The Effect of Tutoring on Student Success

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This research examined the effect of tutoring on student success at an open enrollment community college, controlling for gender, age, race/ethnicity, highest level of education, and reading, writing and mathematics competency. Student success was defined three ways: term grade point average (GPA), success in courses, and persistence from the fall to spring semesters. Using analysis of variance and logistic regression, researchers found that tutoring was associated with student success, controlling for the other variables. Results provide empirical support for the hypothesized importance of tutoring in colleges' arsenals of student support services.

Introduction and Purpose

During the past 10 years, there has been increased national attention directed to student success in higher education. Emanating from a variety of sources, including calls for accountability, revised accreditation criteria that place greater emphasis on student outcomes, and greater emphasis on teaching *and learning*, colleges are expected to do a more substantial job of measuring students' learning and using assessment results for improvement. The recent report of the Spellings Commission and spring 2007 Department of Education negotiated regulations discussions regarding the possible role of accrediting agencies in guaranteeing institutional performance further underscore the expectation that colleges will need to be able to document student success. How colleges can affect and improve learning and student success continues to be an unanswered question, although a variety of relatively new instruments and initiatives are aimed at this goal.

For example, the Foundations of Excellence® Project, sponsored by the Policy Center on the First Year of College, posits nine foundational dimensions of excellence, aspirational dimensions that characterize excellent college principles and programs for first-year and new college students. Two versions of the dimensions exist, one for four-year and the other for two-year colleges (Foundations of Excellence®, 2005).

The National Survey of Student Engagement (NSSE) and Community College Survey of Student Engagement (CCSSE) are both designed to obtain self-reported measures of student engagement; i.e., students respond to questions that assess institutional practices and student behaviors that research has shown to be correlated highly with student learning and student retention. National results provide an interesting picture of how students spend their time, particularly in activities identified as "good practices" in undergraduate education (CCSSE, 2007).

Achieving the Dream is another broad student success initiative. Now in its fourth year, the project involves more than 80 colleges in 15 states in multi-year efforts to improve student achievement, especially for low-income and minority students. Nearly all Achieving the Dream institutions are community colleges. Participating institutions are required to compile and analyze data on student performance to aid in developing intervention strategies that address what each institution identifies as critical barriers to success for its students. The colleges are expected to measure the impact of their strategies by compiling and analyzing data to determine whether students are, indeed, achieving at higher levels than had been the case before the new strategies were implemented (Achieving the Dream, 2006).

What these and other efforts share is a number of assumptions about the institutional policies and programs that foster student success. These policies and programs include placement in appropriate level mathematics and composition courses, required advising, orientation programs, provision of support services such as tutoring and mentoring, and both in-class and out-of-class activities that engage students rather than permitting them to be passive learners. What is relatively new, however, is research that tests the efficacy of these strategies.

The purpose of this project is to examine the efficacy of one common student success strategy: tutoring. Specifically, this study examined the achievement of students who received tutoring compared to similar students who did not, in order to examine the relationship between tutoring and performance.

Literature Review

A number of important studies have investigated factors that influence student success. In his seminal 1987 book, *Leaving College: Rethinking the Causes and Cures for*

Student Attrition, Tinto suggested that students who integrated both academically and socially into an institution were more likely to persist. Numerous subsequent studies have tested the validity of Tinto's theory with mixed results (Braxton, 2004). In their review of decades of research on the impact of college on students, Pascarella and Terenzini (2005) note several categories of theories about college student change: developmental, sociological, and environmental. Their work emphasizes that changes which occur in college come about from multiple experiences and can be viewed through different lenses. Thus colleges designing programs to foster student success need to take a broad perspective, recognizing that no single program or intervention will be effective for all students. Kuh and his colleagues (2007) prepared an extensive study summarizing research related to student success. They identified five theoretical perspectives: sociological, organizational, psychological, cultural and economic. In their work they also explored institutional initiatives affecting success, including academic support services. The literature they examined found many students did not use support services, but those who did were more likely to persist and earn higher grades (p. 87).

A small number of recent studies have empirically examined factors associated with student success in community colleges. For example, Jenkins et. al. (2006) looked at transcript-level data for 150,000 students in three cohorts of Florida community college students and conducted case studies of six colleges, three identified as "high impact" and three as "low impact." They identified seven sets of activities hypothesized to characterize effective colleges; i.e., institutions that had a high impact on student success. Jenkins and his colleagues concluded that high impact colleges targeted support for minority students, made them feel welcome, and offered programs and services targeted to them. Case studies of three high-impact and three low-impact colleges revealed general but not complete consistency between college practices and activities hypothetically associated with success.

Purnell and Blank (2004) suggested a number of support services that could help community college students succeed. These are clustered in five broad areas: academic guidance and counseling, personal guidance and counseling, career counseling, academic tutoring, and supplemental supports such as transportation and child care. They described a variety of such programs and presented an overview of several empirical studies of multi-service program effectiveness. However, they acknowledged that the research was based on descriptive and correlational studies rather than on rigorous research designs with control groups.

The Opening Doors Demonstration is a new, multi-college project to test the effectiveness of various intervention programs intended to improve student achievement and persistence (Brock & LeBlanc, 2005). The project involves random assignment of students to programmatic interventions, thus permitting researchers to gauge the impact of interventions while controlling for a variety of variables. To date, available empirical research examined the effect of learning communities at Kingsborough Community Colleges (Bloom & Sommo, 2005). Researchers found that students enrolled in learning communities outperformed control group students during their first semester and, one year after enrollment, were more likely to have completed remedial English requirements. Because Opening Doors uses random assignments of students, research from this project is likely to be of unusual value in assessing the effectiveness of intervention strategies.

At Washtenaw Community College in Michigan, researchers found that the odds of success in courses for students not tutored was 1.3 times as high as for students who were tutored, although variables were not used to control for differences between the two groups (Washtenaw Community College, 2006). No difference in success rates were found based on number of tutoring sessions.

Patton, Morelon, Whitehead, and Hossler (2006) examined published research on retention efforts to find examples of empirical evidence to support assumptions about program effectiveness. They concluded that "one of the most important findings of this investigation is the dearth of evidence to support the claims proffered on the efficacy of a wide range of campus-based retention initiatives" (p. 10). The authors also noted that few empirical studies had been conducted at community colleges.

Luan (2006) conducted a longitudinal study to assess the effect of tutoring on student success in courses. Using student information system data, Luan tracked students from Spring 1999 to Spring 2005. He found that students who enrolled in LIBR 502, an elective course that offers drop-in tutorial assistance, had higher rates of success in their courses than students who did not obtain this assistance. In particular, pre-collegiate basic skills students and younger students benefited most from tutoring.

Finally, McClenney, Marti, and Adkins (2007) linked the results from the CCSSE and institution-level data to confirm that students' self-reports of engagement and institutional practices were positively associated with a number of academic success measures, including GPA, percent of credits completed, and persistence from fall-to-spring and fall-to-fall terms.

While the literature about student success is large and growing, much of it is premised on studies conducted at four-year colleges and universities. Studies of support services and institutional practices intended to improve success tend to be more descriptive than analytical, so that the actual effectiveness of these measures continues to be largely unknown.

Methodology

This study was conducted at an open enrollment community college in the suburbs of a major metropolitan area. The population included the 2,724 students who were new to the college in Fall 2005. The central variable of interest was participation in tutoring (number of visits and total time in minutes for the semester). A number of student demographic and academic preparedness variables were used as controls (gender, age, race/ethnicity, placement into remedial math and English, highest level of study achieved to date). Three outcome measures of student success were used: fall term GPA, percent of fall courses successfully completed (grades of A, B, C, or Pass for remedial courses), and persistence to the spring semester. Because the college does not include remedial course grades in the calculation of GPAs, this variable by itself is an incomplete depiction of student success. Table 1 lists variables and descriptive statistics (frequency counts, means, and standard deviations).

Table 1. Control Variables, Tutoring and Outcome Variables

Categories	Number	Percent	Mean	SD
Gender				
Female	1,344	49.3		
Male	1,380	50.7		
Age				
Below 24	1,822	66.9		
24 or above	902	33.1		
Race /Ethnicity				
White Non-Hispanic	1,368	50.2		
Minority[a]	813	29.8		
Other/no information	543	19.9		
Highest Level Education				
Some college or below	2,143	78.7		
Associate's degree or higher	581	21.3		
Writing Placement				
Remedial	631	23.2		
College-level	801	29.4		
No placement test	1,292	47.4		
Reading Placement				
Remedial	600	22.0		
College-level reading course recommended	317	11.6		
No reading course needed	697	25.6		
No placement test	1,110	40.7		
Math Placement				
Remedial	853	31.3		
Intermediate algebra	301	11.0		
College-level math	222	8.1		
No placement test	1,348	49.5		
Received Tutoring				
Yes	306	11.2		
No	2,418	88.8		
Number Tutoring Visits (based on N=306)			4.7	6.6
Total Minutes Tutored (based on N=306)			297.6	518.3
Fall Grade Point Average[b]	2,282		2.38	1.33
Percent Courses Successfully Completed [c]	2,724		.65	.40
Returned Spring 2006 Semester				
Yes	1,688	.62		
No	1,036	.38		

[a] Includes Asian, Black, Hispanic, American Indian.
[b] 2,282 students earned grades of A, B, C, D, or F in at least one college-level course; remedial course grades are not included in GPA.
[c] Includes remedial and college-level courses with grades of A, B, C, or P divided by total number courses attempted in fall semester.

To examine the association between success and tutoring, controlling for demographics and academic preparedness, we conducted a series of analyses using logistic regression to examine the effect of tutoring on the dependent variables persistence and course completion, and analysis of variance (ANOVA) to examine GPA. While some of the nominal variables, such as course placements, might masquerade as ordinal measures if we consider that remedial placements are lower than college-level placements, we could neither exclude the large number of students who had no placement data or make assumptions about what their placements might be. Therefore, we generated a series of dummy variables for writing, reading, and math placements and ethnicity. For writing and reading, variables were remedial placement (yes/no), college-level placement (yes/no), or no placement data. For math, variables were remedial placement (yes/no), intermediate algebra placement (yes/no), college-level placement (yes/no), or no placement data. For race/ethnicity, variables were white non-Hispanic (yes/no), minority (yes/no), or no information.

Successful course completion was initially defined as the percentage of courses successfully completed by each student. However, a large percentage of students took only one course and successfully completed it, skewing results in the direction of 100 percent. Therefore, each course was treated

as a separate observation for each student and coded "1" if the grade was A, B, C, or P (pass in developmental courses) or "2" if the grade was D, F, incomplete, or withdrawal.

The frequency distribution for number of visits for tutoring also was highly skewed, with 2,418 students never obtaining tutoring, 125 students obtaining tutoring only once, 94 students obtaining tutoring two-four times, and the remaining 87 students obtaining tutoring five or more times. Consequently, we reclassified the number of tutoring visits into a dichotomous variable, where "0" equaled no visits and "1" equaled one or more visits.

Results

To investigate factors affecting the measures of student success, a univariate analysis for each success variable, each control variable, and the variable of interest (tutoring) was conducted to ascertain whether variables were differentially associated with success. T-tests or ANOVAs were used. As Table 2 indicates, tutoring and almost all control variables were statistically significant in their association with the student success indicators. The preliminary analysis also suggested that female students had higher term GPAs and higher rates of course success than male students. Older students had higher term GPAs and higher course success rates and were less likely to return in spring than younger students. Minority students had lower GPAs and were less likely to succeed than white students or those with unknown ethnicity. Students who placed in higher level math had higher term GPAs and were more likely to succeed in their courses and return in the spring term. Students who placed in higher level reading and writing had higher term GPAs and were more likely to return in the spring. Students who received tutoring were more successful in terms of successful course completions, term GPA, and persistence to the spring term than those who did not receive tutoring.

Statistical Models

The next step in the study was the creation of three statistical models—one for each success outcome—to examine the effect of tutoring net of other variables. A control variable was eliminated if it did not enter the model as statistically significant at the .05 alpha level. Control variables that were correlated with others were also eliminated from the model. Examining the relationships among the control variables, we found several such correlations: the highest level of education was correlated with age and placement levels (those with more education are more likely to be older and to either have no placement tests or to place into college-level courses), gender was correlated with age (women are more likely to be older), and placement in composition was correlated with placement in reading (students tend to place into college-level work in both areas, remedial work in both subjects, or to have no placement tests in both areas). The variable that had the greater contribution to the final model was retained.

Tutoring, the central variable of interest, was entered last to determine its effect, if any, on student success after controlling for other variables. After determining the final statistical model for each success outcome, the relative effect of each statistically significant variable on the outcome variable was examined. For those statistically significant control variables with multiple categories, we performed pairwise statistical tests to determine which levels predicted greater student success than other levels of that variable. For example, if math placement was statistically significant in predicting persistence to the spring term, which placement level(s)—remedial, intermediate algebra, college-level—predicted a higher likelihood of students enrolling in the spring?

Table 2. Relationship between Control Variables, Tutoring and Student Success

	Term GPA T-Test (T) or Analysis of Variance (F) Statistic	Successful Course Completion T-Test (T) or Analysis of Variance (F) Statistic	Persistence to Spring Chi-Square
Gender	6.15 (T)**	5.27 (T)**	1.19
Age	13.97 (T)**	5.50 (T)**	186.74**
Race /Ethnicity	12.86 (F)**	5.26 (F)*	11.90*
Highest Level of Education	14.46 (T)**	6.50 (T)**	154.56**
Placement in Reading	75.69 (F)**	2.08 (F)	477.59**
Placement in Writing	62.59 (F)**	0.25 (F)	361.62**
Placement in Math	59.16 (F)**	18.18 (F)**	366.79**
Received Tutoring	3.59 (T)**	5.35 (T)**	62.75**

*$p<.01.$ **$p<.001.$

Model for Term Grade Point Average

Analysis of variance (ANOVA) was used to examine term GPA. All variables were found to be statistically significant. However, due to multicollinearity, placement in writing, age, and highest level of education were removed from the final model. Tutoring was entered into the model last and was found to be statistically significant. A pairwise comparison of every combination of levels within a variable was conducted to examine statistical differences in GPA. Table 3 displays the results of the final model.

The expected change in term GPA is interpreted as the expected difference in term GPA for students based on the variable of interest, after controlling for all other variables in the model. Overall, students who placed in remedial math have term GPAs that are .82 points lower than students who placed in college-level math, even adjusting for the effect of all other variables, including tutoring. The results indicate that tutoring does matter, however. Students who obtained tutoring have term GPAs .38 points higher than students who do not receive tutoring after controlling for the effects of race/ethnicity, gender, and course placements.

Model for Successful Course Completions

To examine successful course completions, a logistic regression analysis was employed using an event/trials form. For this model, an event was defined as the number of successful course completions and the trial was defined as the number of courses attempted in the term. Each control variable was found to be statistically significant; however, due to multicollinearity, placement in writing, age, and highest level of education were removed from the final model. Tutoring entered the model last and was also found to be statistically significant. A pairwise comparison of every combination of levels within a variable was conducted to examine statistical differences in successful course completion. Table 4 displays the results of the final course completion model.

The odds ratio is interpreted as the likelihood of a student successfully completing a course based on the variable of interest, after controlling for all other variables in the model. For example, students who placed in college level math were 2.8 times more likely than students who placed in remedial math to succeed in their courses, even adjusting for the effect of all other variables including tutoring. Note that all courses were examined, not just math courses. The results indicate that tutoring does matter: a student who obtained tutoring was 1.8 times as likely to successfully complete a course after controlling for the effects of race/ethnicity, gender, or course placements.

Model for Fall-to-Spring Persistence

To examine persistence to the spring semester, a logistic regression was used, with tutoring entered last. Gender was eliminated as not significant. A pairwise comparison of every combination of levels within a variable was conducted to examine statistical differences in persistence. Table 5 displays the results of the final persistence model.

The odds ratio is interpreted as the likelihood of a student persisting to spring based on the variable of interest, after controlling for all other variables in the model. For example, students who placed in college level reading were 4.5 times more likely than students with no placement test to persist to the spring semester, even adjusting for the effect of all other variables, including tutoring. In fact, students who did not take placement tests were less likely to persist even controlling for race/ethnicity and tutoring. Again, the results indicate that tutoring does matter. A student who obtained tutoring was 2.3

Table 3. Effects on Term GPA

Variable	Expected Change in Term GPA	95% Confidence Interval	
		Lower	Upper
Gender			
Female	0.31	0.20	0.41
Male			
Race / Ethnicity			
White	0.23	0.11	0.35
Minority			
Unknown	0.24	0.09	0.39
Placement in Reading			
2=College level			
1=Remedial	-0.37	-0.50	-0.23
0=No placement test	0.21	0.06	0.36
Placement in Math			
3=College level			
2=Intermediate algebra	-0.61	-0.83	-0.39
1=Remedial	-0.82	-1.02	-0.63
0=No placement test	-0.40	-0.61	-0.20
Received Tutoring			
Yes			
No	-0.38	-0.55	-0.22

times as likely to persist to the spring semester after controlling for the effects of race/ethnicity or course placements.

Limitations

This study has several limitations that should be acknowledged. This study was conducted at a single open-enrollment, commuter institution and the study's results may not be generalizable to dissimilar institutions. Also, several important potential contributors to student success—such as motivation, hours of employment, and family obligations—are not included in the models because data were not available. Grades, one of the dependent variables, may not be the best measure of student success, particularly if the focus is on learning itself. While grades or GPAs are not as pristine or pure a measure of what students know and can do as we might wish, they are widely used as success indicators. Finally, we were unable to operationally connect tutoring in a specific course or subject with academic success in that course. Instead, academic success is defined more globally for each student.

Discussion and Implications for Further Research

The results of this study suggest that tutoring is associated with student success as defined by GPA, successful completion of courses, and persistence to the next semester. This finding provides empirical evidence to support notions about the importance of including tutoring among the arsenal of student support services offered by community colleges. It may also strengthen the case for continuing financial support for tutoring, a service that rarely generates revenue.

However, the world of community colleges and community college students is far more complex than this simple study might suggest. Manny community college students must balance competing roles of student, employee, and family member. Fulfilling their multiple responsibilities may prevent them from taking full advantage of support services offered by a college, even when they recognize their academic performance might benefit from those services. Students may overestimate their knowledge and skills, assuming they will be able to succeed without assistance. Time management, the ability to complete assignments and prepare for examinations in a timely manner, is also a challenge for many students.

Table 4 Effects on Successful Course Completions

Variable	Odds Ratio	Most likely to succeed in course if...	Least likely to succeed in course if...
Gender		Female	Male
Female	1.4		
Male	--		
Race/ Ethnicity		Unknown	Minority
White	1.2		
Minority	--		
Unknown	1.4		
Placement in Math		College Level	Remedial
3=College level	2.8		
2=Intermediate algebra	1.4		
1=Remedial	--		
0= No placement test	1.3		
Received Tutoring	1.8	Yes	No

Table 5. Effects on Fall to Spring Persistence

Variable	Odds Ratio	Most likely to return in spring term if...	Least likely to return in spring term if...
Race/ Ethnicity		White or Minority	Unknown
White	1.4		
Minority	1.2		
Unknown	--		
Placement in Reading		College level	No placement test
2=College level	4.5		
1=Remedial	3.3		
0= No placement test	--		
Placement in Math		College level or Intermediate algebra	No placement test
3=College level	3.2		
2=Intermediate algebra	2.6		
1=Remedial	1.8		
0= No placement test	--		
Received Tutoring	2.3	Yes	No

Thus, despite evidence affirming the contribution of tutoring to student success, students may lack the time, recognition of need, or self-discipline to obtain tutoring.

Tutoring may also serve a different function for students: connecting them with the institution. While assisting them with the acquisition of knowledge and skills for success, tutoring may also link a student with someone who cares. This feeling of connection can be a crucial factor affecting students' experiences at a college, making them feel at home and encouraging persistence.

It may also be the case that the effect of tutoring is more granular than suggested by a success variable such as course success or GPA. Moving a student from a B to an A in the course will not change course success data, when success is defined as a grade of A, B, C, or Pass, for example. But to the student whose objective is to earn an A, tutoring can be as critical as for a student who wants only to earn a passing grade.

This study examines student success at the end of the term. It would be useful, perhaps, to examine changes in students' grades as they progress through the semester. This would require tracking both course performance and participation in tutoring during the semester and aligning performance on specific assignments with receipt of tutoring both in that specific course and for any course. Such a study would require faculty members to report grades on each course assignment by date, tutoring providers to report dates and subjects of tutoring, and researchers to link assignment grades and tutoring by date.

The effect of tutoring could also be explored through a longitudinal study to identify students who did not receive any tutoring in one term, but did receive tutoring in another, and to determine whether academic success differed based on whether or not they received any tutoring. This would be a pre-test, post-test design if the first term was the one in which tutoring was not received. Again, this may be an area for further research.

In a perfect research world, colleges could learn more about the direct effectiveness of tutoring by randomly assigning students to receive tutoring or not or by measuring other student characteristics such as motivation and external obligations. However, both ethics and the educational setting limit the feasibility of these approaches.

The value of the study reported in this article is that empirical evidence points to a clear relationship between tutoring and student success. That clear relationship may be causal for some or all students, but that is a statement we cannot make. Tutoring matters but, as of yet, research does not enable us to say exactly how.

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