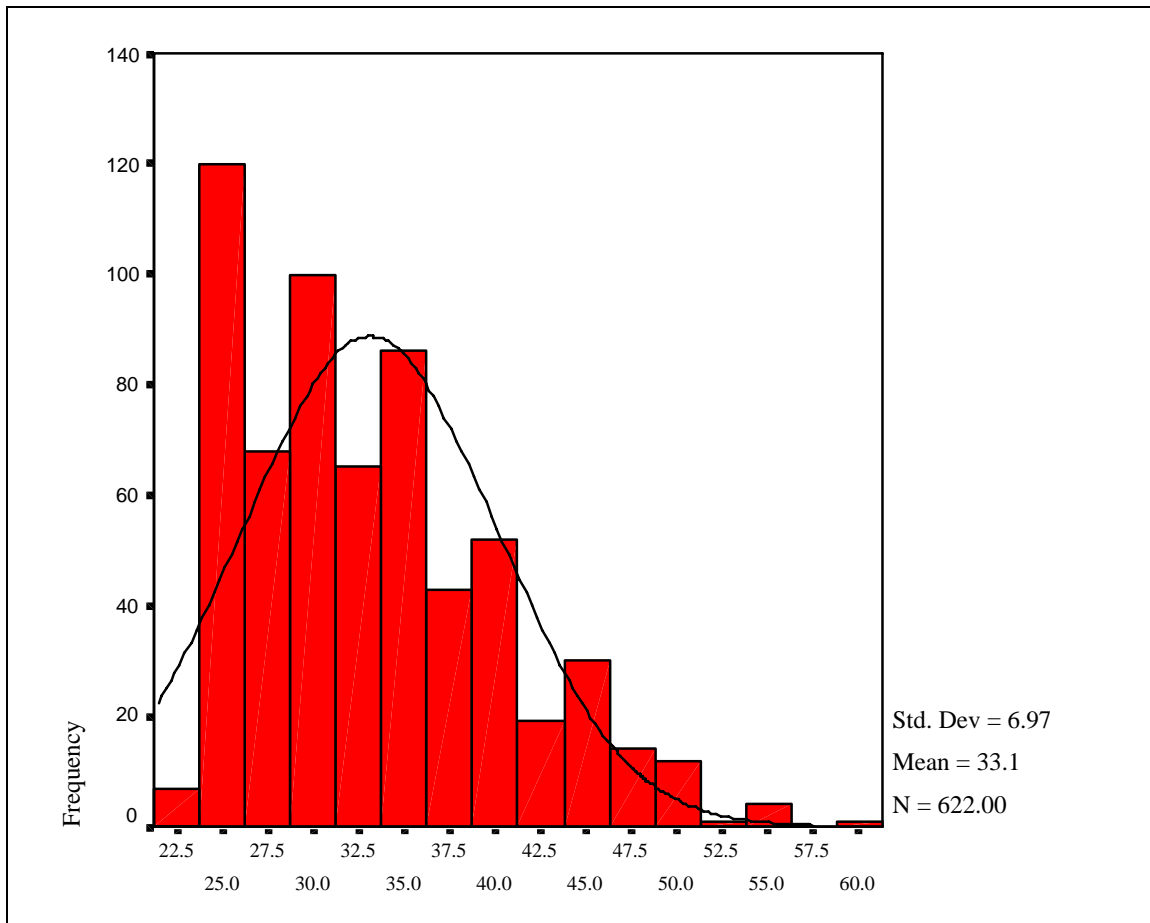
Figure 12 **-** Age distribution

Prior academic record

     The rank in high school is expressed here as a percentile rank computed from the

numeric rank and the size of the graduating class. The mean student in the sample as

indicated in Table 19 was at the 62nd percentile in his or her high school class. The

distribution of high school ranks was moderately negatively skewed as shown in Figure 13,

with students primarily grouping in the upper half of their class. This measure of prior

academic record (high school rank) was expected to be positively associated with

persistence.

Table 19 – Descriptive statistics for high school rank

Statistic	Value
Mean	62.7452
Median	66.6700
Mode	50.0000
Std. Deviation	23.6249
Skewness	-.521
Kurtosis	-.610
Range	96.88
Minimum	2.35
Maximum	99.22
Percentiles	
25th	46.5116
50th	66.6700
75th	81.5085

Std. Dev = 23.62
Mean = 62.7
N = 519.00
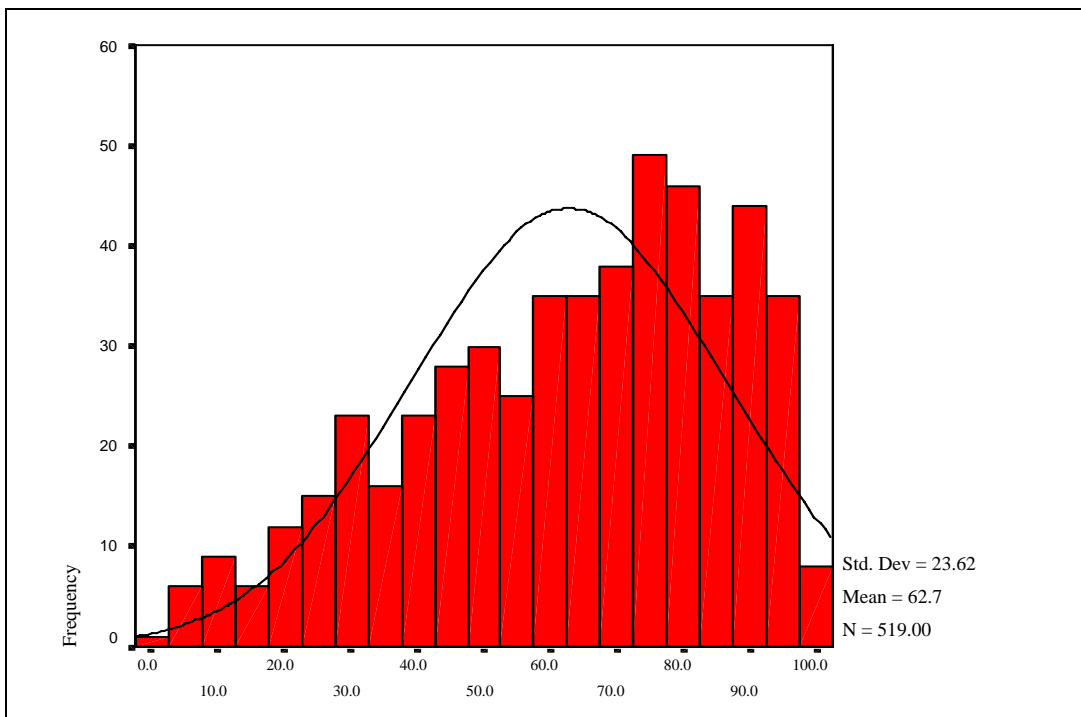
Figure 13 **-** Distribution of high school ranks

PLA portfolio participation

Slightly better than 14% of the sample as indicated in Table 20 had participated in the

PLA portfolio process. This rate of participation is typical of that reported in other studies of

PLA portfolio participation. Participation in the PLA portfolio was expected to be positively

associated with persistence.

Table 20 – Descriptive statistics for participation in PLA

	Frequency	Percent
Yes	89	14.3%
No	533	85.7%
Total	622	100%

Persistence of the sample

The results in Table 21 indicate that the persistence rate for this sample (44.1%) is

lower than the average for full-time students (approximately 62%) at this college. In Table

5, on page 18, the persistence rates (graduate plus still enrolled) of a national sample of

"highly nontraditional" 1989-90 bachelor's degree students was 45.6% after 5 years. The

Simpson sample fits the definition of highly nontraditional used in that NCES study and

exhibits a typical rate of persistence.

Table 21 - Persistence among PLA-eligible students, 1982-1992

Persist	Frequency	Percent
No	348	55.9%
Yes	274	44.1%

Total	622	100%

Hypotheses and analysis

The inquiry was conducted to determine if participation in the PLA portfolio process is predictive of persistence. It was believed that the inclusion of the factor of PLA portfolio participation in a model seeking to predict student persistence would make a significant contribution to the explanatory power of the logistic regression model. In other words, students who receive PLA portfolio credit will persist at higher rates than other similarly situated students. The research hypotheses are stated as follows:

The hypotheses are that the six variables (gender, age, high school rank, prior credits, grade point average, and PLA portfolio participation) are predictive of persistence. The pre-college variables (gender, age, high school rank, prior credits) comprise a group and are hypothesized to be predictive of persistence. The in-college variables (grade point average and PLA portfolio participation) comprise a group and are hypothesized to be predictive of persistence. PLA portfolio participation was expected to be a significant predictor of persistence, when controlling for the other variables.

For this analysis, the data subset was restricted to students who were eligible for the life experience portfolio process (those who had fewer than 64 credits upon admission and were age 25 and above at some point). Those who demonstrated life experience credit on their transcript were coded appropriately and an analysis was conducted to determine if there was a positive association with persistence, after inclusion in the model of the factors derived from the literature.

Listed in Table 22 is a summary of descriptive data for this sample. Age, high school rank, prior credits, and GPA are not normally distributed.

Table 22 – <u>Variables summary</u>

Variable	Type	Form	Range	Mean	Normality	Hypothesized impact on persistence
Gender	Categorical	F=1, M=0	F=67.2%	N/A	N/A	Positive
Age	Continuous	Num	22≤n≤60	33.11	Skewness .826 K-S .093 Sig. 000	Negative
HS rank	Continuous	Percent	2.4≤n≤99.2	62.745	Skewness -.521 Kurtosis -.610 K-S .083 Sig. 000	Positive
Prior credits	Continuous	Num	0≤n<64	29.152	Kurtosis -1.446 K-S .105 Sig. 000	Positive
GPA	Continuous	Num	1≤n≤4	3.229	Skewness -1.071 K-S .086 Sig. 000	Positive
PLA	Categorical	Y=1 N=0	Y= 14.3%	N/A	N/A	Positive
Persist/ Non-persist	Categorical	P=1 N-P=0	P= 44.1%	N/A	N/A	Dependent

Note: K-S statistics are the Kolmogorov-Smirnov statistics with Lilliefors significance correction used to evaluate the normal distribution of the variable. The significance level of .000 would indicate that this variable is not normally distributed.

Variables not included

The source of the data is the student academic and demographic file over a period of ten years. This study does not include variables categorized as dispositional in the literature review. This data file does not contain information on the situational variables of children, life changes, marriage, and work. Since this is a single institution study, institutional barriers are not considered, since it is impossible to compare institutional practices in this type of study.

This study does not include measures of socioeconomic status or ethnicity. Financial aid information often serves as a proxy for income or SES. Three problems excluded financial aid information (and thus income or SES) from consideration. Information for the early part of the period (1982 - 1988) is no longer available in computer form. The rules for financial aid availability varied substantially over the period for which the information was available. At this time, the financial aid rules are more generous toward part-time students and currently allow grants where the same student would have received only loans a few years ago. The final problem was that the other studies were not consistent in their view of financial aid as a factor associated with persistence. Thus, financial aid and SES were excluded.

Ethnicity is excluded. The data in Table 23 indicate that 98% of the sample is white.[4] Ethnic origin is available in the data file but only 2% of the portion of the population is African-American, Asian-American, Hispanic or other. Ethnic origin was not used in the analysis because the literature indicates that the distribution of the sample on this variable is insufficient for logistic regression.

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[4] Austin et al. (1992) argue that the number of observations for each category of the independent variables should be of sufficient size (n >30) or central assumptions of logistic regression would be violated.

The variables presumed relevant that are excluded from this study dispositional

elements, institutional practices, financial aid (and thus SES), and ethnic origin.

Table 23 – Frequency distribution of the sample by ethnic origin

Category	Frequency	Percent
Asian-american	3	.5
African-american	4	.6
Hispanic-american	1	.2
European-american	614	98.7

Choices among data forms for variable construction

Rank in high school was chosen instead of high school GPA as the variable for high

school performance because the high school GPA had anomalies such as values ranging from

4.1 to 7.8. In addition, for a substantial number of students the high school GPA was missing

from the data. Over 35% of the original sample had a high school GPA that was absent or

exceeded 4.0. High school rank was missing or invalid for only 14% of the sample. Because

of this difference, high school grade point average was discarded as an unreliable way to

measure the construct of prior academic performance. Rank and high school GPA were

moderately correlated ($r=.389$) in these data. ACT or SAT test scores were moderately

correlated with rank in high school ($r=.34$) and the scores were unavailable for over one-third

of the students in the sample, hence, test scores were excluded as the appropriate measure of

prior performance. The measure of prior academic performance chosen was percentile rank

in high school class. GED status was found for only 8 students in the sample, and was

excluded for the same reason as ethnic origin.

While full-time students are eligible for the portfolio credit (twenty have received such credit), adult full-time students graduate at rates well above the norm. This study seeks to focus on the group most likely to stop out and to stay out (adult part-time students). Thus, the full-time students are excluded.

Statistical methods

Logistic regression is commonly used in retention and persistence studies (Garrison, 1987; Gebel, 1995; Gillespie & Noble, 1992; Lanni, 1997; Murdock, 1995; Sadler, Cohen, & Kockeson, 1997). Logistic regression is a robust technique that does not require assumptions of normality and is designed for modeling categorical variables. Since the dependent variable *persistence* is dichotomous and a number of the variables do not meet the assumptions of discriminant analysis (in particular normal distribution), logistic regression is the appropriate statistical technique (Lottes, Adler, & DeMaris, 1996; Woldbeck, 1998).[5] Logistic regression (Agresti & Finlay, 1997) provides us with ability to assess the probability that a student with a particular set of values for the predictor (or independent) variables will achieve the successful outcome (in this case, persistence). It is a tool for calculating probability.

The logistic regression procedure is ideally suited to predict a binary outcome (i.e. persist yes/no) using a mixture of predictor variables. The procedure allows the researcher to

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[5] Meshbane and Morris (1996) suggest that predictive discriminant analysis may be superior for correctly classifying the members of the smaller group under study (in this case those who persist) while logistic regression may be superior for correctly classifying those in the larger group (those who did not persist). Discriminant analysis requires normality of distribution in independent variables and was not chosen as the technique for this study because age, high school rank, prior credits, and GPA were all not normally distributed.

use predictor variables that are not normally distributed (for this data set, none of the

predictor variables are normally distributed) or that are qualitative or categorical in nature

 (gender, PLA participation). The results must be interpreted carefully and care must taken

assure proper model fit and calibration and to assure through scatterplot analysis that the

predictor variables are not multi-collinear. The four major assumptions required in order to

use logistic regression are (1) linearity in the logits, (2) no multi-collinearity, (3) statistical

independence of the responses, and (4) large sample size (at least n>30 for each catgory in

the independent variables) (Austin, Yaffee, & Hinkle, 1992). This sample met those

conditions. Logistic regression was chosen for this analysis.

It is common in educational research to set the significance level at .05 (Gall, Borg, &

Gall, 1996). Since this was an initial study using this hypothesis, the alpha level was set at

.05.

The variables that are background or pre-college were entered as a first group in the

regression equation. The second group consisted of the in-college variables. The variables

are summarized in Table 24.

In Figure 8 - Pearson's model of influences on adult student persistence in higher

education at page 66 the hypothesized model contained a number of these variables.

Table 24 - Pre-college and in-college variables

Group	Variable
Group One: Pre-college Variables	• Gender • Age at time of start • HS rank in percentile • Number of prior credits
Group Two: In-college Variables	• Simpson GPA • Completed PLA
Dependent variable	• Persist/non-persist

A simplified model containing only the pre-college or background variables of gender, age, high school rank, and prior college credits along with the in-college or process variables of grade point average and prior learning assessment will be tested using logistic regression. The following figure portrays the simplified model.
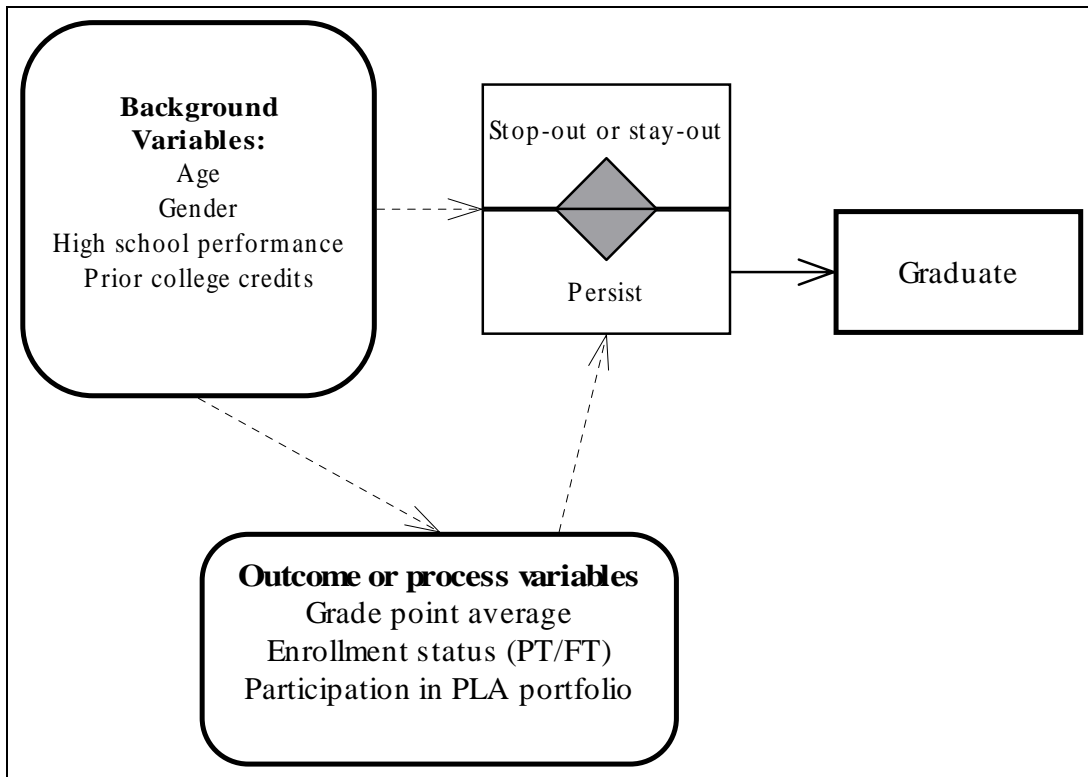
Figure 14 - Simplified logistic regression model

The logistic regression equation that contains each of the variables was written as follows (where π denotes the estimated probability of persistence):

Logit(π)=α+(β_1Gender+β_2Age+β_3HS Rank+β_4Prior credits) + (β_5GPA+β_6PLA)

Equation 1 - Logistic regression equation

The normal form of this equation is to state the contribution of variables in an additive manner, but the hypothesis was that age is negatively associated with persistence. All of the other variables were assumed to be positively associated with persistence.

The equation was applied to the data set using the SPSS 9.0 dichotomous logistic regression procedure. The variables were entered in two groups (as indicated in the equation). This feature of SPSS allows the researcher to choose a different method of entry for each group of variables. That option was not followed in this analysis. A forward stepwise likelihood-ratio (LR) entry procedure was chosen for each group. This method of entry was chosen to ensure that removal from the model of variables that are not significant predictors is done on the most careful basis (SPSS, 1999). This method of entry incorporating two groups of variables (pre-college and in-college) and the forward stepwise LR entry for each group enabled the researcher to preserve a variable that might disappear in a simple linear form. This method is not a force entry, merely a separation of the variables into groups for processing. For example, the analysis yielded a finding of significance for *high school rank* in the processing of the first group of pre-college variables. The subsequent processing of the second group of in-college variables (which included *GPA*) resulted in *high school rank* no longer meeting the significance threshold. *High school rank* and *GPA* are often correlated, and that connection held for this sample.

CHAPTER 4: RESULTS

Introduction

The purpose of the study was to incorporate the contribution of PLA to persistence into a model that predicted persistence. The study was conducted in three stages. In the first stage, the association between each of the variables and *persistence* was examined, using the chi-square test. In the second stage, the original logistic regression model was tested for the capacity to predict *persistence*. In the third stage, the logistic regression model was revised using the results of the first and second stages and tested.

Chi-square analysis

Chi-square analysis was used in the first stage to examine if an association existed between each independent variable and the dependent variable (*persistence*). Chi-square analysis enables the researcher to visualize relationships within the data, to spotlight particular patterns of relationships, and to aid in building an improved logistic regression model.[6]

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[6] In this chi-square analysis, data on independent variables were grouped into native categories (i.e. *gender*=-male/female) or in derived ranges (i.e. in deciles of *high school rank*) and presented as rows in a cross-tabulation with the two columns representing the dichotomous outcome variable (*persistence* - Yes/No). The expected value represented the value if the distribution were uniform. If, across the table, the data were nearly equal to the expected value, the null hypothesis that the distribution is uniform is not rejected. In other words, the independent variable would not have a significant association with the dependent variable. A chi-square test value is reported as [chi-square (degrees of freedom, <u>number of valid cases</u>) = value, level of significance]. For this study, a significance level of .05 or greater resulted in a failure to reject the null hypothesis of uniformity. A significance level of less than .05 indicates that there is an association between the independent variable and *persistence*. Such a finding led to a stronger expectation that the logistic regression model would find the variable to be significant in predicting persistence.

The real value of chi-square analysis for these purposes lies in the analysis of the standardized residuals when the chi-square value is significant. A standardized residual equal to or greater than an absolute value of 2.0 is highlighted in **bold** in the following tables. These were associated with the values that contributed to the significant results: to the rejection of the null hypothesis (Agresti & Finlay, 1997). The significant residuals indicate important relationships and patterns in the data that will not be evident in the subsequent logistic regression analysis. As an example, the variable *high school rank* proved significant in the first iteration of the logistic regression model and in the chi-square analysis. The table cells for *high school rank* in Table 27 on page 99 that display significant residuals are for students who were in the top 10% of their high school class. These students were significantly more likely to persist (standardized residual for persist: yes = 2.0). No other group of students was significantly more or less likely to persist. In the first iteration of the logistic regression model, *high school rank* was a significant but weak predictor variable. The weakness is easily understood when referring to the chi-square analysis. A strong predictor would yield progressively higher levels of the dependent variable with higher levels of the independent variable and lower levels of the dependent variable with lower levels of the predictor variable. This was not the case for *high school rank*. The chi-square analysis enabled an understanding of this pattern in the data and the outcome in the logistic regression model. As is noted later in the text, *high school rank* also disappears from the second iteration of the model because it is modestly correlated with grade point average (*GPA*). Logistic regression results can be tricky to evaluate and understand. Chi-square analysis enables greater confidence in interpreting the results of logistic regression.

A group of variables was expected to be positively associated with the dependent

variable *persistence* (except for *age*, which was hypothesized to be negatively associated

with *persistence*). The independent variables were: *gender, age, high school rank, prior

credits, GPA,* and *PLA*

In the following sections, the chi-square results for each variable will be presented.

Gender

The hypothesis was that *gender* would be associated with *persistence*. Women were

expected to exhibit a higher rate of *persistence* in this sample. The results in Table 25

indicate that male and female students in this sample do not have a significantly different rate

of *persistence*. None of the residuals are equal to or greater than 2.0.

As exhibited in Table 25, women in this sample have a slightly higher rate of

persistence (44.7%) than men (42.6%). This is in the direction hypothesized, but the

difference in the share of those who persist is not statistically significant.

Table 25 - *Gender* and *persistence* cross-tabulation

		Persist		
Gender		No	Yes	Total
Male	Count	117	87	204
	Expected Count	114.1	89.9	204.0
	% within male	57.4%	42.6%	100.0%
	Std. Residual	.3	-.3	
Female	Count	231	187	418
	Expected Count	233.9	184.1	418.0
	% within female	55.3%	44.7%	100.0%
	Std. Residual	-.2	.2	
Total	Count	348	274	622
	% within *gender*	55.9%	44.1%	100.0%

The chi-square value (1, $\underline{N}$ = 622) = .243, $\underline{p}$ = .622 indicates that the difference in

persistence rates is not significant. The null hypothesis of uniformity may not be rejected

($\underline{p}$>.05). The expectation that *gender* would be a significant predictor of *persistence* in the

logistic regression model was weakened by these results.

Age

It was hypothesized that *age* at the beginning of enrollment was negatively associated

with *persistence*. Increasing *age* was expected to be associated with lower levels of

persistence. For the chi-square analysis, *age* was grouped in two year increments through

age 45. Age 46 and up was considered as one group.

Table 26 - *Age* and *persistence* cross-tabulation

			Persistence		
Age			No	Yes	Total
22-23		Count	2	5	7
		Expected Count	3.9	3.1	7.0
		% within RANGE	28.6%	71.4%	100.0%
		Std. Residual	-1.0	1.1	
24-25		Count	34	29	63
		Expected Count	35.2	27.8	63.0
		% within RANGE	54.0%	46.0%	100.0%
		Std. Residual	-.2	.2	
26-27		Count	57	47	104
		Expected Count	58.2	45.8	104.0
		% within RANGE	54.8%	45.2%	100.0%
		Std. Residual	-.2	.2	
28-29		Count	37	19	56
		Expected Count	31.3	24.7	56.0
		% within RANGE	66.1%	33.9%	100.0%
		Std. Residual	1.0	-1.1	

Table 26 – continued

30-31	Count	32	33	65
	Expected Count	36.4	28.6	65.0
	% within RANGE	49.2%	50.8%	100.0%
	Std. Residual	-.7	.8	
32-33	Count	37	28	65
	Expected Count	36.4	28.6	65.0
	% within RANGE	56.9%	43.1%	100.0%
	Std. Residual	.1	-.1	
34-35	Count	37	31	68
	Expected Count	38.0	30.0	68.0
	% within RANGE	54.4%	45.6%	100.0%
	Std. Residual	-.2	.2	
36-37	Count	23	18	41
	Expected Count	22.9	18.1	41.0
	% within RANGE	56.1%	43.9%	100.0%
	Std. Residual	.0	.0	
38-39	Count	22	17	39
	Expected Count	21.8	17.2	39.0
	% within RANGE	56.4%	43.6%	100.0%
	Std. Residual	.0	.0	
40-41	Count	23	10	33
	Expected Count	18.5	14.5	33.0
	% within RANGE	69.7%	30.3%	100.0%
	Std. Residual	1.1	-1.2	
42-43	Count	8	11	19
	Expected Count	10.6	8.4	19.0
	% within RANGE	42.1%	57.9%	100.0%
	Std. Residual	-.8	.9	
44-45	Count	14	7	21
	Expected Count	11.7	9.3	21.0
	% within RANGE	66.7%	33.3%	100.0%
	Std. Residual	.7	-.7	
46 up	Count	22	19	41
	Expected Count	22.9	18.1	41.0
	% within RANGE	53.7%	46.3%	100.0%
	Std. Residual	-.2	.2	
Total	Count	348	274	622
	% within TOTAL	55.9%	44.1%	100.0%

As seen in Table 26, ages 22-23 (71.4%), 30-31 (50.8%), and 42-43(57.9%) were most likely to persist. Ages 28-29 and 40-41 were least likely to persist. However, an

analysis of the residuals indicates there are no statistically significant differences. There is

no discernible pattern between *age* and *persistence* in Table 26. The chi-square values (12,

$\underline{N} = 622$) = 10.971, $\underline{p}$ = .531 indicate that the null hypothesis of uniformity may not be

rejected ($\underline{p}$>.05). In other words, *age* does not display a significant association with

persistence for this sample, using the chi-square test. The null hypothesis that there is no

association between *age* and *persistence* cannot be rejected. *Persistence* and *age* appear to

be unrelated for this sample. The expectation that *age* would be a significant predictor of

persistence in the logistic regression model was weakened by these results. The lack of

association is illustrated in Figure 15.
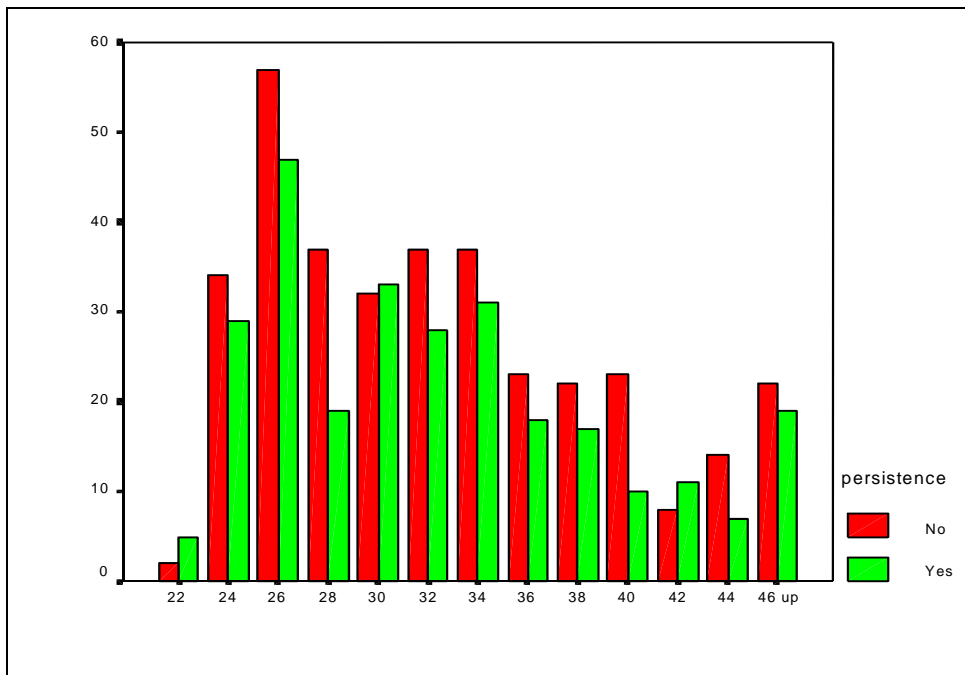
Figure 15 **-** *Persistence* distribution by start *age*

Prior academic performance

      High school rank in percentile form is the variable that was chosen to represent prior academic performance. The hypothesis was that increases in *high school rank* were positively associated with greater likelihood of *persistence*. Percentile rank in high school was converted to deciles for this chi-square analysis.

Table 27 - *High school rank* and *persistence* cross-tabulation

Decile		Persistence No	Yes	Total
(90.01-100th)	Count	24	40	64
	Expected Count	34.8	29.2	64.0
	% within Decile	37.5%	62.5%	100.0%
	Std. Residual	-1.8	**2.0**	
(80.01-90th)	Count	47	34	81
	Expected Count	44.0	37.0	81.0
	% within Decile	58.0%	42.0%	100.0%
	Std. Residual	.5	-.5	
(70.1-80th)	Count	40	52	92
	Expected Count	50.0	42.0	92.0
	% within Decile	43.5%	56.5%	100.0%
	Std. Residual	-1.4	1.5	
(60.1-70th)	Count	40	28	68
	Expected Count	36.9	31.1	68.0
	% within Decile	58.8%	41.2%	100.0%
	Std. Residual	.5	-.5	
50.1-60th	Count	32	25	57
	Expected Count	31.0	26.0	57.0
	% within Decile	56.1%	43.9%	100.0%
	Std. Residual	.2	-.2	
40.1-50th	Count	34	21	55
	Expected Count	29.9	25.1	55.0
	% within Decile	61.8%	38.2%	100.0%
	Std. Residual	.8	-.8	

Table 27 – continued

30.1-40th	Count	26	16	42
	Expected Count	22.8	19.2	42.0
	% within Decile	61.9%	38.1%	100.0%
	Std. Residual	.7	-.7	
20.1-30th	Count	21	11	32
	Expected Count	17.4	14.6	32.0
	% within Decile	65.6%	34.4%	100.0%
	Std. Residual	.9	-.9	
10.1-20th	Count	12	6	18
	Expected Count	9.8	8.2	18.0
	% within Decile	66.7%	33.3%	100.0%
	Std. Residual	.8	-.8	
(0-10th)	Count	6	4	10
	Expected Count	5.4	4.6	10.0
	% within Decile	60.0%	40.0%	100.0%
	Std. Residual	.2	-.3	
Total	Count	282	237	519
	% of Total	54.3%	45.7%	100.0%

Students within the first decile in Table 27 (90.01-100th percentile) and the third

decile (70.01-80th percentile) of their high school class have higher levels of *persistence*, but

the difference is significant only for the first or highest decile in Table 27.

The chi-square values (9, $\underline{N}$ = 519) = 17.840, $\underline{p}$ = .037 indicate a modest level of

association between *high school rank* and the likelihood of *persistence*. These results

indicate that the null hypothesis of uniformity must be rejected ($\underline{p}$< .05). Those who ranked

in the top decile of their class persisted at significantly higher rates.

This pattern is repeated in Figure 16. The expectation that *high school rank* would be

a significant predictor of *persistence* in the logistic regression model was only slightly

strengthened by these results.
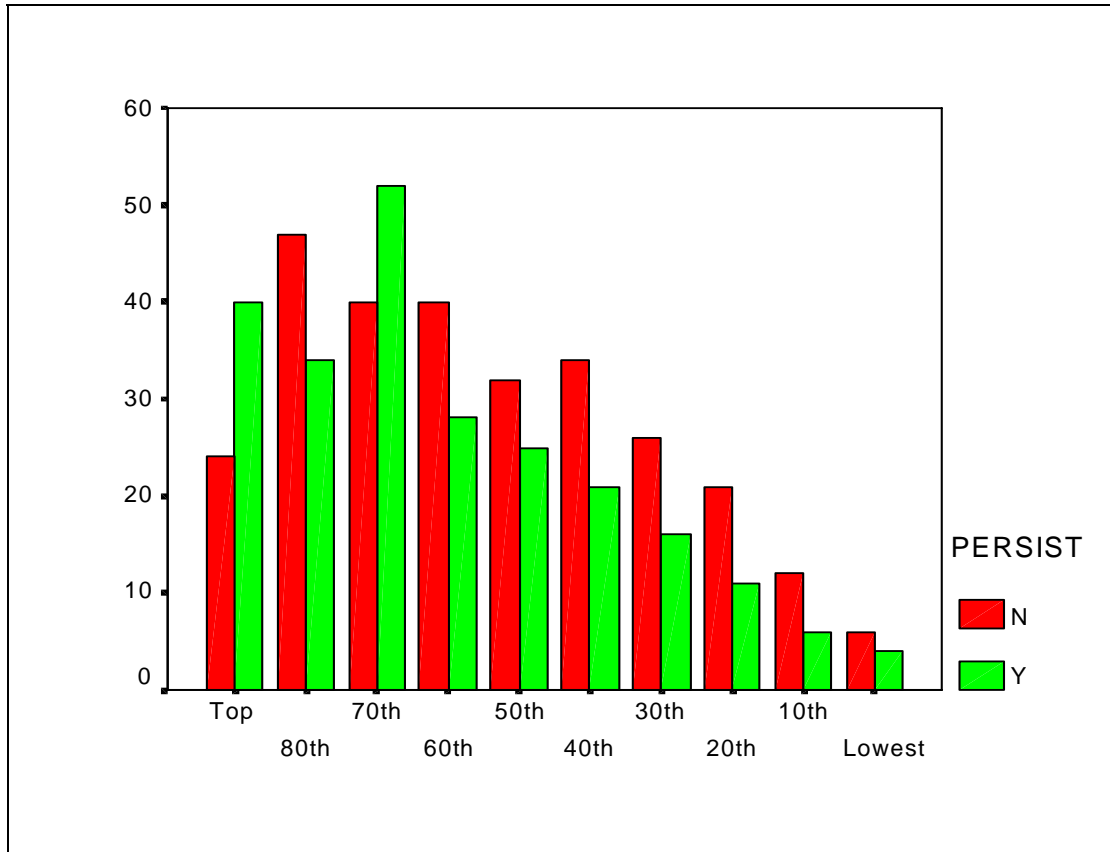
Figure 16 - *Persistence* by *high school rank*

Prior credits

An increase in the number of *prior credits* that the student brings to the college was expected to be associated with greater likelihood of *persistence*. The range is 0-63.67 for this sample seen in the following table. In this table, *prior credits* is presented in semester equivalent ranges (i.e. for first semester, the student has $1 \leq n < 16$ credits).

Table 28 - _Prior credits_ in semester equivalent and _persistence_ cross-tabulation

		persistence		
Prior credits		No	Yes	Total
None	Count	86	24	110
	Expected Count	61.5	48.5	110.0
	% within semester	78.2%	21.8%	100.0%
	Std. Residual	**3.1**	**-3.5**	
First	Count	66	33	99
1-15.99	Expected Count	55.4	43.6	99.0
	% within semester	66.7%	33.3%	100.0%
	Std. Residual	1.4	-1.6	
Second	Count	59	65	124
16-31.99	Expected Count	69.4	54.6	124.0
	% within semester	47.6%	52.4%	100.0%
	Std. Residual	-1.2	1.4	
Third	Count	60	53	113
32-47.99	Expected Count	63.2	49.8	113.0
	% within semester	53.1%	46.9%	100.0%
	Std. Residual	-.4	.5	
Fourth	Count	77	99	176
48-63.99	Expected Count	98.5	77.5	176.0
	% within semester	43.8%	56.3%	100.0%
	Std. Residual	**-2.2**	**2.4**	
Total	Count	348	274	622
	% of Total	55.9%	44.1%	100.0%

The standardized residuals (persist no = 3.1, persist yes = -3.5) for students who have

no _prior credits_ ("None" in Table 28) indicate that these students are significantly less likely

to persist. Students who have from 48-63.9 credits (labeled as "Fourth" in the table) are

significantly more likely to persist (standardized residuals are persist No = -2.2, persist Yes =

2.4). The chi-square values (4, $\underline{N}$ = 622) = 41.199, $\underline{p}$ = .000 indicate that there is a significant

association between the likelihood of _persistence_ and the number of _prior credits_ a student

brings to the college. Students who bring a higher number of credits appear to be more likely

to persist. Conversely, the students who have no prior credits appear less likely to persist.

The null hypothesis of uniformity of distribution is rejected (p<.05). The expectation that *prior credits* would be a significant predictor of *persistence* in the logistic regression model was strengthened by these results. The visual evidence presented in Figure 17 further suggests that *prior credits* will be a significant predictor within the logistic regression model.
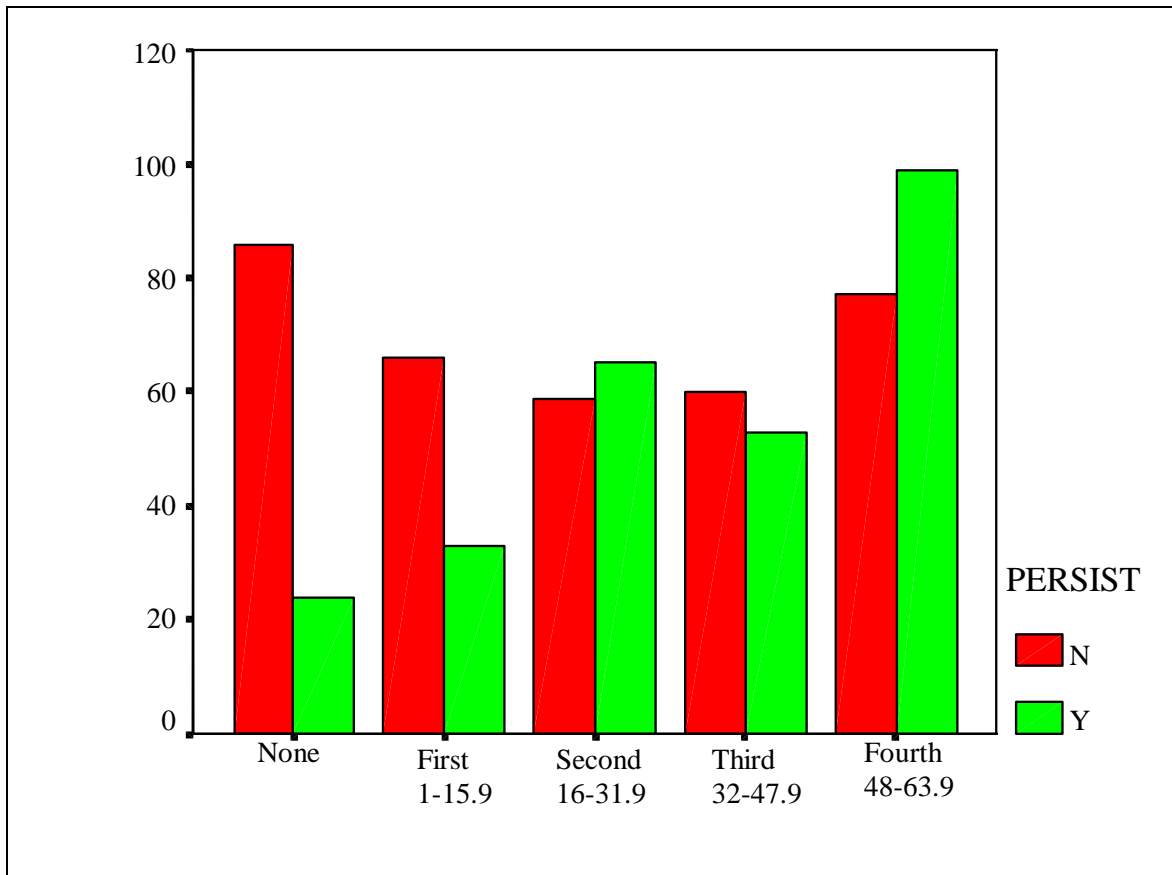
Figure 17 - *Prior credits* and *persistence*

Contemporary grade point average

The grade point average achieved at the college (*GPA*) was expected to be positively associated with greater likelihood of *persistence*. In the following table, *GPA* is presented in ranges that are equivalent to grades.

In Table 29, the standardized residuals (persist no = -2.2, persist yes = 2.4) for students who have a GPA expressed as a letter grade of "A-" indicate that they are significantly more likely to persist. Students with a "D+" average are significantly less likely to persist (standardized residual persist yes = -2.0). In general, the lower grades demonstrate lower levels of persistence within the ranges expressed as D and C-. However, the residuals associated with these ranges are not significant.

Table 29 – *GPA* and *persistence* cross-tabulation

GPA as GRADE		persistence		
		No	Yes	Total
A	Count	14	2	16
	Expected Count	9.0	7.0	16.0
	% within *A*	87.5%	12.5%	100.0%
	Std. Residual	1.7	-1.9	
A-	Count	50	71	121
	Expected Count	67.7	53.3	121.0
	% within *A-*	41.3%	58.7%	100.0%
	Std. Residual	**-2.2**	**2.4**	
B+	Count	96	94	190
	Expected Count	106.3	83.7	190.0
	% within *B+*	50.5%	49.5%	100.0%
	Std. Residual	-1.0	1.1	
B	Count	67	58	125
	Expected Count	69.9	55.1	125.0
	% within *B*	53.6%	46.4%	100.0%
	Std. Residual	-.4	.4	

Table 29 – continued

B-	Count	39	28	67
	Expected Count	37.5	29.5	67.0
	% within *B-*	58.2%	41.8%	100.0%
	% of Total	6.3%	4.5%	10.8%
	Std. Residual	.2	-.3	
C+	Count	46	18	64
	Expected Count	35.8	28.2	64.0
	% within *C+*	71.9%	28.1%	100.0%
	Std. Residual	1.7	-1.9	
C	Count	14	2	16
	Expected Count	9.0	7.0	16.0
	% within *C*	87.5%	12.5%	100.0%
	Std. Residual	1.7	-1.9	
C-	Count	9	1	10
	Expected Count	5.6	4.4	10.0
	% within *C-*	90.0%	10.0%	100.0%
	Std. Residual	1.4	-1.6	
D+	Count	9	0	9
	Expected Count	5.0	4.0	9.0
	% within *D+*	100.0%	.0%	100.0%
	Std. Residual	1.8	**-2.0**	
D	Count	4	0	4
	Expected Count	2.2	1.8	4.0
	% within *D*	100.0%	.0%	100.0%
	Std. Residual	1.2	-1.3	
Total	Count	348	274	622
	% within total	55.9%	44.1%	100.0%

The chi-square values (9, $\underline{N} = 622$) = 47.640, $\underline{p}$ = .000 indicate that the distribution is not uniform. The null hypothesis of no relationship between *GPA* and *persistence* is rejected ($\underline{p}$<.05). There is a significant association between *persistence* and *GPA*. Lower GPA appears to be significantly associated with lower persistence and higher GPA appears to be significantly associated with higher persistence.

The expectation that *GPA* would be a significant predictor of *persistence* in the logistic regression model was strengthened by these results. The relationship is illustrated in Figure 18.

Students who have grade point averages of C+ and below have lower levels of persistence than those who have higher grade point averages. Very few of the persisters have a *GPA* of C or below. Students with A- averages are significantly more likely to persist. The general pattern seems to be that the highest (more likely) and the lowest GPA's (less likely) are associated with persistence.
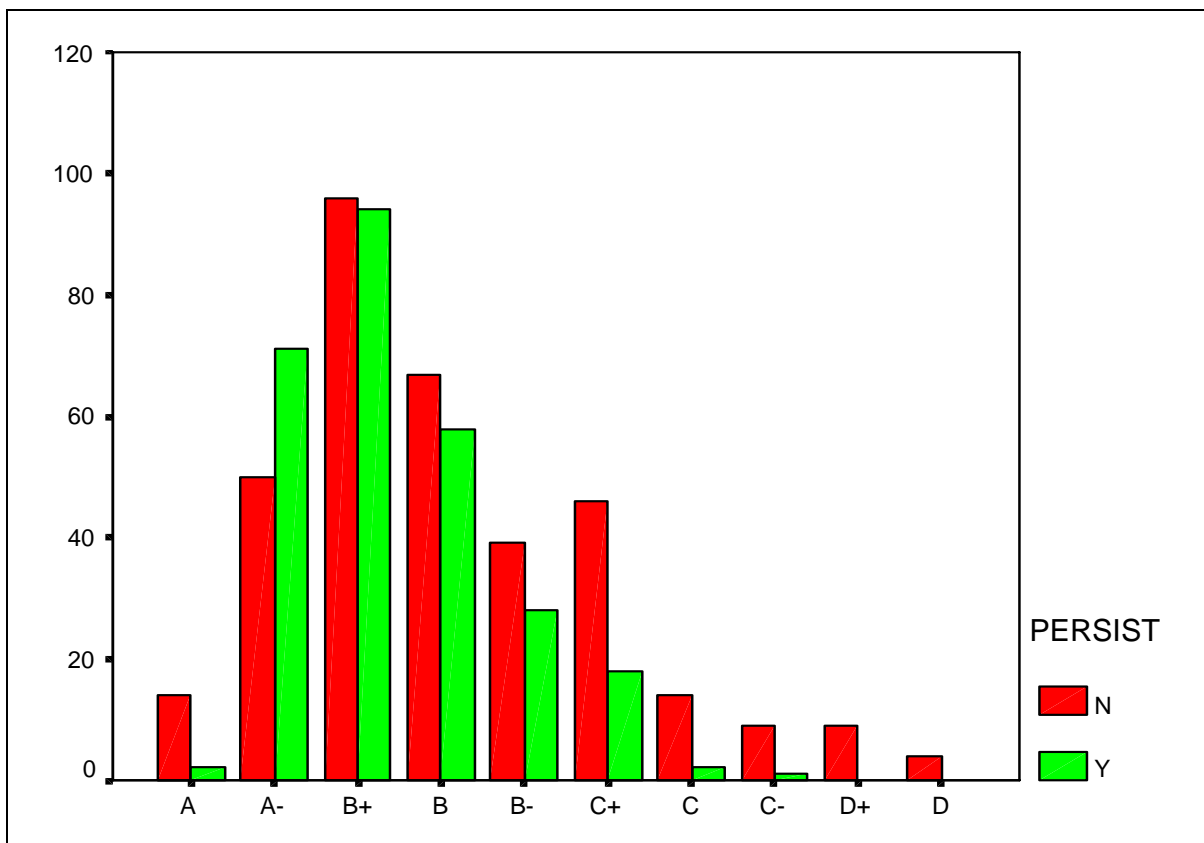

Figure 18 - *GPA* and *persistence*

PLA portfolio participation

It was expected that participation in the PLA portfolio process would be associated with higher levels of *persistence*. The results in Table 30 indicate a strong association between *PLA* and *persistence*.

Students in Table 30 who completed the PLA portfolio process were significantly more likely to persist (standardized residual persist yes = 4.4). They comprised only 14.3% of the total students but were 24.5% of the persisters. Those who completed the PLA portfolio process were also significantly less likely to fail to persist (standardized residual persist no = -3.9).

The chi-square values (1, $\underline{N}$ = 622) = 41.099, $\underline{p}$ = .000 indicate that the distribution was not uniform. The null hypothesis of uniform distribution must be rejected ($\underline{p}$<.05).

Table 30 - *PLA* and *persistence*

PLA		persistence		Total
		No	Yes	
No	Count	326	207	533
	Expected Count	298.2	234.8	533.0
	% within *NO*	61.2%	38.8%	100.0%
	% within *persistence*	93.7%	75.5%	85.7%
	Std. Residual	1.6	-1.8	
Yes	Count	22	67	89
	Expected Count	49.8	39.2	89.0
	% within *YES*	24.7%	75.3%	100.0%
	% within *persistence*	6.3%	24.5%	14.3%
	Std. Residual	**-3.9**	**4.4**	
Total	Count	348	274	622
	% within Total	55.9%	44.1%	100.0%

Students who completed the PLA portfolio were significantly less likely to drop out and significantly more likely to persist. Students who failed to complete the PLA portfolio

were less likely to persist than those who completed the PLA process, but the residuals

shown in Table 30 are not significant. The expectation that *PLA* would be a significant

predictor of the likelihood of *persistence* within the logistic regression model was

strengthened by these results.

Summary of chi-square analysis

The initial hypotheses were that the following variables would be significantly

associated with *persistence*: *gender, age, high school rank, prior credits, GPA,* and *PLA.*

The chi-square results are summarized in Table 31.

Table 31- Chi-square results for *persistence*

Variable	Chi-square results
1. *Gender*	No association with *persistence*
2. *Age*	No association with *persistence*
3. *High school rank*	Association with *persistence*
4. *Prior credits*	Strong association with *persistence*
5. *GPA*	Association with *persistence*
6. *PLA*	Strong association with *persistence*

The chi-square analysis cast doubt on the research hypotheses in part. It was possible

to suggest that *gender* and *age we*re not likely to be significant predictors of *persistence.*

High school rank was expected to be a weak predictor. The chi-square analysis suggested

that *prior credits, GPA,* and *PLA* were likely to be predictors of persistence.

In the following figure, the actual persistence rates are displayed comparing students

who completed PLA with those who did not using the number of prior credits to categorize.

This figure amplifies on the relationship between *prior credits* and *PLA*. The more prior

credits, the more likely the student was to persist. The gap in the rate of persistence between those who did not complete *PLA* and those who did narrowed with more *prior credits*.
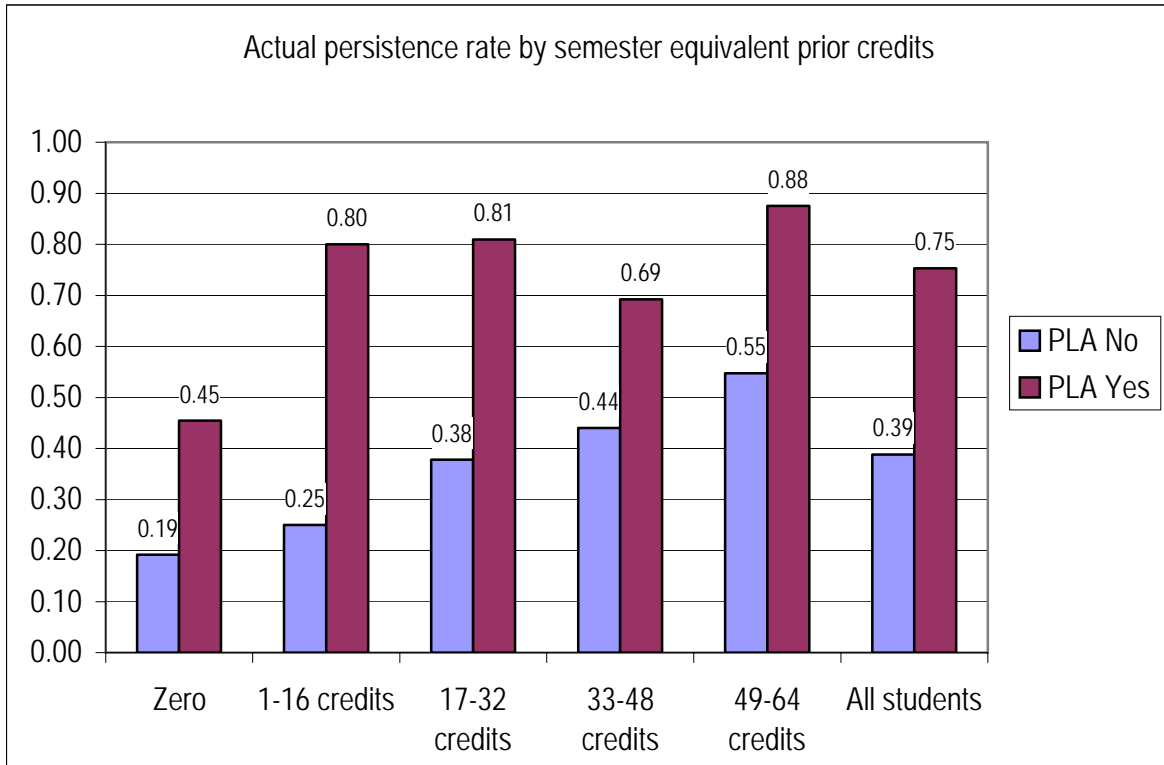
Figure 19 - Actual persistence rates by prior credits and by PLA

It was possible to anticipate that the original model:

Logit(π)=α+(β_1Gender+β_2Age+β_3HS Rank+β_4Prior credits) + (β_5GPA+β_6PLA) would be adjusted with the exclusion of *gender* and *age* and the possible exclusion of *high school rank*. The probable model revision follows:

Logit(π)=α+(β_1~~Gender~~+β_2~~Age~~+*β_3HS Rank(?)*+**β_4Prior credits**) + (β_5GPA+**β_6PLA**)

Equation 2 - Anticipated model revision after chi-square analysis

In other words, the results of the chi-square analysis enabled the researcher to anticipate that: the value of *high school rank* would be limited, that *age* and *gender* would not be significant, and that the other variables would remain significant in predicting *persistence*.

Logistic regression model testing

The second portion of the analysis was to determine if the original logistic regression equation predicted *persistence*.

The original logistic regression equation was:

Logit(persistence)=α+(β_1Gender+β_2Age+β_3HS Rank+β_4Prior credits) + (β_5GPA+β_6PLA)

Six hundred and twenty-two cases were available and 103 were rejected for missing data (*high school rank*). The remaining number of cases was 519.

Results from stage one of the logistic regression analysis

The variables *age* and *gender* did not remain in the equation in stage one (the processing of the pre-college variables) because their values were not significant ($p > .05$). For *age* the beta values were $(1, \underline{N} = 519) = .0974$, $\underline{p} = .7550$, R = .0000.

For *gender*, the beta values were $(1, \underline{N} = 519) = .1462$, $\underline{p} = .7022$, R = .0000. These results are consistent with the chi-square analysis. For this sample, *gender* and *age* were not significant in predicting the likelihood of *persistence*.

The portion of the first hypothesis (all six variables will prove significant in predicting *persistence*) that deals with *gender* and *age* is rejected ($\underline{p} > .05$). The demographic

predictors (*gender* and *age*) available for this sample are not significant predictors of

persistence.

Results from stage two of the original logistic regression model

Four variables remained in the equation at the end of stage two (the processing of all

variables including the pre-college and in-college variables). These were *high school rank,*

prior credits, PLA, and *GPA*. The second stage form of the equation was written as follows:

Logit(persistence)=α+β_3HS Rank + β_4Prior credits + β_5GPA + β_6PLA

Equation 3 - Stage two version of original logistic regression model

This portion of the original equation is significant in predicting *persistence*. The null

hypothesis that the logistic regression model will not significantly predict *persistence* is

rejected (p < .05). The stage two version of the logistic regression model is significant in

predicting *persistence*.

High school rank was weak (as predicted in the chi-square analysis) but significant in

stage one (see Table 32). *High school rank* remained in the equation in stage two but the

value of *high school rank* as a predictor was substantially reduced. It is likely that this

happened with the inclusion of *GPA*, which is correlated with *high school rank* (r = .389).

Table 32 - Values for *high school rank* in stage one and stage two of the analysis

High school rank	β	S.E.	Wald	df	Sig	R
Stage One:	.0103	.0039	6.8763	1	.0087	.0825
Stage Two	.0036	.0045	.6507	1	.4199	.0000

Three variables (*prior credits*, *PLA*, and *GPA*) are significant predictors of

persistence after stage two. This is consistent with the chi-square analysis. In Table 33 the

remaining predictor variables are summarized. The results in Table 33 indicate that *prior*

credits (β = .0253, p = .0000), *PLA* (β = -1.5803, p = .0000), and *GPA* (β = .6762, p = .0009)

demonstrate significant levels of prediction of the likelihood of *persistence.*

Table 33 - Summary of logistic regression model for variables predicting *persistence* in
stage two (N=519)

Variable	β	S.E.	Wald	df	Sig.	R
Group One:						
High school rank	.0036	.0045	.6507	1	.4199	.0000
Prior credits	.0253	.0046	29.8999	1	.0000	.2020
Group Two:						
PLA (No=1, Yes=0)	-1.5803	.3031	27.1845	1	.0000	-.1919
GPA	.6762	.2032	11.0730	1	.0009	.1152
Constant	-2.0091	.7148	7.9001	1		.0049

The estimates of the change in odds (defined as Prob[persist]/Prob[no persist]) for a

one unit change in the independent variable are reported as Exp(B) in Table 34. When values

for Exp(B) confidence intervals include the value of 1.0, it is not certain that there is any

change in the odds of *persistence* from changes in that variable (SPSS, 1999).

Table 34 - Confidence interval (95% CI) for Exp(B) for second stage model

Variable	Exp(B)	Lower	Upper
High school rank	1.0036	.9949	1.0125
Prior credits	1.0256	1.0163	1.0349
No *PLA*	.2059	.1137	.3730
GPA	1.9664	1.3204	2.9285

For example, in Table 34, the variable *high school rank* includes the value of 1.0 within the confidence interval (lower bound = .9949, upper bound = 1.0125). *High school rank* is thus excluded from consideration as a predictor variable when controlling for *prior credits, PLA,* and *GPA*. Because the confidence interval does not include the value of 1.0 for the three remaining variables (*PLA*, *prior credits*, and *GPA*), these variables are significant in predicting *persistence.*

Table 35 - Goodness of fit indicators for second stage model

-2 Log Likelihood	633.486
Goodness of Fit	518.555
Cox & Snell - R^2	.146
Nagelkerke - R^2	.196

The Nagelkerke R^2 value (.196) in Table 35 indicates that nearly twenty percent of the variance in *persistence* is explained by the model. The Nagelkerke and Cox and Snell measures provide a rough approximation of the correlation coeffecient (SPSS, 1999), giving a measure of the amount of R^2 variance in *persistence* explained by remaining predictor variables (*PLA*, *prior credits*, and *GPA*). The values for *-2 Log Likelihood* and *Goodness of fit* demonstrated steady improvement at each stage and entry of the model building process. *Goodness of fit* is derived from an analysis of the residuals (the difference of the observed

and the predicted value for each case (SPSS, 1999) while the *-2 Log Likelihood* is derived

from a calculation of the probabilities. A perfect model fit would display a *-2 Log Likelihood*

value of 0. Declining values for *-2 Log Likelihood* in each successive stage indicates that the

added variables are contributing to the accuracy of prediction.

Model calibration for the second stage logistic regression model

The test for the model's calibration indicates that the observed and expected

probabilities are adequately matched. The Hosmer and Lemshow goodness of fit test is a

chi-square test that compares groups of observed and expected values (SPSS, 1999). In this

test the desirable result is that the observed and expected results are very similar and the null

hypothesis of uniformity is not rejected. The significance level for the Hosmer and

Lemeshow goodness of fit test (p=.9038) indicates that the null hypothesis of no difference

between the observed and expected values must not be rejected. The model fits the data

reasonably well.

The classification table in Table 36 indicates that the model accurately predicts

roughly two out of three cases. An overall accuracy of 65.7% indicates that the model is

moderately successful in predicting the *persistence* of this sample.

As is often the case with logistic regression (Meshbane & Morris, 1996), the model is

best at successfully classifying the largest group. The model correctly predicts 71.6% of

those who fail to persist.

Table 36 - Classification table for *persistence* for second stage model

		Predicted		
		No	Yes	
Observed	No	Yes	Percent correct
No	202	80	71.63%
Yes	98	139	58.65%
		Overall	65.70%

In 98 of the cases (18.9%), the model incorrectly predicted failure to persist. In 80 of the cases (15.4%), the model incorrectly predicted *persistence*. The model correctly predicted 58.65% of persisters.

There were interactions displayed in Table 37 between the following pairs of independent variables: P*LA* and *prior credits*, *PLA* and *GPA*, and *high school rank* and *GPA*. It is difficult to interpret a correlation between a categorical variable and a variable that is not normally distributed. The correlation between *GPA* and *high school rank* was expected.

Table 37 - Correlation matrix of remaining variables in stage two for first model

	Constant	*High school rank*	*Prior credits*	No *PLA*	GPA
Constant	--	-.0168	-.1788	-.4204	-.8364
High school rank		--	-.0621	-.0296	.3822
Prior credits			--	-.1850	.0742
No *PLA*				--	.1025
GPA					--

Third stage of analysis: revised logistic regression model

One of the diagnostic procedures suggested for logistic regression (SPSS, 1999) is to compute the logistic regression model with and without variables that are marginal to determine if the prediction accuracy is improved. Since *high school rank* was marginal (i.e., the Exp (B) confidence interval included the value of 1.0) and the exclusion of that variable would bring another 103 cases into the calculation, the logistic regression model was re-written using the significant predictor variables as follows:

Logit(*persistence*)=α+β_4*Prior credits*+β_5*GPA*+β_6*PLA*

Equation 4 -Third stage logistic regression model

Using this version of the model, a new set of values was also derived. Values for *high school rank* had been missing from 103 cases of the total 622 and those 103 cases (which were excluded in the first version of the model) were included in the second version since the variable *high school rank* was not used in this version of the model. A total of 622 cases were included in this calculation of the model.

Table 38 - Values for the third stage logistic regression model (N=622)

Variable	β	S.E.	Wald	Df	Sig	R
Prior credits	.0272	.0043	40.5359	1	.0000	.2125
PLA (No=1, Yes=0)	-1.7000	.2767	37.7416	1	.0000	-.2046
GPA	.7366	.1727	18.1876	1	.0000	.1377
Constant	-1.9961	.6499	9.4330	1	.0021	

The Beta and R values reported in Table 38 are stronger in this version of the model and the significance level improved for *GPA*. All three variables are significant in predicting

persistence. The estimates of the change in odds (defined as Prob[persist]/Prob[no persist])

for a one unit change in the independent variable are reported as Exp(B) in Table 39.

Table 39 - Confidence interval (95%) for Exp(B) for third stage model

Variable	Exp(B)	Lower	Upper
Prior credits	1.0276	1.0190	1.0362
No *PLA*	.1827	.1062	.3142
GPA	2.0888	1.4889	2.9304

It is uncertain that there is any change in the odds of *persistence* from changes in a

variable where values for Exp(B) have a confidence interval that includes the value of 1.0

(1.0 indicates no change in odds). According to the values in Table 39, all of the variables

(*PLA, GPA,* and *prior credits)* are significant in predicting *persistence*. The R^2 values in

Table 40 indicate a modest improvement in the prediction power of the second model.[7]

Table 40 - Goodness of fit indicators for third stage model

-2 Log Likelihood	745.217
Goodness of Fit	619.223
Cox & Snell - R^2	.160
Nagelkerke - R^2	.214

Model calibration for the third stage logistic regression model

The test of model calibration indicates that the observed and expected probabilities

match reasonably well. The significance level for the Hosmer and Lemeshow goodness of fit

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[7] In stepwise model testing, a declining value for *-2 Log Likelihood* is an indication of adding predictive power
at each step of the model. The value for the third stage model (745.217) is higher than the value for the final
version of the first model (633.486). Similarly, a declining value in *Goodness of Fit* is seen as adding
predictive power. The value of *Goodness of Fit* for the third stage model (619.733) is higher than for the final
version of the first model (518.555). Both of these tests report values that are a function of sample size. The
goodness of fit statistic comes from the formula $Z^2 = \Sigma$ Residual ÷ [predicted value*(1-predicted value)]. In

test (p=.4019) indicates that the null hypothesis of no difference between the observed and expected values must not be rejected. The model fits the data reasonably well.

The classification table reported as Table 41 also indicates an improvement in the prediction power of the third stage model over the first.

Table 41 - Classification table for third stage model

	Predicted		
	No	Yes	
Observed	No	Yes	Percent correct
No	261	87	75.00%
Yes	112	162	59.12%
		Overall	68.01%

In the third stage version of the model, 87 students (14%) were incorrectly predicted to persist and 112 students (18%) were incorrectly predicted to fail to persist. The overall prediction accuracy is enhanced, while including one less variable. A more parsimonious model is always preferred in logistic regression.

The negative correlation between *prior credits* and *PLA* in Table 42 indicates that the students without *PLA* credits were less likely to have a significant number of *prior credits*. The mode was zero for *prior credits* and the distribution was far from normal. Diagnostic plots indicated the mean of *prior credits* for students without *PLA* was higher than the mean for students with *PLA*. The positive correlation between *GPA* and *PLA* indicates that the students who did not complete the PLA process had moderately higher grade point averages.

this formula, larger sample sizes yield larger values for goodness of fit (SPSS, 1999). Since the sample size

GPA was also not normally distributed. The diagnostic plots indicate that the students who had *PLA* had a moderately higher mean *GPA* and a narrower range than the students without *PLA*. *PLA* is a categorical variable. It is difficult to interpret a correlation coefficient that attempts to model linear association between a non-normal variable and a dichotomous variable.

Table 42 - Correlation matrix for third stage model

	Constant	Prior Credits	No *PLA*	*GPA*
Constant	--	-.1585	-.4105	-.9129
Prior credits		--	-.2120	.0333
No *PLA*			--	.0933
GPA				--

Summary of findings

The following variables were significant in predicting persistence:

- *PLA*

- *Prior credits*

- *GPA*

This final result was consistent with the earlier chi-square analysis. The variables *age, gender,* and *high school rank* were not significant in predicting persistence when controlling for *PLA, prior credits,* and *GPA*. *High school rank* had a substantial interaction with *GPA* and this also warranted its exclusion in the third stage of the model building process. The

increased from 519 to 622, the increase in these values is of no concern.

value of *high school rank* as a predictor was limited prior to controlling for *GPA*. This result is consistent with the chi-square analysis.

The literature and these findings

This study was designed to develop and test a model to predict adult student persistence that included prior learning assessment (PLA). The hypothesized model was developed from the literature on adult student persistence. The longitudinal nature of this study and the data available resulted in a set of variables that included age, gender, high school rank, prior college credits, contemporary grade point average, and completion of the portfolio form of prior learning assessment.

In the final logistic regression model, age, gender, and high school rank were not significant as predictors. This contradicts the literature in a number of areas.

Farabaugh-Dorkins (1991), McGivney (1996), Snyder (1990), and Webb (1989) all found that younger students are more likely to persist. In Bean and Metzner's 1985 model, age was presumed to have an indirect influence on persistence, through the mediating factors of "family responsibilities, hours of employment, and higher levels of absenteeism than younger students" (p.494). Bean and Metzner's 1987 model found that age was significantly and positively associated with their key predictor variables: *GPA* and *intent to leave*. Age was not a direct predictor of persistence in their study, but older students were less likely to intend to leave. In other words, the effect of age was the opposite of that hypothesized by Bean and Metzner. The Bean and Metzner sample consisted of part-time students and had a mean age of 23.5. Only one-third of their 1987 sample was age 25 or older. The Simpson sample had a very different age distribution. For this sample, the mean age was 33.11 and

only a minor portion was under the age of 25. This sample was chosen for eligibility for

PLA (age 25 and above at time of application for PLA credits) and for its close

approximation to the definition of highly non-traditional used in the NCES (1997) study

(part-time attendance, delayed enrollment, being independent, working full-time while

enrolled). The logistic regression model and the chi-square analysis did not find age to be

significantly associated with persistence with this sample. It may be possible that students

under the age of 25 would be more likely to persist. In this study of highly non-traditional

students, age was not significantly associated with persistence.

Gender was hypothesized to be significantly associated with persistence (women

more likely to persist) based on a set of studies (Choy et al., 1995; Farabaugh-Dorkins,

1991; Horn & Carroll, 1997; McCormick, Geis, Vergun, & Carroll, 1995; McGivney, 1996;

Swift, 1987; Webb, 1989). The Bean and Metzner 1987 did not find a significant association

between persistence and gender. The findings of this study support that conclusion. Gender

was not significantly associated with persistence for this sample in either the chi-square or

logistic regression analysis.

The original logistic regression model at least partially supported the hypotheses

derived from the literature in the finding that *high school rank*, *prior credits*, *GPA*, and *PLA*

were significant as predictors.

Prior college credits was expected to be a significant predictor of persistence based

on the studies by Christensen (1991), Hanniford and Sagaria (1994), Harrington (1993),

Holm (1988), Martin (1990), McCaffrey (1989), and Simmons (1995). This study supports

the conclusion that the level of prior college credits is significant in the prediction of

persistence.

High school performance was expected to be significant in the prediction of persistence. In the Bean and Metzner 1985 model, high school performance was expected to be significantly associated with contemporary grade point average and, through GPA, with persistence. Their 1987 analysis found this relationship to be significant in the prediction of persistence. This study supports that conclusion. High school rank was moderately correlated with GPA for this sample and GPA was a significant predictor of persistence.

Contemporary grade point average is a variable that was expected to be a significant predictor of persistence. In the Bean and Metzner (1987) model, GPA was a significant predictor. A broad range of studies has found GPA significant in persistence (Farabaugh-Dorkins, 1991; Ganiere et al., 1991; Horn & Carroll, 1998; Kasworm, 1990; McCaffrey, 1989; Mercer, 1993; Naretto, 1995; Snyder, 1990; St. John & Starkey, 1995). This study supports the conclusion that GPA is a predictor of persistence.

A number of studies have suggested very positive outcomes from prior learning assessment (Boornazian, 1994; Burris,1997; Dagavrian & Walters, 1993; Fisher, 1991; Freers, 1994; McGinley, 1995; Sheckley & Weil, 1994). The completion of the portfolio form of prior learning assessment was expected to be significant in the prediction of persistence. The literature in this area is less well developed than the other variables, but the studies by Freers (1994) and Snyder (1990) support the idea that PLA is predictive of persistence. This study supports that conclusion. The portfolio form of prior learning assessment was significant in the prediction of persistence for this sample.

Bean and Metzner placed a great deal of weight on the academic record or academic integration in the prediction of persistence. In their 1987 study they suggested "…the attrition of nontraditional students is most likely to be due to poor academic integration. It is

characterized by inferior academic abilities or performance and a low level of commitment to the educational process at the university" (p. 30). They define this construct through the student's intent to leave, low credit hour enrollment, and frequent class absence.

In this study, the variables *prior college credits* and completion of the *PLA* portfolio process play a prominent role in the prediction of persistence. These predictor variables are much stronger predictors in the logistic regression model than the academic record variables of *GPA* and *high school rank*.

In this way, the current study extends the findings of Bean and Metzner. The academic record matters in persistence for this sample but variables that measure prior and current academic performance were not the strongest predictors in this study. Completion of the PLA process can be seen as a measure of commitment to the academic process. PLA completion at Simpson requires time and self-directed effort. If completion of PLA can be interpreted as a marker for commitment to the academic process, then this logistic regression model supports that portion of their 1987 conclusions. Commitment to the academic process does matter in persistence.

CHAPTER 5: INTERPRETATION

In this section, the results from the final logistic regression model will be applied to several hypothetical students exhibiting a variety of patterns to examine the impact of *PLA* on *persistence*. Examples of how these variables play out in the lives of students will be explored.

The original logistic regression model was:

Logit(π)=α+(β_1*Gender*+β_2*Age*+β_3*HS Rank*+β_4*Prior credits*) + (β_5*GPA*+β_6*PLA*).

The revised model that includes only significant predictors is stated as follows:

Logit(*persistence*)=α+β_4*Prior credits*+β_5*GPA*+β_6*PLA*

The beta values were: *prior credits* (.0272), *GPA* (.7366), no *PLA* (-1.7000), and Constant (-1.9961). The mean or mode value for each variable (see Table 23) will be used in the first application of the equation to determine the estimated probability of *persistence*: *prior credits* (29.00), *PLA* (1), *GPA* (3.23), and Constant (1.00).

The change in estimated probability from PLA completion

Applying the values derived from the analysis, the equation may be used to calculate the estimated probability of *persistence*. In the following table "Z" denotes the sum of the beta weights. "Exp beta" or e^Z is e raised to the power of Z. The value "e is the base of the natural logarithms, approximately 2.718" (SPSS, 1999, p. 36) The formula (Agresti & Finlay, 1997) for calculating the estimated probability of *persistence* is (Exp beta)/(1+Exp beta) or (e^Z)/(1+ e^Z).

Change in estimated probability of persistence using mean values

In this section, the method of calculating the estimated probability of *persistence* is presented. In addition, the change in estimated probability of *persistence* will be calculated using the mean values for *prior credits* (29), *GPA* (3.23), and the mode value for *PLA* (No). The estimated probability was .3710 for the persistence of a student in Table 43 with mean or mode values for each of the predictors. This hypothetical student (who achieved 29 prior credits, did not participate in the PLA portfolio process, and achieved the average GPA of 3.23) had an estimated probability of *persistence* of .3710 or failing to persist of .63.

Table 43 - Estimated probability of *persistence* with mean values on predictor variables

Variable	β	Value	Beta weight
β_4 *Prior credits*	0.0272	29	0.7888
β_6 *PLA*	-1.7	1	-1.7000
β_5 *GPA*	0.7366	3.23	2.3792
α Constant	-1.9961	1	-1.9961
		Z	-0.5281
		e^z	0.5897
		Estimated probability	0.3710

Note: A value of 1 for *PLA* indicates no PLA credits. 0 indicates the completion of the PLA portfolio.

The impact of completing the PLA portfolio on the estimated probability of *persistence* for this hypothetical average student would be substantial as indicated in Table 44. The hypothetical student in Table 44 with the mean *GPA* and *prior credits* was substantially more likely to persist if he or she completed the PLA portfolio, changing the estimated probability by +.3926, or a 106% improvement.

Table 44 - The change in probability of *persistence* from completion of *PLA*

Variable	β	Value	Beta weight	*PLA* change in probability	Percentage change in probability
β₄ *Prior credits*	0.0272	29	0.7888		
β₆ *PLA*	-1.7000	0	0.0000		
β₅ GPA	0.7366	3.23	2.3792		
α Constant	-1.9961	1	-1.9961		
		Z	1.1719		
		e^z	3.2282		
		Estimated probability	0.7635	0.3925	106%

Summary of the change in estimated probability from PLA *completion*

The estimated probability of *persistence* predicted by adding *PLA* completion is presented for nine combinations of the other two variables (*GPA:* low, mean, high, and *Prior credits:* low, mean, high).

In Table 45 the increase in estimated probability of *persistence* for the student who completes the *PLA* is greatest (+.4011) for the student with no *prior credits* and a high *GPA* (3.9). The greatest improvement in percentage terms (+281%) is for the student with the lowest estimated probability of *persistence* - the student with a "C" *GPA* and no *prior credits*.

For any combination of variables, the completion of the *PLA* adds greatly to the estimated odds of *persistence*.

Table 45 - Summary of *PLA* change in estimated probability of *persistence*

Variables	Probability without *PLA*	Probability with *PLA*	Increase in probability for *PLA*	Percentage increase
No *prior credits*				
Low *GPA* (2.0)	0.0977	0.3722	0.2745	281%
Mean *GPA* (3.23)	0.2113	0.5946	0.3833	181%
High *GPA* (3.9)	0.3051	0.7061	0.4011	131%
Mean *prior credits* (29)				
Low *GPA* (2.0)	0.1925	0.5661	0.3736	194%
Mean *GPA* (3.23)	0.3710	0.7635	0.3925	106%
High *GPA* (3.9)	0.4914	0.8410	0.3496	71%
High *prior credits* (48)				
Low *GPA* (2.0)	0.2855	0.6863	0.3736	194%
Mean *GPA* (3.23)	0.4972	0.8441	0.3469	70%
High *GPA* (3.9)	0.6183	0.8986	0.2804	45%

The only students without *PLA (*column one - probability without *PLA)* for whom the model predicts a greater than even likelihood of persistence (i.e. a probability of .50 or better) are those who have high *prior credits* (48) and a high *GPA* (3.9 or A-). The results for those with *PLA* (column two - probability with *PLA*) indicate a pattern that is entirely different. The addition of *PLA* changes the likelihood of persistence to greater than even for all students except those with lowest values on *prior credits* (none) and *GPA* (2.0 or C). The addition to the likelihood of persistence (Table 45 column three: increase in probability) is strong across all groups. The lowest increase in probability is +.2745 and the highest is +.4011. Another way of expressing the change is seen in the final column (percentage increase). In this column, the change in the likelihood of persistence coming from completion of *PLA* ranges from a low of 45% increase to a high of 281%.

The following figure portrays the increase in estimated probability of persistence for students who were at mean (3.23) on GPA. The estimated probability of persistence was

strongest for students with average and above average *prior credits* who completed *PLA* and

lowest for students who did not complete *PLA* and had no *prior credits*.
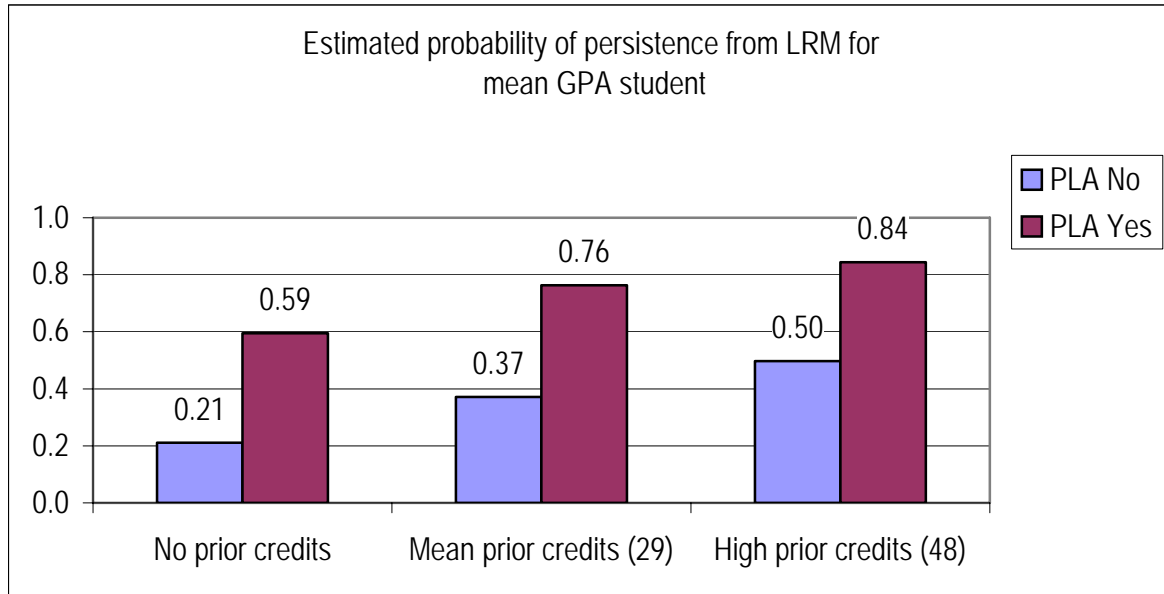

Figure 20 - Estimated probability of persistence for student with mean *GPA*

These results are consistent with the actual rates of persistence. In the following

figure that is extracted from the data in Figure 19 on page 109, the largest differences in

persistence rates associated with PLA completion are for students with no (Zero in the

figure) or low (1-16 in the figure) prior credits.

As students bring more credits to the college, they are more likely to persist. PLA

completers are more likely to persist at all levels of prior credits but this association is
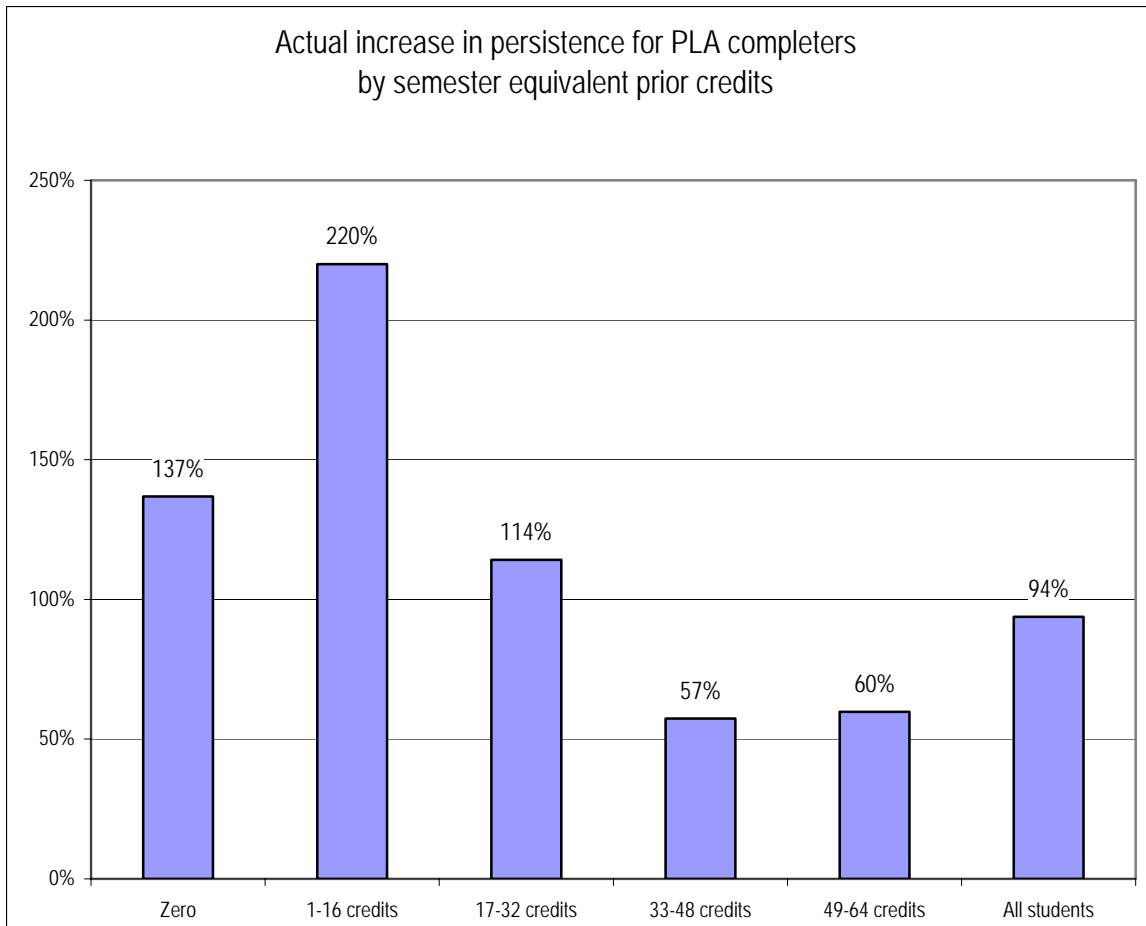
Figure 21 - Percentage increase in *persistence* associated with *PLA*

strongest for students with few prior credits and weaker (although it is still a very strong

association) for students with higher prior credits. The LRM results presented as "Figure 20

- Estimated probability of persistence for student with mean *GPA*" on page 128 are very

similar to this portrayal of the results. PLA completion adds dramatically to the odds of

persistence in this logistic regression model. PLA completion is a powerful predictor of

persistence.

This study does not address the question of causation. There are a number of other factors not accounted for here that might account for the power of PLA as a predictor for persistence.[8]

Example cases

Student motivation and commitment are complex phenomena. No set of numbers or formula can capture the complexity of that fabric of human emotion and determination that makes up the decision to persist. The following three cases illustrate some of these complexities.[9]

Some students fail to persist despite the model's prediction that they are likely to persist. The model indicated Joanne was likely to persist but she did not. Joanne ranked at the top of her high school class and went directly to college, achieving 47 prior credits before dropping out. She returned to college at the age of 40 and immediately completed the PLA portfolio process, receiving 12 credits for her prior learning. She took one class and received a grade of A (GPA 4.0). Her estimated probability of persistence was .90. She left the college after the first class and never came back. She had *PLA*, *GPA*, and *Prior credits* on her side, but she failed to persist.

Shari persisted in spite of all the odds against her. The model predicted Shari would be very unlikely to persist but she graduated after 12 years of part-time study. She ranked at the 39th percentile of her high school class. Shari did not attend college until her start at the

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[8] Educational attainment of spouse and parents, work intensity, life changes, grant forms of financial aid, dispositional elements are variables that were not present in the logistic regression model tested in this study.
[9] Joanne and Shari and Thomas are pseudonyms. The cases of Joanne and Shari arise from an analysis of outliers in the Z residual distribution. The large Z residual in their cases arose because the actual outcome in

age of 26. She was in and out of academic probation during her years of study, achieving a GPA of only 2.1. She did not complete the PLA portfolio. The model predicted that she would not persist (the estimated probability of persistence was .10). Lack of *PLA*, low *GPA*, no p*rior credits*, and a poor high school background would together predict attrition. Despite all of these barriers, she graduated.

Thomas illustrates the success of the model in predicting persistence. Thomas was a hospital worker when he re-entered college as a part-time student at the age of 42. He had a less-than-stellar high school record, ranking at the 44th percentile. He had taken a few college classes, completing the equivalent of one semester of credit. He completed the PLA portfolio and achieved a 3.6 GPA. His estimated probability of persistence, according to the model tested in this study, was .75. He graduated after six years of study.

These students illustrate the complexity of predicting persistence. Logistic regression predicts likelihood, not certainty. Prior learning assessment adds dramatically to these students' odds of persistence but PLA does not insure persistence.

Colleges need to be creative and determined to help adult students overcome the many barriers they face in situation and disposition. The portfolio form of PLA is one of the most important variables to estimate the probability of adult student persistence at this college. Since so much of what may affect persistence is beyond the influence of the college or university, it is of great value to adult educators to know that this intervention (the PLA portfolio process) adds so dramatically to the students' chances of persistence.

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their cases was significantly different than the predicted outcome. The case of Thomas was chosen at random to represent the success of the model at predicting persistence.

Summary

Completion of the PLA portfolio process doubles the odds of persistence for an average student within this sample. The smallest improvement in the likelihood of persistence from PLA in this model is 45%. The largest improvement in the probability of persistence is 281%. An intervention that is associated with that great an improvement in the rate of persistence is of great value to adult educators in higher education.

However, it is valuable to remember that there are limits to the utility of this finding. If the value for GPA, prior credits and PLA is known, this model successfully predicts the outcome for 2 of 3 of the students in the sample. In our examples, a student dropped out despite strong odds of persisting and another student did graduate despite very high odds against doing so. The student example cases illustrate the difficulty of predicting such a complex human behavior as student persistence.

In the next chapter, the implications of these findings will be explored and suggestions will be made for further research.

CHAPTER 6: CONCLUSIONS AND SUGGESTIONS FOR RESEARCH

Enhancing persistence

Vincent Tinto (1993) has stressed the importance of social and academic integration in the persistence of traditional age students. Tinto argues forcefully for a variety of policy and practice interventions to support greater persistence among students. There are disputes about the best measures to use in applying the concept of social integration to adult students but there is no dispute over the importance of academic integration for the persistence of adult students. It is reasonable to argue that the completion of the portfolio form of prior learning assessment enhances academic integration. Adult educators would do well to advocate for allowing and encouraging the portfolio form of prior learning assessment.

This study has found that PLA is a powerful predictor of persistence at this college. It is possible that this finding is anomalous. The similarities of this student body to the national sample (O'Brien & Pearson, 1996) and the consistency of the PLA process at Simpson to the accepted standards for PLA makes it unlikely that the finding at Simpson is anomalous. This consistency between the population and the PLA practices, coupled with the strength of the effect of PLA on persistence lends weight to the notion that more students should participate and that the portfolio form of PLA should be made more widely available.

One key finding of this study of adult part-time students is that those who have low or no prior college credits are less likely to persist. The effect of PLA participation is strongest for students with few or no prior credits (see Table 45 on page 127 and Figure 20 at p. 127) and becomes weaker among students with a higher number of prior credits. The two strongest predictors in this study are *PLA* and *prior credits*. Students with a higher number

of prior credits derive substantial support from PLA for persistence. However, students with few or no prior credits are most likely to stop-out and are most in need of the effect of PLA. Indeed, the change in the odds of persistence from PLA participation for students with no prior credits and an average GPA is to improve their odds by 181%. This effect is 2.5 times stronger than it is for students with 48 prior credits and an average GPA (who increase their odds by 70%). Baccalaureate-granting institution have several choices when faced with adult students who have no prior credits. One choice is to send the student to a community college and see if the student can be successful. There are many programs that have taken this approach, often working in cooperation with community colleges in "degree-completion" programs. Another choice is to admit these students and hope they can be successful on their own with a set of interventions designed to help students of all ages. The best choice for adult students seeking the baccalaureate degree who have no or very few prior credits would be to attend a four-year institution that combines support mechanisms with the encouragement of participation in the portfolio form of PLA.

Adult part-time students in this study who ranked low in their high school class were more likely to achieve a low grade point average at the college and were thus less likely to persist. Adult educators should be aware that a poor high school background is a modest warning sign that the incoming student would be less likely to persist. Adult educators in colleges and universities should use this information to focus their efforts to support persistence for these students. It is not especially newsworthy that students who achieve low grade point averages are less likely to persist, but early intervention when an adult student is not performing to his/her expectations should be considered to support further persistence. Proper course choice, enrollment in preparatory or refresher courses, student support groups,

and individual tutoring (Tinto, 1993) are standard methods to support student academic achievement. All of these are relevant to adult students who had a low high school rank.

Based on the review of prior literature, further persistence-enhancing strategies for adult students should include:

- providing as much grant aid as feasible (see page 36)

- working to enhance academic and social integration (see page 49)

- helping adult students to become clear about their goals (see page 48)

- working to build family support for the student (see pages 32 and 50)

- providing a high quality educational environment (see page 51).

The portfolio form of prior learning assessment suffers from a low rate of participation by students (only 14% of those eligible in this study; see also Fisher, 1991 and Topping, 1996) and does not yet have the wide level of acceptance in higher education that it deserves (631 institutions had portfolio forms of PLA according to Fugate & Chapman, 1992). Making prior learning assessment available to adult students and enhancing the level of participation in this valuable process is a sensible strategy to enhance student persistence.

The practice of prior learning assessment suffers from a lack of understanding and from low prestige in the academy (Fisher, 1991; Topping, 1996). Expanding the reach of prior learning assessment to more colleges and professionalizing the process so that it gains wider acceptance and transferability is an important and on-going effort of the Council for Adult and Experiential Learning (CAEL, 2000).

Expansion of the use of prior learning assessment has important consequences for adult learners, colleges and universities, and for our society.

For adult learners, the outcomes cited in the literature (see p. 62) are: improvement in self-concept, increased satisfaction, strengthened values and cognitive skills. Shortening the time to degree completion and saving on tuition are important benefits for the adult students. The higher salaries associated with enhanced rates of completion of college are another important benefit.

For colleges, the economic payoff from expanding PLA has the potential to be dramatic. This assertion seems counter-intuitive. How could a process in which the college awards credit for prior learning without charging tuition enhance tuition revenue? An application of the values derived from the logistic regression model makes it clear that the average student in this Simpson College sample doubled their odds of persistence if they completed the PLA portfolio. If the college could double the rate of participation in the PLA process from 14% to 28% and the rate of persistence stayed the same for PLA completers with this higher rate of participation, the net tuition income from these students would have grown substantially. Using these assumptions, 67 additional students in this sample might have persisted. At the current tuition rate, this would have generated approximately $1,139,000 in additional tuition income over the years represented in this sample.[10] This is one example where colleges will do well by doing the right thing for adult students.

For society, expanded degree completion for adult students has the potential to enhance economic equality. In Table 2 on page 3, the improvement in annual income for full-time working adults who complete the college degree is very substantial (approximately

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[10] This is calculated as follows: 67 students x 85 credits x $200 per credit = $1,139,000. This assumes that the student received the average of 14 free PLA credits and the award plus prior credits (mean = 29) brought the student up to 43 credits accumulated. 128 credits are required for graduation. The tuition impact for students with no prior credits (the mode value) would be larger.

70%). Shortages of skilled workers are having a negative impact in many fields (Ballon, 2000). Expanded participation in PLA by students and more widespread adoption of PLA could play a role in enhanced college completion for adult students and, thus, in creating greater income equality and in solving skilled worker shortages.

More important than the economic pay-off is the expansion of the democratic attitude. When education fulfills its mission in a democratic society, it enables the learner to grow from a process of reflection through experience. Dewey reminds us that "the educational process is one of continual reorganizing, reconstructing, transforming" (Dewey, 1916, p. 54) understandings built from experience. "The inclination to learn from life itself and to make the conditions of life such that all will learn in the process of living is the finest product of schooling" (p. 56). The cultivation of this stance is central to the mission of education in a democratic society. "Since a democratic society repudiates the principle of external authority, it must find a substitute in voluntary disposition and interest; these can be created only by education" (p. 93). The portfolio form of prior learning assessment democratizes the relationship between the learner and institution and enables the learner to realize that he or she has already learned much from life and that experience will continue to be a rich source for learning throughout life. The democratized relationship and the growth in learner confidence (see Affective outcomes on p. 62) enhance the desirable social effect of education. The assessment and recognition of prior learning derived from adult experiences is an important contribution to the democratizing mission of higher education.

Suggestions for further research

The model of influences on adult student persistence

The final (or third stage) logistic regression model found in this study is a linear combination of three predictor variables (prior credits, GPA, and PLA). The model suggested in Figure 8 - Pearson's model of influences on adult student persistence in higher education on p. 66 presents a much more complicated set of variables and interactions. That model has not been tested in this study. Age and gender appear in that model and were assumed to be predictive of persistence for the original logistic regression model. Age and gender were not significant for this data using the analytical processes employed in this study. This finding does not preclude the possibility that age and gender might prove significant in future work with the Figure 8 model using a different data set or a different technique. The variables found to be significant predictors using logistic regression with this data set are: prior college credits, contemporary grade point average, and completion of the portfolio form of prior learning assessment. The results of the logistic regression provide some indication that these variables might also be significant in the suggested model presented as Figure 8.

The development of a systematic longitudinal study that would capture data on all of the additional variables (life changes, educational attainment of spouse and parents, enrollment and work intensity, grants/scholarships, and dispositional elements) and incorporate them in a new model of the influences on persistence would contribute to the understanding of adult student persistence in higher education.

PLA research

There are a number of areas for further research around the role of prior learning assessment. It would be valuable to repeat this type of study with another sample and a different set of PLA policies to determine if the power of PLA as a predictor would hold. Different constructions of the variables might produce a more refined model. It is important to explore the process by which PLA affects persistence. Further research would guide the development of improved policies to guide PLA practice.

Since community colleges serve the bulk of adult students, repeating this type of study with a population of community college students would help in understanding the value of extending PLA to that substantial population. The persistence of adult students in community colleges is even lower than in the four-year sector.[11] If widespread PLA completion boosts persistence and this effect holds for community colleges, then community colleges might do well to adopt PLA portfolio processes.

Repeating this study with a more refined set of variables would be useful. Persistence was defined in this study as a Yes/No variable. A more refined measure might be to use credits completed or to compute a share of the degree possible that was completed.[12]

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[11] The importance of prior credits as a predictor in this study might help to explain some of the lower rates of persistence found in community colleges.
[12] The formula for this would be: (128 credits – outside credits) / institutional credits

PLA completion was also defined as a Yes/No variable. The PLA completers received a range of credits from a minimum of 6 to a maximum of 24. It is certainly possible that a student who received 6 credits when eligible for 24 would be greatly discouraged and fail to persist. A more refined measure for PLA could be the share of possible credits allowed that was awarded. It is likely that more refined variables will tell more.

This study did not address the role of life changes in persistence. The students who completed the portfolio at Simpson spoke in their portfolios about the type of life changes they experienced (a devastating family illness, a job loss, a divorce) but this study did not explore whether the non-PLA students had a greater, lesser, or the same level of life changes. It is possible that the students who completed the PLA portfolio but did not persist simply experienced a greater level of disruptive life change during their period of study. It is equally possible that enhanced motivation coming from PLA completion helped carry the PLA completers through disruptive life changes. Knowing more about the role of PLA and life changes would help in guiding our practices in this area. Indeed, since adult students are situated learners, learning more about how all of the adult students cope with life changes would be valuable for adult educators.

The literature suggests a number of affective outcomes and effects on the student's relationship with college that come from the completion of PLA. To understand the processes by which PLA effects persistence it would be vital to explore these outcomes and effects. It is possible that the process works in the following fashion: PLA participation leads to greater learner self-concept and closer relationship with the college and these effects lead to greater persistence. More research is needed to understand the process.

One way to frame this is consider whether PLA participation causes greater

persistence or whether PLA is a marker for a greater level of commitment that leads to

persistence. One view is that the most committed or most organized students are likely to do

PLA and they would be more likely to persist, PLA or not. Another view is that the

relationship with the college, goal clarity, and self-concept are enhanced by PLA completion

(Boornazian, 1995; Burris, 1997) and that these affective outcomes lead to greater

persistence. Research could enable us to know whether one or both of these views are true.

The role of financial savings achieved through PLA completion[13] in the greater

persistence of the PLA completers is another productive area for research. Since grants play

a positive role in persistence for adult students, it is possible to construe the PLA policy as a

part of the college institutional aid policy related to academic achievement. Astin (1993)

argues that aid related to academic achievement has a powerful effect on traditional student

persistence. Exploring this construction of the PLA effect on persistence would be useful.

The improvement of PLA policies should be guided by further research. Participation

in PLA adds dramatically to the odds of persistence and PLA participation comes from a

small share of the students. It would be very useful to know if the power of PLA as a

predictor would be sustained if a broader level of participation in PLA were achieved.

The mechanisms of promoting a higher level of participation have not been cataloged.

It would be helpful to know if voluntary PLA classes would produce a greater level of

participation in PLA. Further strategies for promoting PLA participation need to be

explored. Determining the groups of students who are most likely to benefit from PLA

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[13] The Simpson student who receives 24 PLA credits has effectively received a scholarship worth $4800 in today's tuition dollars.

participation would be another productive research area. Developing a profile of the students most likely to complete the portfolio and to receive significant credits from the process would be a productive domain for research.

At least as practiced at Simpson College, *requiring* PLA participation is not a sensible practice. Many students have learned little from their experiences or have spent their time in trivial or inappropriate pursuits. The PLA committee will not find the recitation of *all* learning from experience to be credit-worthy. A student recently attempted to submit a portfolio in which he talked about the mathematical skill he had gained from his years as a drug dealer (he is a decent and law-abiding citizen now). The student did not receive credit for this learning. Learning does come from experience but not all learning is appropriate for college credit. A far more common problem is that students who could receive valuable recognition of their prior learning fail to submit the portfolio. The development of a method of assessing who should prepare a portfolio is an important research goal.

Research would help us to understand the appropriate balance between credits completed and participation in PLA. It seems likely that there is some level of prior credits at which the PLA effect begins to disappear. For many students, the completion of additional elective credits is of no value. At Simpson, the PLA credits are restricted to the first 64 credits of the 128 required for graduation. A student who has transferred 64 credits must be very careful in selecting courses to avoid going beyond the required credits. The requirements of the majors, liberal arts distribution, and competencies can easily push a student above 128 credits if their previous 64 credits were not a careful match of this college's requirements. The practical effect of additional elective credit beyond the 64-credit

rule might be very small at this college. The best construction of PLA policies needs to be tested with additional research.

Summary

The effort to support adult student persistence requires effort and creativity. Encouraging the growth of the portfolio form of prior learning assessment is a useful strategy for adult educators who want to enhance the academic integration and the persistence of adult students. The lack of a significant number of prior college credits is a key predictor of failing to persist and the benefit of PLA for these students is strongest in this study. It makes sense to concentrate the effort to enhance completion of the PLA portfolio on students with a small number of prior credits, while still making the process widely available. Concentrating academic support efforts for students who have a poor high school record is another sound strategy. Other adult student persistence enhancing strategies include grant aid, enhancing academic and social integration, building goal clarity and family support, and providing a high quality educational environment. The pay-off from expanded PLA participation could be significant for students, colleges and universities, and our society.

The areas for further research are numerous. These include: developing a systematic longitudinal model with an expanded set of variables, repeating this study in different contexts (especially community colleges), producing more refined measures for key variables, addressing the role of life changes in persistence, unraveling the process by which PLA affects persistence, clarifying the role in persistence of financial savings achieved through PLA, assessing the power of PLA as a predictor if broader levels of participation

were achieved, analyzing the mechanisms of boosting participation in PLA, and determining

the groups of students most likely to benefit and succeed.

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