A Strategy for Improving Freshman College Retention

Cindy P. Veenstra

For U.S. colleges, only 58 percent of the entering freshmen graduate from the same college within six years (Astin and Oseguera, 2005). Much of the attrition occurs during the freshman year. There is increased interest in improving the graduation rates at U.S. colleges and universities, especially in the sciences and engineering. Education leaders such as Vincent Tinto have indicated that we need an institutional model for helping students succeed. In a recent article, he wrote, "What is needed and what is not yet available is a model of institutional action that provides guidelines for the development of effective policies and programs that institutions can reasonably employ to enhance the persistence of all their students," (Tinto, 2006-07).

Institutional action for helping students in the first year includes student support activities such as advising, tutoring, and mentoring. This article proposes a framework for targeting student support activities based on students' pre-college characteristics such as academic achievement, family background, goals, and attitudes. The expected result is improved freshman retention and a higher graduation rate.

The Freshman Year

Figure 1 illustrates the overall process for the freshman year (Veenstra, 2008). A class of freshmen enters college and experiences the freshman year. The students were admitted to a college because they meet a set of admission criteria; however, they come with different experiences, attitudes, and backgrounds—many of which are significant predictors for student success. The role of the college includes bringing the class together into a freshman community and ensuring that each student has the potential for achieving a quality, value-added learning experience.

To enable this transition to occur, the culture of the freshman experience is molded by the actions of the administration, faculty, staff, and other students at the college. This includes the classroom experiences, dormitory living experiences, engagement with faculty and other students, and extracurricular activities. The only control the college has over student retention is in the development of its educational processes and programs throughout the freshman year. This includes providing a culture that is student-focused and offering services supportive to the needs of each student. The quality of the student support services can encourage and influence the student's decision for continuing in the college or university.

At the end of the freshman year, students make a retention decision. As shown in Figure 1, each student decides on one of four alternatives listed below:

A. Return to the same college.

B. Leave this college and transfer to another college in the same university.

C. Leave this college and transfer to another university.

D. Drop out of college.

Figure 1: The Freshman Year Process and the Four Decisions of Retention
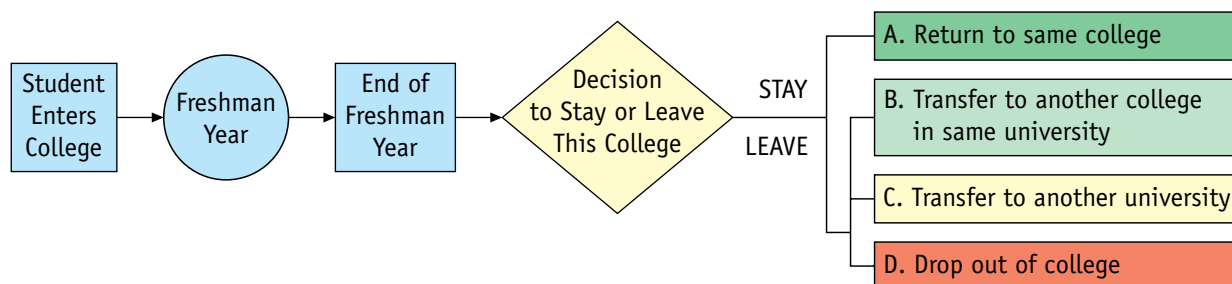
Assessment of the Cost of Student Attrition to the University

For each student who leaves a college, there is a loss in revenue, such as tuition, to the college. As a result, attrition from a college can be described conceptually in terms of a loss function. A loss can be attributed for each of the four decisions of retention and is conceptualized in Figure 2 (adapted from Veenstra, 2008).

The loss associated with each decision is as follows:

- For decisions A and B, the investment of the university in the first year is returned with the student returning to the same university. There is no loss; only gain in the potential learning by the student. The freshman year is a time of transition, and if the student decides to switch to another college in the same university (decision B), this can be considered part of the freshman learning process. Many students enter a particular college without a full understanding of the careers associated with the majors in that college.

- For decision C, the student leaves the university and transfers to another university. The first university loses its investment in the student. From society's viewpoint, the student still is pursuing a college degree, and there is no loss to society with the assumption that the student will complete a degree at the second university.

- In decision D, after the first year of college, a student drops out. This is both a loss in the investment of the initial university and to society. Instead of the student pursuing a college-based career, he/she will be limited to an entry-level position in the job market. The potential of the student may not be reached in his/her education, earning power, or value to society. This loss to a college or university can be defined in monetary value based on dollars lost in tuition and other factors that may be important to a college. The loss function will depend on the financial structure of the university. The monetary loss associated with dropping out of the university will be much larger to society than that of a student who transfers to another university.

The Importance of Student Support Services

The primary responsibility for helping students experience a successful freshman year lies with

Figure 2: Loss Functions Related to Retention/ Attrition of Students
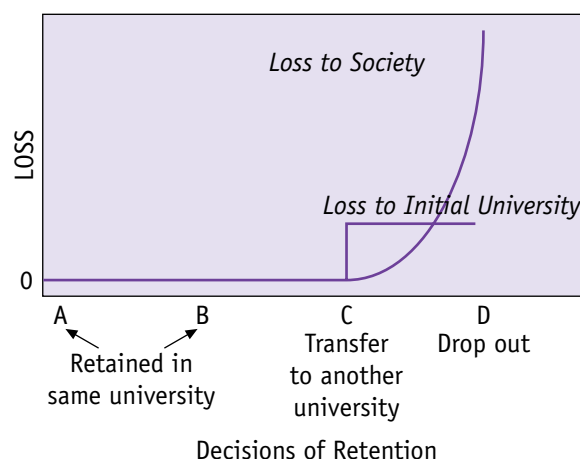
the faculty who teach the freshman courses. Yet, for some students, the faculty cannot provide the necessary support. More support such as placing students into courses, advising, tutoring, and mentoring may be guided by faculty, but these are the responsibility of the college staff to implement successfully. These services, in combination with faculty involvement, can make the difference in a student's transition to college.

Literature supports strong intervention in the first semester. Seidman recommends early identification of students who may be at risk and early, intensive assistance. He also recommends a continuous process to monitor a student's progress (Seidman, 2005). Seymour indicates that the main difference between leavers and stayers in the sciences and engineering was "whether they were able to surmount them [their problems] quickly enough to survive," (Seymour, 2001). Seymour found that some students who left the science or engineering major appeared to have an adequate level of ability but needed a "more encouraging learning environment." Seymour's findings reinforce the idea of early, more directed student support services.

The cost of student support services that would encourage freshmen to stay can be weighed against the monetary value of the loss associated with the number of students who leave at the end of the freshman year. As long as the budget for student services is less than the loss associated with students leaving the university, the monetary benefit to the university of supporting a major student support effort is positive.

Table 1: Pre-College Characteristics

Pre-college Characteristic	Measured By
High school academic performance	H.S. G.P.A., H.S. rank, SAT total, or ACT composite
Quantitative skills (math and science skills)	ACT math and/or SAT math, ACT science reasoning
Confidence in quantitative skills	Confidence indicator and self-ratings
Study habits	High school hours per week studying
Commitment to career/degree	Indicator such as highest degree sought
Commitment to college the student is attending	Indicator whether this college was first choice
Financial needs not met	Survey indicator
Family support	Parents' level of education
Social engagement	Survey indicator of social engagement in high school

Attrition as a Social Loss

The value of the student to the university is also important in non-monetary terms. The student may add diversity of ideas or more engagement in his/her classrooms. Each individual student brings a different set of attributes to the university and with careful encouragement can be valuable to the university educational processes (Gurin et al., 2002). It can be argued that the university has a social responsibility to support each student to be successful. Saco (2008) suggests that a definition of social responsibility is to "do no harm" as advocated in the physicians' Hippocratic oath. For every student who completely drops out of college, there is a social loss to both the university and society. Only the admitting university could have supported that student in a successful transition; thus, in the context of "do no harm," universities have a social responsibility to help students be successful—especially students who are admitted because they contribute a desired attribute to the university.

An Institutional Approach

An institutional approach to student success is worth consideration. First, we must define the pre-college characteristics that are considered predictive of freshman success. These may vary with each university and each university must have a data-driven approach in defining significant pre-college characteristics. Then we must identify interventions that will help improve student success. These services would be offered to students individually, based on their pre-college characteristics.

An Example

In a literature-based model for student success, pre-college characteristics were organized into nine categories (Veenstra, Dey, and Herrin, in press). This model was intended for first-time, full-time freshmen. The categories for pre-college characteristics are shown in Table 1. The research literature suggests that these characteristics are linked directly or indirectly to student retention.

Note that both quantitative skills and confidence in quantitative skills are more prevalent as predictors for success for engineering colleges than for most four-year colleges. When "survey indicator" is listed, it means that the student was queried with a survey, e.g. concern about financial needs, participation in after-school activities, etc.

In addressing Tinto's call for an institutional model that helps students succeed, a functional relationship of institutional action relative to each of the pre-college characteristics in Table 1 is needed. These staff actions for student success are shown in Table 2. First, the highest priority is correct placement of a student into his/her first-term courses. Then, based on the pre-college characteristics, an institution provides advising, tutoring, and mentoring services throughout the freshman year.

Table 2 proposes the support staff's value-added actions for a student's deficiency in each of the pre-college characteristics. Borrowing a concept from quality engineering, this is similar to a corrective action analysis. Some students come to a college with a high level of each of the pre-college characteristics and can be expected to perform well in the first year. Some students have

Table 2: Pre-College Characteristics

Pre-college Characteristic	Measured By	Low Level Expected Effect on Retention	Process Change	Effect
High school academic performance	H.S. G.P.A., H.S. rank, SAT total, or ACT composite	Less prepared academically, freshman courses challenging	Proper placement is key; directed tutoring, advising support	Significant improvement in knowledge; leading to a high college G.P.A.
Quantitative skills, Math skills	ACT math, SAT math	Less prepared, may not be ready for calculus, residual effect on rest of math-based courses (such as engineering); at very high risk	First term is key; proper placement into all courses, less course load; directed tutoring; advising support	Enables student to be successful, early intervention a must
Quantitative skills, Science reasoning	ACT science	Less prepared for chemistry and physics	Proper placement in science first term, directed tutoring, advising support	Enables student to be academically successful
Confidence in quantitative skills	Confidence indicator, self-ratings	Even with good grades, student may drop out	Mentoring, career advising, or course on careers	Student persists
Study habits	High school hours per week studying	May not be able to keep up with course load	Mentoring, courses like College 101	Enables student to be successful
Commitment to career/degree	Indicator such as highest degree sought	May drop out	Career mentoring, or course on careers; advising; discussion of careers by faculty in classes, establish peer community	Student persists
Commitment to college the student is attending	Indicator whether this college was first choice	May drop out	Establish peer community	Student persists
Financial needs not met	Survey indicator	May drop out; financial needs not met	Financial advising	Student persists
Family support	Parents' level of education	May drop out	Parents' encouragement of student; online parents' network	Student persists
Social engagement	Survey indicator of social engagement in high school	May drop out; may be over-challenged in courses that stress team work	Extra guidance on participating in dorm activities, small club activities	Student persists
Adapted from Veenstra, Dey, and Herrin (in press) and Veenstra (2008).				

a low level of one or more characteristics and still are well prepared for this college. They will benefit from tutoring, mentoring, or advising.

For example, a student who plans a science major and has a low value (deficiency) in quantitative skills will benefit from careful consideration of placement in his/her first freshman math course and tutoring. The student who is well prepared academically but has a low value for social engagement will benefit from specific guidance into small club activities. Each student must be considered as an individual, and the advising process should determine whether the student needs extra support based on the pre-college characteristics. Depending on deficiencies in pre-college characteristics, the intervention strategy would differ.

Summary

To achieve a higher graduation rate at U.S. colleges and universities, it was suggested that there are financial tradeoffs between students dropping out of a college and the establishment of an effective student success program. When a student drops out of college in the first year, both a financial and social loss to the university and society can occur. As a result, the admitting university has a social responsibility to provide student support programs for struggling students.

In his discussions of quality management, W. Edwards Deming called for attention to processes (Deming, 1986). Attention to the processes of learning yields functional institutional actions that will help more students successfully transition to college. This, in turn, will lead to a higher freshman retention and overall graduation rate for colleges and universities that practice this strategy.

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"College Retention: Can It be Improved?"

ASQ Higher Education Brief, November 6, 2008, www.asq.org/perl/forums/edu/categories.pl? doc=26767&WT.mc_id=EM2284M&WT.dcsvid= 1929972416.

Excerpt: "This issue of *ASQ Higher Education Brief* is dedicated to an important quality topic in

higher education: college student retention. With increased pressure for continuous improvement in colleges, more emphasis is being placed on increasing student retention and graduation rates. In the global economy, students who complete undergraduate degrees in their chosen major will enjoy better careers than students who do not complete their undergraduate degrees. College retention is typically measured by the graduation rate. Currently, 36 percent of U.S. college students

graduate in four years and 58 percent graduate in six years (Astin and Oseguera, 2005).

For the past 30 years, educators have been researching and discussing the reasons for college student attrition and retention. Alexander Astin and Vincent Tinto are recognized as the leaders in establishing theories of student retention. Each has authored books that are considered classics on the theory and practice of student retention." (Astin, 1984) (Tinto, 1993).

"Innovation and Continuous Improvement in Engineering Colleges"

Quality Education Division News, Spring/ Summer 2006, www.asq.org/forums/edu/ newsletters/qed-spring-summer-06.pdf.

Excerpt: "Engineers bridge the gap between what the mind can imagine and what the laws of nature allow.…Science and engineering are essential partners in paving the way for America's future" —National Science Foundation Web site

"It is fitting that in a year that the National Science Foundation (NSF) has increased its support for engineering research and innovation that ASQ has established as the theme for its 2007 national conference, Fueling Innovation. What has led to this focus by the NSF and in what direction are it and major engineering colleges headed?"

"Data-Driven Decision-Making in Higher Education"

Quality Education Division News, Spring/Summer 2006, www.asq.org/forums/edu/newsletters/qed-spring-summer-06.pdf.

Excerpt: "Have you visited Jay Marino's Quality in Education blog? (Go to www.asq.org/blog/.)

Jay addresses the issue of what being 'data driven' means. He indicates that the K-12 school systems collect all kinds of data. He writes: 'So what? So we can collect all of this data… Does this mean we are data driven?

It is only when we apply this data in the decision-making process that various questions can be answered and we become 'data driven'. His thinking is equally appropriate for our colleges and universities. We can include in 'data driven' both data collected by the university (student data, graduation rates, industry placement statistics) and empirical research studies. Colleges and universities have much research available to them on student learning. Some of this research indicates the need for data-driven decisions. The latest statistics indicate the national average of the six-year graduation rate of students who start as freshmen at a college is 55-58 percent. It has been constant in this range for a number of years. We all want to see a higher student graduation rate and evidence is increasing that being data driven helps improve it. For each college dropout, a potential career is lost."

"Innovation Using the Baldrige Process"

Proceedings of the 2007 Frontiers in Education Conference, October 11-13, 2007, http://fie-conference.org/fie2007/papers/1465.pdf.

Abstract: "Increasingly, it is evident that the Malcolm Baldrige National Quality Award (MBNQA) process is helping universities achieve their strategic planning goals. Yet, minimal attention in the engineering colleges has been given to the Baldrige criteria/process. This paper will address the successes of the Baldrige process for colleges and universities achieving academic achievement improvement. It will discuss the elements of the Baldrige criteria for higher education and identify three higher-level educational institutions that are MBNQA in Education winners and their successes. The use of the Baldrige criteria in engineering colleges will be discussed. This paper proposes that the Baldrige criteria could provide the framework for systematic thinking for leading innovation to current engineering education critical issues."