Measuring the Effect of Freshman Mentoring on Retention

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Abstract

Because of the many issues that arise out of their newfound environment the freshman year represents a critical time in an undergraduate student's decision-making process regarding their academic career. Mentoring programs, along with pre-college programs, bridge programs, counseling are other services, are among the tools used by universities to increase freshman student retention.

A study was conducted at a large, Midwestern university to determine whether a relationship exists between participation in a mentoring program and second-year retention. An ex post facto analysis was performed using logistic regression to predict a student's return to a school the following year based on demographic variables and participation in the mentoring program. Participation in the mentoring program was shown to be a statistically significant variable in predicting retention. Results from the analysis, including measures of significance for all variables and model fit are presented.

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Introduction

Because of decreases in contributions and government funding many of today's colleges and universities find themselves having to address tighter budgetary constraints. These institutions look to various sources of income including tuition revenue to finance their operations. To increase their revenue stream schools often seek to adjust their pricing structure and attract new students while also retaining existing students. One of the different types of retention programs that schools implement is a mentoring program.

This paper reports the results of an ex post facto study using logistic regression to identify the presence of a relationship between a student's participation in the mentoring program and their decision to return to the institution the following year, independent of the student's gender, race, and admissions test score.

Retention

In terms of keeping students enrolled at a school (retention), the freshman year represents the period in a student's academic life when he or she is most likely to leave an institution (Levitz, Noel, & Richter, 1999). Because of a number of factors, including financial status, poor preparation or readiness, lack of support or discipline, students often find they are not ready for the rigors of postsecondary education and the social changes that accompany it. Similarly students may choose to transfer to another institution because of lower costs, differing curriculums, or other factors.

Barriers to education in general are identified by Cross (1981) as coming in three forms; institutional, situational and dispositional. The first which are institutional can be described as problems which exist or originate within the school itself. Examples can include; the lack of adequate parking, sufficient hours in offices in the evening or on weekends, or lack of study areas convenient to classrooms. The next, situational barriers originate from the student and can include lack of funds to buy books and supplies or pay tuition, unreliable transportation or childcare, and/or too many outside responsibilities. The third barrier, dispositional, is also student originated. Dispositional barriers include the lack of necessary academic skills to be successful in college level courses, not realizing the level of commitment to the educational process, and the failure to recognize the difference in the workload of college classes as compared to high school classes.

While racial differences exist in the composition of the general student body as a whole, so too are there often differences in the retention rates of students by race (Lee, 1999). Lang (2001) outlined the various methods of improving minority student retention as specifically falling into several categories: pre-college programs, bridge programs, mentoring programs, development education programs, counseling and academic skills improvement, and special services. (It should be noted that these programs are not limited to minority students.) Pre-college programs and bridge

programs are both targeted to students before they arrive at college and seek to build interest in and aid a student's transition to college. Mentoring programs couple a student with a faculty or staff member who can provide the student with assistance in their academic endeavors. Development education programs provide remedial classes to students who need to improve their basic skills before taking college-level courses. Counseling, academic skills improvement and special services all are used to provide individualized attention to a student's needs and address areas which may lead to dropping out of college.

The Freshman Year Experience and the Mentoring Program

The school used in this study is an urban institution set in the downtown area of a large midwestern city. The majority of students attending the university are from city and the surrounding suburbs. The university provides a holistic approach to education for new students through the First Year Experience (FYE) model (Upcraft & Gardner, 1989). This method offers an in-depth means to initiate an incoming student into the culture of the community. The components of this model include; a summer orientation program, an "Introduction to University Life" course, academic advising, and a freshman mentoring program.

The orientation program allows the student an overview of the available support services provided by the University, plus social activities. The University Life course reiterates many features of the orientation in terms of support services and provides a forum to discuss issues and problems. Academic advising in the FYE model provides the student with the same advisor for the entire freshman year. The final component of this model is the Freshman Mentoring Program.

The mentoring program at the school is voluntary for both students and the faculty and staff who participate. Assignments between mentors and students are made according to the academic pursuits of the student so that a base for mutual interests is established. Students are recruited at the summer orientation programs where they can fill out an application to show their interest and to receive additional information. Two follow-up phone calls are made once the application is processed to assess the level of interest and to invite the student to attend one of the mandatory training sessions offered during the month prior to the start of classes. A training session is offered but not mandatory for mentors as an overview to faculty and staff who are new to the program and also to continuing mentors in order to share statistics, explain changes, answer questions and address any concerns. Assignments are made by the program manager and then given to mentors who contact the students to introduce themselves. Arrangements are also made for the first meeting, which takes place at an evening reception on campus a week or two before classes start. This first contact is often the most important as it sets a tone for the relationship and the importance of the commitment to the program. While the mentoring program is voluntary, once a student or faculty member agree to be part of the program they agree to four contacts a term, a relationship based on mutual respect, open communication,

and active listening. The role of the mentor is to help the student by providing tools for empowerment, in which the mentee takes on more responsibility during the friendship. Successful mentoring depends on the ability to form helpful relationships. One way that a successful relationship is measured is by the retention of the student to the next year.

While the university in the study is home to a large number of first generation students, many students are from families in which parents have completed their own college studies. A profile of a typical student (mentee) can range tremendously (Chickering, 1990) from those who have scored high on the college entry tests (ACT or SAT), understand the university culture and are very much at home, to students who have placed in remedial classes, don't understand the educational system and terminology, their responsibilities in the educational process, and are lost in this new environment of higher education. The kinds of help and support that students ask for from their mentors are often as varied as the students themselves. Based on our experiences of the five most common expectations students have of their mentors, one is help with practical needs, such as directions to campus offices and classrooms, how to arrange tutoring, and understanding their syllabi. A personal support system is the second reason. Students look for someone to give them encouragement and support in an environment that is new to them. They also need a sounding board and opportunities to vent. The third reason is a desire for a one-on-one relationship with someone that is already established on campus. Creating a friendship with a more experienced person creates an important link to the school community. A similar area of academic interest is the fourth expectation and of particular importance to students who are unsure of which major they want to complete. They are then able to get a view of their major at an early point in the educational process. The fifth reason is that many students do realize the importance of introductions within or outside the campus community. The opportunity of having professional experiences such as internships and cooperative education with an outside entity before their education is completed has become part of the process.

The academic curriculum doesn't carry the full burden of educating students at a university. The co-curricular activities that a school offers provide another facet of education. Rather than just gaining specific knowledge, the development of the student as a total person is the primary goal of the university. Many other support pieces are needed for students to take full advantage of the educational process. Mentoring has become recognized as an important tool for student development whether that development is social, knowledge-based or personal. The university's mentoring program provides opportunities for participants to socialize with other students and faculty and staff members through a series of social events offered once a month. Speakers are invited to these events to address topics important to first year students such as campus jobs, financial aid, and workshops on academic survival. Other meetings between mentors and mentees are made between the individuals. A newsletter is published to update participants about upcoming events and activities, opportunities for leadership, how to join clubs and organizations, volunteer activities, and important dates and deadlines.

The mentoring program has two main goals: to increase participation of incoming new students in the program itself for one academic year and to impact retention of these same students as compared to the general population of new students for a particular academic year. Outcomes for goal one are measured by the growth rate of mentees and mentors for the academic year. Participation is measured by the completion of the minimum number of contacts that were made. Data is collected through attendance sheets at sponsored events, emailed feedback forms, returned agreement forms, and yearly evaluation forms from both mentors and mentees. All of this data is self-reported with the exception of attendance records from events.

The impact of this mentoring program is measured by the fall-to-fall retention rate of participating mentees who are expected to make eight contacts during the year with their mentors. Information is collected by the Data Management Office and reported to the program manager by a specified date. Satisfaction with the overall mentoring experience and the mentoring relationship is assessed in addition to connectivity to the university through the mentoring experience. The data on satisfaction and connection is collected though self-reported evaluations.

Research Question

The institution in this study has a racially diverse student population with many students representing the first family generation attending college. As an example, the retention rate of the Fall 2001 freshman student cohort group (first-time, fulltime, degree-seeking freshmen) averaged 63% ranging by race from 50% (Native American) to 67% (Whites, Asian Americans). The research in the study will identify the impact that the school's mentoring program has on retention. Specifically, the research seeks to answer the following question:

- Is there a relationship between participation in a freshman mentoring program and second-year retention independent of race, gender, age and standardized test scores?

Methodology

To conduct the research two data components were collected for analysis. First, a list of students enlisted in the school's mentoring program during the previous four years was compiled from the school's Department of Student Life which administers the mentoring program. Secondly, to measure the retention and identify student demographic characteristics, enrollment records from the school's institutional research office were also compiled for both the mentee group and the freshman cohort group (first-time, full-time, degree-seeking freshman). If a student was a member of both groups (mentee and cohort) they were coded as a mentee. Table 1 lists the variables that were collected for students in the study.

Table 1
Student Demographic Variables

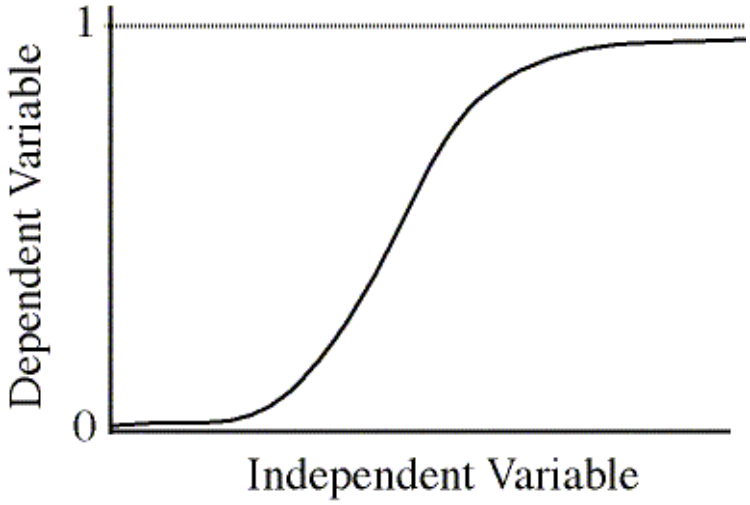
Variable	**Description**
Return	The retention of the student to the institution the following year (same semester). Yes = 1, No = 0
Mentee	Participation in the mentoring program. Yes = 1, No = 0
Test	Test score (ACT or converted SAT). Range: {11,35}
Hours	Course load in the fall semester (in credit hours). Range: {5,21}
Male, Female	Gender. Yes = 1, No = 0
Age	Age of the student in years. Range: {16,38}
White, Black, Hispanic, Asian/Pacific Islander, Native American, Unknown Race, Non-Resident Alien	Race of the student. Yes = 1, No = 0

The demographic information collected consisted of race, gender, and test score information supplied to the school at the time of admission as well as course load in the fall semester. Age was calculated for the beginning of the student's first semester based on the student-supplied date-of-birth. Enrollment data was compiled for both the initial semester of enrollment (fall) and the fall semester one year later. If a student was enrolled in the second year, the *Return* variable was set equal to "1". If not, the variable was set to "0".

The *Test* variable is defined as the highest college entry test score available for the student from multiple sources including the standard ACT test, an Internal ACT offered at the school and the SAT test. For the SAT scores, the results were translated to an equivalent ACT scores using commonly accepted conversion tables (College Board, n.d.). When multiple test scores existed for a student, the highest score was used. If no test scores were available for the student, that record was removed from the data set. As indicated in Table 1, the scores ranged from 11 to 35.

To predict student retention as outlined in the research question it was necessary to use a method that predicts a dichotomous output variable (retention) based on a number of input variables (the demographic variables), including both dichotomous and continuous variables. While linear regression can include both dichotomous and continuous independent variables, the predicted output variable is continuous. Similarly, for discriminant analysis, the dependent variable is categorical (Lea, 1997). However logistic regression (Menard, 2001; Hosmer & Lemeshow, 2000) generates a probability that is then converted to a dichotomotous output variable based on a cutoff (usually 0.5). The logit function, as shown in Figure 1, forces the output variable to have a range limited to between 0 and 1.

Figure 1
Logit function



Source: An Introduction to Logistic Regression (Whitehead, n.d.)

For this data, the equation that transforms the data is

$\ln((P/(1-P)) = a + bX$

where *ln* is the natural logarithm function
P = the probability of the outcome being equal to 1
P/(1-P) = the odds of the outcome being equal to 1
a + bX = the linear combination of variables being tested

Logistic regression was performed on each of three models as shown in Table 2.

Table 2
Freshman Retention Models

Model 1

$Return_{full} = a_0U + a_1Mentee + a_2Test + a_3Hours + E$

Model 2

$Return_{full} = a_0U + a_1Mentee + a_2Test + a_3Hours + a_4Male + a_5Female + a_6Age + E$

Model 3

$Return_{full} = a_0U + a_1Mentee + a_2Test + a_3Hours + a_4Male + a_5Female + a_6Age + a_7White + a_8Black + a_9Hispanic + a_{10}Asian + a_{11}Native + a_{12}Unknown + a_{13}NonRes + E$

where U is a constant and E represents the error component.

Results

Table 3 presents the basic descriptive statistics for the four years of freshman data that were included in the study.

Table 3
Descriptive Statistics – Complete Data Set

	N	Minimum	Maximum	Mean	Std. Deviation
Return	3577	0	1	.66	.475
Mentee	3577	0	1	.12	.327
Test	3577	11	35	19.71	4.064
Hours	3577	5	21	14.51	1.934
Male	3577	0	1	.51	.500
Female	3577	0	1	.49	.500
Age	3573	16	38	18.40	1.147
White	3577	0	1	.64	.480
Black	3577	0	1	.21	.408
Asian American	3577	0	1	.04	.186
Hispanic	3577	0	1	.04	.195
American Indian	3577	0	1	.00	.055
Race Unknown	3577	0	1	.07	.257
Valid N (listwise)	3573				

Descriptive Statistics – Mentees

	N	Minimum	Maximum	Mean	Std. Deviation
Return	435	0	1	.69	.464
Mentee	435	1	1	1.00	.000
Test	435	11	33	18.93	3.863
Hours	435	5	19	14.41	2.087
Male	435	0	1	.31	.463
Female	435	0	1	.69	.463
Age	435	16	29	18.38	1.084
White	435	0	1	.47	.500
Black	435	0	1	.39	.488
Asian American	435	0	1	.02	.150
Hispanic	435	0	1	.07	.254
American Indian	435	0	0	.00	.000
Race Unknown	435	0	1	.05	.210
Valid N (listwise)	435				

The analysis presented in Table 4 shows that, at the .05 level there exists a significant relationship between participation in the mentoring program and first-year retention as measured in Model 3 only. Based on the Cox and Snell R^2 and Nagelkerke R^2 approximations overall all three models account for a negligible amount of variance. However, the Hosmer-Lemeshow test indicates that…..

In addition, because of the heteroskedastic nature of the error data, the prediction of the Return value as shown in the Classification Table in Table 4 is not nearly the same for both values Yes and No.

Table 4
Logistic Regression Results
Dependent Variable = Return
Beta Coefficients and Model Statistics

	Model 1	Wald (Sig)	Model 2	Wald (Sig)	Model 3	Wald (Sig)
Constant	-1.398	23.289 (.290)	-0.734	1.277 (.258)	-0.131	0.038 (.845)
Mentee	0.209	3.528(.111)	0.178	2.531(.112)	0.260	5.192 (.023*)
Test	0.034	13.732(.009**)	0.036	14.690 (.000**)	0.024	5.834 (.016*)
Hours	0.093	23.074(.019*)	0.093	22.690(.000**)	0.084	18.216 (.000**)
Male			-0.131	3.272(.070)	-0.164	4.997 (.025*)
Age			-0.033	1.227(.268)	-0.035	1.326 (.250)
White					-0.124	0.733 (.392)
Black					-0.464	8.510 (.004**)
Hispanic					-0.731	0.091(.001**)
Asian					0.072	11.112(.763)
Native American					-0.191	0.087(.767)
-2 Log Likelihood	4553.8		4543.7		4518.2	
Hosmer-Lemeshow Sig.	0.743		0.381		0.098	
Chi-Square (df=8)	5.136		8.560		13.427	
Cox and Snell R^2	0.015		0.016		0.023	
Nagelkerke R^2	0.021		0.022		0.032	
% Correct Predictions	65.5%		66.0%		66.0%	

Note: the Female and Race Unknown variables were automatically removed from the analysis because of linear dependence

The table below shows the statistical power (Cohen, 1977) of all three models given different effect size levels. That is, with any effect size (low, medium or high), one can be 99% confident that the significance reported in the analysis is accurate. This high level of certainty is largely a result of the relatively large sample size used in the study.

Table 5
Power Analysis for Different Effect Sizes

Effect Size	Power
Low (.10)	99
Medium (.225)	99
High (.35)	99

Discussion

The results displayed on the previous pages show that there while there exists a positive relationship between the participation in the student mentoring program and the likelihood of a student returning to the school the following year (as evidenced by the Beta coefficient of the mentee variable, .260), independent of race, gender, age, entry test score, and course load, the overall variance explained by the model is very low. In addition, the mentoring variable did not become significant until Model 3 when the race variables were added. Overall the poor performance of the model may have been caused by several factors. Most significantly, participation in the mentoring program was included as a simple dichotomous variable reflecting essentially whether a student had enrolled in the program, not the degree to which he or she participated. A student who signed up at the beginning of the semester but met infrequently with his or mentor is grouped with others who had a more substantial mentee/mentor relationship. In the future the school's mentoring program will have additional data collection (e.g. number of mentor/mentee meetings in a semester) which is being collected now that will allow higher quality data to be included in the regression model.

Even with a more robust model, any relationship between the mentoring program and retention is not meant to imply a cause-and-effect relationship. That is, just because a student enters the mentoring program does not mean that the student is necessary more likely to return. To measure that relationship one would require a test that uses an experimental design. Instead, the research suggests that students that enter the program may have certain personal characteristics (for example, being highly motivated or resourceful) that make them more likely to return to the school the following year. Indeed this model does not attempt measure the effectiveness of the mentoring program itself.

Also, retention should not necessarily be judged by the reader as a strictly positive or negative result in terms of a student's success. While the retention can certainly be a key indicator of success for the institution being studied, the student may not return the following year because of extenuating circumstances (e.g. moved, transferred to a different school, found a full-time job, personal finances.)

Future Research

Additional research could address the characteristics of the students participating in the mentoring program. Are there differences in the demographics of the students participating in the Mentoring program compared to those in the student cohort group? What mentee demographics *are* the best predictors of retention?

The research methods used in this study present a tool for measuring the likeliness of students in a program returning to the same school the following year compared to students not in the program. A researcher wanting to perform such work would require: access to the data, an assurance of accurate data coding, and enough independent variables to give meaning to the analysis. Based on their results an institution can increase or decrease their emphasis on the program or revise it accordingly. Similar programs that were discussed earlier (bridge programs, orientation programs) could also be analyzed in a similar fashion.

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