

GRADUATION RATES AND THE HIGHER EDUCATION DEMOGRAPHIC EVOLUTION

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ABSTRACT

*In his 1918 orienting work, *The Higher Learning in America*, Veblen highlights two primary aims of the higher education institution: (a) scientific and scholarly inquiry, and (b) the instruction of students (Veblen, 1918). As of 2006, this overarching mission remained intact. In contemporary literature, a common measure of the efficacy of the latter of these two goals is an institution's graduation rates. Previous research asserts admissions criteria to be the dominant predictor of graduation rates. However, the nature of the higher education student is changing. Underrepresented populations, specifically non-traditional students, comprise a greater portion of an institution's student body than at any point in history. The impact of this evolution has yet to be adequately assessed in the graduation rate literature. Using OLS regression with data from the National Center for Education Statistics (IES) for thirty randomly selected land-grant universities, we investigate the extent to which admissions criteria remains the leading predictor of graduation rates when accounting for variables indicative of non-traditional and underrepresented students – such as the percentage of the student body above the age of twenty-five, the percentage of the student body receiving financial aid, part-time enrollment, and student to faculty ratio. Results indicate, while selection criteria play a role in graduation rates, the influence of non-traditional students on graduation rates is also notable.*

Higher education in the U.S. historically was focused on educating the elite class in society (Hallinan, 2006). Since World War II, universities have focused increasingly on research and teaching a broader swath of society (Daniels, 1997). Since that period, higher education has increasingly become important to upward mobility in the U.S. (Ibarra, 2001). First-generation students from underrepresented populations began to gain access to higher education (Schofer & Myer, 2005). Higher education became a necessary but not sufficient condition for upward mobility (Collins, 1971). By the end of the 20th century, non-traditional students became increasingly important to higher education institutions (Allen & Seaman, 2008).

This background on the evolution of higher education is essential to understanding the development of theory on graduation rates. The tracking of graduation rates as an indicator of the higher education experience is a relatively new enterprise. Historically, higher education was reserved for the privileged few. Graduation rates were predictably high in this environment. In this environment there were few reasons for a student to not proceed

through graduation (Bastedo & Gumport, 2003). Graduation rates became increasingly variable as a higher percentage of the population gained access to higher education (Schofer & Myer, 2005).

By the mid 1970s, graduation rates were an important topic of study within the sociology of education. Researchers hypothesized that the more integrated into the fabric of the institution students feel, the more likely they are to continue their studies and graduate.

(Tinto, 1975). By the 1990s, researchers began to focus on internal support factors such as the student to faculty ratio and access to financial aid. This work help to reorient the graduation rate debate toward admission criteria and the reputation of the admitting institution. Objective factors such as SAT scores and overall acceptance rate were directly linked to an institution's graduation rates (Ozga & Sukhnandan, 1998). Astin's (1997) study continued in this vein, applying qualitative measures to better understand the concept of "integration." While more grounded than Tinto's (1975) original work, pinning down the essence of integration proved elusive and the study's most

meaningful contribution was in reifying the power of faculty to student ratios and admissions criteria as vital to understanding graduation rates.

Braxton et al (2000) studied students at a private institution and found that organizational attributes play an important role in determining retention and graduation rates.

Murtaugh, Burns, and Schuster (1999) analyzed retention at a large land grant institution and identified several steps that the university could take to improve retention, including finding that out-of state students were at greater risk than are in-state students. Their work also reinforced the relevance of admissions criteria as a leading indicator of graduation rates. Specifically, the better prepared a student is to enter the university environment (as evidenced by admissions test scores and high school course load, among other factors) the more she is to eventually complete her degree program.

By the mid 2000s, quantitative methods were being applied to specific components within the graduation rate puzzle. Singell and Stater (2006) looked at the relationship between students receiving financial aid and graduation rates at three large public institutions. Their results indicate that access to financial aid increases graduation rates. They also warn that policies aimed at curbing financial aid packages is likely to reduce graduation rates accordingly and decrease the rate of enrollments of underrepresented student populations (Singell & Stater, 2006).

Of note, the framework of the reports identified above leaned heavily on micro level analysis and single institution or small sample sizes were primarily deployed. Systemic conditions at single institutions were studied and recommendations were made to improve that institution's retention rates. Cross-institutional and larger sample studies are less common in the literature. The single case study approach can be particularly useful to the institutions studied, and may have applicability at other institutions. This study is aimed at helping to fill this comparative void; more specifically, it was undertaken to determine how a set of variables influence graduation rates hold across a sample of land grant institutions.

This study seeks to confirm whether factors previously tested as predictors of graduation rates hold in an analysis of a larger sample of institutions. In addition, it includes control variables reflecting changes in the student population over recent decades (e.g., increasing numbers of part time and non traditional students). Our first hypothesis has its roots in Tinto's (1975) early work on graduation rates. Since then research on smaller samples has found that admissions rigor is related to graduation rates. We

seek to confirm this in a larger sample of land grant institutions and offer the following hypothesis.

Hypothesis 1: There is a positive relationship between admissions rigor and graduation rates. As admissions rigor increases, graduation rates also increase.

A primary component of the integration theory related to graduation rates is the ability for students to enjoy quality, regular interaction with faculty members. While variables such as "quality" are difficult to measure, the 'opportunity' for one-on-one interactions has become the standard measure. Theoretically, the higher the faculty to student ratio the more likely interaction between students and faculty is to occur. A natural extension of this reasoning is that less contact equates to less integration, and less integration can lead to less likelihood of retention through graduation. This would support Tinto's original assertion that integration influences graduation rates in higher education and that student to faculty ratios is appropriate measure of the same (Tinto, 1987). Therefore, we offer the following hypothesis.

Hypothesis 2: There is a negative relationship between faculty to student ratio and graduation rates. As faculty to student ratios increase, graduation rates increase.

Data and Method

In order to test these two hypotheses, data from the Center for Educational Statistics (IES) is considered for thirty land grant institutions. The institutions in the sample were selected at random from the original population in of one hundred and three institutions appearing in the 2006 IES data set. Of these one hundred and three institutions, twenty three were excluded as two year institutions. The remaining eighty included twenty institutions which had incomplete data for the class of 2006, so they were also excluded. The year 2006 is the most recent year for which sufficient data were available in order to construct a comprehensive, random sample and comparison group. In addition, it is the most recent year for which exit data on a graduating cohort included information for all of the independent variables included in the study. Because institutions of higher education experience change at a relatively slow pace, these data provide a robust source to test the hypotheses. The remaining sixty institutions were selected every other order to provide a random sample of the land grant institutions in the set. The unit of measurement is held strictly to the institutional level in this research.

Land grant institutions are interesting to this work for at least two reasons. Their mission originated in the ideal that

higher education should be more accessible in underdeveloped parts of the country and, perhaps by extension, to underrepresented populations – though it must be noted that these populations tended to be homogeneous along racial and gender lines (Johnson, 1981). This understanding is germane to this study in that land grant institutions enjoy a long history of seeking to be inclusive, rather than exclusive like their private institution contemporaries. Given that multiple scholars have noted the relationship between integration, rigor and graduation rates, we are interested to find if rigor retains its significance in an exclusively land grant institution sample (Gumport, 2007).

Secondly, previous research efforts in the field have focused primarily on single or small sample case studies. Some scholars have tended towards private institutions for myriad reasons (examples may include institutional exclusivity, association capital gains, and funding parameters). Others have mixed institution types in their selected sample. This work is interested in better understanding the theoretical integrity of previous graduation rate research when applied to an exclusively land grant institutional sample. In this manner, new insights are gained while dealing with a sample that tests comparable institutions – helping to minimize the exogenous influences in the study.

Both hypotheses are adequately tested for the purposes of this work through OLS regression analysis of the data collected from IES. Of primary interest is to understand the statistical significance of each of the independent variables relative to the graduation rates of the institutional sample, controlling for other factors.

A series of models were developed to isolate the impact of individual variables, while controlling for other factors. In total, four models were run and analyzed. Testing for collinearity through VIF analysis revealed the independent variables selected to be comfortably below the higher education research standard threshold of 4, with no reading exceeding VIF 1.5.

The final OLS regression model included the following independent variables 75th SAT critical reasoning scores (admissions rigor) and faculty to student ratio. In addition, we controlled for percentage of students applying that are admitted, part-time retention rates, percent of study body receiving financial aid, and percent of students who are over the age 25 (non-traditional students). The dependent variable is the graduation rate of undergraduate students.

Analysis of Results

Table 1 provides an overview of the regression results.

Table 1 (Y) Dependent Variable: Graduation rates and Model Progression	
Independent Variables	
Admissions Rigor	0.7894 <i>b</i> = -0.00020 <i>se</i> = 0.00074
Faculty/Student Ratio	0.0631 * <i>b</i> = 0.02686 <i>se</i> = 0.14257
Financial Aid	0.1947 <i>b</i> = -0.30439 <i>se</i> = 0.22911
Percent Admitted	0.8519 <i>b</i> = -0.00205 <i>se</i> = 0.000709
Part-time Retention Rates	0.0472 ** <i>b</i> = 0.22991 <i>se</i> = 0.11073
Non-traditional students	0.0056 ** <i>b</i> = -43.18523 <i>se</i> = 14.40331
	R² = 0.5181
*Statistically Significant at $p \leq .10$ **Statistically Significant at $p \leq .05$	

There are several notable insights when analyzing the outputs from these models. The primary goal of this study was to test whether admissions rigor, is a statistically significant predictor of graduation rates. The current study does not support this traditional finding. Admissions rigor was not a statistically significant predictor of graduation rates; support was not found for Hypothesis 1. However, we did find modest support for Hypothesis 2 (at the $p \leq .10$ level). Faculty to student ratio is a positive, statistically significant predictor of graduation rates.

The data also indicate that non-traditional students may have much to contribute to our understanding of graduation rates. Specifically, the parameter estimate (*b*) for non-traditional students is negative and statistically significant (at the $p \leq .05$ level). This highlights that non-traditional students, negatively influence graduation rates in a notable manner (Daniels, 1997). As Tinto (1975) argues, these

students likely are not fully integrated into the higher education experience and, therefore, are less likely to graduate.

It is not obvious admissions rigor is not statistically significant in our model. One reason may be that the nature of rigor, in general, is not fully captured in the SAT reading deployed in this analysis.

DISCUSSION AND CONCLUSION

This study was designed to contribute to the discussion of graduation rates in two ways. First, to understand the relevance of the variables utilized in popular theoretical models when applied exclusively to a sample of land grant institutions. Second, this study sought to analyze the extent to which graduation rates are influenced by the increases of non-traditional students that has occurred since the early 1990s (Stamps, 1998).

The results of our regression analysis provide some support that the variables consistently cited in the higher education literature appropriately capture the influences on graduation rates. However, admissions rigor appears to be decreasing in importance. Thus, though great care was given to tightly align our variables with previous theory while controlling for other factors, it is important to concede this study is limited to the extent it may omit variables that are germane to graduation rates. One example may be additional measures of rigor, such as preparatory school course load.

The negative influence of non-traditional students on graduation rates in this sample is logical. Non-traditional students tend to have more life events to contend with than non-traditional students. Related, their status as a minority may contribute to a desire to remove themselves from a less comfortable situation. Both scenarios beg further understanding as to how traditional universities can better integrate this growing segment of the student population. Likewise, this trend may provide clues into the rapid acceleration of non-traditional higher education institutional models.

Regarding testing as a criterion for admission, its unclear significance to graduation rates begs an important question regarding how the higher education system is to deal with those who come from backgrounds that do not lend themselves to preparatory work for such admissions tests, but who exhibit alternative forms of intelligence and ambition. Tracking graduation rate outcomes for students who exhibit lower test scores but embody some combination of elements that would point to capability of successfully completing a college degree (such as emotional intelligence quotient, clarity of career direction, and creative thinking) are important measures to understand.

There are some noteworthy limitations to this study. It represents a snapshot of a single graduating class of students, as opposed to a longitudinal comparative view of multiple classes over a series of years. This prohibits it from accounting for changes over time. A longitudinal approach is likely to yield a trend view that makes understanding questions of omitted variables, endogenous selection and exogenous selection constraints more available. Further, researchers are encouraged to build on the multi-institution approach of this study by increasing the sample sizes and comparative lenses through which graduation rates have historically been studied.

Sharpening our view of the outliers in this sample may also yield important benefits. For example, is the non-traditional drag on graduation rates revealed in this study occurring along gendered lines? Are non-traditional students leaving higher education altogether or are they moving to alternatives that better fit their lifestyle constraints?

The constraints in one study can point to opportunities in subsequent work. This study is no different. We have highlighted just a few areas in which derivative work to this study can be developed. If the efficacy of higher education is to ultimately be measured by graduation rates, then few topics within higher education are more vital to fully understand.

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