# EXPLORING CORRELATES OF POSTSECONDARY GRADUATION RATES: AN UPDATED CASE FOR CONSUMER EDUCATION

**by**

**STEVEN R. HOAGLAND, PH.D**
**dr_hoagland@yahoo.com**

## ABSTRACT

Institutional accountability for performance and quality is an evolving topic with immeasurable appeal. Data and sources are abundant, but validated measures and meaningful information are scarce. While pursuing an approach centered on construct validity, this study transforms complex data into useful information. Correlation analysis reveals variables of primary interest to consumers, college seekers, and their sponsors while choosing a college. In addition, the research employs a theoretical framework and factor analysis to delineate image and reputation as two dimensions likely to inspire decision makers, university administrators, and regulatory officials in their efforts to demonstrate accountability for performance and quality. Regression analysis illuminates the nature of relationships between those factors and graduation rates. In essence, the study clarifies some characteristics that purport to measure institutional performance and quality. A key finding is the inconsistency in variances between the upper and lower segments of the graduation rate spectrum, which limits the scope of this work. Furthermore, the study points to the need to address model specification and construct measurement limitations and it highlights some areas for future research. More importantly, it directs the attention of researchers, evaluators, and methodologists toward some characteristics of graduation rate estimates and troublesome inconsistencies in variance patterns. A study by-product is the strong correspondence between a well-known, yet controversial, reputation score and an overarching reputation construct.

———

Paper completed, presented at 46th Annual Forum of the Association for Institutional Research (Chicago, Illinois) "Effectiveness Through Diversity" on May 16, 2006. The author acknowledges, appreciates the insights and the feedback received from session participants at the 2005 Spring meeting of the Ohio Association of Institutional Research and Planning (Miami, Ohio) and that from participants at the 46th Annual Forum of the Association for Institutional Research.

## PROBLEM STATEMENT

Information about postsecondary education performance and quality remains in high demand. However, evidence of it is elusive and sketchy in the absence of valid and reliable measures. Nonetheless, calls for accountability continue and they could persist well into the next decade. A commission examining the future of higher education contends the closest and current proxies with which to demonstrate accountability are by virtue of institutional accreditation status and by default through annual publications of institutional rankings.

Reputation scores, performance gaps, and persistence rates are receiving a lot of attention as demands unfold for evidence on accountability. Though an abundance of data are available to college seekers, a need exists to transform it into information revealing which variables matter the most to their decisions. This shortage of information is far reaching, constraining stakeholder decisions. Furthermore, consumers and policy makers alike need valid and reliable metrics of performance and quality in order to form sound fact-based decisions. Moreover, researchers have an opportunity to provide information about the characteristics of graduation rate estimates and the constructions of institutional image and reputation.

Brooks (2005) questions whether the education community understands the quality concept any better following a decade of assessment research. She asserts that the reputation score should be an acceptable measure of institutional quality by now, with its prominence in US News & World Report's annual guide. Its first appearance was published in the inaugural edition over two decades ago along with the initial ranking of approximately 80 institutions.

Dill & Soo (2005) analyze the extent of congruence among publications that rank institutions of higher education in various locations around the world. In a recent examination of institutional attractiveness to prospective students, Volkwein & Sweitzer (2005) found high

school rank, acceptance rate, ACT and SAT scores, and other variables related to the widely published reputation score. As an effort to measure reputation, consistencies between that work and this study are noteworthy as movement towards convergence and validation among relevant measures.

Definitions of quality vary to a wide degree between industrial and educational sectors. For example, the Council for Higher Education Accreditation (CHEA, 2006) casts quality in terms of assessing an institution's fitness for purpose whereas General Electric's "Six Sigma" casts quality in terms of assessing an organization's capacity to serve customers. Some combination of the two approaches would seem appropriate. As an assembly of representatives from several sectors, the Commission on the Future of Higher Education (COFHE) points to the need for parsimonious compilations on performance and quality and refers to institutional ranking guides as an accountability system by default (Selingo, 2006)

Hersh (2005) and others point out that higher education is unique because the quality of an institution is both a reflection and a determinant of the quality of its student body. Furthermore, student attraction is largely a function both of the artifacts from those who went before them (Dill & Soo, 2005) and of institutional prestige factors (Volkwein & Sweitzer, 2005). More important, an institution is dependent on students, as critical sources of revenue, and on its own capacity to retain those resources (Berger, 2001-2002). In addition, a student is dependent on institutional capacities to engage them and to serve their varied needs.

## SIGNIFICANCE OF STUDY

A need exists to transform complex data into meaningful information and portable knowledge. In order to address those needs, this paper seeks to contribute to the development of

valid measures of performance and quality  The results reported herewith are intended to help scholars, regulators, and consumers become more knowledgeable about institutional performance and quality.

Reputation scores and performance gaps, as reported in US News & World Report's America's Best Colleges, are objects under investigation here and elsewhere in terms of their capacities to portray performance and quality (Brooks, 2005; Newman, 2004; Volkwein & Sweitzer, 2005).  This study condenses an existing supply of data in order to inform those with vested interests in institutional effectiveness and/or accountability for performance and quality.

Increases in graduation rates appear to be a desirable performance outcome.  Placement of information related to performance and quality into the hands of consumers seems to be a viable path toward realizing that outcome.  Apparently, consumer choice exerts significant influence on persistence rates though some misalignment exists.

Alexander Astin reports that almost all entering students intend to remain at the same institution until their graduation (Swail, 2004).  However, national statistics reflect the reality that more than one quarter of such students transfer to another institution before they receive their college degrees.  These statistics imply an abundance of opportunities exist closing the gap between their intents and realities.  Dill & Soo (2005) assert that consumer actions alone hold the potential to increase average rates of retention and graduation within the United States.  By extension, it appears likely that college seekers would be open to receiving guidance toward the correlates of graduation rates, the probabilities of a timely graduation, and the likelihood of a favorable return on investments in postsecondary education.  In essence, consumers and others could benefit from a user-friendly compilation of measures known to be valid and reliable.

If higher rates are desirable, then how do we get there from here? In order to answer this question, one needs to consider the likelihood that consumers are investing in postsecondary education in the absence of concise descriptors of performance and/or in their errant omission of relevant and significant variables. In recent years, a variety of proposals on Capitol Hill were focused on boosting graduation rates (Glenn, 2004; Hebel, 2005; Krawzak, 2004; Newman, Couturier, and Scurry, 2004; Swail, 2004). However, these efforts seemed to ignore or underestimate the abilities of consumers to apply their academic qualifications while comparing a set of institutions on various factors before casting votes with their application fees and tuition dollars. While investigating graduation rate correspondence with standardized admissions test scores, this study aims to clarify those relationships by developing some valid measures and by illuminating some unique variance patterns. The significance of this study resides its focus on reducing arrays of complex data into meaningful tidbits of information.

## STUDY APPROACH

This researcher advances the notion that college-seekers, with some guidance toward key variables, would be more inclined to select institutions from a set under consideration that exhibit the highest persistence rates and correspond with their own admissions' test score or other measures of academic preparation. This approach may be most saleable by downplaying college seeker orientations toward specific academic program offerings at a particular institution. It seems safe enough to assume, in the absence of visible data, that students change their majors almost as frequently as they transfer between institutions.

This paper extends the author's work on the correlates of graduation rates with its current focus on graduation and retention rates as measures of performance. It moves methodically

through a number of stages following the construct validation process outlined by Carmines & Zeller (1979). An earlier version of this research project was presented at session of the Spring 2005 Meeting of the Ohio Association for Institutional Research and Planning (OAIRP). Participants at that meeting provided valuable feedback contributing to the foundation for this study.

This study draws first from the prior set of correlates employing them as a frame of reference for the current investigation. Second, it adopts a conceptual framework and a model of performance linkages with which to guide the data reduction effort and to develop a bi-dimensional factor structure. Third, it extracts factor scores for use as variables in the regression analytic portion and it makes other variables available as measures of image and reputation. Fourth, it investigates the residuals from regression analysis while testing for violations of underlying assumptions. Lastly, it draws some attention to unique variance patterns and it casts new light on some characteristics of graduation rate estimates.

## CONCEPTUAL FRAMEWORK

The resource dependence perspective, in part, acknowledges institutions are dependent on tuition, exist to educate students, attempt to meet competing and conflicting societal demands, and seek to diversify funding sources and resource acquisitions. Prospective students along with their sponsors are among a group of stakeholders who exert external control over the institution via their ability to choose from any number of institutions within a set that corresponds with their academic merits and financial abilities. With its inquiry into the nature of relationships among key variables of interest to external stakeholders, this paper applies resource dependence theory (Pfeffer and Salancik, 1978).

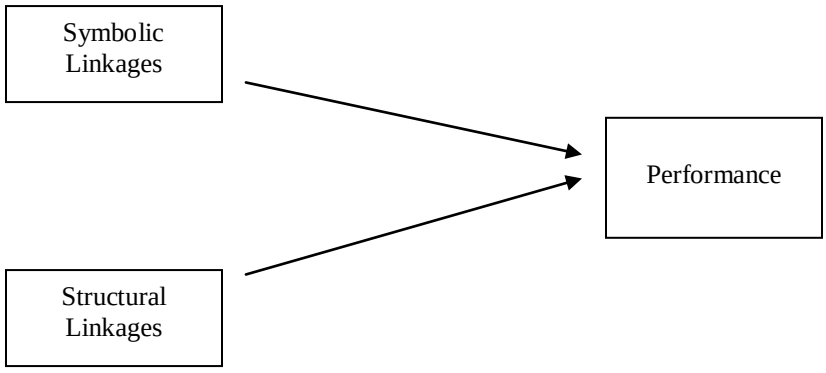
Resource dependence theorists view organizations as being resource interdependent. For example, the number of college students available to any institution at any one point in time is fixed. Institutions are also dependent on tuition revenues from those students though to varying degrees. Furthermore, these theorists assert that organizations form, implement, and evaluate resource diversification strategies. For example, many institutions view their students as prospective alumni and donors whose future contributions will diminish the institution's dependence on tuition revenues while diversifying capital accumulations and cash flows. Moreover, resource dependence theorists contend that diversification strategies in a recursive manner can moderate resource environments creating favorable outcomes that become inputs or resources in a latter phase. For example, increases in average ACT scores, persistence rates, and placement rates altogether contribute to an institution's reputation with which it builds its capacity to attract and retain new students who in turn will persist and so on the cycle goes.

This study develops, in part, a model of institutional performance that Berger (2001-02) adapts from the resource dependence perspective. The model asserts an interdependent relationship between student success and institutional linkages to performance and quality. Those linkages are both symbolic and structural in nature. Structural linkages reflect relationships to the external environment especially in terms of employers and graduate schools. They represent dimensions of the outcomes or impact of student placement or their activities after they graduate or leave the institution. An investigation of the structural linkages component will occur in a subsequent study.

Symbolic linkages, as the focal point for this study, encompass reputation and image factors. Berger submits that image, as one of the symbolic linkages to performance, varies directly with retention and graduation rates. Reputation and image are two forms of a symbolic

linkage to performance (Berger, 2001-2002). Reputation reflects the general judgment within a relatively narrow community of peers on a set of constructs. Those judgments arise out of past performance and carry forward as expectations for future behavior on a specific institutional characteristic; for instance, average ACT scores over time generate a specific reputation for an institution. Frequently, reputation factors are reported by third-party information providers (Rindova, *et al*, 2005) such as US News & World Report, the College Board, and the Princeton Review. Image, on the other hand, embodies the general perception across a relatively wider point of reference to a general institutional characteristic; for instance, classification as a state-supported research-intensive university generates a certain mental image.

**Figure 1: Model of Linkages to Performance**




At one point in time, the consequences are consistent with the directional arrows in Figure 1. At a later point in time, however institutional performance determines reputation and image. For example, an institution's six-year graduation rate represents an outcome at one point in history, but its subsequent publication may attract students who bring attributes that can alter

future rates. Due to various limitations and constraints, this research focuses first on those symbolic linkages that influence institutional performance.

The conceptual framework and linkages model guides this research in a number of ways. First, it establishes the bi-dimension nature of symbolic linkages defining them as Reputation and Image. This facilitates the factor analytic portion of the study methods, which also serves to operationalize the variables. Second, the framework provides a basis with which to formulate and to test the following hypotheses.

### Specification of Alternative Hypotheses

H1: A positive relationship exists between symbolic linkages and graduation rates.

H2: A positive relationship exists between the reputation factor and graduation rates.

H3: A positive relationship exists between the image factor and graduation rates.

H4: The variances in residuals from testing Hypothesis 1 (H1) are equal.

H5: The variances in residuals from testing Hypothesis 2 (H2) are equal.

H6: The variances in residuals from testing Hypothesis 3 (H3) are equal.

## METHODS, DATA & VARIABLES

The primary focal point of this study is measurement validation. Regression analysis procedures highlight the relevance of measurement and specification errors. It is important to detect and to avoid these errors. Concerned with a possible violation of the assumptions underlying regression analysis while estimating graduation rates, this study includes an analysis of the residuals generated by testing hypotheses H4, H5, and H6. The assumption of greatest concern is that the residuals will have equal variances. The Goldfield-Quandt method will assist with that determination. Another assumption is that little or no correlation exists among the

independent variables. Factor analysis with varimax rotation helps to avoid multicollinearity and it delineates which variables can be used in other studies as proxies for the constructs of interest.

Institutions listed in the rankings guide portion of the 2004 edition of America's Best Colleges comprise the sample under study here. That guide contains nearly 1,400 four-year public and private institutions, which is more than half of the 2,500 four-year institutions the United States. The guide provides the following variables: the freshman-to-sophomore retention rate; the six year graduation rate; the comprehensive ACT score; the alumni giving rate; the percent of classes with 50 students or more; the percentage of faculty who are full-time; the percentage of students who finished in the top quartile of their high school class; and, the acceptance rate (defined as the number of admitted students divided by the number of applicants).

The Carnegie Foundation for the Advancement of Teaching's classification guide contains information from which this researcher constructs a dichotomous, or dummy, variable. For institutions that are classified as both a state-supported and a doctorate-granting institution, the dummy variable takes a value of "1" and a "0" for those classified otherwise.

## Methods & Procedures

In order to facilitate statistical analysis, test score conversions require two steps. First, midpoint of a range for a test score becomes its numeric value. Second, conversions from a SAT score to an ACT score occur with the aid of a concordance table. These two steps are consistent with the methodology employed by Volkwein & Sweitzer (2005) in their work on institutional attraction and reputation factors.

The study began by examining correlates of graduation rates in an effort to identify a smaller set of significant variables and then it proceeds to refine and establish that initial set of variables. Correlation analysis provides the foundation for a prior presentation and this subsequent work. It helped the researcher to identify a set of variables that correlate with retention and graduation rates. In an effort to develop construct validity, a conceptual model provides an overarching framework for reducing those correlates into factors that purport to reflect performance.

Principal components transform those correlates into two factors that present image and reputation as valid measures of the symbolic linkages to performance. The factor analysis procedure takes the form of principal component analysis using the varimax option within the orthogonal rotation method. Two criteria govern the procedure: first, the absolute minimum for a variable to load on the factor is .40; second, each factor contains at least three loadings.

A supplemental procedure included US News & World Report's reputation score as a parsimonious method for judging which of the two factors reflect the image dimension and which reflects the reputation dimension. Variables that correlate with other variables purport to be measures of the same construct. More importantly, its brief inclusion in this study serves to confirm its validity as a measure of the reputation construct. Consequently, the reputation and image factor scores are taken as variables for use in regression analysis procedures. However, this study uses factor scores any variable from those factors can be employed as proxy for the applicable construct.

Regression analysis incorporates reputation and image in the performance linkages model. The next step involves testing for violations of the underlying assumptions using the Goldfield-Quandt method (Pindyck & Rubinfeld, 1981). This method determines whether there

is a violation of the assumption that variances of residuals are equal. A violation of that assumption suggests the presence of measurement and/or specification error in regression analysis. Its detection involves running a regression analysis and then saving the residuals from that procedure. The dataset is then sorted by the value of the independent variable and is divided into equal segments; five segments in this study. The middle one-fifth of the data points is filtered out and omitted from the analysis. Two regression analysis procedures are then performed on the data: one against the lower two-fifths and another against the upper two fifths.

The resultant Regression Sum of Squares (RSS) and the degrees of freedom from those procedures are used to calculate a ratio referred to as a G-value. This is done by dividing one RSS by the other so that the value is one or larger. If the residual variances are unequal, the G-value will be greater than one and its statistical significance can be interpreted through use of the tables that contain F-values.

## RESULTS

Correlation analysis reveals that the strongest relationships exist among ACT scores, retention rates, and graduation rates. According to these results, ACT scores explain 58 percent of the variation in retention rates and 53 percent of the variation in graduation rates. The latter is slightly lower than the results from a comparable regression model. Aside from these, the percentages of freshman in the top quarter of their high school class and the alumni giving rates bear the next two highest correlations with graduation rates. All correlation coefficients in the matrix on the next page were found to be significant at or below the .10 level except for the entry, which bears the pound (#) sign.

**Table 1: Bivariate Correlation Matrix**

| | Retention Rate | Graduation Rate | Public Doctorate Granting | Frosh in Top HS Quartile | Pct. Faculty Full-time | Accept. Rate | Class Size Pct. > 50 | Alumni Giving Rate |
|---|---|---|---|---|---|---|---|---|
| **ACT Score** | .76 | .73 | .06 | .55 | .22 | -.41 | .17 | .53 |
| **Retention Rate** | | .83 | .14 | .55 | .30 | -.35 | -.16 | .52 |
| **Graduation Rate** | | | .05 | .54 | .27 | -.30 | .10 | .65 |
| **Public Doctorate Granting** | | | | -.19 | .13 | # .00 | .64 | -.16 |
| **Frosh in Top HS Quartile** | | | | | .13 | -.41 | -.53 | .45 |
| **Pct. Faculty Full-time** | | | | | | -.16 | .34 | .27 |
| **Acceptance Rate** | | | | | | | -.13 | -.25 |
| **Class Size Pct. > 50** | | | | | | | | -.19 |

Note: All coefficients are significant at p<.10 except where noted with a #.

According to the results from principal components analysis, symbolic linkages are bi-dimensional in structure consisting of the Reputation factor and the Image factor (Table 2A). This result is consistent with the model of linkages developed by Berger (2001-2002). These two factors explain 64% of the variance regardless of reputation score inclusion. The results in Table 2B suggest that score is a valid measure of reputation. The individual components within those factors become available for use as separate variables in other studies. For the purposes of conducting regression analysis, the incorporation of one variable from any dimension into a model will avoid some complications that arise when two or more independent variables are correlated.

**Table 2A:**
**Final Factor Matrix (63.7%)**

| | **Reputation** | **Image** |
|---|---|---|
| % Top HS Quartile | 0.78 | -0.03 |
| Acceptance Rate | -0.71 | -0.13 |
| ACT Scores | 0.84 | 0.19 |
| % Full-time Faculty | 0.34 | 0.56 |
| Alumni Giving Rate | 0.74 | -0.17 |
| % Classes GT 50 | -0.18 | 0.87 |
| Publ. Doct. Granting | 0.02 | 0.90 |

**Table 2B:**
**Supplemental Matrix (64.3%):**

| | **Reputation** | **Image** |
|---|---|---|
| **USN&WR Peer Score** | **0.84** | **0.24** |
| % Top HS Quartile | 0.81 | -0.05 |
| Acceptance Rate | -0.69 | -0.10 |
| ACT Scores | 0.82 | 0.17 |
| % Full-time Faculty | 0.34 | 0.54 |
| Alumni Giving Rate | 0.70 | -0.20 |
| % Classes GT 50 | 0.06 | 0.90 |
| Publ. Doct. Granting | -0.16 | 0.87 |

Correlation between the two factors is virtually nonexistent by design, which allows for their inclusions in a regression model. The results from regression analysis models are in Table 3 below. Factor scores comprise the data for each independent variable in each of the three models. Graduation rate is the dependent variable in those models. The complete symbolic linkages model (I) explains 62 percent of the variation in graduation rates. The Reputation Factor in Model II explains 60 percent of the variation in graduation rates; slightly higher than the 53 percent result obtained by squaring the correlation ACT scores, and graduation rates.

**Table 3: Results of Regression Analysis**

| **Model** | **I** | **II** | **III** |
|---|---|---|---|
| **Constant** | 0.54 | 0.54 | 0.54 |
| | (161.97) | (158.71) | (101.07) |
| **Reputation Factor** | 0.14 | 0.14 | - - |
| | (40.49) | (39.68) | - - |
| **Beta** | 0.78 | 0.78 | - - |
| **Image Factor** | 0.02 | - - | 0.02 |
| | (6.65) | - - | (4.15) |
| **Beta** | 0.13 | - - | 0.13 |
| **Sample size** | 1,046 | 1,046 | 1,046 |
| **Adjusted R-square** | 0.62 | 0.60 | 0.02 |
| **F-value** | 841.98 | 1574.48 | 17.24 |

**T-values in parenthesis; all coefficients significant @ p < .01**

Table 4 presents the data and conclusions pertaining to the test for equality of variances in the residuals for Models II and III. Both models were found to contain violations due to unequal variances between the lower and upper segments. It is noteworthy that variances are significantly larger in the lower segment than the upper segment in all three models. This finding appears contrary to the statistical notion that larger values are expected to exhibit larger variances. More importantly, these graduation rate estimates are of limited use until future studies employ procedures to correct this inconsistency.

**Table 4: Goldfield-Quandt Test**

| **Factors & Segments** | **Model:** | **II** | **III** |
|---|---|---|---|
| **Reputation Factor Score** | **N** | | |
| Lower RSS | 418 | 1.27 | |
| Upper RSS | 418 | 4.34 | |
| **Image Factor Score** | **N** | | |
| Lower RSS | 418 | | 0.38 |
| Upper RSS | 418 | | 0.12 |
| **G-value** | | 3.407 | 3.296 |

**Note: G-value of 1.00 indicates equality between Residuals' segments.**

Some key findings from the data under study include: the Symbolic Linkages to Performance account for 62% of graduation rate variation within the model; bi-dimensional in structure, Symbolic Linkages consist of an Image factor and a Reputation factor; variables within those factors are now available as valid measures of those factors; the Reputation Score, as published in US News & World Report's annual rankings guide, loads on the reputation

dimension thus appearing to be a valid measure of reputation; graduation rate estimates are questionable especially when used to calculate performance gaps.

## LIMITATIONS, CONCLUSIONS, AND IMPLICATIONS

Though institutions vary along characteristics described in this report, some limitations need to be kept in mind. First, the sample of 1,400 institutions appears to be slightly unrepresentative of the 2,487 institutions comprising the population on one or more variables. Specifically, a comparison of the average ACT scores suggests the sample may not be a good representation of the population. The average ACT in the sample is 25.21 whereas it is near 21.00 in the population; a t-test confirms the difference is statistically significant at the .05 level.

Sumner (2005) contends that some data being submitted by institutions for inclusion in the rankings guide are inaccurate and probably overstatements. Furthermore, the midpoint and conversion procedures performed in this study may have contributed to measurement error. Future studies may need to gather and use data from IPEDS' and sources as supplements and/or substitutes to the annual rankings guides.

Along the lines of specification error, future research needs to incorporate variables and/or factors that complete the linkages model by adding the structural linkages component. That component may explain the remaining one-third of the variation in graduation rates. In addition, a need exists to find variables that correlate with the residuals thus explaining more of the variation in the linkages model and/or moderating the relationship between linkages and graduation rate performance.

A need exists to be mindful of specification errors when interpreting the results from any regression analysis. Accordingly, this study may have included irrelevant variables and/or

excluded relevant variables. In addition, the characteristics of specific variables included in the study may be contributing more to the inequality in residual variances than other variables. Future research needs to investigate such variables as possible sources of error. Other items for future research include an examination of the aforementioned factor scores by various subgroupings, an attempt to assign meaningful values to those scores, and a study that applying confirmatory factor analysis to a different set of annual rankings data.

As data retrieved from one edition of an annual rankings guide, the calculation of average retention rates uses sets of students who became sophomores in the fall terms between 1999 and 2002 and the calculation of average graduation rates uses sets of students who became graduates in the same timeframe. A graduation timeframe consistent with a cohort's pattern of persistence would require gathering data from alternative sources and/or several issues of the annual rankings guide. Future studies that use cohort-based longitudinal data may develop a better understanding of relationships and patterns within the data.

The college selection process itself, nonetheless, may yield higher rates of retention and graduation should consumers decide to use these variables in their college selection processes. Given the variance patterns found herewith, this research tends to support the contention that college-bound students need to focus on institutions exhibiting the most favorable statistical performance given their test scores and other academic qualifications.

By way of a review, this project set out to provide information with which to affect the choice and selection behaviors of prospective students and their sponsors. Essentially, these results seem to strengthen the case for consumer education through its description of some important relationships that exist within a set of widely publicized and highly relevant variables. Furthermore, these results and findings suggest there is a need to consolidate policymaker

deliberations, consumer education, and researcher investigations into a comprehensive framework of performance and quality. More importantly, this study found support in favor of establishing the reputation score as a valid measure though its reliability needs to be assessed over time. In addition, the study illuminates the inequality in variances of the residuals while drawing attention to the inaccuracies of the graduation rate estimates and the performance gap calculations.

In terms of a framework of quality based on deviations from an acceptable parameter, it may be insightful to consider inclusion and diversity issues by noting that wide variance patterns occur at the low end of the graduation rate spectrum and narrow variance patterns occur at the high end of the spectrum. By extension, the goal of diversity in a context of variance consistency may require a decision to prefer dispersion patterns that are wide all along that spectrum as opposed to those that are narrow. In the process, we need to be ever mindful of the assumptions made about college seekers' abilities to make informed decisions and to vote with their dollars. In conclusion, comparative variances are a topic worthy of further investigation whether the focal point is metric development, institution accountability, or knowledge generation.

## REFERENCES


Astin, A.W. (2004, October 22). To use graduation rates to measure excellence, you have to do your homework. *The Chronicle of Higher Education*.

Ballinger, P. (2005, February 25). College selection should be an educational experience. *The Chronicle of Higher Education*, B37.

_____ (2001-2002). Understanding the organizational nature of student persistence: Empirically-based recommendations for practice. *Journal of College Student Retention*, 3, 3-21.

Brooks, R.L. (2005). Measuring university quality. *The Review of Higher Education*, 29, 1-21.

Carmines, E.G. & Zeller, R.A. (1979). *Reliability and Validity Assessment*. Newbury Park, CA: Sage Publications.

Chapman, R.C. (1986). Toward a theory of college selection: A model of college search and choice behavior. *Advances in Consumer Research*, 13, 246-250.

Coughlin, M.A. (2005). Applied Multivariate Statistics. In M.A. Couglin (Ed.) *Applications of Intermediate/Advanced Statistics in Institutional Research* (pp. 169-213). Tallahassee, FL: Association for Institutional Research.

Council for Higher Education Accreditation (2006, January 5). Footsteps and footprints: Emerging national accountability for higher education performance. *Inside Accreditation*, 1. Washington DC: author.

Dill, D.D. & Soo, M. (2005). Academic quality, league tables, and public policy: A cross-national analysis of university ranking systems. *Higher Education*, 49, 499-533.

General Electric (undated). What is six sigma? Company web site: author.

Glenn, D. (2004, October 14). A better way to rank colleges could be crafted out of students' 'Revealed Preferences,' paper says. *The Chronicle of Higher Education.*

___ ____ (2006, April 10). Government analyst deplores shoddy statistics and 'worst case' claims about higher education. *The Chronicle of Higher Education*.

Gose, B. (2005, February 25). Looking beyond 'U.S. News,' rethinking the SAT. *The Chronicle of Higher Education*, B8.

Hammermesh, D.S. (2005, November 9). Four Questions on the Labor Economics of Higher Education. Washington, DC: Commission of the Future of Higher Education.

Hebel, S. (2005, March 4). Colleges are urged to work more with schools. *The Chronicle of Higher Education*, A23.

Hersh, R.H. (2005, November). What does college teach? *The Atlantic Monthly.*

Higher Learning Commission (2003). Habits of mind for AQIP peer reviewers. Organization Web site: author.

Krawzak, P.M. (2004, March 4). Regula collects ideas to improve education. The *Times-Reporter*, A-2.

National Commmision on Accountability in Higher Education (2005, March 10). Accountability for better results: A national imperative for higher education. Washington DC: author.

Newman, F., Couturier, L., & Scurry, J. (2004, October 15). Higher education isn't meeting the public's needs. *The Chronicle of Higher Education*, B6.

Palladino, J. (2004, March 12). How to improve student retention. *The Chronicle of Higher Education*, B22.

Pfeffer, J. & Salncik, G. (1978). *The external control of organizations: A resource dependence perspective*. New York Harper & Row.

Pindyck, R.S. & Rubinfeld, D.L. (1981). *Econometric models and economic forecasts*, 2nd ed. New York: McGraw-Hill Book Company.

Rindova, V.P., Williamson, I.O, Petkova, A.P. & Sever, J.M (2005). Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation. *Academy of Management Journal*, 48, 1033-1049.

Selingo, J. (2006, March 31). Higher-education commission releases papers on key ideas it is considering. *The Chronicle of Higher Education*.

Sumner, J. (2005, 25 February). Sins of admission. *The Chronicle of Higher Education*, B34.

Swail, W.S. (2004, January 23). Legislation to improve graduation rates could have opposite effect. *The Chronicle of Higher Education*, B16.

Volkwein, J.F. & Sweitzer, K.V. (2005, May 30). The guidebook ratings game: the influences on institutional prestige and reputation. Presentation at the Association for Institutional Research 45th Annual Forum, 1-17.

US News & World Report (2004). *America's Best Colleges 2004 Rankings Guide*. Washington, DC: author.