Institutional Expenditures and Student Engagement:

A Role for Financial Resources in Enhancing Student Learning and Development?

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The concept of student engagement is receiving increased attention from researchers, higher education leaders, and the general public in recent years. This increased attention represents a shift from the more traditional "resource and reputation" model of academic quality to a model that emphasizes institutional best practices and student experiences that enhance student learning and development. At the same time, institutions and the public face rising operating costs of costs of attendance. However, relatively little effort has been made to explore the potential relationship between these two important research and policy areas. This study examined the relationship between institutional expenditures and student engagement based on data from 142 colleges and universities. The results of an OLS multiple regression model, including a factor for student engagement as the dependent variable, suggest that administrative expenditures are negatively related to student engagement. These results support further exploration of potential complex causal links between expenditures and engagement and may provide support for initiatives to reverse historical trends and adjust institutional spending.

KEYWORDS: Higher education finance, student engagement, resource allocation, institutional expenditures

INTRODUCTION

Student engagement has emerged as an important concept in the research literature on higher education quality, student development, and student learning (Pike, 2004; Kuh, 2002; Kuh, 2001; Ku and Hu, 2001; NSSE, 2001). Its impact is evident in the establishment and growth of the National Survey of Student Engagement (NSSE) as a new evaluative instrument for gauging best practices in post-secondary education that enhance student learning and development. For those who have been disgruntled with the usefulness of more traditional "input" models of higher education quality and concerned with accountability, greater attention to gauging best practices that enhance student learning represents an a welcome advance in defining and evaluating academic quality. In fact, even recent issues of the well-known college ranking guide published by U.S. News and World Report have included voluntary reports from some colleges and universities of specific NSSE results, including student reports on asking questions in class, receiving prompt feedback on coursework, having discussions with instructors outside of class, writing papers, and participating in research.

The theoretical and empirical roots of student engagement as a factor in student learning and development are strong and deep. Specifically, researchers and higher education leaders have given a great deal of attention to the concepts of student involvement (Astin, 1993), faculty-student interaction (Pascarella and Terenzini, 1991), and student academic and social integration (Tinto, 1975; Tinto, 1993; Spady, 1971) as explanations for the impact of college on students and predictors of student persistence and development. However, even though the concept of student engagement contains some complementary and shared characteristics with these concepts, student engagement

is anchored more directly in Chickering and Gamson's (1987) "Seven Principles for Effective Practice in Undergraduate Education" and focuses on the interactions and experiences that emerge from the interaction of individual students and institutions.

Concurrent with the rising interest in student engagement, resource management and the effective use of financial resources represent another broad area of concern for policymakers, the public, and college administrators. Data from the U.S. Department of Education's National Center of Education Statistics publication The Digest of Education Statistics (2003) suggests real increases in expenditures in recent years at colleges and universities, most notably in the institutional support (administrative) category (see Figures 1 and 2). Recent activity by the U.S. House Education and Workforce Committee (2003) also reflects a concern with rising college costs and may foreshadow policy changes or new requirements within the context of the Higher Education Reauthorization Act to enhance accountability for increased costs. Regional accrediting agencies (see Higher Learning Commission, 2004) also are focusing on more than institutional stability and financial security. They are asking institutions to provide evidence for student learning and success in fulfilling respective institutional missions. With heightened concerns about college costs, access, and impact on students and society, a better understanding of the potential links between institutional expenditures and student engagement represents an opportunity to enhance our understanding of the relationship between institutional characteristics and student engagement.

In spite of these two "800 pound gorillas" of student engagement and higher education finance in the room of higher education research and practice, relatively little work has been done to examine potential institutional resource effects on college student

involvement, interaction, or engagement. In fact, the vast majority of empirical research has focused on primary and secondary education (Hanushek, 1997; Hodas, 1993; Monk, 1992; Monk, 1993; Pritchett and Fulmer, 1997; Weglinsky, 1997). Over 30 years of research and debate about whether or not “money matters” has produced mixed findings at best. However, recent studies focused on higher education by Belfield and Thomas (2000) Ryan (2004), Smart, Ethington, Riggs and Thompson (2003), and Toutkoushian and Smart (2001) do lend some support to the idea that institutional expenditures impact students in a variety of important ways. However, none of these studies has examined the potential relationship between institutional expenditures and student engagement.

PURPOSE

This study seeks to extend the range of study of student engagement and address a gap in the research literature by exploring the relationship between institutional expenditures and student engagement. . In fact, a study by Kuh and Hu (2002) explicitly noted the need to better understand the institutional characteristics that may support or inhibit student engagement --especially institutional expenditures -- an area they report as a limitation of the same study. The conceptual foundation for this study outlines linkages between a) institutional resource decisions b) programming, institutional policies, and staffing that shape the institutional environment and c) the frequency and quality of student interaction, integration, involvement, and engagement as proposed in a conceptual framework outline by Ryan (2004).

The results of this study may be useful to both researchers and policymakers, especially within a constrained fiscal context, as both groups seek to better understand and address the challenge of enhancing student learning and development. The results

also may be useful for institutional leaders as they seek to develop policies and initiatives to support student engagement, enhanced learning, and effective use of financial resources. Lastly, this study also seeks to link two important areas within higher education research and explore the utility of including institutional expenditures in models of college impact. This kind of conceptual and empirical integration also may be of interest to NSSE as they relate to calculations and modeling used to produce the Student Engagement Index for individual institutional benchmark scores in various categories related to student engagement.

RESEARCH QUESTIONS AND HYPOTHESES

Given the overall purposes, this study sought to answer the following research questions:

1) Is there a relationship between institutional expenditures and student engagement?

2) Does the expenditure of financial resources in instruction, academic support, and student services exhibit a positive relationship with student engagement?

3) Does the amount of spending on institutional support (administration), including legal and business services, exhibit a negative relationship with student engagement?

4) What are the potential implications for higher education leaders, researchers, and policymakers?

5) Do the findings warrant further attention by researchers and the integration of expenditure variables in models of student engagement?

In light of these questions and prior research noted earlier, this study expected to find that institutional expenditures within colleges and universities have an impact on student engagement. Specifically, expenditures on instruction, academic support, and student services would have a positive relationship with student engagement and expenditures for institutional support (administration) would have a negative effect on

student engagement. The variety of factors that can influence institutional decisions regarding financial resources and budgeting were assumed to represent a “zero sum game” (a resource gain in one area necessarily leading to less of a gain or a loss in another area) among participants and decision-makers at a fixed point in time.

DATA AND METHODOLOGY

This study employed a non-experimental research design and multivariate ordinary least squares (OLS) regression based on data collected for 142 colleges and universities using SPSS version 11.0 for Macintosh OS X for statistical computations. The Integrated Postsecondary Education Data System (IPEDS) and voluntarily publicized National Survey of Student Engagement (NSSE) results from U.S. News and World Report’s “America’s Best Colleges” issues (NSSE survey years 2000-2002) served as the data sources.

From IPEDS, various student and institutional characteristics, specifically academic preparation and selectivity (entering cohort SAT 25th percentile average for 2001 and 2002), gender (percentage of undergraduate females), race/ethnicity (percentage of undergraduate minorities), age (percentage of traditional-aged students, 18-25), percentage of part-time undergraduate students, institutional size (full-time equivalent enrollment), institutional control (public/private), and percentage of non-science undergraduate majors (not majoring in physics, engineering, biology, or math) served as the control variables for the study. These variables represent some of the control variables that the NSSE Student Engagement Index uses to establish institutional benchmarks for participating institutions. The variables of interest were expenditures per full-time equivalent student in instruction, academic support, student services, and

institutional support. The expenditure data for fiscal year 1996 was the last year of final release data available prior to the change in accounting standards for private and public institutions. Also, Upcraft and Gardner (1989) identify the first year as critical to student adaptation to college and the 1995-96 academic year represents the first year for some senior student respondents in the NSSE data used here. Meisinger (1994) and Massy (1996) also point out the common use of incremental budgeting. Therefore, the use of expenditure data for fiscal year 1996 was appropriate for the purposes of this study. Descriptions for all variables are available in Table 1. Full-time equivalent student was calculated as follows:

$$\text{\# FTE Students} = \text{\# full-Time Students} + 1/3(\text{\# Part-Time Students}) \qquad (1)$$

The measurement of student engagement was more problematic. Given the complexity and multiple facets of the student engagement construct, this study employed principle components factor analysis with varimax rotation for responses to three sets of questions. The first set of item responses contained the percentage of respondents selecting "often" or "very often" to a variety of NSSE items voluntarily submitted to U.S. News and World Report. These questions items included:

1) Asked questions in class or contributes to class discussions
2) Worked with classmates outside of class to prepare assignments
3) Participated in a community-based project as part of a regular course
4) Discussed ideas from readings or classes with faculty outside of class
5) Received prompt feedback from faculty on academic performance

The second set of questions items for student engagement focused on the amount of writing students reported doing during the current school year. The response options for each item were “none,” “1-4,” “5-10,” “11-20, and” “21+.” The variables were calculated as a combined reported percentage of 5 papers or more for each individual question item. These question items included:

1) Number of papers fewer than 5 pages
2) Between 5 and 19 pages
3) 20 pages or more

The last set of question items required a “yes,” “no,” or “undecided” response to items asking students which of the following they had done or planned to do before graduation. The percentage of “yes” responses at each institution was used as the measure for each variable. These question items included:

1) Practicum, internship, field or co-op experience, or clinical assignment
2) Work on a research project with faculty member outside course requirements

Based on the factor loadings for each of these variables, four variables loaded at a sufficiently high level (above .6) to warrant inclusion as components of the student engagement factor. These items were a) asked questions in class or contributed to class discussions b) discussed ideas from readings or classes with faculty outside of class c) received prompt feedback from faculty on academic performance and d) number of papers written in the past year from 5-19 pages in length. Therefore, the factor score for student engagement was calculated using these four variables.

This study also employed a set of log transformations (using the natural log function) on the expenditure variables of interest. Economists routinely perform such

variable transformations on financial variables based on the principle of diminishing marginal productivity of inputs in production theory. Gujarati (1995) and Fox (1991) also recommend a series of regression diagnostics to detect certain violations of OLS assumptions. Therefore, the variance inflation factor (VIF) as an indicator of multicollinearity, a plot of standardized residuals for normality of the distribution of errors, and a scatterplot of standardized residuals and predicted values of the dependent variable for heteroskedasticity were produced and examined. The primary regression output included a model summary, the F statistic, regression coefficients (including standardized coefficients), t-statistics and p values, and partial correlations.

Lastly, this study calculated the selectivity/academic preparation variable by averaging IPEDS 2001 and 2002 institution reported scores for SAT and ACT at the 25th percentile for the freshman class. ACT scores for institutions that did not report a set of SAT scores were converted to SAT scores using an ACT to SAT concordance table (Macro, Abdel-fattah, and Baron, 1992).

RESULTS

According to the results, the model explained approximately 35.7% of the variation in student engagement ($R2$ = .357). The model also appeared to be a decent fit for the data based on the F statistic (7.514) and a significance of $p < .001$ (see Tables 2 and 3). Residual plots and the variance inflation factor did not indicate any violations of the assumptions of a) independence among the explanatory variables b) the normal distribution of errors, or c) the constancy of error variance.

The regression output (Table 4) provided the main results of interest in this study. Specifically, among the student and institutional control variables, only academic

preparation/selectivity (AVGSAT), the percentage of traditional-aged students (PERTRAD), and being a private institution (PRVT) had positive and significant relationships with student engagement (ENGAGE). AVGSAT and PERTRAD were significant at the .05 level and PRVT was significant at the .001 level. MINOR, PTUG, NONSCI, PERFEM, and AVGFTE were insignificant, with MINOR and AVGFTE the only non-significant variables that had a positive relationship with ENGAGE.

Among the expenditure variables of direct interest, INSTR, ACSUPP, and STDSRV were insignificant, although the relationship between INSTR and ENGAGE was positive. However, INSUPP had a negative and significant relationship with ENGAGE. In fact, it possessed the largest coefficient of any variable in the model and at a significance level of .001.

DISCUSSION AND IMPLICATIONS

What are the implications of the results in light of the research questions and hypotheses stated earlier? Based on the findings of this study, there does appear to be some evidence of a relationship between institutional expenditures and student engagement. In particular, administrative expenditures had a negative and significant relationship with student engagement. This result suggests that institutional decisions regarding the allocation of financial resources, various regulatory requirements, and established norms of institutional administration – all of which can contribute to higher administrative spending -- may contribute to lower levels of student engagement.

However, expenditures in the instructional, academic support, and student service categories did not have a significant relationship with student engagement. In fact, expenditures in academic support and student services, although insignificant, were

negative. Only instructional expenditures had a positive relationship with student engagement among these non-significant variables.

Within the context of previous research on the influence of institutional expenditures on students, this study could be described overall as providing some complementary and some contradictory results. However, it is important to keep in mind that this study focused on a different dependent variable, student engagement.

Astin (1993) reported that the percentage of educational and general expenditures devoted to student services has a positive effect on student perceptions and attitudes and the percentage of instructional expenditures has a similar, albeit more modest and indirect effect. Smart, Ethington, Riggs and Thompson (2002) concluded that instructional expenditures have a negative effect on students' leadership abilities and expenditures on student services have a positive effect. The authors concluded 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 Terenzini'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 effect on students. Ryan's (2004) findings also suggested a positive and significant relationship between expenditures in instruction and academic support and cohort graduation rates. Ryan also found a negative and insignificant relationship between administrative expenditures and degree attainment. 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 have been due to contextual differences between American and British higher education.

In spite of the results of this and other studies, the “how” and “why” of the relationships the results attempt to explore remain as important research puzzles for the research community. Further steps to establish and explore the more complex conceptual linkages between resources, institutional environment, institutional practices and programs, student experiences, and the impact of these interactions on students remain to be taken. However, the evidence thus far does lend some support to efforts by higher education leaders and the government to pursue strategies that enhance support for non-administrative functions. Although the specific needs and priorities of individual institutions are varied, the identification of empirical relationships between institutional expenditures and the variety of effects on student experiences and outcomes of the college experience may help to establish more sophisticated approaches to resource allocation and budgeting. “Empirical budgeting” may be a way of describing an approach for prioritizing and shaping higher education funding and spending. This approach may hold greater promise for enhancing the impact of higher education as opposed to traditional incremental and historical approaches that do not attempt to maximize return on educational investments as defined by institutional practices, student learning, and student development.

The findings in this study take on even greater importance in light of the broad expenditure trends suggested in Figure 1 and Figure 2. Institutional support expenditures have increased in real terms and as a percentage of total spending by colleges and universities since 1976. At the same time, financial support for instruction has remained

relatively flat over the same time period. These trends do not suggest the kind of resource allocation patterns and levels that may enhance student engagement and other college outcomes of interest to institutions, the government, students, and the general public. Ehrenberg's research (2000) concludes that these increased costs, as reflected in rising tuition, are not due to increases in faculty salaries but due in part to increased competition for certain services and amenities that appeal to students and contribute to perceptions of prestige. All of these issues may be of interest to the U.S. Congress as it devotes more attention to the pending Higher Education Reauthorization Act.

Lastly, the NSSE Project may want to consider incorporating institutional expenditures as control variables in the multiple regression model used to calculate institutional benchmark scores for the Student Engagement Index. A replication of this study could be done with the entire NSSE data set to establish actual expenditure and student engagement relationships that exist among participating institutions. This approach may improve the precision of predicted engagement scores.

LIMITATIONS

The results and conclusions of this study must be considered in light of certain limitations. The sample was non-random and determined based on a set of institutions that volunteered to publicize certain NSSE survey results from 2000, 2001, and 2002 in U.S. News and World Report. As a result, the sample size was limited as well.

Secondly, the availability of final release data on an annual basis was inconsistent. This study attempted to accommodate potential changes in variables over the time period of interest within the constraints of the available information form NSSE and IPEDS. Changes in accounting and financial reporting standards between public and private

institutions since 1996 also present a potential confounding influence on the meaning of expenditure data for future studies. This challenge should be addressed to ensure continued research in this important area of empirical and practical concern.

Third, the measurement of student engagement is challenging and complex. The question items used to calculate the factor for student engagement were limited to those reported to U.S. News and World Report. Hundreds of additional institutions have participated in NSSE in recent years and the information from those institutions would enhance studies of student engagement and its relationship to other variables, factors, and characteristics of institutions and students. The NSSE Project might provide a great service and enhance its impact by exploring the ability to simultaneously make NSSE data more available to researchers and protect institutional and student confidentiality. Lastly, although this study included a number of important control variables in the model, there may be other important variables to include in future studies.

CONCLUSION

This study examined the relationship between institutional expenditures and student engagement based on data from 142 colleges and universities. The results of an OLS multiple regression model, including a factor for student engagement as the dependent variable, suggest that administrative expenditures are negatively related to student engagement. These results support further exploration of potential complex causal links between expenditures and engagement and may provide support for initiatives to reverse historical trends and adjust institutional spending.

In terms of research development, this study suggests potential benefits from integrating various conceptual frameworks and areas of research interest such as student

engagement, higher education finance, and degree attainment into a more comprehensive model of college impact and quality. This advance will require additional study, patience, and enhanced collaboration among different groups of researchers. However, the stakes for the future of higher education and the potential benefits for students and society more than justify our concerted effort.

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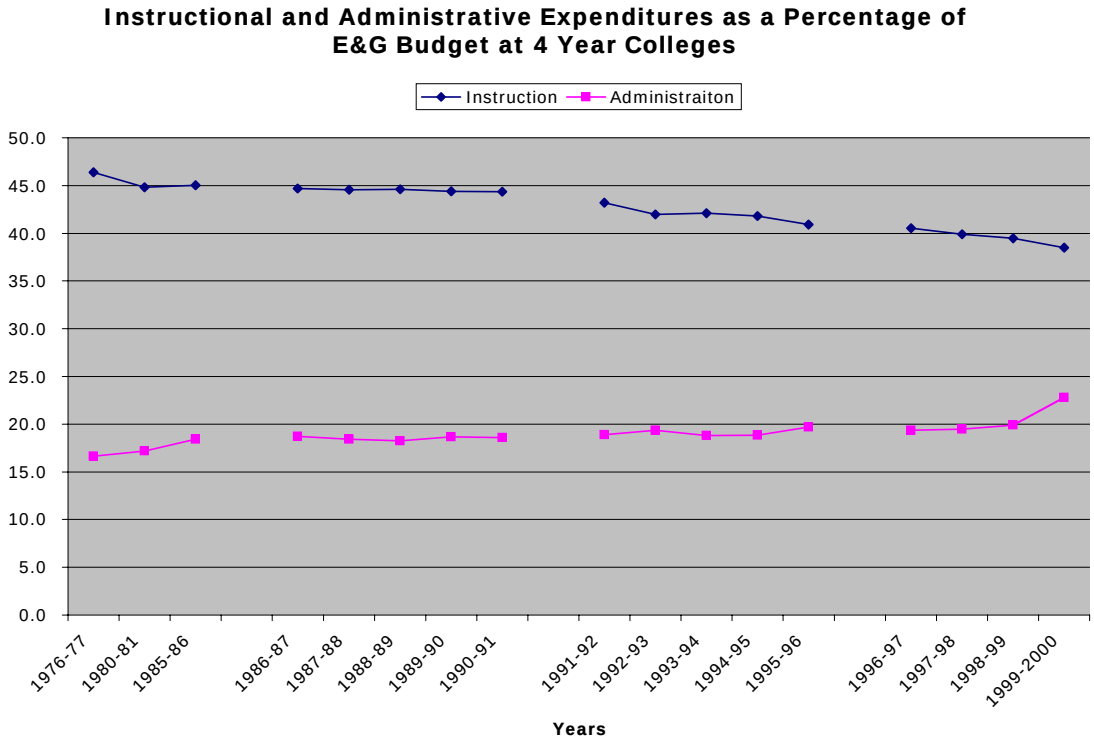
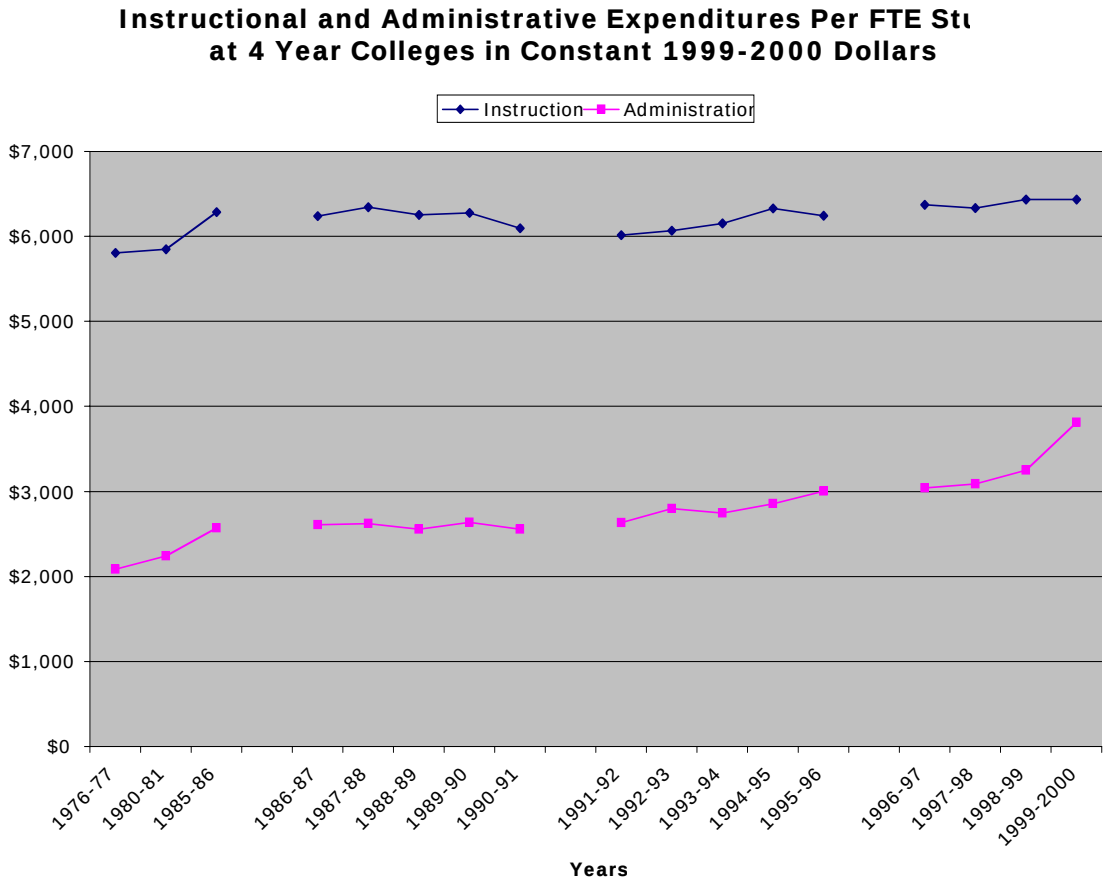
TABLE 1. Variable Descriptions and Data Sources

VARIABLE	DESCRIPTION	TRANSFORMATION	SOURCE
ENGAGE	Student engagement (most recent)	Factor	NSSE (USNWR) 2000, 2001, 2002
MINOR	Minority student FTE percentage (undergrad)	None	IPEDS 2002
AVGSAT	Entering class SAT 25%ile average	ACT conversion	IPEDS 2001, 2002
PTUG	Part-time student percentage (undergrad)	None	IPEDS 1996, 2001, 2002
NONSCI	Non-science majors FTE percentage (undergrad)	None	IPEDS 2002
PERTRAD	Traditional age students FTE percentage (18-25 yrs undergrad)	None	IPEDS 1996, 2001, 2002
PERFEM	Female student FTE average percentage (undergrad)	None	IPEDS 1996, 2001, 2002
PRVT	Private/public control	Private = 2 Public = 1	IPEDS 2002
AVGFTE	FTE student enrollment Average	None	IPEDS 1996, 2001, 2002
INSTR	Instructional expenditures per FTE student	Natural log	IPEDS 1996
ACSUPP	Academic support expenditures per FTE student	Natural log	IPEDS 1996
STDSRV	Student service expenditures per FTE student	Natural log	IPEDS 1996
ADMIN	Institutional support expenditures per FTE student	Natural log	IPEDS 1996



Source: Digest of Education Statistics, 2002 (National Center of Education Statistics).

Figure 1. Instructional and administrative expenditures as a percentage of E&G budget at 4 year colleges



Source: Digest of Education Statistics, 2002 (National Center of Education Statistics).

Figure 2. Instructional and administrative expenditures per FTE students at 4 year college in constant 1999-2000 dollars

TABLE 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.641 [a]	.411	.357	.76276832	2.271

a. Predictors: (Constant), ADMIN, NONSCI, MINOR, ACSUPP, PTUG, PERFEM, AVGFTE, AVGSAT, PRVT, PERTRAD, STSRV, INSTR

TABLE 3. ANOVA Table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.460	12	4.372	7.514	.000 [a]
	Residual	75.054	129	.582		
	Total	127.514	141			

a. Dependent variable: ENGAGE

TABLE 4. Expenditures and Engagement Model Regression Results (coefficients, standardized coefficients, t statistics, exact significance, levels of significance, partial correlations, and collinearity statistics; n = 142)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.589	1.890		.841	.402					
	MINOR	3.032E-03	.004	.058	.696	.487	-.242	.061	.047	.666	1.501
	AVGSAT*	2.247E-03	.001	.263	2.474	.015	.442	.213	.167	.404	2.477
	PTUG	-8.038E-03	.007	-.123	-1.134	.259	-.460	-.099	-.077	.390	2.567
	NONSCI	-.186	.250	-.052	-.746	.457	-.157	-.066	-.050	.922	1.085
	PERTRAD*	1.473	.596	.252	2.474	.015	.469	.213	.167	.438	2.283
	PERFEM	-.663	.571	-.091	-1.162	.247	-.287	-.102	-.079	.746	1.340
	PRVT***	.671	.202	.351	3.329	.001	.129	.281	.225	.410	2.440
	AVGFTE	5.525E-06	.000	.040	.445	.657	.083	.039	.030	.566	1.766
	INSTR	.130	.269	.052	.482	.630	.116	.042	.033	.393	2.546
	ACSUPP	-5.512E-02	.179	-.029	-.307	.759	.082	-.027	-.021	.504	1.982
	STDSRV	-7.787E-02	.170	-.049	-.458	.648	.069	-.040	-.031	.401	2.494
	ADMIN***	-.652	.186	-.390	-3.505	.001	-.131	-.295	-.237	.368	2.719

*p < .05, ***p < .001