

**The Relationship Between Institutional Expenditures and Degree Attainment at  
Baccalaureate Colleges**

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## Abstract

Enhancing student persistence and effectively managing financial resources present important challenges to higher education. Surprisingly, existing student persistence and attrition models offer little insight into the potential links between institutional expenditures and student persistence. This study examines the impact of institutional expenditures on six-year cohort graduation rates at 363 Carnegie-classified Baccalaureate I and II institutions. The results suggest a positive and significant relationship between instructional and academic support expenditures and cohort graduation rates. As a result, researchers might consider ways to integrate expenditure variables into student persistence models. Institutions also might seek out ways to shift financial resources to areas that enhance student persistence and degree attainment. Additional research may serve to strengthen student persistence frameworks and improve links between persistence research and financial decision-making in colleges and universities.

**KEY WORDS:** institutional expenditures, degree attainment, persistence, retention, higher education finance

## The Relationship Between Institutional Expenditures and Degree Attainment

### INTRODUCTION AND BACKGROUND

The attempt to better understand, explain and predict student persistence remains a challenging and important area of research within the higher education literature. Current persistence, attrition and retention studies can trace their roots to the work of Spady (1971), Bean (1980), Tinto (1975, 1993), Pascarella and Terenzini (1991) and Astin (1994, 2001). The concepts of academic and social integration (Tinto), student interactions (Pascarella and Terenzini), student involvement (Astin) and student satisfaction (Bean) that have emerged and developed over the years create the conceptual foundation for studying the retention, development and learning of college students. Others, such as Pace (1984) and Chickering and Gamson (1987) also stress the importance of student experiences (Pace) and educational practices (Chickering and Gamson). More recently, Kuh's (2002) student engagement concept has emerged as an important construct. It also provides the underlying theme for the increasingly popular National Survey of Student Engagement (2001).

Additional studies such as those found in Braxton's (2001) edited volume Reworking the Student Departure Puzzle and by DesJardins (1999), St. John and Hu (2001) and Beekhoven, De Jong and Van Hout (2002) provide a good snapshot of a healthy, evolving research agenda. Specifically, this kind of research consistently suggests the need to refine existing models and test more specific components of student persistence models. Cabrera, Castaneda and Hengstler (1993) even suggest the importance of creating and testing integrated models of student retention as a next step in developing retention research.

However, as research continues and our understanding of the student departure process evolves, national data consistently indicate that approximately one-fifth to one-quarter of all first-year students fail to return to the same institution for a second year. Also, almost one-half of students fail to graduate within a 5 to 6 year period (ACT Incorporated, 2002; Consortium for Student Retention Data Exchange (CSRDE), 2002). Even though a small percentage of students “stop out” and transfer to other institutions to complete their degrees -- and efforts to track these students have increased-- many still do not earn a college degree. The CSRDE reports that only about 58% of students eventually earn a degree. While it is reasonable to expect that some percentage of students will not earn a degree, researchers and practitioners cannot dismiss the personal, social and financial costs incurred due to so many students failing to achieve this goal.

Interestingly, as the phenomenon of student attrition continues to affect students, higher education institutions and society, the research has devoted relatively little attention to the role and effect of institutional expenditures on college students. Conceptual frameworks and studies of student persistence have devoted even less attention to this subject. A critical review of important conceptual frameworks developed by Tinto (1975), Spady (1971) and Bean (1980) reveals that institutional expenditures are not identified as an integral component of the academic or social systems (Tinto), institutional environment (Bean) or as a set of distinct variables that might influence student persistence. In another example, Astin (1993) devotes less than two pages to the issue of institutional expenditures. He suggests that the percentage of educational and general expenditures devoted to student services has a positive effect on student

perceptions and attitudes while the percentage of instructional expenditures has a similar, albeit more modest and indirect effect.

Empirical studies in education that include or focus on resource and expenditure variables seem more numerous at the primary and secondary education level. In particular, Hanushek's (1997) well-known synthesis of more than 20 years of education production function research concludes that the influence of financial resources and education spending remains unclear. At the same time, Fortune (1997), Hodas (1993) and Levin (1993) argue against the relationship between educational "inputs" and "outputs" and the efficacy of the production function approach. Hodas even goes as far as asserting that the approach seems to be developing the characteristics of a "dying paradigm."

However, other studies disagree with Hanushek's findings. Card and Krueger (1992, 1996) contend that there is a positive relationship between state educational spending and student achievement. As a method, Monk (1992, 1993) argues that the production function approach remains an important and useful tool in education research. Others such as Pritchett and Fulmer (1997) claim that specific expenditures such as spending on instructional materials and technology seem to provide greater returns than increased expenditures on teacher salaries.

More recently, there seems to be some increased interest in the role and effect of expenditures at the post-secondary level. Porter (2000) critiques the use of predicted graduation rates (that fail to account for the standard error of estimates) as the basis for ranking institutions. However, his model suggests that higher educational expenditures have a positive and significant affect on graduation rates. In contrast, Smart, Ethington,

Riggs and Thompson (2002) conclude that instructional expenditures have a negative effect on students' leadership abilities, while expenditures on student services have a positive effect. The authors conclude that this finding, by accounting for the mediating effects of student participation in an "enterprising major" and leadership activities, also lends support to Pascarella and Terenzinni's (1991) view that student effort and student interactions are primary in shaping the affects of college on students. At the same time, Smart, Ethington, Riggs and Thompson's findings suggest more complex effects by expenditure categories (indirect and direct, positive and negative) in contrast to Astin's (1993) conclusion that expenditures exert a small, positive affect on students. On the other hand, in a study of further education institutions in the U.K., Belfield and Thomas (2000) failed to find an expenditure level effect on student performance, a finding that may be due to contextual differences between American and British higher education. As this illustration of contradictory findings suggests, research that focuses on the impact of institutional expenditures and addresses the lack of an expenditure component in persistence frameworks may lead to improvements in student persistence frameworks, theory development and our understanding of expenditure effects. A more detailed and focused consideration of expenditure patterns and expenditure levels within colleges and universities – specifically baccalaureate institutions that have a particular focus and emphasis on undergraduate degree programs -- may reveal some important effects on student persistence and degree attainment.

The current situation in student persistence research stands in stark contrast to the large amount of attention given to funding and expenditures for education by the media, the public, policymakers and higher education leaders. Given the recurring nature of

budgetary and financial challenges, efforts to enhance the use of financial resources represent an important responsibility on the part of education leaders and decision makers. These challenges become even more important as institutions attempt to respond to increased pressure for accountability and performance (see Donald, 1997; Guskin, 1994a, 1994b). However, most institutional budget decisions tend to be based solely on performance outcomes, historical patterns of expenditure or size of enrollment. Institutions are even less likely to base these decisions on cost or responsibility center approaches (Massy, 1996; Meisinger, 1994). Decisions based on an empirical link between where financial resources are used and the achievement of institutional and student goals such as persistence and degree attainment are noticeably absent from these approaches.

## PURPOSE

This study seeks to extend the range of student persistence research by investigating the impact of expenditures on degree attainment. It also focuses on specific expenditure categories instead of broad, total expenditures (Weglinsky, 1997). By considering expenditure levels across categories within institutions, we can develop a more detailed understanding of expenditure effects on students, persistence and degree attainment. The results of this study also may lead to more complex tests of the direct and indirect effects of expenditures in student persistence models by employing more advanced statistical techniques.

The development of a more specific understanding of the institutional environment (Bean, 1980; Pascarella and Terenzini, 1991) in persistence models and specifically the potential effect of institutional expenditures within these models is

another goal in this study. Given the relative lack of attention in the literature to the impact of expenditures on student persistence and degree attainment, this study attempts to enhance theories of student persistence. It also seeks to develop an empirical tool that institutions might use to inform budget decisions. Research that focuses more attention on expenditure effects also may lead to further research and development of the specific links between expenditures and student persistence outlined in the proposed conceptual framework (see Figure 1).

## HYPOTHESIS AND RESEARCH QUESTIONS

To provide a conceptual context for this study, I contend that the amount of financial resources devoted to various functional and program areas within a college or a university, in part, reflects institutional priorities, purposes, history, culture and budgetary constraints. These resources, and specifically where resources are used within an institution, affect the specific mixture and quality of professional and faculty staffing, expertise, programming, services, support and opportunities for experimentation, innovation and improvement that shapes the institutional environment. These characteristics influence the probability, frequency and quality of student interactions and experiences with faculty, staff and other students. In turn, there is an effect on student persistence and degree attainment. Figure 1 represents a simple framework that identifies the conceptual links between expenditures and persistence to degree and how expenditure variables might fit into existing student persistence and attrition frameworks.

On the basis of this conceptual framework, this study addresses the following questions:

- 1) Is there a relationship between expenditures and persistence to degree attainment?



- 2) Does support for student services, academic support and instruction help to explain variations in persistence to degree?
- 3) Do the findings clarify contradicting claims about expenditure effects?
- 4) Do the findings warrant further investigation?
- 5) What are the potential implications for the development of theories of student persistence, institutional decision-making and public policy?

After building and testing a multiple regression model, I expect to find a positive and significant relationship between expenditures in a) instruction b) academic support and c) student services with student degree attainment as measured by six-year cohort graduation rates. Secondly, I also expect that institutional support expenditures will have a negative affect on student degree attainment. Higher expenditures in areas that do not have a direct effect on students' academic and social experiences in college may result in lower expenditures for other areas that have a positive effect. I assume that a given financial resource level is fixed in the short run and that financial resources for institutions at any given point in time represent a "zero sum" dilemma.

## RESEARCH DESIGN AND METHODOLOGY

Based on a non-experimental, applied research design, I used the ordinary least-squares (OLS) regression method to test the hypothesis. The statistical model includes expenditures per full-time equivalent student (FTE) on instruction, academic support, student services and institutional support. The model also includes control variables for certain characteristics of students and institutions such as academic preparation, gender, ethnicity, age, institutional size, living on campus, institutional affiliation, institutional control and institutional size. Prior studies and reports identify these student-level and

institution-level characteristics as important factors in student persistence (see ACT Report, 2002; Consortium for Student Retention Data Exchange Report, 2001; Harvey-Smith, no date; Hoyt, 2001; Porter, 2000; Tillman, 2002).

While I based a number of control variables on what these scholars and others have considered in existing research, there are some important differences in purpose, sample selection and the main variables of interest. For example, Porter studied national universities and used a total education-related expenditure variable in his critique of the graduation rate performance indicator in the U.S. News and World Report College Ranking Guide. I focused this study on Carnegie-classified Baccalaureate I and II institutions and specific expenditure categories per full-time equivalent (FTE) student as they relate to student persistence theory and degree attainment.

I also employed a set of log transformations (using the natural log) for the expenditure variables in the model. These transformations are routinely performed in economic models based on the principle of diminishing marginal productivity of inputs in production theory. I describe these transformations in the Table 1. In order to detect and remedy other potential violations of OLS assumptions (Gujarati, 1995), I also produced and analyzed a) the square root of the variance inflation factor (VIF) for multicollinearity b) a normal plot of the regression standardized residuals for normality of the distribution of error terms and c) a scatterplot of the standardized residuals and predicted values of the dependent variable for heteroskedasticity.

## SAMPLE, DATA AND VARIABLE DESCRIPTIONS

### Sample

I based this study on a non-probability sample of institutions using the IPEDS Peer Analysis System. Specifically, each institution in the sample was classified as a Carnegie Baccalaureate I or II institution in 1995. I identified 363 institutions (58.2%) with complete data after all of the data were collected. Since the sample does not necessarily represent the variety of institutions in the population of higher education institutions in the United States, the ability to generalize the results may be limited. However, the sample is a reasonable size and does allow for sufficient variation in the model variables. The sample also reduces the confounding effects of expenditures at institutions with large post-bachelor degree and graduate enrollments while focusing on institutions with a particular emphasis on undergraduate education and bachelor's degree programs. Future studies might extend the range of study by testing and analyzing different samples and types of institutions beyond the sample used here.

### Data

The data used to derive the expenditure variables were based on IPEDS expenditure amounts for different functional areas as reported by institutions for fiscal year (FY) 1996. The 1996 data set is only one of two recent data sets that have been released as final versions (the 2000 data set being the other). It also represents expenditures during the important first year of college (Upcraft and Gardner, 1989) for the 1995 cohort. Also, given Meisinger's (1994) evaluation that budgetary practices and expenditure patterns have been fairly consistent historically (also see NCES, 1997), the

use of first-year expenditures as a proxy measure of institutional expenditures during the freshman cohort's college experience appears to be reasonable.

One approach to analyzing the separate allocative (where or how resources are spent) and scale (the level of expenditure or how much is spent) effects of expenditures is to express categorical expenditures as percentages of a budget and include an additional control variable for the total amount of expenditures. However, for the purposes of this study the expenditure variables (instruction, academic support, student services and institutional support) are expressed as expenditures per full-time equivalent (FTE) student. This approach simultaneously captures actual expenditure amounts within each expenditure category and the basic location of those expenditures. In total, these expenditures constitute the core of educational and general (E & G) expenditures at the institutions included in this study. This approach also permits testing of the unique effect of actual expenditure levels within each category by controlling for actual expenditure levels in the remaining expenditure categories. Student FTE enrollment was calculated using the following formula commonly employed at colleges and universities:

$$\# \text{ FTE Students} = \# \text{ Full-Time Students} + 1/3(\# \text{ Part-Time Students}) \quad \mathbf{(1)}$$

The IPEDS data set also provided the six-year cohort average graduation rate for the Fall 1995 freshman cohort (reported in the 2001 survey), institutional size based on enrollment (total student FTE count), institutional affiliation (religious-affiliation or no religious-affiliation), institutional control (public or private), the percentage of females in the cohort and whether or not an institution is classified as an historically black college or

university (HBCU). I obtained data from The College Handbook (College Entrance Examination Board, 1997) for SAT scores (recentered 25<sup>th</sup> percentile scores in combined verbal and math sections), freshman class minority percentage, average age and percentage living on campus. In cases where SAT scores were not available and ACT scores were available, I used a concordance table to convert ACT composite scores to SAT scores (see Marco, Abdel-fattah and Baron, 1992).

In addition to the limitations of a non-probability sample due to missing data, another limitation may be the potential difference between data describing the “freshman class” (students who enrolled as part of the freshman class) produced by The College Board and “freshman cohort” (first-time, full-time students) reported to the IPEDS system. Finally, any self-reported data by institutions or individuals may contain some error. However, if any errors exist they may be random. Data checking and cleaning typically is part of the standard procedures by these organizations and helps to protect data sets from systematic errors.

## Variable Descriptions

The explanatory variables in the statistical model (see Table 1) fall into two main categories: the control variables and the expenditure variables of particular interest. The control category contains the variables that represent characteristics of students and institutions that influence persistence. After the dependent variable COGRD01, the first four independent variables (ALLSAT through PERFEM) represent characteristics of the Fall 1995 freshman cohort. These characteristics represent various aspects of students’ backgrounds, including academic preparation, ethnicity/race, gender and age. The next variable, PERONC, represents the percentage of the freshman class that lives on campus

(this includes the percentage of those that do not commute if the percentage of the freshman class that commutes was provided instead of the percentage living on campus). This variable could be considered both an institutional and a student characteristic. The next four variables (SIZE through HBCU) represent various institutional characteristics and at a minimum, short run constraints on institutions (for a good discussion about this debate, see Porter, 2000). The last four variables, INSTR through INSUPP, represent the expenditure variables of primary interest in this study.

## RESULTS AND ANALYSIS

### Results

Table 2 provides the descriptive statistics for variables in the model. Table 3 presents the model summary statistics ( $\underline{R}$ ,  $\underline{R}^2$ , adjusted  $\underline{R}^2$ , standard error of the model estimate), the ANOVA results (including the  $\underline{F}$  statistic and model significance) and the regression output (coefficient estimates, t-scores, significance levels and multicollinearity statistics). I initially included a tuition variable in the model as an indicator of cost. However, it produced a variance-inflation factor (VIF) square root of well over 2 (see Fox, 1991), suggesting at least a moderate multicollinearity problem. Since the effect of tuition cost seemed to be indistinguishable from the effect of other variables in the model, I re-specified the model by excluding the tuition variable.

Second, a scatterplot revealed the distinctive effects of race and ethnicity at high percentage values (near or at 100%) that seemed to contradict the overall trend of the scatterplot. This characteristic in the scatterplot suggested that the relationship between the percentage of minorities in a freshman cohort and the graduation rate for that cohort might be curvilinear. This certainly warrants additional investigation in future studies.

After further investigation, I found that these institutions were likely to be identified as historically black colleges and universities (HBCU's). Therefore, I included a dummy variable for HBCU's in the model to account for the effect of these institutions.

## Analysis

Overall, it appears that the model explains a high percentage of the variation in cohort graduation rates. Table 2 shows that the  $R^2 = .725$  and that the  $F$  statistic = 70.719 ( $p < .000$ ). Also, the regression diagnostics do not reveal any apparent problems with normality of the error distribution, multicollinearity or heteroskedasticity. However, the results indicate that two of the cases in the data set appear to be outliers or highly unusual cases. These are cases where the actual cohort graduation rate was at least three standardized errors from the predicted cohort graduation rate. In spite of the potential influence of such data, researchers have been warned about eliminating unusual data and engaging in model "overfitting" based on a small number of unusual cases (see Fox, 1991). As a result, they are not excluded from the sample. At the same time, these cases may represent the effect of another variable not included in this model.

However, in order to determine the effect of the outliers, I ran an auxiliary regression excluding these cases. This did not affect the expenditure variables of interest in this study, except that academic support (ACSUPP) and total FTE enrollment (SIZE) increased in significance to the .001 level and the percentage of freshmen not commuting to or off campus (PERONC) and being an historically black college or university (HBCU) decreased slightly to the .05 level (although the exact significance was .01 and .011 respectively). Both of these variables also happened to represent characteristics of the largest outlier. However, all of these cases may represent actual occurrences since

appropriate regression diagnostics were performed. A check of the data revealed that the cohort graduation rates in the prior year were 2 percent lower and not reported for each case respectively. Also, one of the two cases was categorized as an HBCU and the other had a commuter percentage of 97 percent and a minority percentage of 40 percent. These outliers may suggest the need to conduct more in-depth studies of these and other institutions with distinctive histories, missions and identities.

The parameter estimates in Table 5 indicate that the student and institutional characteristics included as control variables in the model seem to have the effect the literature suggests. Specifically, SAT scores (ALLSAT), institutional control (PRIVATE) and instructional expenditures (INSTR) have a positive and significant effect ( $p < .001$ ). Institutional size (SIZE), living on campus (PERONC) and academic support expenditures (ACSUPP) also have a positive and significant effect ( $p < .01$ ). The results also indicate that the percentage of minorities (MINOR) and average age (AGE) have a negative effect on graduation rates ( $p < .001$ ). Although institutional support expenditures (INSUPP) have a negative effect, the result is not significant ( $p = .732$ ). Student service expenditures (STDSRV) produced a similar, insignificant effect ( $p = .649$ ).

## DISCUSSION, IMPLICATIONS AND CONCLUSION

### Discussion and Implications

Overall, the results seem to confirm part of the general hypothesis that expenditures affect student persistence and degree attainment. First, the findings suggest that instructional and academic support expenditures produce a positive, significant effect on cohort graduation rates. This relationship partially confirms Astin's (1993)



conclusions regarding expenditure effects on students and contradicts Belfield and Thomas (2000) who found no relationship between unit (department) expenditure levels and student performance. Instructional expenditures have the highest standardized beta coefficient in the model ( $\underline{b} = .281$ ) after SAT scores ( $\underline{b} = .381$ ). Since the instructional expenditure variable is transformed by a natural log function, the result suggests that a one percent increase (real, not nominal) in instructional expenditures will lead to over a one-quarter of a percent increase in the cohort graduation rate.

Second, student services expenditures do not appear to have a positive or significant effect on degree attainment as the hypothesis predicted. This finding contradicts the positive effect proposed by Astin (1993) and suggests the opposite of the effect Smart, Ethington, Riggs, and Thompson (2002) found on student leadership development. The finding in this study is surprising since IPEDS defines the student services category to include expenditures for activities and services that contribute to a student's well being. It is possible that such services, while important and even mandatory, may produce a decreasing rate of return in terms of cohort graduation rates. It also is possible that these kinds of services represent areas where colleges and universities have less training and expertise. Since a large percentage of the student services category may be in admissions and financial aid service expenditures, these categories may overshadow the effects of expenditures of other services that may affect students more directly and more often.

Third, the finding that academic support expenditures -- which include academic administration and curriculum development, libraries, audio/visual services and technology support for instruction -- have a positive and significant effect stands in

contrast to the insignificant effect of institutional support. This suggests that all administrative and support expenditures may not be of equal importance to students. While non-academic overhead and support costs may be necessary “costs of doing business,” the results indicate that keeping these expenditures to a minimum is best for improving student degree attainment. Resources not spent on institutional support could be directed to instructional and academic support areas in ways that individual institutions might find most beneficial. Institutions might direct more resources to enhance program delivery and completion options and to support minority and “non-traditional” students, who the model suggests face particular challenges to completing a degree.

The negative implications of certain regulatory burdens, litigation and other mandatory requirements that increase institutional support costs seem clear. Such expenses and increased costs divert financial resources from areas that have a more positive effect on persistence and degree attainment. This situation may lead to lower rates of persistence and degree attainment. Ironically, some institutions may be caught in a cycle of spending more financial resources to recruit more students in order to replace students they do not retain. Such a process might increase institutional support expenditures and divert more resources from other areas.

The positive effect of institutional size on cohort graduation rates presents another interesting finding. It is possible, given the sample of institutions in this study, that there are economies of scale for this sector of the higher education system. This finding supports Belfield and Thomas (2000) and Toutkoushian’s (1999) findings that there seem to be short-run economies of scale for colleges and universities. Somewhat larger

institutions also may offer a better variety and higher level of certain academic and support services that enhance student persistence and degree attainment. Expenditures for such services may offset the potential negative effects of student isolation and a lack of integration, engagement or involvement that may be more common at larger institutions.

Finally, the overall results create some interesting implications for existing student persistence models and frameworks. The finding that instructional expenditures, academic support expenditures, percentage living on campus, size and being an historically black college or university have a positive effect on degree attainment is particularly important. It suggests that the categories one might expect to be closely related to student involvement, engagement, experiences and integration have the greatest affect on persistence and degree attainment.

Further, instructional and academic support expenditures remain significant even after the model controls for other important retention variables. Instructional and academic support expenditures may provide more support for student integration, involvement, engagement and meaningful experiences that enhance student retention. These results highlight the importance of institutional expenditure characteristics and the potential value of including these variables in student persistence models. Specifically, it seems appropriate to give more attention to these variables as a component of the institutional environment, academic and social system, integration and experiential portions of various models.

The findings also suggest some interesting possibilities for institutions and entities that provide financial support to colleges and universities. First, institutions may realize

benefits from evaluating existing expenditure patterns and developing strategies that shift financial resources to higher impact areas such as instruction and academic support. Such an approach would require a substantial change in traditional approaches and institutional habits related to budgeting and financial decision-making (see Meisinger, 1994). Second, public and private supporters of colleges and universities (namely private donors, foundations and the government) may contribute to higher rates of degree attainment by increasing earmarked funds for instruction and academic support as opposed to other activities and functions. Governments in particular might consider this approach as an alternative to strictly performance-based funding systems (see Donald, 1997; Guskin, 1994a, 1994b; Meisinger, 1994). These systems do not necessarily reward the most effective use of financial resources and may lead to lower performance at certain institutions by diverting resources to institutions that may need the additional support the least.

## Conclusion

In conclusion, the results of this study suggest that the level and location of financial expenditures within colleges and universities affect student persistence and degree attainment. At the same time, we need to conduct more research to fully test and understand the specific and rather complex role that expenditures might play within the student persistence process. This research also will need to investigate different samples of institutions and test expenditure impacts within the context of more complex statistical methods such as structural equation and multilevel statistical modeling (see Patrick, 2001).

Secondly, the conceptual framework introduced in this study (Figure 1) may provide a foundation for investigating more complex linkages between expenditures and other components of student persistence and development models. Such research may require greater integration of large and seemingly unrelated data sets from a) national surveys of students, faculty, and institutions such as CIRP, NSSE, CSEQ b) IPEDS and other standardized, comprehensive data sources and c) more detailed expenditure data. Existing data sets may need to provide more detailed information about the specific location and level of institutional expenditures within currently defined expenditure categories.

These issues, along with other research and methodological issues presented in this study and in the literature, pose a challenge to improving our understanding of the relationship between institutional expenditures and degree attainment. We also face a challenge to enhance and better specify our concepts and assumptions about the conceptual components and linkages within the student persistence process. However, the potential benefits to student persistence and development research, higher education institutions, students and those that provide financial support to higher education warrant our concerted effort and serious attention.

## References

- ACT, Incorporated. (2002, November). College Graduation Rates Steady Despite Increase In Enrollment [On-line]. Available: <http://www.act.org/news/releases/2002/11-15-02.html>
- Astin, Alexander W. (1993). What Matters In College: Four Critical Years Revisited. San Francisco: Jossey-Bass.
- Bean, J.P. (1980). Dropouts and turnover: the synthesis and test of a causal model of student attrition. Research in Higher Education, 12, 155-187.
- Beekhoven, S. De Jong, U. and Van Hout, H. (2002). Explaining academic progress via combining concepts of integration theory and rational choice theory. Research in Higher Education, 43 (5), 577-600.
- Belfield, C.R. and Thomas, H.R. (2000). The relationship between resources and performance in further education colleges. Oxford Review of Education, 26, 239-253.
- Braxton, J.M. (2000). Reworking the student departure puzzle. (1<sup>st</sup> ed.). Nashville: Vanderbilt University Press.
- Cabrera, A.F., M.B. Castaneda (1993). The convergence between two theories of college persistence. Journal of Higher Education, 63, 143-164.
- Card, David, and Krueger, Alan (1996). School resources and student outcomes: an overview of the literature and new evidence from North and South Carolina. Journal of Economic Perspectives, 10, 31-50.
- Chickering, A.W., and Gamson, Z.F. (1987). Seven principles for good practice in undergraduate education. AAHE Bulletin, 37 (7), 3-7.
- College Entrance Examination Board (1997). The College Handbook. New York, NY.
- Consortium for Student Retention Data Exchange (2002). 2000-01 CSRDE Report: The Retention and Graduation Rates in 344 Colleges and Universities [On-line]. Available: <http://www.occe.ou.edu/csrde/execsum.pdf>
- DesJardins, S.L., Ahlburg, D.A., and B.P. McCall (1999). An event history model of student departure. Economics of Education Review, 18, 375-390.
- Donald, Janet (1997). Improving the Environment for Learning: Academic Leaders Talk About What Works. San Francisco: Jossey-Bass.

- Fortune, Jim C. (1993). Why Production Function Analysis is Irrelevant in Policy Deliberations Concerning Educational Funding Equity. Education Policy Analysis Archives, 1 (11).
- Fox, John (1991). Regression Diagnostics. Sage University Papers. Newbury Park; Sage Publications.
- Gujarati, Damodar N. (1995). Basic Econometrics (3<sup>rd</sup> ed.). New York: McGraw-Hill.
- Guskin, A.E. (1994a). Reducing student costs and enhancing student learning: the university challenge of the 90's-Part I: restructuring the administration. Change, 26 (4), 22-29.
- Guskin, A.E. (1994b). Reducing student costs and enhancing student learning: the university challenge of the 90's-Part II: restructuring role of faculty. Change, 26 (5), 16-25.
- Hanushek, E.A. (1997). Assessing the effects of school resources on student performance: an update. Educational Evaluation and Policy Analysis, 19, 141-164.
- Harvey-Smith, Alicia (no date). Student retention: theory, accountability, and intervention. Austin, TX: Community College Survey of Student Engagement (Student Success Initiative).  
Available: [http://ccsse.org/ssi/docs/Harvey-Smith\\_Alicia\\_Retention\\_Article.pdf](http://ccsse.org/ssi/docs/Harvey-Smith_Alicia_Retention_Article.pdf)
- Hodas, Steven (1993). Is Water an Input to a Fish?: Problems with the Production-Function Model in Education. Education Policy Analysis Archives, 1 (12).
- Hoyt, Jeff E. (2001). First-Year Retention at Utah Valley State College: A Follow-Up Study. Orem, UT: Utah Valley State College, Institutional Research and Management Studies.  
Available: [www.uvsc.edu/ir/research/fall9900nr.htm](http://www.uvsc.edu/ir/research/fall9900nr.htm)
- Kuh, G.D. (2002). The College Student Report (4th ed). National Survey of Student Engagement, Center for Postsecondary Research and Planning. Bloomington: Indiana University.
- Levin, Benjamin. (1993). Students and Educational Productivity. Education Evaluation and Policy Analysis, 1 (5).
- Marco, G.L., Abdel-fattah, A.A., and Baron, P.A. (1992). Methods used to establish score comparability on the enhanced ACT assessment and the SAT (College Board Report No. 92-3). New York, NY: The College Board.

- Massy, William F. (ed.) (1996). Resource Allocation in Higher Education. Ann Arbor: University of Michigan Press.
- Meisinger, Richard J. (1994). College and University Budgeting: An Introduction for Faculty and Academic Administrators (2<sup>nd</sup> ed.). Washington D.C., NACUBO.
- Monk, David H. (1992). Education Productivity Research: An Update and Assessment of its Role in Education Finance Reform. Educational Evaluation and Policy Analysis, 14 (4), 307- 332.
- Monk, David H. (1993). A Reply to Mr. Hodas. Education Policy Analysis Archives, 1 (15).
- National Center for Education Statistics (1997). Current Funds Revenues and Expenditures of Institutions of Higher Education: Fiscal Years 1987 through 1995 (NCES Publication No. 97-441). Washington, D.C.
- National Survey of Student Engagement (2001). NSSE Technical and Norms Report. Indiana University Center for Postsecondary Research and Planning.
- Pace, C. R. (1984). Measuring the quality of college student experiences. Los Angeles: University of California, Los Angeles, Center for the Study of Evaluation.
- Pascarella, Ernest T. and Terenzini, Patrick T. (1991). How College Affects Students: Findings and Insights From Twenty Years Of Research. San Francisco: Jossey-Bass.
- Patrick, William J. (2001). Estimating first-year student attrition rates: an application of multilevel modeling using categorical variables. Research in Higher Education, 42(2), 151-170.
- Porter, S. R. (2000). The robustness of the graduation rate performance indicator used in the U.S. News and World Report college rankings. International Journal of Educational Advancement, 1(2), 145-163.
- Pritchett, L., Fulmer, D. (1997). What education production functions really show: a positive theory of education expenditures. Economics of Education Review, 18 (2), 223-239.
- Smart, John C., Ethington, Corinna A., Riggs, Robert O. and Thompson, Michael D. (2002). Influences of institutional expenditure patterns on the development of students' leadership competencies. Research in Higher Education, 43 (1), 115-132.
- Spady, W. (1971). Drop-outs from higher education: toward an empirical model. Interchange 1, 38-82.



- St. John, Edward P., Hu, Shouping (2001). Student persistence in a public higher education system. Journal of Higher Education, 72 (3), 265-285.
- Tillman, Charles A., Sr. (2002). Barriers to student persistence in higher education. Diadache: Faithful Teaching, 2 (1).  
Available: [http://www.nazarene.org/iboe/riie/Diadache/Diadache\\_vol2\\_1/barriers1.htm](http://www.nazarene.org/iboe/riie/Diadache/Diadache_vol2_1/barriers1.htm)
- Tinto, Vincent (1975). Dropout from higher education: a theoretical synthesis of recent research. Review of Educational Research, 45, 89-125.
- Tinto, Vincent (1993). Leaving College: Rethinking the Causes and Cures of Student Attrition. Chicago: University of Chicago Press.
- Toutkoushian, Robert K. (1999). The value of cost functions for policymaking and research in higher education. Research in Higher Education, 40 (1), 1-15.
- Upcraft, M.L., & Gardner, J.N. (1989). The Freshman Year Experience: Helping Students Survive and Succeed in College. San Francisco: Jossey-Bass.
- Wenglinsky, H. (1997). When Money Matters: How Educational Expenditures Improve Student Performance and How They Don't. Princeton, NJ: Educational Testing Service.

**TABLE 1. Variable Descriptions**

<b><u>Variable Name</u></b>	<b><u>Description</u></b>	<b><u>Transformation</u></b>	<b><u>Source</u></b>
COGRD01	Six-year cohort (first-time, full-time degree seeking) graduation rate	None	IPEDS
ALLSAT	Freshman class 25 <sup>th</sup> percentile score (verbal and math); some with ACT only were converted using a concordance table	None	College Board
MINOR	Percentage of freshman class reported as a member of a minority group	None	College Board
AGE	Average age of freshman class	Dummy coded (0=not 18) (1=18)	College Board
PERFEM	Percentage of the freshman cohort that is female	None	IPEDS
PERONC	Percentage of the freshman class not commuting to or off campus	None	College Board
SIZE	Total FTE enrollment	None	IPEDS
AFFIL	Religious affiliation of the institution	Dummy coded (0=no affiliation) (1=affiliation)	IPEDS
PRIVATE	Public or private institution	Dummy coded (0=public) (1=private)	IPEDS
HBCU	Historically black college or university	Dummy coded (0=no) (1=yes)	IPEDS
INSTR	Expenditures per FTE student for instruction and not separately budgeted research and public service	Natural log	IPEDS
ACSUPP	Expenditures per FTE student for academic support services	Natural log	IPEDS
STDSRV	Expenditures per FTE students for activities that contribute to students' well being and development	Natural log	IPEDS
INSUPP	Expenditures per FTE student for administrative functions	Natural log	IPEDS

**TABLE 2. Variable Means and Standard Deviations with Pre-Transformed Expenditure Variables, Model Summary and ANOVA**

	Mean	Std. Deviation	N
COGRD01	56.40	17.49	363
ALLSAT	975.4270	132.4275	363
MINOR	14.1846	16.2651	363
AGE	.2562	.4371	363
PERFEM	.5886	.1654	363
PERONC	80.8981	24.3460	363
SIZE	1459.2590	971.6256	363
AFFIL	.6033	.4899	363
PRIVATE	.8705	.3362	363
HBCU	2.755E-02	.1639	363
INSTR	8.5058	.4141	363
ACSUPP	14.0372	.8788	363
STDSRV	7.4089	.5122	363
INSUPP	14.9391	.6290	363

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
EXPDEG	.851	.725	.715	9.34

Model		Sum of Squares	df	Mean Square	F	Sig.
EXPDEG	Regression	80248.737	13	6172.980	70.791	.000
	Residual	30432.998	349	87.201		
	Total	110681.735	362			

**TABLE 3. Expenditures and Degree Attainment Model Regression Results  
(Coefficients, Standardized Coefficients, T-statistics, Exact Significance, Levels of Significance and Collinearity Statistics)  
n=363**

Model		Unstandardized Coefficients		Standardized	t	Sig.	Collinearity Statistics	
		B	Std. Error	Coefficients			Tolerance	VIF
EXPDEG	(Constant)	-123.142	13.594		-9.059	.000		
	ALLSAT	0.050***	.006	.381	8.289	.000	.374	2.675
	MINOR	-0.175***	.049	-.163	-3.557	.000	.377	2.653
	AGE	-5.222***	1.272	-.131	-4.107	.000	.780	1.283
	PERFEM	4.749	3.156	.045	1.504	.133	.884	1.132
	PERONC	0.085**	.027	.118	3.134	.002	.557	1.796
	SIZE	0.002**	.001	.119	3.432	.001	.657	1.522
	AFFIL	2.030	1.315	.057	1.544	.124	.580	1.723
	PRIVATE	8.130***	2.258	.156	3.601	.000	.418	2.392
	HBCU	16.404**	4.712	.154	3.482	.001	.404	2.476
	INSTR	11.880***	2.188	.281	5.430	.000	.294	3.407
	ACSUPP	3.101**	1.140	.119	2.720	.007	.412	2.426
	STDSRV	-0.712	1.562	-.021	-.456	.649	.376	2.656
	INSUPP	-0.560	1.636	-.018	-.342	.732	.294	3.401

\*p < .05; \*\*p < .01; \*\*\*p < .001

Institutional Priorities, Purposes, History, Culture and Budget Constraints



Expenditure Levels and Patterns (by functional area, program, service)



Staffing, Expertise, Programming, Services, Support and Innovation



Institutional Environment



Frequency and Quality of

Interactions/Involvement/Experiences/Engagement



Persistence/Degree Attainment

**Figure 1. Conceptual framework for expenditure component in persistence models**