Probationary Admit Students: An Exploratory Study of First-Year Retention

by

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Introduction

This study was conducted in response to a request from the Provost, Vice-Provost for Undergraduate Studies and Vice-Provost for Enrollment Management. They asked our office to examine first-year success and retention patterns among first-time-college freshmen admitted to the university on academic probation. Specifically, they wanted to know if this group of students earned lower grades and if they are retained at lower rates than students who do meet the university's admission requirements, with a goal of establishing some guidelines to assist Admissions with making offers of admission to students in this population who were more likely to succeed and be retained.

The admissions requirements at the university exceed those established by the state. In particular, the university requires more high school credits in math, English, and science than the minimum state requirements. The university requires a minimum ACT composite score of 24. Both state and university policies allow institutions to admit 10% of each entering class with deficiencies vis á vis the admissions requirements. Students admitted to the university on academic probation are required to maintain a 2.0 GPA in 12 graded credit hours in order to remain at school.

It was not apparent from this first phase of the study how best to conceptualize deficiencies in the high school core coursework in order to better understand its relationship to retention and success. This study develops and tests three different ways of measuring this weakness in college preparation, and does so in the context of

regression models accounting for demographic, pre-college, and first-year experience variables.

Research Questions

- What factors contribute to and detract from the likelihood of probationary admit students being retained?

- What factors best predict first-year GPAs of probationary admit students?

- Which, if any, measures of high school core coursework deficiency best contribute to our understanding of which probationary admit students are retained or are successful?

Literature Review

This study finds itself uncomfortably located at the intersection of two literatures. The first is the student departure literature pioneered by Tinto's (1975, 1993) interactionalist model, arguing that initial characteristics, precollege schooling experiences, as well as the academic affect student departure and normative structures of the institution students choose to attend. A vast literature has evolved in response to Tinto's original work. Some have suggested the need to incorporate economic and financial variables into models of persistence (St. John et al., 2000; St. John, 1994 and Cabrera, Nora, and Castañeda, 1993). Stage and Rushin (1993) linked an examination of college choice with persistence. These studies suggest, with varying degrees of success, that increasing integration within both the academic and social life of the university increases student persistence in college (Braxton, Sullivan and Johnson, 1997).

Stodt (1987) traces two key components of student retention. The first, echoing Tinto (1975), deals with intra-student processes. These processes include student satisfaction with his or her involvement with their institution. Satisfaction is measured in a variety of ways such as interaction with faculty, both quality and quantity and friendship with fellow students. Importantly, another feature of intra-student processes is the balance between the need for challenge and the availability of adequate support for students. Students must also perceive that their efforts will result in a desired outcome.

Institutional factors are the second component playing a role in student retention, According to Stodt (1987), the ways in which an institution uses its resources impacts its ability to incite student satisfaction. Colleges and universities must provide adequate support for faculty teaching development in order to meet students' in-class and out of class needs (Pascarella & Terenzini, 1991, 1998). Baldridge, Kemerer, and Green (1982) also maintain the importance of learning support centers to assist students with studying. Financial aid policies and other administrative policies can significantly impact retention as well. Finally, the institution must provide many opportunities for non-academic student involvement to promote integration to campus life (Stodt, 1987).

The second, enrollment management, literature certainly concerns itself with retention albeit from a different perspective than that done by scholars working on student departure. Enrollment management concerns itself with maintaining the pipeline of students flowing into the institution from the recruitment phase through graduation (Kroc and Hanson, 2001). Ingersoll (1988) argues that institutions must admit and enroll students who possess characteristics that fit with their institutional goals. When there is a poor fit, institutions find it difficult to maintain retention rates let alone improve them.

Levitz, Noel, and Richter (1999) argue that an emphasis on first-year retention can be of most use to enrollment managers, as most attrition occurs at this point. They contend that affective measures contribute a great deal more to retention that has been previously credited. First-year experiences are key to setting students on a successful path through the institution. Listing five key reasons for attrition—personal, social, academic, life issues, and institutional issues, these authors make several recommendations for lowering attrition rates. First, approaches to students must be sufficiently individualized. These mirror, albeit in a more nuanced fashion, those developed by Ewell (1984) and Adelman (1998) Second, campus strategies must be systematically linked with each other to foment long-term cultural change in the campus climate. Dunphy, Miller, Woodruff, and Nelson (1987) also argued in favor of an emphasis on first-year experiences. They contend that a series of seminars aimed at addressing college survival skills, easing the freshman transition, and major and career exploration can help students acclimate to the institution and find a success path for themselves. Dunphy et al. also outlined an aggressive and intervention based advising program for students who had experienced some academic success prior to college but find themselves struggling with the challenges of college-level work and living. They specifically did not target students who entered the institution with known academic deficiencies.

Valverde (1987) and Moore and Carpenter (1987) develop different ways of accounting for students' preparation for college when discussing retention. Adelman (1998) develops a notion of academic risk as well. For Valverde (1987) the most salient aspects of preparation lie in a student's socioeconomic status measure by income and

experience as a first-generation college student. Moore and Carpenter (1987) use socioeconomic indicators, but note that students who aren't financially underprivileged can be academically unprepared as well. However, they emphasize cognitive factors and exclude students who have performed poorly in high school. They look for those who are more ephemerally underprepared. Adelman (1998), on the other hand, develops measures of the degree of instability in high school preparation, middle-school grades, in addition to more traditional socioeconomic and engagement variables.

Most public institutions admit students who, at the outset, it acknowledges are a poor fit as determined by stated admissions requirements. There are few studies examining this population of students—those who are admitted with significant and obvious academic deficiencies. Rather it seems to be an unstated presumption that relatively high attrition rates are to be expected from this group of students. Moreover, these students are not the voluntary school leavers emphasized in the departure literature. The students in the population examined for this study at any rate by and large left the institution after experiencing significant academic difficulty resulting in probation or dismissal. The constructs advanced by this literature, however, are useful for developing models that can assist admissions offices in their admission decisions for students who don't fit the mold outlined by admissions requirement. Furthermore, these constructs can assist those working in student services in better assisting students who enter with a high degree of acknowledged academic risk.

Study Population

The population for this study consists of 1511 first-time-college freshmen admitted to the university on academic probation from Fall 1999 to Fall 2003.

Table 1: Characteristics of Probationary Admit Students

Population Characteristics

Ethnicity		Gender		First-Generation College		Income	
Caucasian	78%	Male	55%	Yes	32%	< $20,000	9%
Underrepresented Minority	16%	Female	45%	No	68%	$20,000-$40,000	11%
Other	6%					$40,000-$60,000	11%
						$60,000-$80,000	9%
						$80,000-$100,000	8%
						>$100,000	9%
						No FAFSA	44%

H.S. Setting		Major		Academic Unit	
Urban	22%	Declared	48%	Arts & Science	41%
Suburban	41%	Undeclared	52%	Business	20%
Rural	14%			Ag/Natural Resources	11%
Out of State	18%			Education	7%
GED	2%			Engineering	4%
Home Schooled	3%			Human Environmental Sciences	3%
				Journalism	10%
				Nursing	2%
				Health Professions	2%

An initial analysis of the data indicated that the retention rates of probationary admit students lagged behind those of the general population of FTC freshmen by about 15%. Students admitted on academic probation also exhibited 21% lower success rates, success being defined as earning a 2.0 cumulative GPA after their first-year at

the university. Underrepresented minority students admitted on probation were retained at the same rate as probationary admits as a whole, and at the same rates as Caucasian students admitted on probation. Female students admitted on probation were retained at slightly higher rates, 5% more, than male students. First-generation college students admitted on probation were retained at 9% lower rates than students whose families had some college education. Students whose families earned less than $20,000 per year were retained at 15% lower rates than the population of probationary admits as a whole. Furthermore, they were retained at 20% lower rates than students whose families earned more than $100,000 per year. Urban students admitted on probation were retained at the highest rates (72%) among the various high school settings. Rural students, on the other hand, were retained 61% of the time. Home schooled and GED students were retained at the lowest rates, only 41%.

There was a slight difference in retention rates between students who had chosen a major and those who were undecided. Students with a declared degree program were retained at a 66% rate, while undeclared students were retained at a 71% rate. There were some differences in retention rates among students in different academic divisions. The colleges of Business, Agriculture & Natural Resources, Education, Nursing, and Journalism all had retention rates higher than for the population of probationary admits as a whole. Arts & Science, Human Environmental Sciences, and Health Professions retained students at about the same rate as the overall population, while Engineering retained students at an 18% lower rate than the group of probationary admits as a whole.

The major finding from the initial descriptive analysis indicated that students granted admission despite deficiencies in their high school core courses exhibited lower success and retention rates than did students admitted with only deficient ACT scores. Specifically, students with deficiencies in ACT composite scores had a 75% retention rate, somewhat better than the group of probationary admits as a whole. Students with deficiencies in their high school coursework and those with both ACT and high school coursework weaknesses were 16% less likely to be retained than those with only an ACT score deficiency.

Methodology

The study was conducted at large residential research institution with just over 25,000 students, admitting approximately 4500 new freshmen each fall. Three methods of data analysis were used to address the research questions posed above. First, additional exploration of the descriptive statistics such as frequency tables and cross tabs took place to aid in the development of the explanatory models. Interactions between all of the variables were examined. Second, a linear (OLS) model was created to determine which characteristics and course-taking behaviors contributed to higher GPAs among probationary admit students at this institution. Finally, a logistic regression model was used to explore the relationships between these same variables, to be outlined below) and the likelihood of retention. Both the linear and logistic models were run three times. Each iteration substituted a different measure of high school core course deficiency. All of the other independent variables remained the same throughout the various analyses. All categorical independent variables were dummy coded.

Models

The models outlined here draw upon two competing sub-literatures within the larger body of scholarship addressing student retention. One body of work contends that high school preparation and demographic characteristics are more important predictors, while the second literature argues that institutional factors and student behaviors in their first-year exert greater influence on retention and success. The models developed for this study use variables from both pre-college and first-year characteristics and experiences. The variables measuring first year course taking were developed through conversations with the Director of Academic Advising and the Vice-Provost for Undergraduate Studies.

It should be noted, however, that measures of student self-perceptions, perceptions about the institution, and measures of satisfaction and motivation etcetera are not available for this institution. The analysis is limited by fact in that in some ways we know very little about the students making up this population beyond general demographic descriptors, their academic performance, and course-taking habits.

Table 2: Linear Regression Variables

Dependent Variable	
Cumulative GPA	
Independent Variables (pre-college/demographic)	*Independent Variables (first-year)*
Gender (dummy coded)	Took Learning Strategies Course (dummy coded)
Ethnicity—white, underrepresented minority, other dummy coded	Participated in Freshman Interest Group (dummy coded)
First Generation College (dummy coded)	Major—declared or undeclared (dummy coded)
High School Setting—urban, suburban, rural (dummy coded)	Academic unit—A&S, A&S undeclared, Ag/Natural Resources, Education, Engineering, Human Environmental Sciences, Business, Health Professions, Nursing, Journalism (dummy coded)
Income—taken from FAFSA	Combinations of English and Math courses taken in the Fall term (dummy coded)
Broad deficiency type	Combinations of English and Math courses taken in the Winter term (dummy coded)
Number of subject area deficiencies	Total credits earned in the first year
Sum of missing credits	
High School GPA	
High School Percentile Rank	

Essentially the linear regression controls for some standard demographic characteristics such as gender, ethnicity, first generation college status, and socioeconomic status, measured as income. The model adds one demographic measure not typically seen, by controlling for the geographic setting in which the student completed his or her high school requirements. Students who were non-residents, home-schooled, or who had their GED were excluded from the analysis. During the initial examination of the data, it became clear that out-of-state students admitted on probation performed nearly as well as regularly admitted students. Usually, out-of-state students are admitted on probation only because their high school requirements differ

from those in this state. Our administrators were also more interested in in-state students. The home-schooled and GED students were excluded from the analysis because their numbers were too small to make for meaningful analysis.

The second set of variables, measuring high school performance and course-taking characteristics, essentially serve as a proxy measure for a student's readiness for college work. Again some standard variables controlling for academic ability, namely the composite ACT score and high school GPA, were used. In addition, high school percentile rank was used, as there has been some debate among student service providers on campus as to which indicator is a better predictor of initial college success.

As mentioned above three measures of high school core coursework deficiency were developed and tested for this study. They move from a very general conceptualization to a more specific treatment of missing courses.

- Broad deficiency type: Students had a deficiency in the following—ACT composite score, missing high school core courses, or some combination of the two.

- Number of subject area deficiencies: the number of subjects in which students had missing coursework

- Sum of missing credits: sums the number of missing units (one unit=1 year) across all subject areas

Obviously these few variables don't exhaust the possible ways of measuring important aspects of probationary admit students' high school course-taking patterns. The high school data used for this study, however, were obtained from census files used for

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statewide reporting. These datasets don't include information about grades in individual high school courses, nor do they indicate which specific courses were taken.

Finally, variables measuring first-year course taking were included. The university offers three types of first-year-experience (FYE) courses for which students may earn academic credit. A learning strategies course helps students learn how to navigate their coursework, deal effectively with faculty, plan their course of study, and effectively complete assignments and prepare for exams. The Freshman Interest Group (FIG) program combines coenrollment in 3 courses, common living areas, and a proseminar course. Students may also take major-orientation courses that provide broad overviews of the programs offered by some of the academic units on campus. None of the FYE courses are required, although students, particularly those deemed to be at academic risk are strongly encouraged to take either the learning strategies course, or participate in a FIG.

A variable indicating whether or not each student had decided on an academic program and indicating each student's initial academic unit were also included. While each student's major was available, many degree programs simply had too few students (admitted on probation) to make for meaningful analysis. At the request of the Director of Advising, variables measuring whether or not students took English composition and a math together in either the fall or winter of their first year were also included. Common wisdom on campus holds that taking these two courses together significantly disadvantages students, particularly those with weak academic preparation. A variable indicating how many credit hours students earned over the course of their first year were included as well.
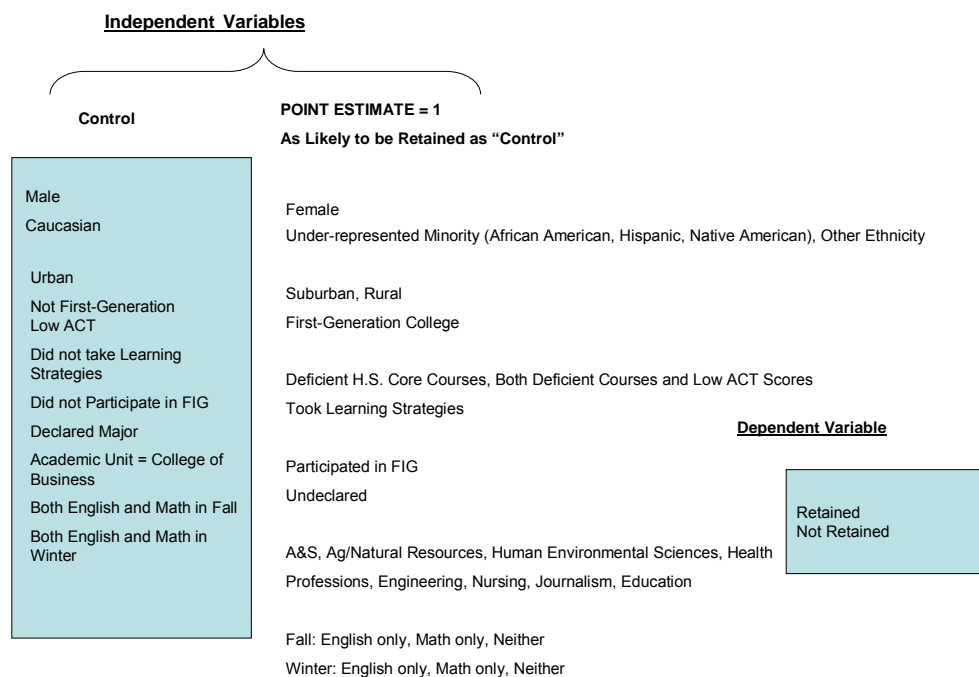
The model can be depicted as follows:

demographic characteristics + high school + first-year = GPA

Logistic Regression

The logistic models ran the same set of variables, substituting the different measures of high school coursework in the iterations. The dependent variable, however, changed from GPA to a binary variable indicating whether each student was retained.

Figure 1: Logistic Regression Model

Independent Variables

Control

POINT ESTIMATE = 1
As Likely to be Retained as "Control"

Male
Caucasian

Urban
Not First-Generation
Low ACT
Did not take Learning
Strategies
Did not Participate in FIG
Declared Major
Academic Unit = College of
Business
Both English and Math in Fall
Both English and Math in
Winter

Female
Under-represented Minority (African American, Hispanic, Native American), Other Ethnicity

Suburban, Rural
First-Generation College

Deficient H.S. Core Courses, Both Deficient Courses and Low ACT Scores
Took Learning Strategies

Dependent Variable

Participated in FIG
Undeclared

Retained
Not Retained

A&S, Ag/Natural Resources, Human Environmental Sciences, Health
Professions, Engineering, Nursing, Journalism, Education

Fall: English only, Math only, Neither
Winter: English only, Math only, Neither

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Findings

Table 3: Three Linear Models Compared

Linear Regression					
Model 1 (Broad Deficiency)		Model 2 (Subject Area Deficiency)		Model 3 (Sum of Missing Credits)	
IV	Point Estimate	IV	Point Estimate	IV	Point Estimate
Except = H.S. Core	Not Significant	Subject Deficiencies	0.00678	Sum of Missing Credits	-0.04523
Except = ACT	0.10054				
Ethnicity = Minority	-0.2278		-0.23001		-0.21721
Setting = Rural	-0.23257		-0.23441		-0.23384
H.S. GPA	0.17416		0.20049		0.17483
H.S. % Rank	0.00523		0.00532		0.00623
Learning Strategies = Yes	-0.12477		-0.12287		-0.12235
Math only in Fall	-0.10738		-0.10214		-0.11457
Academic Unit = Ag/Natural Resources	0.20468		0.19245		0.23588
Academic Unit = Engineering	-0.31175		-0.32481		-0.29647
Academic Unit = Nursing	0.3107		0.30418		0.30233
Academic Unit = Human Environmental Sciences	0.28345		0.28218		0.29649
Credit	0.03137		0.03212		0.0312
Intercept	1.04175		0.91435		0.82051
n	1263		1263		1263
R^2	0.1381		0.1356		0.1386
F Test	6.81		6.91		7.09

Variables significant at the .10 level or better.

Table 3 compares nearly identical models designed to predict first-year GPA for students admitted to the university on academic probation. As mentioned above, all of the independent variables are the same in each model, save for the variable measuring weaknesses in students' high school coursework. All three models were significant at the .0001 level. Each model accounted for similar amounts of variance in probationary admit students' first-year GPAs, with the R^2s ranging from .1356 to .1386. While this is certainly a modest degree of variance explained, it's not inconsequential given the limitations of the data available for this analysis. With the exception of the variables

measuring high school coursework, the same set of independent variables was significant across the three models.

Seven of the independent variables were statistically significant (p<.10) and positive. Specifically, having only an ACT composite score deficiency, the number of high school subject area deficiencies, high school GPA, high school class rank; and enrollment in Agriculture & Natural Resources, Nursing, and Human Environmental Sciences all combined to produce higher first year GPAs. In addition, taking higher credit hours throughout the first year also produced better academic performance.

The direction of most of these coefficients is as anticipated. Although, this author was somewhat surprised by the magnitude of the academic unit coefficients. They were larger than anticipated. More importantly, the direction of the coefficient for the number of subject area deficiencies was surprising. To reiterate, the number of subject area deficiencies refers to how many required subjects a student had failed to take the required number of credits. For example, a student missing credits in both high school English and social studies would have two subject area deficiencies. The positive direction of this coefficient, despite its tiny magnitude, is puzzling.

Six of the independent variables were statistically significant (p<.10) and negative. Being an underrepresented minority, from a rural high school, having a higher number of missing high school credits, taking learning strategies, taking a math course in the fall, and enrollment in the College of Engineering are all associated with lower first year GPAs. The direction of most of these coefficients makes sense, save for the direction of the learning strategies coefficient. Designed to improve students' study

habits and improve engagement, the negative impact on probationary admit GPAs is very surprising.

A closer examination of the descriptive statistics, however, sheds some light on this surprising finding. Only 233 students in the population analyzed here took learning strategies. According to advisors on campus only the students perceived to be most at-risk are encouraged to take the course as it has limited capacity. Moreover, they report that students frequently fail to take the course seriously. Looking at the small group of students who took the course reveals that underrepresented minority students, particularly males, were the only group to be significantly advantaged by taking the course. Importantly, taking the course improved this subgroup's chances of being retained, but did not lead to higher first-year GPAs.

Table 4: Three Logistic Models Compared

Logistic Regression

Model 1 (Broad Deficiency)			Model 2 (Subject Area Deficiency)			Model 3 (Sum of Missing Credits)		
IV	Point Estimate	Effect	IV	Point Estimate	Effect	IV	Point Estimate	Effect
Female	1.511	Positive (p<.1)		1.508	Positive (p<.1)		1.539	Positive (p<.1)
First-Generation College	0.671	Negative (p<.1)		0.679	Negative (p<.1)		Not significant	
H.S. Rank	Not significant			1.016	Positive (p<.1)		Not significant	
H.S. Core	Not significant		Subject Deficiencies	Not significant		Sum of Missing Credits	Not significant	
Both Core & ACT	Not significant							
Took Learning Strategies	0.616	Negative (p<.1)		0.613	Negative (p<.1)		0.643	Negative (p<.1)
Credit	1.325	Positive (p<.05)		1.328	Positive (p<.05)		1.317	Positive (p<.05)
n	673			673			673	
X^2	258.6655	30 df p<.0001		255.6584	29 df p<.0001		247.3125	29 df p<.0001
% Correct	80.50%			79.90%			80.30%	

Again, all three logistic models were significant at the p<.0001 level. The models yielded similar levels of correct predictions at roughly 80% for each model. Identical sets of independent variables were used in each model, mimicking the process employed in the linear regression; only here the dependent variable is first-year retention. A point

estimate of 1 indicates that the tested value was as likely to be retained as the control group. The magnitudes of the odds-ratios were nearly identical across the three logistic models.

Interestingly the set of statistically significant variables changed from one model to the next, as the measure of high school coursework deficiency was altered. Only female and credit were both statistically significant and positive across all three models. Females were .511 more likely to be retained than males, while students with more credit hours completed in the first year were .325 more likely to be retained. On average, retained students earned 27 credit hours in their first year, while probationary admits who left school took only 20 hours in their first year. High school class rank was significant and ever so slightly positive only in the model testing the number of subject area deficiencies.

Only the learning strategies course was statistically significant and negative across the three models. Students taking the learning strategies course were less likely to be retained than students who did not take the course, the odds-ratios ranged from .613 to .643. In the model testing the broad high school course deficiency, first-generation college students were .671 less likely to be retained. First-generation college students in the model testing the number of subject area deficiencies were .679 as likely to be retained as those from families with some experience in college.

None of the measures of high school coursework deficiencies were significant contributors to a student's likelihood of being retained. This finding is perplexing given that the initial analysis of the data indicated something in the high school core coursework was associated with lower retention rates. When the data are explored

more closely, however, there are only small differences in the number of missing credits between those who are and those who are not retained.

Discussion

While the results of the linear and logistic regression analyses presented here do not provide definitive answers to the research questions posed at the outset of this paper, they do offer some direction for admissions and student service personnel working directly with this population of student. First, an effective measure of a student's high school coursework as an indicator of college preparedness remains elusive. The variables introduced here performed adequately in the linear models, but failed to register as significant in the logistic models. A portion of the weakness of the measures can be attributed to the relatively small numbers in the different categories used in the analysis. Still, it is likely that a better measure, maybe something akin to Adelman's (1998) use of the number of Cs and Bs in analyzing middle school transcripts would prove to be more salient than the measures used here.

The most important finding, however, is that students admitted with acknowledged academic weaknesses should not be written off as beyond hope, as is implied in some of the retention literature. While students admitted on academic probation are certainly at greater risk for both low performance and for leaving school, nearly 70% of them do manage to remain enrolled. Moreover, there is not a single, nor is there a systematic constellation of factors identifying the students most at-risk for departure. It may well be that the inclusion of some of the cognitive and affective

variables, were it available, and might make the creation of a more definitive profile possible.

As it stands, I think the data demonstrate that the Admissions Office does a fairly good job of screening academically underprepared students. The challenge on this campus seems to reside more with student service personnel working in academic advising, the learning center and other support services, and residential life to more effectively address the needs this population of students have when they arrive on campus. Specifically, the findings tentatively suggest the need for a more aggressive program targeting students who can benefit from the various services already offered on campus, while strengthening the learning strategies component[1]. Most of the services available to students on campus are reserved, due grant contract constraints, to ethnic minorities, first-generation college students, and students from low income families. These groups do not make up the bulk of students admitted on probation. Adjustments should be made to make study assistance and similar programs more widely available.

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[1] The learning strategies course entered an intensive period of redesign starting in Fall 2003. The outcome of these changes cannot be addressed with the data used for this study.

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