How to define retention: A New Look at an Old Problem

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Introduction

Perhaps the two most vexing measurement issues in higher education research are how to obtain true transfer rates from community colleges to four-year universities and the correct formula for the measure of college student retention, regardless of institutional type. While this chapter will focus specifically on retention, it is important to note that the problems associated with an appropriate measurement system is common to other often-researched outcomes in higher education. Measuring college student retention is complicated, confusing, and context dependent. Higher education researchers will likely never reach consensus on the "correct" or "best" way to measure this very important outcome. However, the purpose of this chapter is to thoroughly review the associated problems, discuss the methods used juxtaposed with highlights of each, and to ultimately recommend policy to reach a national consensus.

Let us begin with the most basic and non-controversial definitions of a college persister and a non-persister. A student who enrolls in college and remains enrolled until degree completion is a persister. A student who leaves the college without the earning a degree and never returns is a non-persister. While these definitions are simple and easy to understand, student paths are rarely this direct or straightforward. When looking at enrollment patterns that defy, or at least stretch these basic definitions we find:

- Student A: Enrolls in a university, remains enrolled for two years, and stops out to return six years later.
- Student B: Enrolls in a university, remains for one year and transfers to another university to complete the degree.

- Student C: Enrolls in two community colleges simultaneously, ultimately earning a certificate from one of them.
- Student D: Enrolls in college but does not complete any credits. The next year the student reenrolls and remains continuously enrolled to degree completion.
- Student E: Begins in a community college and successfully transfers to a university. However, the student is not successful at the university and leaves prior to earning any credits. The next semester the student returns to the community college taking the few remaining courses necessary to earn an associate degree.
- Student F: Enrolls for a full-time load of 5 courses (15 units of college credits), but drops all but one class (3 units).
- Student G: Enrolls in two courses, drops one keeping only a physical education course.
- Student H: Enrolls in a community college for a full load of remedial courses, reenrolling in the same courses the next semester because he/she has not yet mastered the material.
- Student I: Enrolls in a full time load of courses, but due to low GPA and lack of progress is academically suspended.
- Student J: Due to unlawful behavior, is judiciously expelled from the university.

These examples highlight the variability in student enrollment patterns that make it difficult to label one student a persister and another non-persister. Clearly, the simple dichotomous student outcome measures often employed in quantitative analysis do not capture the complexity in student progress. Rather, retention requires a series of

measures, that when viewed with their complexity, allows researchers and administrators to measure student progress more accurately. To further illustrate the need for certain engaged groups to have multiple descriptors of phenomenon of particular interest, the example of "snow" is used The English language has one word for "snow" that appears sufficient to describe the precipitation that falls from the sky when the weather outside dips below freezing. However for the Yup'ik Eskimos of Alaska, there are multiple words for snow; a word for powdered snow, another for blowing snow, another for melted snow, and so forth (Jacobson, 1984). Life in central Alaska requires and therefore recognizes the differentiation of snow-types. In similar fashion, this chapter promotes the recognition and differentiation of different types of college retention and promotes a more complex rather than simplistic measurement system.

Retention and Dropout

One of the most widely used dichotomous measures in educational research and practice is retention and dropout. Typically defined as two sides of the same coin, retention is staying in school until completion of a degree and dropping out is leaving school prematurely. It seems simplistic that retention and dropout are just purely opposites. However, more than three decades ago, Alexander Astin identified the dropout concept as a problem in his book *Predicting Academic Performance in College* (1971). According to Astin;

> …the term "dropout" is imperfectly defined: the so-called dropouts may ultimately become nondropouts and vice versa…But there seems to be no practical way out of the dilemma: A "perfect" classification of dropouts

versus nondropouts could be achieved only when all of the students had either died without ever finishing college or had finished college" (P.15). Astin added that defining dropout was further complicated by the prevalence of student enrollment in several different institutions throughout their educational career. (Astin, 1971). According to the National Center for Education Statistics (2003), 23.2% of all of the 1995-96 first-time beginning students in four-year institution transferred to another institution by the end of the sixth year. This movement resulted in the six-year retention rate of 55.3% in the first institution. When considering subsequent institutions, the retention rate rose to 62.7% (NCES, 2003). It is clear that retention rates can vary depending on the perspective and time at which it is measured.

The often cited, Vincent Tinto (1987) agreed that there are limits to our understanding of student departure. "…the label *dropout* is one of the more frequently misused terms in our lexicon of educational descriptors." (P.3). In fact, Tinto (1987) added that many who leave college do not see themselves as failures but rather, see their time in postsecondary instruction as a positive process of self discovery that has resulted in individual social and intellectual maturation. John Bean (1990), agreeing with Tinto acknowledged that students who dropout might have already achieved their goals during their limited time in colleges. Hence, he suggested that neither the student nor the college should be considered failures. Retention, as he explained, needs to be further complicated to consider student educational goals. A dropout would then be defined in comparison to student outcome versus original intent. It is only when students leave college before achieving their goals that they should be labeled a dropout.

The multiple possibilities and choices compound to make it very difficult to define retention using the simple dichotomous measure. While a dropout could be viewed as "anyone who leaves college prior to graduation" it must be accepted that a "dropout" may eventually return and transform into a "non-dropout" anytime prior to death thereby negating any earlier designations used for studies, research, or retention rates. Former dropouts may return as a full time or part-time students, to the same institution or another institution; remain in the same major or switch to another major.

Graduation, Persistence, Retention, and Attrition

The words "persistence" and "retention" are often used interchangeably. The National Center for Education Statistics, however, differentiates the terms by using "retention" as an institutional measure and "persistence" as a student measure. In other words, institutions retain and students persist. Another term commonly used with retention is "attrition". Attrition is the diminution in numbers of students resulting from lower student retention.

Two important terms are graduate and graduation. Starting with a commonly used definition of a graduate- a former student who has completed a prescribed course of study in a college or university, it is clear that all graduates have persisted. However, not all persisters will graduate. Furthermore, a graduate can only claim one institution regardless of prior enrollment at other colleges or universities. While the institution from whence a student graduates will count that student as a persister, previous institutions which the student attended likely count him/her as a non-persister or dropout. Graduation rates are clearly not the same as retention rates while both are measures under the

heading of retention. Using the example from above, the student who transferred to another institution would negatively affect the graduation rate at the initial institution.

Further adding to the complexity of the vocabulary is variation in time-spans used to measure graduation rates. Typically, colleges and universities report four-year rates, while ACT publishes five-year rates, and the National Collegiate Athletic Association reports six-year rates (U.S. Department of Education, 2003). There is less agreement concerning the length of time to measure the associate degree graduation rate at community colleges. The national norms reported by Beckner, Horn, and Clune (2000) indicate that the average time between first enrollment and graduation for community college Associate Degree earners was about 3 ½ years suggesting that the graduation rates should be measured over at least a five year time period.

Models of Retention

In a quest to understand retention and its supporting terminology, we turn to the literature and proposed models of retention. The most often cited model is that of Vincent Tinto (1975) who introduced the importance of student integration (both socially and academically) in the prediction of student retention (1975, 1993). This framework was based on the work of Emile Durkhiem's suicide theory (1951) that pointed to one's unsuccessful integration into society as a strong precursor of suicide. In a similar manner, Tinto's Integration Model suggested that retention is related to the student's ability and actions to become an involved actor in her/his institution (Tinto, 1987). The Integration Model suggests the need for a match between the institutional environment and student commitment. A good match leads to higher student integration into the academic and social domains of college life and thus greater probability of persistence. Conversely,

students are more likely to dropout or transfer to another institution when the match between the students and institution is poor.

John Bean (1990) is in full agreement of the necessity of integration as he stated, "Retention rates are related to the interaction between the students attending the college and the characteristics of the college." (P. 171). As the author of the Student Attrition Model, based on the Price/Mueller model of employee turnover behavior (Bean, 1980), Bean deviates from Tinto's model and stresses that students' beliefs which subsequently shape their attitudes is the predictor of their persistence. Moreover, students' beliefs are affected by the interaction between the students and different components of the institution similar to interaction between employees and corporations.

While Tinto and Bean remain the early pioneers in the retention research and model arena, the importance of the issues brought on a virtual explosion in the subsequent years. An ERIC search of the terms college or university retention returns in excess of 3,000 hits. A scholarly refereed quarterly journal dedicated solely to the subject, the *Journal of College Student Retention: Research, Theory & Ptactice*, is in operation, and new books and monographs are regularly being published. A contemporary retention researcher, John Braxton recently edited a book where several authors reworked and examined college student retention and recommended new views on the revered theories that may more appropriately address the needs of diverse college students (2000). While the purpose of this chapter is not to review the literature, it is important to establish the firm and substantial literature base that has evolved over the last quarter-century as a testament of the importance of this issue. Curious, however, is that despite the plethora

of articles and books on the topic, the concept of retention and its appropriate measurement tools remain cloaked in a significant level of ambiguity.

Measuring Retention

All colleges and universities are required to submit retention figures to federal and state governments. This task is disproportionately more difficult for community colleges due to their higher turnover rates and more diverse student enrollments including many who attend more than one institution at a time (Hagedorn & Castro, 1999). Despite the difficulty, maintaining an appropriate account of student attendance is of the utmost importance because an institution's reputation and sometimes its funding levels depends on its ability to retain a significant level of its students as proof of academic success (Tichenor & Cosgrove 1991).

In his review of retention studies in the 1960s, Summerskill (1962) showed that within each type of institution, institutional retention rates varied from 18 percent to 88 percent . He also alluded to the necessity of a standard formula for measuring retention so that the reported rates could be accurately compared. Four decades later, a standard formula has not yet been universally accepted. However, the United States Government has established a federal definition of graduation rate as part of the - Student Right-To-Know and Campus Security Act (Pub. L 101-542).

The Student Right-To-Know and Campus Security Act, signed Nov 8, 1990, requires colleges to reveal their graduation rates to enable prospective applicants to make a more informed decision regarding the suitability of the institution. The graduation rate was defined as the percentage of full-time, first-time, degree-seeking enrolled students who graduate after 150 percent of the normal time for completion; defined as six years

for four-year colleges (8 semesters or 12 quarters excluding summer terms) and three years for two-year colleges (4 semesters or 6 quarters excluding summer terms).

Although the law is an attempt to provide comparative information for prospective college students, this definition obviously excludes a large number of students enrolled in colleges and universities including:

a) Transfers from other colleges
b) Part-time students
c) Enrolled students not currently working towards a degree or certificate
d) Entering students at any other time except with the traditional Fall cohort
e) Students who are undeclared in majors

Furthermore the formula is even less appropriate for community colleges that frequently enroll very large proportions of part-time and returning students.

The Practices of Measurement: It must be noted that the federal definition is a graduation rate and not a retention rate. A search of the literature, the Internet, plus numerous telephone calls and emails revealed the dominant retention and other completion measurement practices currently used.

There are two federal retention formulas employed by the National Center for Education Statistics for use in the Integrated Postsecondary Education Data System (or IPEDS); one for colleges described as “less than four-year” and another for “four-year” institutions. The only difference between the two formulas is that students finishing a program such as a short-term certificate are included in the retained proportion for colleges described as “less than four-years.” The retention rate is based only on enrollment from the fall of the first year of enrollment to the fall of the next (students

enrolling for the first time during the preceding summer are also included in the fall counts). Included in the calculation are only first-time, degree/certificate-seeking students. It is important to note that the retention rate is a short term measure that covers only one year and thus is not adjusted for students who may leave the college after the first year but before a degree is earned. Colleges submit retention rates separately for full and part-time students. Specifically excluded from the calculation are students who are deceased, permanently disabled, have joined armed forces or foreign aid service of the federal government, and those students on official church missions (NCES, 2003). The currently posted formulas for retention rate (RR) are:

$$\text{IPEDS } RR_{\text{less than 4-year}} = \frac{\text{((Number of students re-enrolled in the following Fall + Number of students who have completed)}}{\text{(Number of students in the Fall cohort - Exclusions))*100}}$$

$$\text{IPEDS } RR_{\text{4-year}} = \frac{\text{Number of students re-enrolled in the following Fall}}{\text{(Number of students in the Fall cohort - Exclusions))*100}}$$

In essence, the formulas used for IPEDS leads the field as the dominant formula used in the calculation of retention rates as it is the formula generally used to report to the federal and state governments, but there remains differentiation on calculations and reported values among some institutions and policymaking bodies. For example, the National Information Center for Higher Education Policymaking and Analysis (NCHEMS), a body

that provides state policymakers and others with information used to make important decisions, calculates and provides multiple data on completion rates by state using measures such as three year associate degree (ADR_3) and six year bachelor degree (BDR_6) acquisition rates; the associate (ADR_{100}) and bachelor degrees (BDR_{100}) awarded per 100 undergraduates; and the number of degrees awarded per high school graduates 3 and 6 years earlier (AD_{HS3} and BD_{HS6}) (NCHEMS, no date).

The ADR_3 and BDR_6 include only first-time full-time degree-seeking students and thus exclude all part time and transfer students while the ADR_{100} and BDR_{100} includes all students (headcount). The AD_{HS3} and BD_{HS6} are also based on headcounts but at the high school level and therefore include only those students who go directly to college after high school graduation (NCHEMS, no date).

Common Data Set: The Common Data Set (CDS), a joint effort by the higher education community and publishers including the College Board, *Peterson's*, *U.S. News and World Report* and others to establish and develop clear standard definitions on the data items to be used in educational research (Petersons, 1998). CDS is an important initiative to improve the comparability of data reported by colleges and to assist colleges and universities to ask survey questions in a standard way. While the CDS is not a mechanism for forwarding specific measures, its popularity among institutions supports the calculations and dissemination of specific institutional measures. The Common Data Set consists of ten areas of data:

a) general information,

b) enrollment and persistence figures,

c) first-time, first-year (freshman) admission;

d) transfer admission;

e) academic offerings and policies;

f) student life;

g) annual expenses;

h) financial aid;

i) instructional faculty and class size;

j) degrees conferred.

The Common Data Set for 2003-2004 has approximately 120 definitions that cover terms from “tuition” to “Carnegie units”. As the initiative develops, new items are added and some items are edited. The CDS, measurement for persistence is the same as that reported for IPEDS for both four year and less than four-year institutions and thus further serves to nationalize the calculations, however other measures help define success in more diverse ways.

Community Colleges: There is more variation regarding the measure of retention among community colleges. The Research and Planning Group for California (RP Group, no date), and the Transfer and Retention of Urban Community College Students Project (TRUCCS) both support the use of the successful course completion ratio (SCCR) (Hagedorn, 2004). Simply stated, a course completion ratio is the proportion or percentage of courses that a student completes as compared to the number of courses in which the student enrolls. Mathematically, the calculation is:

$$\text{SCCR} = \frac{\text{Number of courses with the grade of A, B, C, D, CR, or P}}{\text{\# of courses of enrollment}}$$

Completion ratios can be computed for different periods of time (example, Semester, academic year, or over several years) and flex to accommodate the full or part-time student. The SCCR is a continuous measure (from 0 to 100%), and compares a student's progress to her/his goals. One of the major problems associated with measuring community college student retention is that many students enter the college without the goal of continuing enrollment or of ultimate graduation. Some students have achieved their postsecondary goals by taking a course, a few courses, or transferring to another institution prior to graduation. The typical measures of retention/persistence provide misleading evidence of success and non-success. The SCCR makes a basic assumption; a student enrolling in a course is declaring her/his goal of completing the course. Thus, a student who enrolls in four courses and successfully completes all of them has an SCCR of 100 percent. Likewise, if the student were to complete only 2 courses, he/she would earn a SCCR of 50 percent. The SCCR makes sense as a tool of measurement in institutions where students may frequently "stopout" and return, have diverse academic goals, are not all degree seeking, and may be enrolled in more than one institution.

Types of Retention

The formulas and discussion presuppose that retention exists in one variety – that is that students either remain at an institution or they do not. The truth is that retention comes in multiple varieties. There are at least four basic types of retention: institutional, system, in the major (discipline), and in a particular course.

Institutional Retention**:** Institutional retention is the most basic and easy to understand and is the type measured in the formulas discussed in this chapter. In essence,

institutional retention is the measure of the proportion of students who remain enrolled at the *same* institution from year to year.

System Retention**:** System retention focuses on the student and turns a blind eye on which institution a student is enrolled. Using system persistence as a measure, a student who leaves one institution to attend another is considered a persister. Therefore, system persistence accommodates the frequent occurrence of transfer or re-enrollment at another campus, in another state, or in another institutional type (for example in a for-profit). Some states, such as Texas and New York, have coordinating boards that track students who have transferred to other universities within the state thus keeping track of a limited type of system retention (i.e., system retention within the state university system). Nevertheless, those who transferred out of institutions governed by the coordinating board are generally not tracked. While the measure of system persistence is important to truly understand and measure student success, it requires tracking—a very expensive and difficult procedure. Currently, the only national tracking done is via the National Student Loan Clearinghouse.

The National Student Loan Clearinghouse is a non-profit organization designed to verify degrees and standardize student loan status. Participation in the Clearinghouse, at a small per student fee, requires that participating colleges submit a student enrollment status report. While the National Loan Clearinghouse data is frequently used for system persistence measures, it must be stated that the data was not originally designed to be used in that manner and all institutions do not participate.

Retention within a Major or Discipline: Another type of retention takes a more limited view of the topic by viewing retention within a major area of study, discipline, or

a specific department. For example, a student who declares engineering as a major but then switches to biology may be retained in an institutional sense but is lost to the College of Engineering. Non-persisters in one discipline may earn a degree in another major within the institution of original entry and thus be institutionally retained but departmentally non-retained. Retention within certain majors, such as engineering, may be of special interest due to the difficulty of recruitment and the predicted shortages in the fields. Engineering has a high rate of non-retention in the major, especially among women and people of color (Daempfle, 2003). Retention within the major may be tracked by specific colleges or universities but is not nationally tracked and remains difficult to measure.

Retention within the Course: The smallest unit of analysis with respect to retention is that measured by course completion. Studying at the course level allows the specific determination of which courses are not being completed even though a student may be retained within the institution. As specific as course retention appears to be, it is still fraught with questions of measurement. The TRUCCS Project documented large variation in course completion depending on the time of measurement (Hagedorn, 2003). Course completion is much higher when using the first day of class as the marker to determine if a student attempted a course versus waiting until after the add/drop time. The add/drop period is provided to allow institutions the flexibility to close course that have inadequate enrollments and to allow students to drop courses that may be inappropriate (too easy or too hard) and to add others that may be more suitable. Using the cessation of the add/drop period as the timing for the calculation means that an attempt is defined as a course in which a student obtained a letter grade (A, B, C, D, F, W,

P or I). While the add/drop process most certainly has a positive function from both the student and the institutional viewpoint, it must be stated that during the registration process, courses frequently close when the maximum enrollment is reached thus barring other students who may desire to enroll in the course. When enrolled students drop the course they leave open seats that may have been better utilized by another student who was denied enrollment. Course completion is not nationally posted or compared. Community colleges more typically measure course completion as they generally have more variation in the measure.

Problems with the Current Measures

The current definitions and formulas do not include all students and as such may provide inaccurate measures of retention. Again, as an example of exclusions and confusions, the reader is directed to the initial vignettes of students provided at the beginning of the chapter -- those student activities that defy the current definitions. Furthermore there may be a bit of university "slight of hand" associated with practices that reflect on reported figures. For some time now the *U.S. News and World Report* has published its annual rankings of colleges and universities. The rankings serve as a prestige barometer and create an intense competition especially among top research universities. To establish the highest rankings universities can be somewhat creative in who is counted and who is not. For example, some universities will admit only those students with the very highest admission scores (SAT or ACT) in the Fall cohort while extending admission to a second group of students with slightly lower scores for the Spring semester or quarter. This procedure allows the universities to post their incoming freshman average SAT scores as being higher than it would be if all admits (Fall and

Spring) were included. While the reports of Fall to Fall retention are surely accurate, they include only those students who were admitted in the Fall and are those students with the highest admissions criteria and thus are more likely to be retained.

The current formulas for retention include those students who are more likely to persist and thus may provide an inflated figure less representative of the variation of student persistence. In short, the formulas generally exclude:

- Part time students
- Returning students
- Transfers
- Students who prematurely leave after the second year of enrollment

On the other hand, the formulas for retention allow the inclusion of some students as retained who probably should not be. For example, the student who enrolls in Fall, drops all courses, but re-enrolls the next fall (and maybe to drop again). The point being made is that the retained formula does not contain all those retained and the dropout figures do not include all those who prematurely leave or are ambiguously enrolled. We have no descriptor or measurement for the student who takes courses in a haphazard manner such that while credits are accrued (retained), no degree progress is made. No descriptor or formula includes those who appear trapped in remedial courses and although enrolled and earning credits are not earning credits that can be counted for a college degree.

Retention from Multiple Angles: The New Proposed Formulas

Single measures of retention do not tell the whole story of student persistence. To fully understand an institution's rate of student success, multiple indicators should be calculated and reported. At a minimum, institutions should regularly report institutional

persistence, transfer rates (both of the proportion of students who transfer to other institutions as well as the proportion that transfer in from other institutions) and course completion ratios.

It is recommended that a new measure of pure institutional retention that includes part-time students, continuing students, transfer students, advanced students, and those that begin enrollment at times other than with the fall cohort be reported; perhaps juxtaposed with the fall cohort variety that is frequently but solely used. The new proposed formula for degree seeking students that could be calculated each year:

Pure Institutional Persistence: Performed Annually=

$$\frac{\text{Current total FTE degree seeking enrollment} - (\text{current year newly enrolled students})}{\text{Past year's fall FTE degree seeking enrollment} + (\text{FTE enrollment of degree seeking spring and summer}) - \text{FTE graduates}}$$

Similarly, a system persistence formula could be similarly calculated. Of course, while a formula can be proposed, actual tracking of all college students on a national level is currently not available:

Pure System Persistence: Performed annually

$$\frac{\text{Current total national FTE degree seeking enrollment} - (\text{current year newly enrolled students})}{\text{Past year's total national fall FTE degree seeking enrollment} + (\text{FTE enrollment of degree seeking spring and summer}) - \text{FTE graduates}}$$

Persistence by major may also be performed for most disciplines thus providing a retention measure of the students declaring their initial interest areas. The calculation should be similarly cast as above but substituting the FTE students graduating within a major of those FTEs originally declaring the major.

Two final equations are suggested to complete the picture of student retention; successful course completion ratios and graduation rates. Successful course completion ratios can be calculated globally (all courses in the college/university) and within departments to provide a final and fine-tuned measure of retention. The formula for SCCR was provided earlier in the chapter. Graduation rates provide a measure of retention along with a measure of progress. The proposed equation is similar to that currently used, except employs FTEs and includes transfers in.

$$\textbf{Graduation rate}_{\text{4 year institution}} = \frac{\text{FTE Graduates throughout the academic year}}{\text{FTE Students entering academic year 6 years ago (including Fall, Spring, Summer entrants)}}$$

Conclusion

Why is college retention and its appropriate measurement so important? According to the U.S. Census Bureau, the average household income raises $14,354 and $37,874 when the householder educational attainment increases from high school graduate to associate degree holder or bachelor degree holder respectively (Postsecondary Education Opportunity, 2002). Lower incomes generally correlate with many social problems and lower living standards (McMahon, 2000). Retention not only has an impact on the individual and her/his family but also produces a ripple effect on the postsecondary institutions, the work force and the economy.

College effect: Retention is one of the most common ways students, parents, and stakeholders evaluate the effectiveness of colleges. A positive reputation increases a college's ability to attract the best students and faculty. Furthermore, when a student withdraws from college the invested institutional resources were not spent wisely forcing

the college to invest additional resources to recruit new students. Noel-Levitz (2004), acknowledging the significant institutional costs, posted their *Retention Savings Worksheet* providing a formula to calculate the amount of institutional savings when first-to-second year dropout rate is reduced. While the formula is rather complex the two provided examples, one for a public and one for a private, show that significant savings can be accrued when the dropout rate is reduced by even a small percentage.

Workforce effect: . Non persisting students lack the college training and credentials to enter the professional workforce. Industries not finding sufficiently trained workers either must invest in their own training programs or relocate to areas where sufficiently trained workers are more available, sometimes even going overseas. There is evidence, for example, of a decline in retention to science and engineering graduate programs having a significant workforce effect (Andrade, et al, 2002).

Economic effect: From the economic point of view, higher education attainment leads to decreases in long-term poverty, higher personal per capita income, a higher state tax base, and a stronger economy (McMahon, 2000). In short, a more educated citizenry leads to advantages on many levels.

The importance of the topic is obvious. The current measures are insufficient to understand the topic and thus hinder researchers from validly identifying the predictors. The inaccurate research prevents policymakers from constructing the best policy to increase student success. This chapter encourages colleges and universities to calculate and disseminate multiple measures of retention. Moreover, it is hoped that a national tracking system that includes all colleges and universities including accredited for-profits will be constructed to track student progress. Although such a system will be very

expensive, the importance of this project speaks loudly for its necessity. The old adage attributed to Derek Bok “if you think education is expensive, try ignorance” may be apt.

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