Analysis of Expenditure Patterns in Higher Education Institutions and Student Graduation and Retention Rates

by

Essam Abouzeida

Administration

A dissertation submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Doctor of Philosophy

Auburn, Alabama
August 2, 2014

Keywords: higher education, expenditures, resource allocation, performance, graduation rates, retention rates

Approved by

James E. Witte, Chair, Professor of Educational Foundations, Leadership and Technology
Maria M. Witte, Associate Professor of Educational Foundations, Leadership and Technology
David C. DiRamio, Associate Professor of Educational Foundations, Leadership and Technology

Abstract

Within a challenging environment of financial hardships and budget cuts, higher education institutions have been struggling to maintain the balance between quality and productivity using the available resources while answering to calls for more accountability and proof of effective and efficient institutional performance. This study explored the relationship between institutional expenditures and graduation and retention rates as indicators of institutional performance. Stepwise multiple regression analyses were conducted to examine this relationship in twelve stratified samples of four-year-or above higher education institutions characterized by institutional control (public and private-not-for-profit) and Carnegie classification 2010 (doctorate, master's, and baccalaureate granting institutions).

Results of this study indicated that institutional expenditures significantly predicted graduation and retention rates in all stratified samples. Instruction and academic support contributed positively to graduation and retention rates in majority of the samples while research expenditures contributed positively mainly in doctorate granting institutions. Institutional support expenditures contributed negatively to graduation and retention rates in majority of the stratified samples while, and to a less extent, public services and other expenditures contributed negatively only in some samples. Student services expenditures showed weak and conflicted contribution to graduation and retention rates in few samples and no contribution in majority of the samples. Findings of this study have important implications for institutional leaders and decision makers

in regard to adjusting resource allocation patterns and investing in areas that help improve graduation and retention rates.

Dedication

To my wife, Maysaa. It is never too late.

Acknowledgments

I would like to express my sincere appreciation to Professors James Witte, Maria Witte, and David DiRamio for the enduring assistance they provided to support me throughout the different phases of this educational journey. Thank you all for your kind support all this time.

Table of Contents

List of Figures

List of Tables

CHAPTER 1: INTRODUCTION

In a recent state-of-the-union, February 2013, President Obama addressed the issue of cost and value in higher education and called for changes to the criteria accreditors use to evaluate higher education institutions. He asked the Congress to require accreditors either to play a bigger role in measuring the cost and value of higher education or to establish a new alternative system of accreditation that would be based on performance and results (Nelson, 2013).

This recent call by the President, for acquiring measures of cost and value in higher education came in agreement with increased pressure imposed by accreditation agencies on higher education institutions to introduce accountability measures that link institutional outcomes with expenditures allocation (Shin, 2010). Also, as the costs and price of higher education continue to rise, the public and policymakers are demanding higher education institutions put more efforts to enhance the use of their financial resources efficiently and effectively. There is a common critique that the American system of higher education is inefficient and wasteful (Gansemer-Topf, 2004). This critique is a reflection of higher education costs at rates that are higher than costs of the U.S. economy as a whole (Powell, 2009).Higher education institutions are being asked to prove their accountability for the resources received and the outcomes achieved using these resources.

Measuring inputs and outcomes in higher education is not a simple task and institutions cannot be solely held responsible because some of these inputs and outcomes may be out of the

control of the institutional governance (Gansemer-Topf, 2004).However, innovative researchers would be able to introduce models to measure efficiency and productivity of higher education institutions using the available institutional data. One research direction would be to investigate the relationship between financial resource allocation within the institution and some measurable institutional goals such as higher retention and graduation rates. Retention rate is an indicator of the efficiency of the institution in keeping its students within the institution, especially after their first year in college. According to Gansemer-Topf (2004) students are most likely to drop out during their first year at the institution. On the other hand, graduation rate is an indicator of how well the institution is capable of helping its students to achieve their goal of completing a college degree. It is the most important indicator commonly used by state higher education governing bodies to measure institutional performance (Cantrell, 2006).

There are several studies in literature that attempted to investigate the relationship between institutional expenditures and student academic achievement. Ryan (2004) examined the relationship between institutional expenditures and degree attainment in baccalaureate conferring colleges. Results of the study suggested a positive and significant relationship between instructional and academic support expenditures and graduation rates in these colleges. In another study, Gansemer-Topf & Schuh (2006) examined factors that contribute to retention and graduation. Results of the study suggested that institutional selectivity and institutional expenditures that directly contributed to students' academic achievement were found to contribute significantly to retention and graduation rates.

Problem Statement

There is a limited amount of research that has investigated the relationship between institutional expenditures and institutional performance of higher education institutions in regard

of being efficient, productive, and accountable in the use of financial resources. There are some measurable institutional goals that are commonly used as indicators of institutional performance such as first-year retention and six-year graduation rates (Promades, 2012). There is a need to explore how much the different components of institutional expenditure affect such performance indicators. This study aimed at fulfilling this need and providing a better understanding of resource allocation patterns that might be related to improved retention and graduation rates in different types of higher education institutions in the U. S.

Purpose of the Study

The purpose of this study was to identify the components of institutional expenditures that may, or may not, be correlated to first-year retention and six-year graduation rates in 4-year or above public and not-for-profit private institutions in the U. S. Also, the Basic Carnegie classification 2010 (NCES, 2013) was employed in the study to examine the relationship, if any, between institutional expenditures and retention and graduation rates based on this classification.

Significance of the Study

In an environment of economic challenges and budgetary constraints, higher education institutions are required to reconsider their patterns of resource allocation in order to achieve their institutional goals and improve their institutional performance within the available financial resources. This study investigated the impact of resource allocation on retention and graduation rates as indicators of the institutional success to be efficient, effective and productive. Results of the study may be utilized as guidelines for new resource allocation patterns that help improve retention and graduation rates. The findings of this study will provide information that would help leaders and decision makers to optimize and justify allocation of resources within the institution.

Conceptual framework

The conceptual framework of this study followed the logic of Astin's model of Input-Environment-Outcome (I-E-O) in educational assessment (Astin, 1991). Astin's model proposes that any educational assessment project should include data on student inputs (e.g., personal qualities, SAT scores, socioeconomic status, etc.), student outcomes (e.g., gained knowledge, developed talents, graduating, etc.), and the educational environment to which the students are exposed during the educational program (e.g., teaching methods, facilities, programs, etc.). Proper assessment should not rely on analyzing only inputs and outcomes while neglecting the effect of the educational environment on the resulting outcomes. In fact calculated changes in the educational environment might lead to more enhanced outcomes "if we know that a particular teaching method or particular curriculum is better than others, we are in a much better position to utilize such findings in designing educational environments that will produce more favorable outcomes in the future" (Astin, 1991, p. 22).

A similar analogy was adopted in this study where the goal was to investigate, on the institutional level, the relationships between inputs and outcomes within a certain environment. In this study, the inputs were the institutional characteristics (private-not-for-profit or public 4-year or above institutions and Carnegie classification 2010), the outcomes were first-year retention and six-year graduation rates, and the environment was the resource allocation and expenditure patterns of the institutions.

Research Questions

The study sought to answer the general question of what are the expenditure components, if any, that contribute to first-year retention and six-year graduation rates in four-year or above institutions? This general question can be detailed in the following research questions:

1. Which combination, if any, of expenditure components (as percentages of total core expenses) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?
2. Which combination, if any, of expenditure components (per FTE student) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?
3. Which combination, if any, of expenditure components (as percentages of total core expenses) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?
4. Which combination, if any, of expenditure components (per FTE student) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Definition of Terms

The major terms used throughout this study are listed below with brief definitions that were based mainly on the online glossary definitions provided by the National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System (IPEDS) (NCES, 2013). A list of the full definitions of terms and variables used in this study was reported in Appendix A.

Six-year Graduation rate: percentage of first-time, full-time degree-seeking students who graduated within a six year period (150% of normal time) with respect to the cohort.

First-year retention rate: percentage of freshmen students who re-enrolled at the institution for a second year.

Full time equivalent (FTE) students: enrollment number of full-time undergraduate students added to a one-third of number of part-time students.

Instruction expenditures: all expenses of the colleges, schools, departments, and other instructional divisions of the institution.

Research expenditures: all expenses for activities specifically organized to produce research outcomes.

Public service expenditures: all expenses for activities established to provide noninstructional services to individuals and groups external to the institution.

Academic support expenditures: all expenses for activities and services supporting the institution's missions of instruction, research, and public service.

Student services expenditures: all expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to student emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program.

Institutional support expenditures: all expenses for the day-to-day operational support of the institution.

Assumptions

The main assumption in this study was that the data provided online by the Integrated Postsecondary Education Data System on the IPEDS website are accurate enough to represent the actual educational and financial status of the higher education institutions under consideration.

Limitations

This study is limited to the targeted population of four-year or above institutions characterized by institutional control (public or private-not-for-profit) and Carnegie classification (doctorate, master's, and baccalaureate granting institutions). The findings of this study may not apply to institutions of other categories such as community colleges, private-for-profit institutions, associate colleges, special focus institutions, and tribal colleges.

Summary

Within a challenging environment of financial hardships, higher education institutions have been required to prove their accountability for the resources received and the outcomes achieved using these resources. The purpose of this study was to investigate the relationship between institutional expenditures and graduation and retention rates in different types of four-year or above higher education institutions characterized by institutional control (public and private-not-for-profit) and Carnegie classification 2010 (doctorate, master's, and baccalaureate granting institutions). Chapter 2 included an overview of the literature and research related to institutional expenditures and performance indicators. Chapter 3 described the methods utilized

to conduct the study. Chapter 4 presented the results and findings of the study. Chapter 5 presented the conclusions of the study and discussed the implications of the findings for institutional leaders.

CHAPTER 2: LITERATURE REVIEW

> "Higher education is entering a period of change that will challenge most institutions and widen the performance gap between constituent segments. The shift will also create an exciting set of opportunities for those prepared to benefit from this period of change." (Janson & Bielak, 2008)

Overview of higher education institutions

American higher education has been evolving throughout history in order to maintain its fundamental role in society in preparing individuals to be informed active citizens and creating an innovative environment that fosters ideas and activities needed for the development of strong and competitive economy in a global setting (Bordelon, 2012). Different social, political, and economical elements have influenced, either directly or indirectly, the complex process of shaping American higher education. The federal government has been providing political and financial support to higher education since the middle of the 19th century. For example, the Morel Acts of 1862 and 1890 allowed the establishment of land grant colleges, to support agriculture and mechanical education, and Historically Black colleges and Universities (HBCUs), to provide access for black citizens in higher education. Also, the GI bill in 1944 and the Education Amendments of the early 1970's have provided opportunity to expand access to higher education through federal financial aid (Wegner & National Center for Public Policy and Higher Education, 2008).

With the availability of financial aid and improved access conditions, higher education became a fundamental right for all citizens regardless of social status, color, gender, or income level (Bordelon, 2012). Accordingly, the number of higher education institutions expanded especially through the last quarter of the 20th century and the first decade of the 21st century. In 2011, there were about 6700 higher education institutions serving over 21 million undergraduate and graduate students (Knapp *et al*, 2012). Higher education institutions vary in different ways such as mission, size, student demographics, history, revenue and spending patterns, and institutional control (public or private).

With the growing arena of American higher education, significant forces for change are also growing and reshaping the landscape of higher education is inevitable. Constrained budgets, global competition, changing demographics, new technologies, and demands for accountability are some of these forces of change that may be looked at as threat to higher education or opportunity for reinvention (Goldstein *et al*, 2006). Jansen and Bielak (2008) identified five major trends that are changing the landscape of higher education. These trends are:

1. Growth of nontraditional students attending schools such as online, part-time, and adult students which would require higher education institutions to reconsider the traditional notions of where, when, and how students will learn.
2. Growing gap between price and revenue where the administrative and instructional costs are overgrowing tuition and fees and government-supported research funding.
3. New paradigm competitors in the form of virtual campuses and for-profit institutions which have been gaining more credibility and acceptance of employers and the society.

4. Globalization and emerging international markets for higher education institutions which are competing across boarders for faculty and students while facing new challenges of creating decentralized academic departments and international enrollment units.
5. Answering to the issues of affordability, accessibility and accountability to enhance the performance of higher education institutions through processes that measure productivity and learning outcomes.

All these trends and forces for change are directing higher education institutions toward adopting untraditional approaches in search of improvement. They need to be able not only to maintain their balance in such complex and demanding environment but also to improve their academic and educational processes and meet the societal high expectations for the role of higher education in shaping the future of this nation. Effective deployment of financial resources for higher education institutions is a crucial aspect of management under the current pressuring economic environment (Hamrick *et al*, 2004 and Webber, 2012). Meanwhile, exploring evidences for efficiency, productivity and accountability can provide indicators for the different constituents in the American higher education of how successful the institutions in managing financial resources to improve their performance (Ehrenberg & Webber, 2010 and Bound & Turner, 2006).

Financial resources and spending patterns in higher education institutions

There is a common financial model in colleges and universities where there are two different budgets, operating and capital budgets (Delta Cost Project, 2009). The main funding sources for each of these two budgets are different. For the operating budget, the main funding sources are tuition and fees, local and state appropriations, endowment income, and federal

funds. For the capital budget, the main funding sources are private gifts and donations, bond revenues, and state and federal capital outlay appropriations. These two budgets are usually separated because of the differences in their revenue sources and time for cost benefits. Most of the studies on financial and cost analysis among higher education institutions are focusing mainly on the operation budget (Delta Cost Project, 2009). It should be mentioned that, in some cases, there could be limitations on colleges and universities on where to allocate and spend the money. For example, federal contract and grant money provided to higher education institutions are usually restricted to research or public service expenses. In some institutions, revenues of auxiliary enterprises such as hospitals and dormitories are mainly used to self-support the enterprise rather than the operating budget of the institution (Delta Cost Project, 2009).

All higher education institutions report their spending using categories of expenses based on the standard formats of the federal government's Integrated Postsecondary Education Data System (IPEDS). These standard categories are: instruction, research, public service, academic support, student services, institutional support, and other expenditures (detailed definitions of these categories are listed in Appendix A). The standard formats of spending categories allow for comparison between different types of institutions along different periods of time (Delta Cost Project, 2009).

The 2010 economic recession "has caused a fiscal crisis in both public and private higher education that is unmatched in recent memory. Institutions' attention is focused on what they can cut out of their budgets" (p. 36, Ehrenberg & Webber, 2010). In such an economic environment, it becomes critical for higher education institutions to make the most efficient use of their financial resources (Webber, 2012). A survey conducted by the Council of Higher Education Management Associations (CHEMA) on 190 administrative leaders from different institutions

concluded that 60.5% of them expected financial constraint to be the most significant driver of change for the future of higher education institutions while more than 40% of them considered insufficient financial resources to be one of the largest threats facing higher education institutions (Goldstein *et al*, 2006).

The performance-spending challenge in higher education

Among the challenges facing the future of higher education institutions is the ability to improve levels of performance with the available constrained financial resources (Kelly *et al*, 2007). Institutions are increasing tuition in response to government regulations and the higher cost of the education process while, on the other hand, the government is cutting back on support and financial aid claiming that institutions need to be more efficient and productive (Goldstein *et al*, 2006). The 2006 report from the U.S. Secretary of Education's Commission on the Future of Higher Education (Department of Education, 2006) raised concerns about the "lack of clear, reliable information about the cost and quality of postsecondary institutions, along with a remarkable absence of accountability mechanisms to ensure that colleges succeed in educating students" (p. vii). The report also recommended that institutions "must become more transparent about cost, price, and student success outcomes, and must willingly share this information with students and families" (p. 4). There is a widespread public support for higher education and a growing awareness of its importance to the future of the country. Yet, there is also a common believe among the public that higher education institutions are spending money in ways that serve their self-interests rather than help student to learn and, accordingly, that institutions could reduce spending without hindering the quality of education (Wellman, 2010). Surveys conducted with elected officials, community leaders, politicians, and other opinion leaders indicated that they believe that institutions are either unwilling or unable to manage costs and that institutional

prestige often has a higher priority than meeting public needs. They demanded institutions give more attention to cost management and productivity rather than to increase funding (Wellman, 2010).

The Delta Cost Project report (2009) anticipated that the financial system of higher education would be hard to endure the current economic environment where there are notable signs of "greater demand for student aid, tightening loan availability, dips in endowment assets and earnings, rising costs of debt payments, and deep state budget cuts" (p. 5). Despite the continuous increases in tuition every year, which is a burden on students and their families, it is expected that most institutions would still have to face deficits that might lead to the need of deep spending cuts. Instead of allowing the funding crisis to be used as a justification for rollbacks in access or quality, institutions leaders and policy makers need to make strategic plans not only to create new revenues but also to improve management of costs through reallocation of existing resources. They need also to convince the public and politicians that higher education must be a priority for their continued investment. This would require better data about college spending and comparative analyses relating spending to performance. The report demanded that every institution "should be able to tell students, boards and legislatures basic facts about where the money comes from, where it goes, and what it buys" (Delta Cost Project, 2009, p. 6).

Kelly (2009) addressed the topic of performance relative to funding by adopting an approach to gauge the productivity of different types and systems of higher education institutions across all states, measured mainly by credentials awarded, relative to the resources and funding they have. Findings of the study were not conclusive enough to determine if these institutions were over- or underfunded since it was found that some perform better than others with the same resources. Yet, the study challenged the argument that more funding always leads to better

performance. In another study, Auguste *et al* (2010) proposed a set of five practices that would improve productivity in higher education institutions without restricting access or compromising educational quality. These practices are: systematically enabling students to reach graduation, reducing nonproductive credits, redesigning the delivery of instruction, redesigning core support services, and optimizing non-core services and other operations. These practices were found to contribute to raising the rate at which students complete their degrees and reducing cost per student in some institutions characterized by high levels of productivity (Auguste *et al*, 2010).

Accountability and institutional performance indicators

Calls for greater accountability in higher education institutions have increased during the past several decades fueled by concerns of stakeholders about what institutions are accomplishing in terms of quality education and whether they effectively utilize their resources to promote student learning (Porter, 2012; Pike *et al*, 2011; Bordelon, 2012). The focus of accountability has shifted from input measures such as enrollment or students SAT scores (Porter, 2012) to output measures such as student learning outcomes, time to degree completion, and employment (Bordelon, 2012). To address the calls and demands of greater accountability, it is important to define the critical components and learning outcomes of higher education.

Regional accreditation is one mechanism that has been implemented in the United States to assess the quality of institutional performance and to ensure accountability of higher education institutions (Bordelon, 2012). In order for a college degree to be recognized, it must be awarded from a regionally accredited institution that should meet recognized standards of institutional performance. There are five regional accrediting bodies which are approved as regional accreditors by the federal government: the Higher Learning Commission of the North Central Association of Schools and Colleges (HLC), The Southern Association of Schools (SACS),

Middle States Commission on Higher Education (MSCHE), New England Association of Schools and Colleges Commission on Institutions of Higher Education (NEASC-CIHE), and Western Association of Schools and Colleges Accrediting Commission for Senior Colleges and Universities (WASC-ACSCU) (Bordelon, 2012). Through the mechanism of regional accreditation, institutions are required to provide appropriate and measurable indicators for both inputs and outcomes related to the learning process. Yet, to answer calls for greater accountability, institutions need to focus mainly on the outcomes not only by identifying indicators of those outcomes but also by developing and implementing meaningful assessments that are related to institutional performance measures (Bordelon, 2012).

Graduation and Retention rates:

Graduation and retention rates are considered as the most important indicators for the success and effectiveness of higher education institutions (Hamrick *et al*, 2004; Archibald & Feldman, 2008; Gansemer-Topf & Schuh, 2006; Kelly, 2009; Horn, 2006; Cook & Pullaro, 2010; Cook & Hartle, 2011; Gold & Albert, 2006). They measure both student and institutional success in fulfilling the goals of pursuing and completing a college degree (Gansemer-Topf & Schuh, 2006). Within the states and institutional efforts to develop measures of accountability for higher education, Horn (2006) stated that "the only systemwide performance measures currently available are graduation and retention rates collected by the U.S. Department of Education" (p. 1). Archibald & Feldman (2008) stated that for state governments "graduation rates are the most frequently used performance measure for public colleges and universities" (ps 80-81). Cook & Pullaro (2010) reported that "among 23 criteria of institutional quality, high school seniors chose graduation rates as the fifth most important indicator of institutional quality, ahead of factors

such as graduate school placement, a rigorous core curriculum, existence of an honors program, and college rankings in U.S. News & World Report and other college guides" (p. 2).

Graduation rates are performance measures of completion. They are easy to understand by the public and policymakers since they answer the simple yet common question about the percentage of graduating students (Kelly, 2009). Gathering data about graduation rates is a relatively new practice for colleges and universities in the United States. In fact, before 1985, there have been no national records on graduation rates at higher education institutions (Cook & Pullaro, 2010). In 1985, the National Collegiate Athletic Association (NCAA) required its member schools to collect and report graduation rate data in order for the association to be able to evaluate and compare the academic performance of athletic students with the rest of students. It should be mentioned that these data were available only to NCAA members and not for the public. In 1990, the Student Right-to-know and Campus Security Act was the first to require all higher education institutions that receive Title IV funds (Student Assistance) to disclose data on graduation rates in an annual report to be submitted to the Secretary of Education. Graduation rate data were collected by the U.S. Department of Education in 1996 (Cook & Pullaro, 2010).

Graduation rates are calculated based on freshmen who enroll in the fall as full time students and who have never attended college before. This definition imposes several limitations and shortcomings on the use of graduation rate as a measure of completion since it eliminates students who return to school after dropping out or those who enroll for the first time in the spring. It does not account also for students start their enrollment as part-time or transfer students or those who transfer to other institutions before graduating despite the evident signs that there is an increasing number of students who enroll in multiple institutions through their

course of completing their college degree (Kelly, 2009; Horn, 2006). Such students would be considered as dropouts in all institutions they attended.

There are also concerns that focusing on retention and graduation rates might force institutions to be more selective when it comes to enrollment of low-income and disadvantage students who are usually less academically prepared (Knapp *et al*, 2011). Cook and Hartle (2011) raise concerns about comparing graduation rates in different institutions to measure institutional effectiveness without taking into account the diversity of students' academic and economic background. Astin (1997) called for care in interpreting retention and graduation rates to assess institutional performance or accountability without taking student input characteristics into consideration. He used data on some student characteristics (such as high school grades, admission test scores, and racial and gender composition) to generate formulas that estimate retention and graduation rates. Astin suggested that institutions might compare these estimated rates with actual ones in order to assess their institutional performance (Astin, 1997). Gold and Albert (2006) raise concerns about the concept of rewarding or punishing institutions based on their graduation rates. Institutions of higher graduation rates are assumed, according to this concept, to be doing a good job and should be granted with more financial rewards while on the other hand some funding should be withdrawn from institutions which are not doing well by this measure. This might encourage institutions to "stop serving students who are likely to have problems in persistence; alternatively, it could create an incentive to lower academic standards to ensure that graduation rates stay high" (Gold & Albert, 2006, p. 92).

Expenditure patterns and institutional performance indicators

> "American higher education is being challenged as never before by the imperative to increase postsecondary access and degree attainment despite declines in funding. The challenge is made all the more daunting because of the rapid changes in student demographics. Meeting these challenges without harming quality will require unprecedented attention to the intersection of resource use and performance. Almost every institution is currently struggling to find ways to restructure its costs, a painful exercise that requires hard thinking about priorities and spending. Institutional and policy leaders are asking for guidance, and for data that tells them something about how to focus scarce resources in areas that make the biggest difference in access, attainment, and learning outcomes." (Wellman, 2010, p. 3).

Though access to higher education institutions has dramatically increased over the past three decades in the United States (Bound *et al*, 2009), more access is required to meet the economy's increasing demand for educated workers in the 21st century. A report prepared by the Center on Education and the Workforce has anticipated that by 2018, about two-thirds of the job openings in the U.S. will require some form of education beyond high school which is almost double the ratio a generation ago (Reindl & Reyna, 2011). This increase of access and enrollment in higher education is expected to be mainly among historically disadvantage groups of students who usually have problems of completing their degrees such as working adults, low-income students, and students of color. Meanwhile, higher education institutions will be

competing for the already squeezed state appropriations with other sectors such as health care and pension liabilities which might result in more cuts in their budgets (Reindl & Reyna, 2011). These challenges require for the institutions to effectively manage financial resources while improving student outcomes and institutional performance. Questions of cost-effectiveness in higher education institutions and the difference that money does, or does not, make in getting students complete their degrees with acceptable levels of learning outcomes are being addressed in literature (Wellman, 2010). Yet it should be mentioned that research linking institutional expenditures to student and institutional success have had some conflicting results (Gansemer-Topf & Schuh, 2006) as reported below.

Hayek (2001) examined linkages between institutional expenditures and student-center high performance in 106 public and private four-year colleges and universities. Data were collected mainly from the IPEDS datasets and the College Student Experiences Questionnaire (CSEQ) national database for years 1990 to 1999. In this study, each institution in the study was assigned an overall high performance score based on five scales of student engagement obtained from the CSEQ: academic and intellectual quality of effort, social and personal quality of effort, reading and writing, college satisfaction, and college environment. Expenditure categories included in the regression model included research, instruction, public service, academic support, student services, institutional support, scholarships, and auxiliary enterprise expenditures. Findings of the study showed strong positive relationships between high performing institutions and scholarships, student services, and institutional support expenditures.

Smart, Ethington, Riggs, & Thompson (2002) examined the relationship between expenditure patterns and development of student leadership competencies. Data for institutional expenditure patterns were collected from IPEDS while data for student leadership competencies

were obtained from the 1986 and 1990 surveys of the Cooperative Institutional Research Program (CIRP) sponsored by the University of California. The sample in these two surveys contained 4408 students attending 360 different institutions. Students completed the CIRP freshmen survey while entering college in the fall of 1986 and the follow-up survey in the winter of 1990 which provided information on students' perceptions of their college experiences during the four years period between the two surveys. The study contained measures for percentage of institutional expenditures in the categories of instruction, academic support, and student services expenditures. Measures obtained from the 1986 survey represented students' background characteristics such as perceptions of their leadership abilities as freshmen, importance of developing leadership competencies, and family socioeconomic status. Measures obtained from the 1990 survey represented actual college experiences such as selecting an enterprising academic major (e.g., business administration, communications, industrial engineering, and computer science), involvement in leadership activities, importance of student development as a priority of the institution, and student estimates of their leadership abilities four years after entering college. Findings of the study suggested that instructional expenditures had a statistically significant positive effect on the development of students' leadership competencies, while student services expenditures had a statistically significant negative effect.

Hamrick, Schuh, & Shelley (2004) incorporated institutional expenditures and institutional characteristics into a multiple regression statistical model to predict graduation rates. Data for the study were collected from IPEDS for the year 1997-1998 for 444 public institutions that grant at least a baccalaureate degree. Categories of institutional expenditures included in the model were: instruction, student services, institutional support, physical plant, library, academic support minus library, and total education and general (E & G) expenditures. Institutional

characteristics included in the model were: Carnegie classification (research, doctoral, masters, and bachelors I & II institutions), region, presence of medical/dental or similar school, being a historically black college or university (HBCU), degree of urbanization, and selectivity of admissions (collected from U.S. News & World Report for the year 1999). Results of the study suggested that among the institutional characteristics that contributed to the prediction of higher graduation rates were higher status within the Carnegie classification (research institutions), more urbanized location, presence of a medical/dental or similar programs, and more selectivity of admissions. As for institutional expenditures, results of the study indicated that instructional, library, and academic minus library expenditures were found to be significantly related to graduation rates.

Ryan (2004) investigated the impact of institutional expenditures on 6-year graduation rates at 363 Carnegie-classified Baccalaureate institutions using data collected from the Integrated Postsecondary Education Data System (IPEDS) for the year 1996. The study used the ordinary least squares regression method with a statistical model that included expenditures per full-time student in only four categories: instruction, academic support, student services, and institutional support. The model also included control variables for certain characteristics of student (such as academic preparation, living on campus, gender, ethnicity, and age) and of institutions (such as institutional size, affiliation, and control). Results of the study suggested a positive and significant relationship between instructional and academic support expenditures and graduation rates while student services and institutional support expenditures were found to have insignificant effect on graduation rates. Also, the results suggested that minority and nontraditional students were found to be facing challenges to complete a degree and that living on campus and institutional size have a positive effect on degree attainment. The study

concluded 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” (Ryan, 2004, p. 111). In a subsequent study, Ryan (Ryan, 2005) examined the relationship between institutional expenditures and student engagement based on data collected for 142 colleges and universities for the years 2000, 2001, and 2002. In this study, measurement of student engagement were based on student answers to questions related to class preparation and participation, writing papers, research projects, and internships. Results of the study suggested that institutional support expenditures had a negative and significant relationship with student engagement but instructional, academic support, and student services expenditures did not have a significant relationship with student engagement.

Gansemer-Topf, Saunders, Schuh, & Shelley (2004) investigated whether spending is related to student engagement and learning. Data were collected for institutions selected for the Documenting Effective Educational Practices (DEEP) study. These DEEP institutions were selected because they have achieved higher than expected results for graduation rates and scores on the National Survey of Student Engagement (NSSE) compared to their peer institutions. The total number of DEEP institutions was 19 institutions while the number of peer institutions was 905 institutions categorized by the Carnegie classification as: private baccalaureate, public baccalaureate, public masters, and public doctoral institutions. The purpose of the study was to determine if there were differences in resource patterns between DEEP institutions and their peer institutions. The study also aimed at investigating differences between DEEP and Non-DEEP institutions in regard to some institutional characteristics (such as selectivity, percentage of students living on campus, and size of community in which the institution is located) which were

found to be factors associated to higher rates of student engagement. Data were collected from IPEDS for years 1992, 1997, and 2002 for the expenditures categories of instruction, academic support, student services, institutional support, and institutional grants (scholarships). The study used one-way analysis of variance (ANOVA) to compare the data of DEEP and Non-DEEP institutions. The general conclusion of the study was that there were no significant differences between DEEP institutions and their peers in all examined variables regarding expenditures patterns and institutional characteristics. This conclusion suggested that more spending does not necessarily improve student engagement and learning and that the DEEP institutions might be "embracing organizational behaviors and cultures that surpass investments of financial resource allocation" (Gansemer-Topf *et al*, 2004, p. 17).

Gansemer-Topf & Schuh (2006) expanded Ryan's work (Ryan, 2004) by examining the relationship between institutional expenditures and selectivity and retention and graduation rates at 466 private not-for-profit baccalaureate-granting institutions. The study utilized multiple regression techniques with statistical models that included expenditures in five categories: instruction, academic support, student services, institutional support, and institutional grants for the year 2002. The models also included institutional selectivity ratings, six-year graduation rates, and first-year retention rates. Results of the study showed that institutional selectivity and institutional expenditures were found to contribute significantly to retention and graduation rates. It was found that institutional selectivity, instructional and institutional grants expenditures significantly and positively contributed to retention rate while student services expenditures significantly and negatively contributed to retention rates. As for graduation rates, it was found that instructional, academic support, and institutional grants expenditures and institutional

selectivity positively and significantly contributed to graduation rates while institutional support expenditures significantly and negatively contributed to graduation rates.

Powell (2009) investigated the relationships between institutional expenditures and measures of efficiency and effectiveness in 1862 public and private four-year institutions. Data collected for the analysis were limited to institutions that reported to both the IPEDS datasets and the National Survey of Postsecondary Faculty (NSOPF) for the academic year 2003-2004. Expenditures data were in the categories of instruction, student services, academic support, research, public service, institutional support, and other expenditures. Measures of institutional efficiency included class size, student-faculty ratio, faculty total teaching hours/week, faculty satisfaction index, and administrative staff-faculty ratio. Measures of institutional effectiveness were four- and six-year graduation rates and first-year retention rates. Institutional characteristics included in the study were size, Carnegie classification, geographic region, and percentage of students receiving federal grant aid. The study utilized a number of statistical analysis procedures (such as regression and canonical correlation analyses) to evaluate relationships among four constructs at the institution level: cost factor (expenditures), institutional characteristics, efficiency, and effectiveness. Findings of the study suggested that some institutional characteristics along with some expenditure categories were found to be predictors of institutional effectiveness and efficiency. The expenditures categories that predicted six-year graduation rates and first-year retention rates were instruction, academic support, and student services expenditures. Also, the institutional characteristics of size, Carnegie classification, and the percentage of student receiving federal grant aid predicted the effectiveness and efficiency of institutions. Based on the developed model, the study suggested some benchmarks for the

institutions to identify optimum levels of expenditures to increase retention and graduation rates without overspending.

Weber & Ehrenberg (2010) investigated the effect of expenditures on six-year graduation and first-year retention rates. They collected the data from IPEDS for 1161 four-year colleges and universities during the 2002-2003 to 2005-2006 academic years. The data were stratified by type of institution (baccalaureate, masters, and doctoral), the median SAT scores of interring first-year students (low and high), and the average Pell Grant dollars received by underground students (low and high). The four expenditures categories examined in the statistical model were student services, instruction, academic support, and research expenditures. Results of the study indicated that instructional and student service expenditures had statistically significant positive impacts on graduation and retention rates while research expenditures had negative impact on graduation rates. The study concluded also that the positive effects of student service expenditures on graduation and retention rates were higher at institutions with lower SAT entrance test scores and higher Pell Grant expenditures per student which are typically institutions that have low graduation and retention rates. In a subsequent study, Webber (2012) utilized data from IPEDS and detailed data on student characteristics and outcomes from the Ohio Board of Regents to investigate the effects of expenditures on graduation rates at 13 public universities (94,880 students representing three cohorts of first-time freshmen spanning the years 1998 to 2000) in the state of Ohio. Three expenditures categories were included in the statistical model: student services, instructional, and academic support expenditures. Findings of the study were that student services expenditures had the largest positive impact, among other expenditures, on students with low SAT/ACT entrance test scores while instructional expenditures had the largest positive impact on students with high entrance test scores. Also,

instructional expenditures had a large positive impact on students majoring in scientific and quantitative fields (STEM fields) rather than non-STEM fields.

Umfress (2010) investigated the relationship between student services expenditures and retention rates in 1252 four-year public and private not-for-profit colleges and universities. Data were collected from the IPEDS datasets for the academic year 2007-2008. Measures for some institutional characteristics (such as size, selectivity, and Carnegie classification) were included in the multiple regression analysis. Findings of the study suggested the existence of a significant positive relationship between student services expenditures and retention rates. Also, institutional selectivity and student services expenditures were found to be the strongest predictor of retention rates.

Pike, Kuh, McCormick, Ethington, & Smart (2011) examined the relationships between institutional expenditures and student engagement and learning outcomes. Data on the institutional characteristics were collected from IPEDS data for the year 2003-2004, institutional common data sets, and College Board data. On the student level, data were collected for 35,895 seniors from 175 public colleges and universities who participated in the National Survey of Student Engagement (NSSE) in spring 2004. The study defined five measures for student engagement were based on scores of student responses to the NSSE in categories linked to positive educational outcomes. Namely, these measures are academic challenge (e.g., activities related to writing and higher-order thinking), active and collaborative learning (e.g., activities related to working with other students to solve problems and participate in group projects), student-faculty interaction (e.g., how often students interact with faculty inside and outside classroom), enriching educational experiences (e.g., student experiences with technology, diversity, and other purposeful learning activities), and supportive campus environment (e.g.,

student perceptions of institutional commitment to student success). The study also included student characteristics related to the seniors who participated in the NSSE such as gender, ethnicity, transfer status, enrollment status, living on-campus, and academic major. On the institution level, the study included institutional expenditures in the categories of instruction, academic support, institutional support, and student services. Also, some institutional characteristics were included such as size, selectivity, and emphasis on graduate education. A series of hierarchal linear models were utilized in the study for data analysis. Results of the study indicated that though there were statistically significant differences in learning outcomes across institutions and also among students within institutions, yet differences among students within institutions were much higher than institutional differences. The combined institutional expenditures for instruction, academic support, institutional support, and student services were found to be significantly related to two of the five engagement measures (academic challenge and enriching educational experiences) and to non-cognitive learning outcomes. Yet, it was not possible to use these expenditures to explain institutional differences in student learning and engagement outcomes. This was mainly due to the limitations imposed by the gross measures of IPEDS expenditures categories in which expenditures, within the same category, could be used for considerably different purposes that could affect different student learning and engagement outcomes. The study concluded that though results indicated that expenditures were modestly related to student engagement and learning outcomes, more research is needed to uncouple relations among expenditures, student experiences, and learning outcomes in higher education institutions.

Promades (2012) investigated the influence of institutional expenditures on six-year graduation rates at 113 private not-for-profit four-year and above institutions in New England.

Data related to institutional expenditures were collected from the IPEDS datasets for six fiscal years beginning with 2005. Expenditure categories included in the regression model were instruction, student services, academic support, and institutional support expenditures. Expenditures within each category were divided into two groups, personnel and non-personnel expenses. Averages of expenditures over the period 2005-2010 were used in the model with the graduation rates data for 2010 (cohort of fall 2004). Major findings of the study suggested significant positive relationships between graduation rates and both instruction (non-personnel) and student services (personnel) expenditures while there was a negative relationship between graduation rates and institutional support (non-personnel) expenditures.

Peerenboom (2012) explored relationships between institutional expenditures patterns and graduation rates at 462 public four-year colleges and universities. Two graduation rates, four-year and six-year graduation rates, were included in the study to investigate influences of institutional expenditure patterns on the amount of time students take to graduate. Data were collected from the IPEDS datasets for the students' cohort of academic year 2003-2004 graduating in 2006-2007 (four-year graduation rates) and in 2008-2009 (six-year graduation rates. The study utilized multiple regression models which included institutional characteristics (such as size and Carnegie classification) and expenditure patterns in the categories of instructional, student services, academic support, institutional support, research, and scholarships expenditures. Expenditures data were collected for academic years 2003-2004 through 2008-2009 in order to calculate the average spending over four- and six-year periods. Findings of the study suggested that both research and scholarships expenditures had significant negative effects on graduation rates especially in doctoral and masters institutions. The study also indicated that expenditure patterns did not have significantly different effects on four- and six-year graduation

rates suggesting that "one cannot reasonably conclude that institutions could manipulate expenditure allocations to decrease students' time-to-degree" (Peerenboom, 2012, p.vi).

Several studies have reported the existence of relationships between institutional expenditures and student and institutional success. However, most of these studies, as mentioned earlier, have not been consistent and, in many cases, have reached conflicting results and findings. For example, student services expenditures were found to have positive impact on retention and graduation rates in some studies (e.g., Gansemer-topf & Scuh, 2006; Powell, 2009; Weber & Ehrenberg, 2010; Webber, 2012; Promades, 2012) while the impact was negative or insignificant in other studies (e.g., Umfress, 2010; Ryan, 2004).

Pike *et al* (2011) discussed some factors that might explain the inconsistent findings regarding relationships between institutional expenditures and educational outcomes and concluded that "inconsistencies may be due, in part, to problems of attenuation of institutional differences and blurring of effects arising from including in studies students from different stages of their college careers…. the weak and inconsistent relationships between educational expenditures and college outcomes are also the products of mediating effects of student engagement and contingent effects created by differences in the characteristics of institutions" (p. 84).

Based on this review of literature, it is evident that more research is needed to enrich the existing limited research aiming at providing better understanding of the impact resource allocation in different types of higher education institutions on graduation and retention rates as indicators of institutional performance. More research is also needed to clarify the inconsistency

in some of the findings of existed research on the relationship between institutional expenditures and graduation and retention rates.

Summary

This chapter provided an overview on some of the literature and research issues relevant to this study such as accountability, performance-spending challenge, and indicators of institutional performance. Financial resources and spending patterns in higher education institutions were explored in order to identify the important parameters needed to relate institutional expenditures to institutional outcomes. An overview of research relating institutional expenditures to graduation and retention rates among other institutional performance indicators were also reported. This literature review showed that more research is needed for better understanding of the relationship between institutional expenditures and graduation and retention rates in different types of higher education institutions.

CHAPTER 3: METHODS

The purpose of this quantitative non-experimental study was to investigate the predictive relationships, if any, that exist between institutional expenditures and both graduation and retention rates at four-year or above higher education institutions in the United States. The study also examined the different effects, if any, of the institutional characteristics of control (public and private-not-for profit) and Carnegie classification 2010 (Doctorate, Masters, and Baccalaureate granting institutions) on these predictive relationships. The Integrated Postsecondary Education Data Systems (IPEDS) provided the required data for the study.

Descriptive statistics were used to analyze the collected data. Stepwise multiple regression was used for data analysis in order to answer the research questions of this study using the Statistical Package for the Social Science (SPSS 17.0) software.

Data Source

All variable data used in this study were collected from the Integrated Postsecondary Education Data Systems (IPEDS). The IPEDS contains a set of different surveys conducted annually by the US Department of Education's National Center for Education Statistics (NCES). Institutions that participate in federal student aid program are required by federal law to report institutional data such as enrollments, finances, human resources, and graduation rates. All institutional information gathered through IPEDS is publically available on-line at: www.nces.ed.gov/ipeds. Cook and Pullaro (2010) stated that "IPEDS is the most frequently used data for national graduation rates. As the only database that captures information annually from

every federally funded college and university in the United States, many policy makers and educational researchers view it as the best source of data on postsecondary education institutions" (p. 9).

Sampling

This study targeted four-year higher education institutions granting Baccalaureate or above degrees. Only institutions with complete data sets for the academic years 2005/2006 through 2010/2011 were considered in the analysis. For-profit institutions, community colleges, faith-related institutions, special-focus institutions, and tribal colleges were excluded from the sample since they have typically patterns of revenues, expenditures, completion, or academic programs that are different from the targeted sample.

The number of institutions in the total sample with complete data sets was 1413 institutions. In order to examine the effect of institutional characteristics on the relationship between expenditures and graduation and retention rates, the total sample was stratified on two levels to examine the data pool for multiple factors of institutional characteristics. In the first level, the total sample was stratified twice based on institutional control (511 public and 902 private institutions) and based on Carnegie classification (271 Doctorate, 598 Master's, and 544 Baccalaureate granting institutions). In the second level, the total sample was stratified based on both institutional control and Carnegie classification (172 public Doctorate institutions, 256 public Master's institutions, 83 public Baccalaureate institutions, 99 private Doctorate institutions, 342 private Master's institutions, and 461 private Baccalaureate institutions).

It should be mentioned that according to the definitions glossary available on IPEDS for Carnegie classification 2010, Doctorate institutions are those awarding at least 20 Doctoral

degrees per year, Master's institutions are those awarding at least 50 Master's degrees per year, and Baccalaureate institutions are those where Baccalaureate degrees represent at least 10% of all undergraduate degrees and awarding fewer than 50 Master's degrees or fewer than 20 Doctoral degrees per year. In the Carnegie classification 2010, the Doctorate institutions are divided into three groups based on research activities (very high, high, and normal), the Master's institutions are divided into three groups based on the programs size (larger, medium, and smaller programs), and the Baccalaureate institutions are divided into two groups based on the field (Arts & Sciences and Diverse Fields). However, in order not to have fragmented samples of small populations that might lead to unreliable statistical results, it was chosen in this study to collectively sum these groups under the main three categories of Doctorate, Master's, and Baccalaureate institutions. Figure 1 shows pie-chart diagrams for the stratified levels of the total sample.

Thus, a total of 12 population samples, as listed in Table 1, were considered in this study in order to cover all possible combinations of institutions while investigating the effect of institutional control and Carnegie classification on the relationships between institutional expenditures and both of the graduation and retention rates.

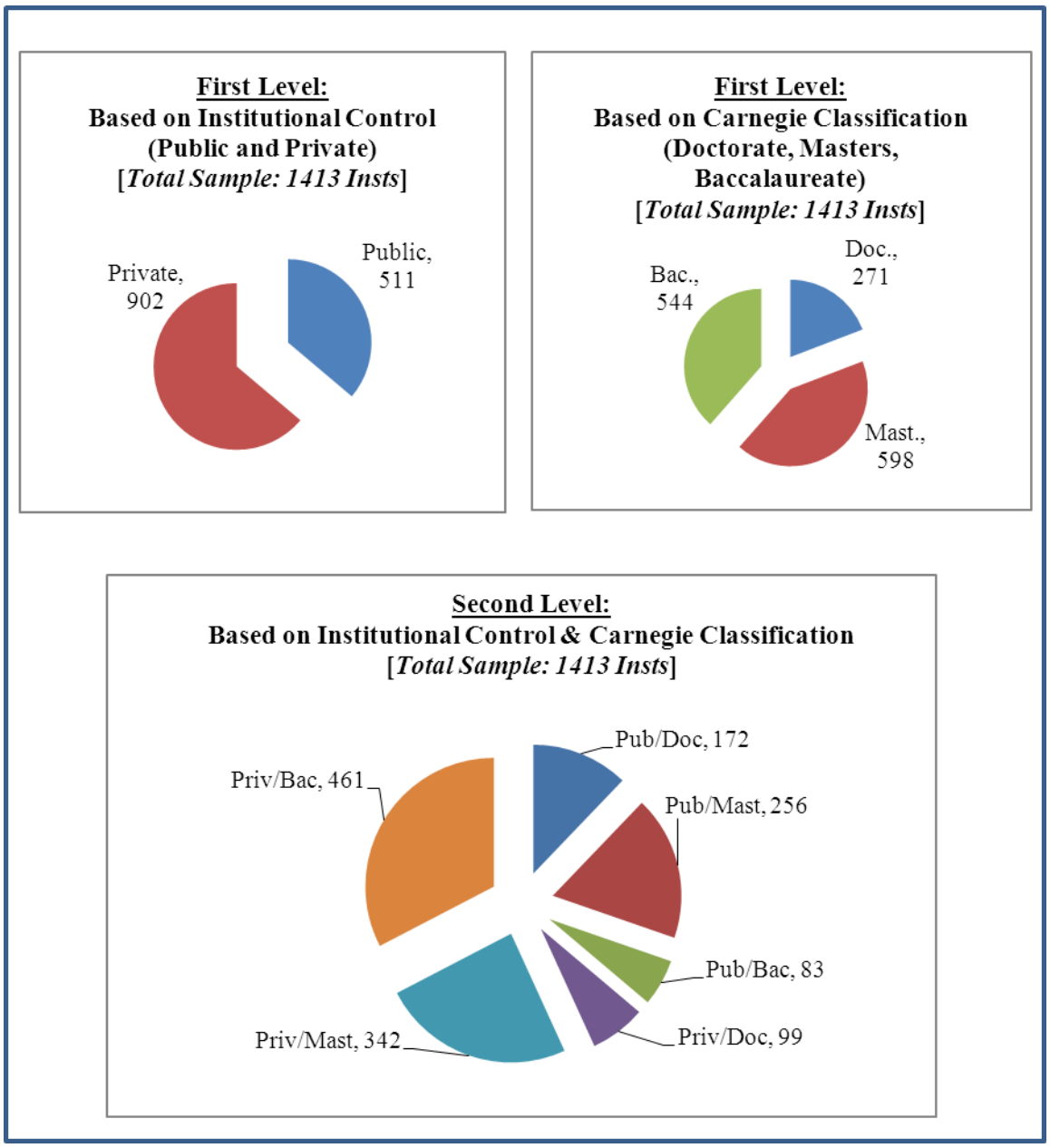

Figure 1. Pie-chart for the two stratified levels of the total sample of institutions

Table 1.

The 12 Samples of Institutions Considered in each Research Question

Sample Population	Sample Code	N
1. Four-year or above institutions	Total	1413
First Level: Based on Institutional Control		
2. Public institutions	Public	511
3. Private institutions	Private	902
First Level: Based on Carnegie Classification		
4. Doctorate granting institutions	Doc	271
5. Master's granting institutions	Mast	598
6. Baccalaureate granting institutions	Bac	544
Second Level: Based on Institutional Control & Carnegie Classification		
7. Public Doctorate granting institutions	Pub/Doc	172
8. Public Master's granting institutions	Pub/Mast	256
9. Public Baccalaureate granting institutions	Pub/Bac	83
10. Private Doctorate granting institutions	Priv/Doc	99
11. Private Master's granting institutions	Priv/Mast	342
12. Private Baccalaureate granting institutions	Priv/Bac	461

Research Questions

The four research questions formulated for this study were:

1. Which combination, if any, of expenditure components (as percentages of total core expenses) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

2. Which combination, if any, of expenditure components (per FTE student) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

3. Which combination, if any, of expenditure components (as percentages of total core expenses) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

4. Which combination, if any, of expenditure components (per FTE student) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Data Collection and Preparation

There are seven components of the core institutional expenditures reported in the IPEDS on-line database (NCES, 2013). These seven components are: instruction, research, public service, academic support, student services, institutional support, and other (mainly scholarships

& fellowships and miscellaneous expenses) expenditures. Each of these seven components is reported in two forms: expenditures per FTE student and expenditures as percentages of total core expenses.

The form of expenditures per FTE student provides an absolute figure of the amount of money actually spent, while the form of expenditures as percentages of total core expenses provides an insight on the institutions priorities in regards to expenditures allocation. Considering the two forms of expenditures in this study would provide two integrative perspectives that are essential for recognizing a more complete picture about how different resource allocation practices might contribute to graduation and retention rates (Gansemer-Topf, 2004).

Data collected from the IPEDS on-line database regarding expenditure components for the institutions were collected for the period starting at the academic years 2005/2006 through 2010/2011 to study the cohort of 2005-2006. The six-year graduation rates were collected for August 31, 2011 and the first-year retention rates were collected for the Fall of 2006. For research questions related to the six-year graduation rates, research questions 1 and 2, expenditure components for the six-year period 2005/2006 to 2010/2011were averaged, using Microsoft-Office Excel 2010, in order to introduce a single value for each expenditure component during this period of time. As for the research questions related to the first-year retention rates, research questions 3 and 4, the actual expenditure components for the academic year 2005/2006 were considered.

Variables

There were two dependent variables in this study, six-year graduation rates (for research questions 1 and 2) and first-year retention rates (for research questions 3 and 4). For each research question there was a different set of seven independent variables representing the seven expenditures components.

For research question 1, expenditure components expressed as percentage of the total core expenses were averaged over the period 2005/2006 to 2010/2011. For research question 2, expenditure components expressed as dollar values per FTE student were averaged over the period 2005/2006 to 2010/2011. For research question 3, expenditure components collected for the academic year 2005/2006 were expressed as percentage of the total core expenses. For research question 4, expenditure components collected for the academic year 2005/2006 were expressed as dollar values per FTE student. Tables 2 to 5 list the dependent and independent variables used to address each of the four research questions.

Table 2.

Variables and Variable Codes Used to Address Research Question 1

Variables	**Variable Code**
Dependent variable	
Six-year graduation rate	GradRate11
Independent Variables	
Average instruction expenditures as percentage of total core expenses	Instruc
Average research expenditures as percentage of total core expenses	Research
Average public services expenditures as percentage of total core expenses	PubServ
Average academic support expenditures as percentage of total core expenses	AcadSup
Average student services expenditures as percentage of total core expenses	StudServ
Average institutional support expenditures as percentage of total core expenses	InstSup
Average other expenditures as percentage of total core expenses	Other

Table 3.

Variables and Variable Codes Used to Address Research Question 2

Variables	**Variable Code**
Dependent variable	
Six-year graduation rate	GradRate11
Independent Variables	
Average instruction expenditures as dollar values per FTE student	Instruc_FTE
Average research expenditures as dollar values per FTE student	Research_FTE
Average public services expenditures as dollar values per FTE student	PubServ_FTE
Average academic support expenditures as dollar values per FTE student	AcadSup_FTE
Average student services expenditures as dollar values per FTE student	StudServ_FTE
Average institutional support expenditures as dollar values per FTE student	InstSup_FTE
Average other expenditures as dollar values per FTE student	Other_FTE

Table 4.

Variables and Variable Codes Used to Address Research Question 3

Variables	**Variable Code**
Dependent variable	
First-year retention rate	RetRate06
Independent Variables	
Instruction expenditures as percentage of total core expenses	Instruc05
Research expenditures as percentage of total core expenses	Research05
Public services expenditures as percentage of total core expenses	PubServ05
Academic support expenditures as percentage of total core expenses	AcadSup05
Student services expenditures as percentage of total core expenses	StudServ05
Institutional support expenditures as percentage of total core expenses	InstSup05
Other expenditures as percentage of total core expenses	Other05

Table 5.

Variables and Variable Codes Used to Address Research Question 4

Variables	**Variable Code**
Dependent variable	
First-year retention rate	RetRate06
Independent Variables	
Instruction expenditures as dollar values per FTE student	Instruc05F
Research expenditures as dollar values per FTE student	Research05F
Public services expenditures as dollar values per FTE student	PubServ05F
Academic support expenditures as dollar values per FTE student	AcadSup05F
Student services expenditures as dollar values per FTE student	StudServ05F
Institutional support expenditures as dollar values per FTE student	InstSup05F
Other expenditures as dollar values per FTE student	Other05F

Data Analysis

Inferences about the relationship between institutional expenditures and both graduation and retention rates were made in this study by analyzing the data using descriptive and inferential statistics. Stepwise multiple regression was utilized in this study, using the Statistical Package for the Social Sciences (SPSS 17.0), to describe and examine the existence of predicted relationships among the variables. Stepwise multiple regression is often used in studies of exploratory nature in which there might be a large number of independent variables and it is needed to determine which specific ones that make significant contribution to the overall prediction of the dependent variable (Mertler and Vannatta, 2010). Utilizing multiple regression was a suitable statistical technique in this study since all variables, dependent and independent, were quantitative.

For each of the four research questions in this study, twelve regression analyses were separately conducted on each of the twelve population samples of institutions (the total sample + five samples in first level + six samples in second level) as illustrated before in Figure 1. These analyses resulted in twelve regression models for each research question that were interpreted to provide inferences on the effect of institutional control and Carnegie classification on the predictive relationships between institutional expenditures and both of the graduation and retention rates.

In the regression models, tolerance statistics were explored to assess multicollinearity among the independent variables. Residual scatterplots were examined to recognize the assumptions of linearity, normality, and homoscedasticity needed for proper application of multiple regression (Mertler and Vannatta, 2010). Results of the stepwise multiple regression models included several important parameters, such as the coefficient of determination R^2 and

Beta coefficients of the regression equation, which were reported in this study. Interpretation of these parameters provided valuable information about the strength and significance of some expenditure components predicting graduation and retention rates in institutions with different institutional characteristics.

Summary

This quantitative non-experimental study sought to investigate the predictive relationships, if any, that exist between institutional expenditures and both graduation and retention rates at 4-year or above higher education institutions taking into consideration the institutional characteristics of control (public and private-not-for profit) and Carnegie classification 2010 (Doctorate, Masters, and Baccalaureate institutions).

The Integrated Postsecondary Education Data Systems (IPEDS) provided the required data for the study. The dependent variables were: Six-year graduation rates and first-year retention rates. The independent variables were: instruction expenditures, research expenditures, public service expenditures, academic support expenditures, student services expenditures, institutional support expenditures, and other expenditures. These expenditures were introduced as percentages of total core expenses and as dollar values per FTE student. Stepwise multiple regression was used for data analysis in order to answer the four research questions of this study using the Statistical Package for the Social Science (SPSS 17.0) software.

CHAPTER 4: RESULTS AND FINDINGS

The purpose of this study was to explore the predictive relationships that might exist between the components of institutional expenditures (instruction, research, public service, academic support, student services, institutional support, and other expenditures) and six-year graduation and first-year retention rates at four-year or above higher education institutions. Expenditures components were presented in this study as dollar amount per FTE students and as percentages of the total core expenses of the institution. The study expanded on the existing research by analyzing several samples of institutions characterized by institutional control (public and private-not-for profit) and Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions) to recognize the effect, if any, of institutional characteristics on these predictive relationships.

Retention and graduation rates are often considered as indicators of institutional success in terms of being efficient, effective and productive. This study sought to investigate the relationships between institutional expenditures and these success indicators to help institutional leaders making informed decisions about resource allocation and budgetary alignment that would improve such important institutional success indicators.

This chapter presents results and findings of the statistical analyses performed to answer the four research questions of this study. In all research questions, the statistical analyses were performed on the twelve stratified samples of institutions: 4-year or above institutions (Total), Public institutions (Public), Private institutions (Private), Doctorate granting institutions (Doc),

Master's granting institutions (Mast), Baccalaureate granting institutions (Bac), Public Doctorate granting institutions (Pub/Doc), Public Master's granting institutions (Pub/Mast), Public Baccalaureate granting institutions (Pub/Bac), Private Doctorate granting institutions (Priv/Doc), Private Master's granting institutions (Priv/Mast), and Private Baccalaureate granting institutions (Priv/Bac).

For each research question, results of the twelve stepwise regression analyses, for the twelve stratified samples of institutions, are being presented in forms of descriptive statistics and regression models.

Results for Research Question 1

Research Question 1: Which combination, if any, of expenditure components (as percentage of total core expenses) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Descriptive Statistics

The dependent variable for this research question was six-year graduation rates (GradRate11). The independent variables were: average instruction expenditures as percentage of total core expenses (Instruc), research expenditures as percentage of total core expenses (Research), average public services expenditures as percentage of total core expenses (PubServ), average academic support expenditures as percentage of total core expenses (AcadSup), average student services expenditures as percentage of total core expenses (StudServ), average institutional support expenditures as percentage of total core expenses (InstSup), and average other expenditures as percentage of total core expenses (Other). Descriptive statistics of mean

values (*M*) and standard deviations (*SD*) for all variables are listed in Table 6 while Figures 2 to 9 show the mean values of each variable in the twelve samples of institutions.

Table 6.

Descriptive Statistics for Variables of Research Question 1

Variable Code		Total	Doc	Mast	Bac	Public	Private	Pub/Doc	Pub/Mast	Pub/Bac	Priv/Doc	Priv/Mast	Priv/Bac
	N	1413	271	598	544	511	902	172	256	83	99	342	461
Dependent Variable (%)													
GradRate 11	***M***	53.7	62.6	49.7	53.7	47.9	57.0	57.5	44.0	40.2	71.6	54.0	56.1
	SD	18.6	18.8	15.0	20.4	17.1	18.6	16.6	14.0	18.4	19.1	14.3	19.9
Independent Variables (%)													
Instruc	***M***	41.1	39.2	43.2	39.7	39.4	42.1	36.2	41.5	39.4	44.4	44.4	39.8
	SD	8.3	8.5	7.5	8.5	6.9	8.8	7.1	5.8	6.8	8.4	8.3	8.8
Research	***M***	4.0	15.6	1.5	1.0	7.5	2.0	17.4	2.5	2.2	12.4	0.7	0.8
	SD	8.0	11.1	3.5	2.8	9.7	6.0	9.8	4.7	4.0	12.7	1.9	2.5
PubServ	***M***	2.3	4.5	2.1	1.3	4.4	1.1	6.2	3.6	3.1	1.7	1.0	0.9
	SD	3.6	4.8	3.5	2.5	4.4	2.4	5.1	3.9	3.3	2.3	2.7	2.1
AcadSup	***M***	10.1	10.7	10.3	9.6	9.8	10.3	9.7	9.9	9.4	12.3	10.6	9.6
	SD	4.3	4.8	4.1	4.2	3.1	4.8	3.0	3.1	3.4	6.5	4.7	4.3
StudServ	***M***	14.4	7.1	14.1	18.4	8.4	17.8	5.4	9.4	11.2	10.0	17.6	19.7
	SD	7.4	4.4	6.1	7.2	3.9	6.8	2.7	3.3	4.1	5.3	5.4	6.8
InstSup	***M***	19.6	12.2	19.0	23.9	11.9	24.0	9.0	12.8	15.1	17.9	23.6	25.5
	SD	8.7	6.2	7.6	8.3	4.6	7.4	3.2	4.0	5.6	6.3	6.2	7.7
Other	***M***	9.0	11.2	10.2	6.5	19.3	3.1	16.7	20.8	20.3	1.7	2.4	4.0
	SD	10.2	8.5	10.6	9.9	5.8	6.9	5.0	5.2	7.2	3.1	5.6	8.2

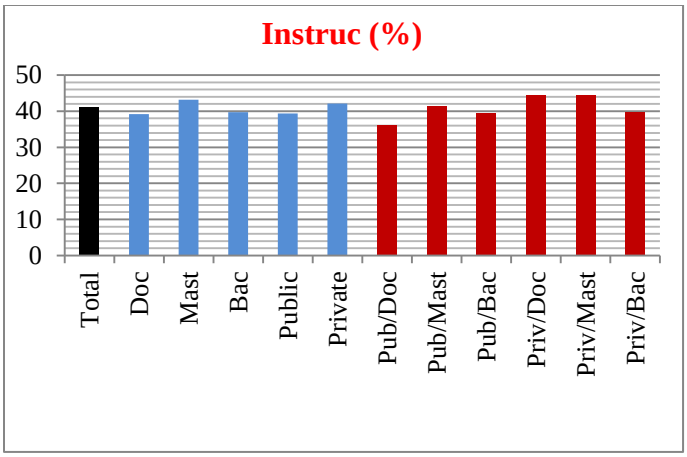

Figure 2. Mean values of instruction expenditures (%) in the twelve samples

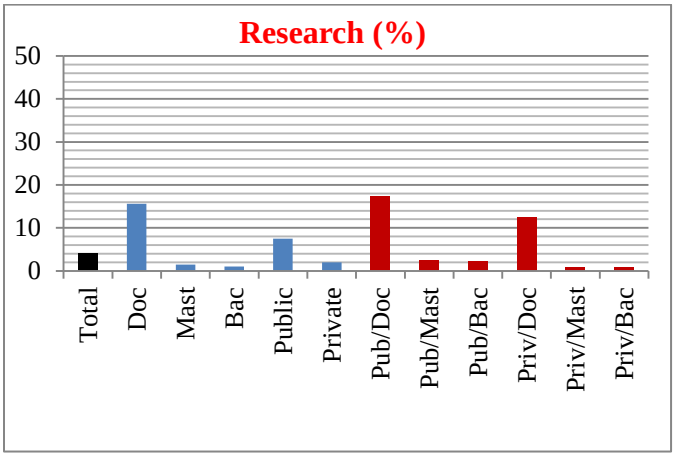

Figure 3. Mean values of research expenditures (%) in the twelve samples

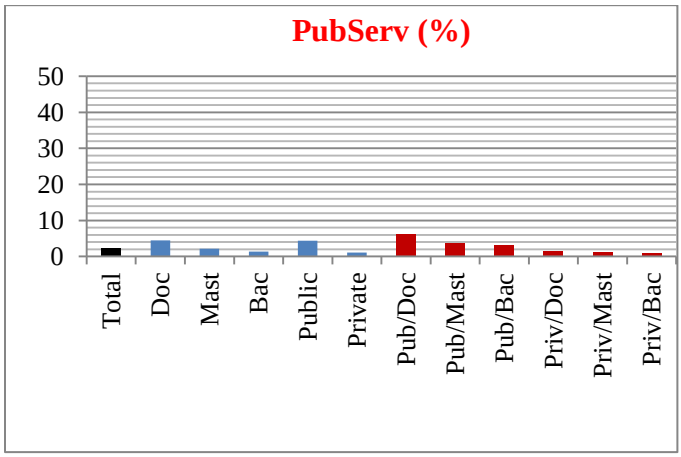

Figure 4. Mean values of public service expenditures (%) in the twelve samples

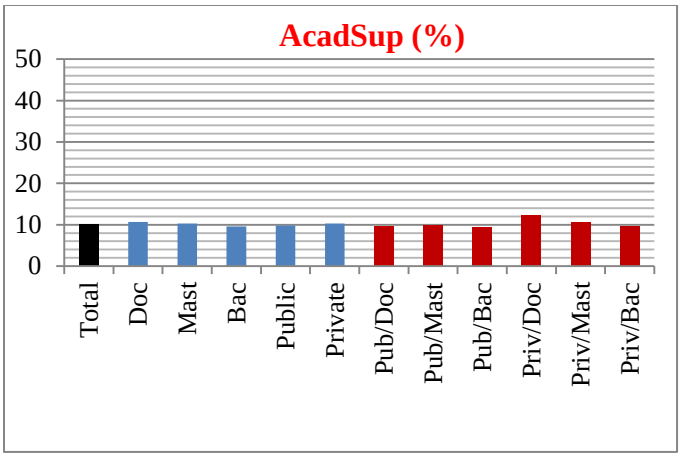

Figure 5. Mean values of academic support expenditures (%) in the twelve samples

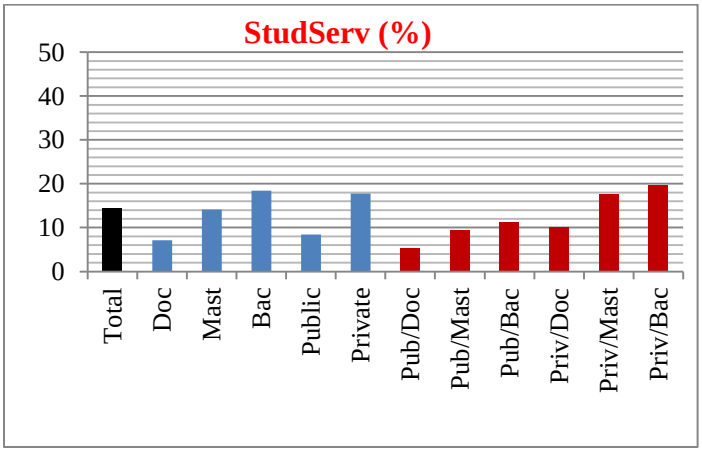

Figure 6. Mean values of student services expenditures (%) in the twelve samples

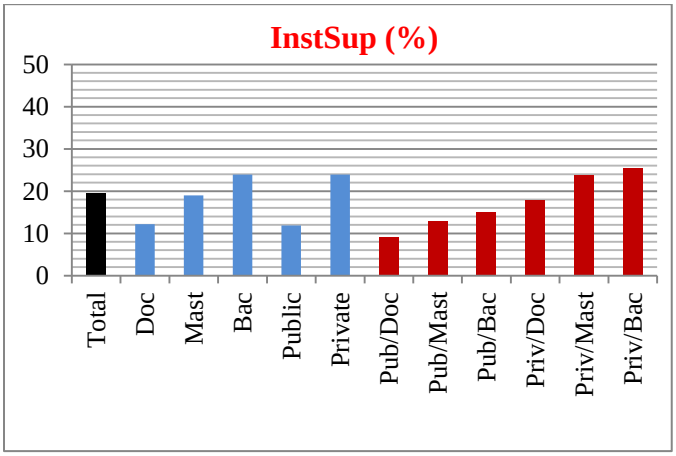

Figure 7. Mean values of institutional support expenditures (%) in the twelve samples

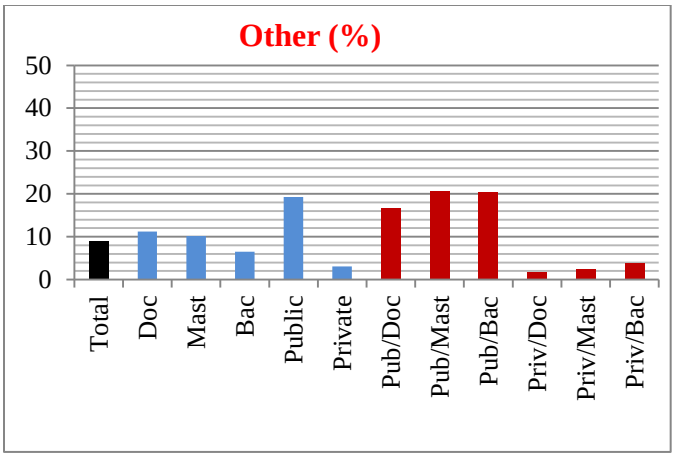

Figure 8. Mean values of other expenditures (%) in the twelve samples

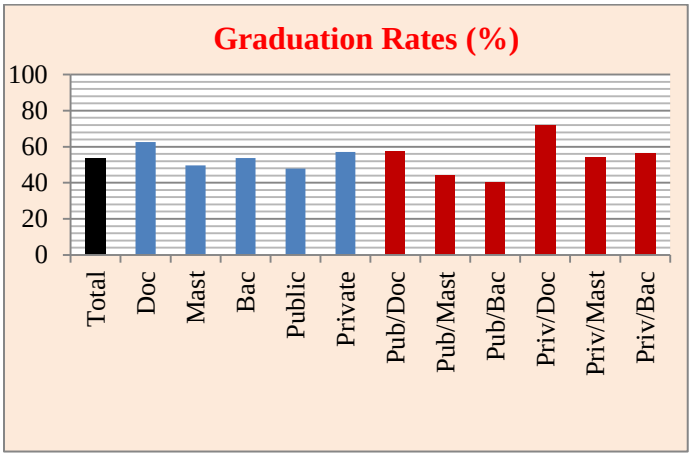

Figure 9. Mean values of graduation rates (%) in the twelve samples

The following findings can be detected from Table 6 and Figures 2 to 9:

1. Instruction expenditures had the highest percentages among other expenditures components in all samples (36% - 44%) with private institutions allocating more percentages than their corresponding public ones in all categories, as shown in Table 6 and Figure 2.
2. Research expenditures had relatively high percentages at public and private doctorate granting institutions (12% - 17%) and low percentages at master's and baccalaureate institutions (0.7% - 2.5%) with public institutions allocating more percentages than their corresponding private ones in all categories, as shown in Table 6 and Figure 3.
3. Public services expenditures had relatively low percentages in all samples (1% - 6%). However, it is noticeable that public institutions allocated more than triple the percentages of their corresponding private institutions in all categories, as shown in Table 6 and Figure 4.
4. Academic support expenditures had small differences in percentages, similar to instruction expenditures, between the samples (9.4% - 11.9%) with private institutions allocating more percentages than their corresponding public ones in all categories especially in doctorate granting institutions, as shown in Table 6 and Figure 5.
5. Student services expenditures varied in percentages among the samples (5.4% - 19.7%) with private institutions allocating almost double the percentages of their corresponding public ones in all categories, as shown in Table 6 and Figure 6.
6. Institutional support expenditures varied in percentages among the samples (9% - 25.5%) with private institutions allocating almost double the percentages of their corresponding public ones in all categories, as shown in Table 6 and Figure 7.

7. Other expenditures had relatively very high percentages at all categories of public institutions (16.7% - 20.8%) compared to their corresponding private institutions (1.7% - 4%), as shown in Table 6 and Figure 8.
8. Graduation rates varied in percentages among the samples, with private doctorate granting institutions having the highest percentages (71.6%) and public baccalaureate granting institutions having the lowest percentages (40.2%). Private institutions had higher graduation rates compared to their corresponding public ones in all categories, as shown in Table 6 and Figure 9.

Regression Models for Graduation Rates with Expenditures as percentages of Total Core Expenses

Results of the stepwise multiple regression analyses conducted on the twelve samples of institutions are presented in this section. An alpha of .05 was used as the level of significance in the regression models. For clarity purposes, main results of each regression model are first presented then summary of all models outputs are collectively detailed in Table 7 at the end of this section.

For the **Total** sample of institutions (N = 1413), regression results indicated an overall model of five variables that significantly predicted graduation rates (R^2 = .265, R^2_{adj} = .262, F(5, 1407) = 101.21, p < .001). The five variables included in the model were: **Other** (ΔR^2 = .094, *Beta* = -.535, p < .001), **InstSup** (ΔR^2 = .107, *Beta* = -.303, p < .001), **Research** (ΔR^2 = .035, *Beta* = .174, p < .001), **PubServ** (ΔR^2 = .015, *Beta* = -.164, p < .001), and **StudServ** (ΔR^2 = .013, *Beta* = -.166, p < .001). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.47. These results indicated that the model accounted for 26.5% of the variance of graduation rates. Research expenditures had a

positive relationship with graduation rates while institutional support, other, public service, and student services had a negative relationship with graduation rates in this sample.

For the **Doc** sample (public & private doctorate granting institutions, $N = 271$), regression results indicated an overall model of four variables that significantly predicted graduation rates ($R^2 = .418$, $R^2_{adj} = .409$, $F(4, 266) = 47.751$, $p < .001$). The four variables included in the model were: **Other** ($\Delta R^2 = .192$, *Beta* = -.29, $p < .001$), **Research** ($\Delta R^2 = .187$, *Beta* = .648, $p < .001$), **Instruc** ($\Delta R^2 = .02$, *Beta* = .296, $p < .001$), and **AcadSup** ($\Delta R^2 = .019$, *Beta* = .165, $p = .003$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.39. These results indicated that the model accounted for 41.8% of the variance of graduation rates. Research, instruction, and academic support expenditures had a positive relationship with graduation rates while other expenditures had a negative relationship with graduation rates in this sample.

For the **Mast** sample (public & private master's granting institutions, $N = 598$), regression results indicated an overall model of two variables that significantly predicted graduation rates ($R^2 = .134$, $R^2_{adj} = .131$, $F(2, 595) = 46.126$, $p < .001$). The two variables included in the model were: **Other** ($\Delta R^2 = .114$, *Beta* = -.287, $p < .001$), and **Instruc** ($\Delta R^2 = .021$, *Beta* = .152, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.89. These results indicated that the model accounted for 13.4% of the variance of graduation rates. Instruction expenditures had a positive relationship with graduation rates while other expenditures had a negative relationship with graduation rates in this sample.

For the **Bac** sample (public & private baccalaureate granting institutions, $N = 544$), regression results indicated an overall model of five variables that significantly predicted graduation rates ($R^2 = .267$, $R^2_{adj} = .260$, $F(5, 538) = 39.159$, $p < .001$). The five variables included in the model were: **Instruc** ($\Delta R^2 = .152$, *Beta* = .403, $p < .001$), **AcadSup** ($\Delta R^2 = .084$, *Beta* = .290, $p < .001$), **PubServ** ($\Delta R^2 = .010$, *Beta* = -.090, $p = .022$), **Research** ($\Delta R^2 = .012$, *Beta* = .131, $p = .001$), and **StudServ** ($\Delta R^2 = .008$, *Beta* = .098, $p = .015$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.83. These results indicated that the model accounted for 26.7% of the variance of graduation rates. Instruction, academic support, research, and student services expenditures had a positive relationship with graduation rates while public services expenditures as percentages had a negative relationship with graduation rates in this sample.

For the **Public** sample (public institutions, $N = 511$), regression results indicated an overall model of three variables that significantly predicted graduation rates ($R^2 = .233$, $R^2_{adj} = .229$, $F(3, 507) = 51.475$, $p < .001$). The three variables included in the model were: **Research** ($\Delta R^2 = .176$, *Beta* = .602, $p < .001$), **Instruc** ($\Delta R^2 = .046$, *Beta* = .282, $p < .001$), and **AcadSup** ($\Delta R^2 = .011$, *Beta* = .108, $p = .007$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.62. These results indicated that the model accounted for 23.3% of the variance of graduation rates. Research, instruction, and academic support expenditures had a positive relationship with graduation rates in this sample.

For the **Private** sample (private institutions, $N = 902$), regression results indicated an overall model of four variables that significantly predicted graduation rates ($R^2 = .292$, $R^2_{adj} =$

.289, $F(4, 897) = 92.594$, $p < .001$). The four variables included in the model were: **InstSup** (ΔR^2 = .174, *Beta* = -.145, $p < .001$), **Research** (ΔR^2 = .065, *Beta* = .334, $p < .001$), **Instruc** (ΔR^2 = .026, *Beta* = .239, $p < .001$), and **AcadSup** (ΔR^2 = .027, *Beta* = .176, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.56. These results indicated that the model accounted for 29.2% of the variance of graduation rates. Institutional support expenditures had a negative relationship with graduation rates while research, instruction, and academic support had a positive relationship with graduation rates in this sample.

For the **Pub/Doc** sample (public doctorate granting institutions, $N = 172$), regression results indicated an overall model of two variables that significantly predicted graduation rates (R^2 = .291, R^2_{adj} = .282, $F(2, 169) = 34.637$, $p < .001$). The two variables included in the model were: **Research** (ΔR^2 = .21, *Beta* = .734, $p < .001$) and **Instruc** (ΔR^2 = .081, *Beta* = .396, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.51. These results indicated that the model accounted for 29.1% of the variance of graduation rates. Both research and instruction expenditures had a positive relationship with graduation rates in this sample.

For the **Pub/Mast** sample (public master's granting institutions, $N = 256$), regression results indicated an overall model of two variables that significantly predicted graduation rates (R^2 = .097, R^2_{adj} = .089, $F(2, 253) = 13.518$, $p < .001$). The two variables included in the model were: **Instruc** (ΔR^2 = .079, *Beta* = .294, $p < .001$) and **AcadSup** (ΔR^2 = .017, *Beta* = .133, $p = .028$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.99. These results indicated that the model

accounted for 9.7% of the variance of graduation rates. Both instruction and academic support expenditures had a positive relationship with graduation rates in this sample.

For the **Pub/Bac** sample (public baccalaureate granting institutions, $N = 83$), regression results indicated an overall model of one variable that significantly predicted graduation rates ($R^2 = .101$, $R^2_{adj} = .090$, $F(1, 81) = 9.09$, $p = .003$). The one variable included in the model was **PubServ** ($\Delta R^2 = .101$, *Beta* = -.318, $p = .003$). These results indicated that the model accounted for 10.1% of the variance of graduation rates. Public service expenditures had a negative relationship with graduation rates in this sample.

For the **Priv/Doc** sample (private doctorate granting institutions, $N = 99$), regression results indicated an overall model of two variables that significantly predicted graduation rates ($R^2 = .469$, $R^2_{adj} = .458$, $F(2, 96) = 42.323$, $p < .001$). The two variables included in the model were: **Research** ($\Delta R^2 = .422$, *Beta* = .481, $p < .001$) and **InstSup** ($\Delta R^2 = .047$, *Beta* = -.274, $p = .005$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.62. These results indicated that the model accounted for 46.9% of the variance of graduation rates. Research expenditures had a positive relationship with graduation rates while institutional support had a negative relationship with graduation rates in this sample.

For the **Priv/Mast** sample (private master's granting institutions, $N = 342$), regression results indicated an overall model of two variables that significantly predicted graduation rates ($R^2 = .056$, $R^2_{adj} = .051$, $F(2, 339) = 10.083$, $p < .001$). The two variables included in the model were: **InstSup** ($\Delta R^2 = .04$, *Beta* = -.176, $p < .001$) and **Research** ($\Delta R^2 = .016$, *Beta* = .13, $p = .016$). Collinearity statistics results did not indicate multicollinearity among the independent

variables with tolerance values greater than 0.96. These results indicated that the model accounted for 5.6% of the variance of graduation rates. Research expenditures had a positive relationship with graduation rates while institutional support expenditures had a negative relationship with graduation rates in this sample.

For the **Priv/Bac** sample (private baccalaureate granting institutions, $N = 461$), regression results indicated an overall model of four variables that significantly predicted graduation rates ($R^2 = .369$, $R^2_{adj} = .364$, $F(4, 456) = 66.808$, $p < .001$). The four variables included in the model were: **Instruc** ($\Delta R^2 = .213$, *Beta* = .391, $p < .001$), **AcadSup** ($\Delta R^2 = .107$, *Beta* = .284, $p < .001$), **Research** ($\Delta R^2 = .034$, *Beta* = .167, $p < .001$), and **InstSup** ($\Delta R^2 = .015$, *Beta* = -.148, $p = .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.70. These results indicated that the model accounted for 36.9% of the variance of graduation rates. Instruction, academic support, and research expenditures had a positive relationship with graduation rates while institutional support expenditures had negative relationship with graduation rates in this sample.

Collective summary of results for all regression models conducted for research question 1 are detailed in Table 7. Findings of the regression analyses for both research questions 1 and 2 are presented together in a separate section after presenting the results of research question 2 in order to perform a more comprehensive evaluation of the relationships between graduation rates and the two forms of expenditures (as percentages of total core expenses and per FTE student).

Table 7.

Summary of Results for Regression Models Conducted for Research Question 1

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Total (*N*=1413)	1	Other	.094	.093	.094	146.34	< .001	-.535
	2	InstSup	.201	.200	.107	188.26	< .001	-.303
	3	Research	.236	.234	.035	65.10	< .001	.174
	4	PubServ	.251	.249	.015	28.84	< .001	-.164
	5	StudServ	.265	.262	.013	25.25	< .001	-.166
Doc (*N* = 271)	1	Other	.192	.189	.192	63.75	< .001	-.290
	2	Research	.379	.374	.187	80.85	< .001	.648
	3	Instruc	.399	.392	.020	8.72	< .001	.296
	4	AcadSup	.418	.409	.019	8.84	.003	.165
Mast (*N* = 598)	1	Other	.114	.112	.114	76.45	< .001	-.287
	2	Instruc	.134	.131	.021	14.11	< .001	.152
Bac (*N* = 544)	1	Instruc	.152	.151	.152	97.28	< .001	.403
	2	AcadSup	.237	.234	.084	59.76	< .001	.290
	3	PubServ	.247	.243	.010	7.45	.007	-.090
	4	Research	.259	.253	.012	8.61	.003	.131
	5	StudServ	.267	.260	.008	5.92	.015	.098
Public (*N* = 511)	1	Research	.176	.174	.176	108.76	< .001	.602
	2	Instruc	.222	.219	.046	30.16	< .001	.282
	3	AcadSup	.233	.229	.011	7.42	.007	.108
Private (*N* = 902)	1	InstSup	.174	.173	.174	189.99	< .001	-.145
	2	Research	.239	.237	.065	76.37	< .001	.334
	3	Instruc	.265	.262	.026	31.66	< .001	.239
	4	AcadSup	.292	.289	.027	34.67	< .001	.176
Pub/Doc (*N* = 172)	1	Research	.210	.205	.210	45.11	< .001	.734
	2	Instruc	.291	.282	.081	19.31	< .001	.396
Pub/Mast (*N* = 256)	1	Instruc	.079	.075	.079	21.82	< .001	.294
	2	AcadSup	.097	.089	.017	4.88	.028	133
Pub/Bac (*N* = 83)	1	PubServ	.101	.090	.101	9.09	.003	-.318
Priv/Doc (*N* = 99)	1	Research	.422	.416	.422	70.80	< .001	.481
	2	InstSup	.469	.458	.047	8.42	.005	-.274

Table 7 “Cont.”

Summary of Results for Regression Models Conducted for Research Question 1

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Priv/Mast	1	InstSup	.040	.037	.040	14.14	< .001	-.176
(*N* = 342)	2	Research	.056	.051	.016	5.82	.016	.130
	1	Instruc	.213	.211	.213	124.29	< .001	.391
Priv/Bac	2	AcadSup	.320	.317	.107	71.81	< .001	.284
(*N* = 461)	3	Research	.354	.350	.034	24.26	< .001	.167
	4	InstSup	.369	.364	.015	11.19	.001	-.148

Note: The dependent variable is six-year graduation rate (GradRate11)

Results for Research Question 2

Research Question 2: Which combination, if any, of expenditure components (per FTE student) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Descriptive Statistics

The dependent variable for this research question was six-year graduation rates (GradRate11). The independent variables were: average instruction expenditures as dollar values per FTE students (Instruc_FTE), research expenditures as dollar values per FTE students (Research_FTE), average public services expenditures as dollar values per FTE students (PubServ_FTE), average academic support expenditures as dollar values per FTE students (AcadSup_FTE), average student services expenditures as dollar values per FTE students (StudServ_FTE), average institutional support expenditures as dollar values per FTE students (InstSup_FTE), and average other expenditures as dollar values per FTE students (Other_FTE). Descriptive statistics of mean values (*M*) and standard deviations (*SD*) for all variables of this question are listed in Table 8 while Figures 10 to 16 show the mean values of each variable in the twelve samples of institutions. Summation of the mean values of the seven expenditures components resulted in mean values of the total expenditures per FTE students in the twelve samples of institutions which are shown in Figure 17 as additional information though it is not one of the variables in this study.

Table 8.

Descriptive Statistics for Variables of Research Question 2

Variable Code		Total	Doc	Mast	Bac	Public	Private	Pub/Doc	Pub/Mast	Pub/Bac	Priv/Doc	Priv/Mast	Priv/Bac
	N	1413	271	598	544	511	902	172	256	83	99	342	461
Dependent Variable (%)													
GradRate11	***M***	53.7	62.6	49.7	53.7	47.9	57.0	57.5	44.0	40.2	71.6	54.0	56.1
	SD	18.6	18.8	15.0	20.4	17.1	18.6	16.6	14.0	18.4	19.1	14.3	19.9
Independent Variables ($ per FTE Students)													
Instruc_FTE	***M***	8956	13583	6736	9093	7483	9791	9505	6149	7406	20670	7174	9396
	SD	7508	13054	2374	6287	3668	8877	3781	1224	5922	19095	2880	6309
Research_FTE	***M***	1705	7550	337	299	2240	1403	5535	586	515	11051	152	260
	SD	6484	12845	2226	865	4396	7396	4893	3337	1143	19831	521	800
PubServ_FTE	***M***	541	1462	347	295	986	289	1849	555	530	789	192	253
	SD	1153	2005	611	724	1435	862	2046	652	632	1747	529	733
AcadSup_FTE	***M***	2295	3832	1617	2273	1918	2508	2640	1454	1852	5902	1740	2350
	SD	2812	5294	911	2006	1429	3333	1759	526	1900	8062	1100	2018
StudServ_FTE	***M***	2881	2150	2207	3988	1508	3659	1322	1399	2232	3588	2811	4304
	SD	2108	2243	1151	2368	1248	2100	597	566	2703	3154	1107	2159
InstSup_FTE	***M***	4150	4078	3007	5443	2264	5219	2287	1949	3190	7189	3799	5848
	SD	3431	4163	1581	4016	1835	3658	981	895	3906	5538	1518	3904
Other_FTE	***M***	1841	3084	1582	1506	3759	755	4374	3187	4240	844	379	1014
	SD	2864	2795	1948	3508	2713	2328	2167	1762	4928	2309	967	2935

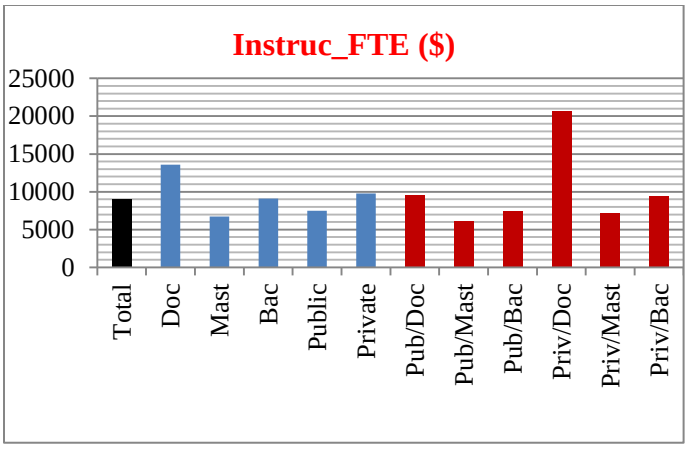

Figure 10. Mean values of instruction expenditures ($ per FTE) in the twelve samples

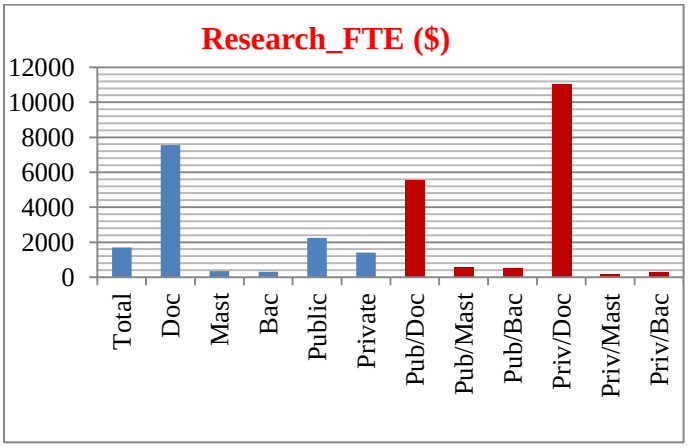

Figure 11. Mean values of research expenditures ($ per FTE) in the twelve samples

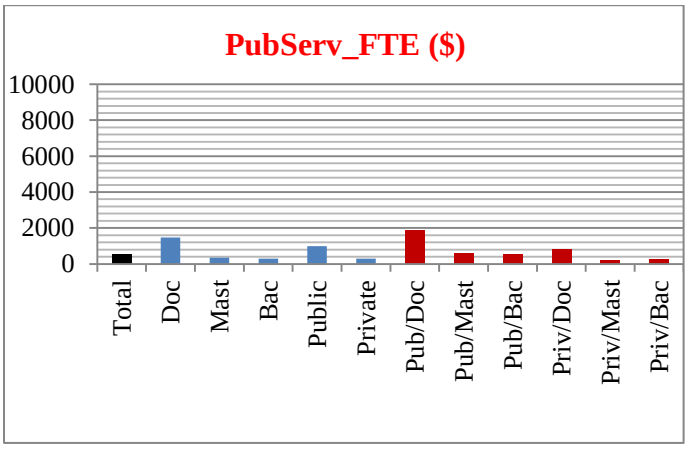

Figure 12. Mean values of public service expenditures ($ per FTE) in the twelve samples

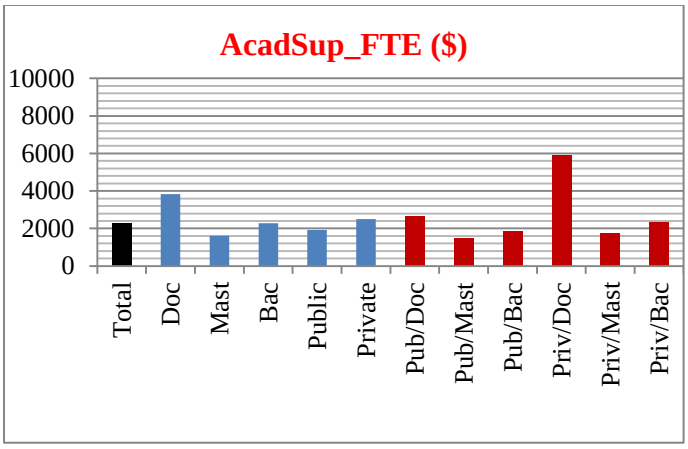

Figure 13. Mean values of academic support expenditures ($ per FTE) in the twelve samples

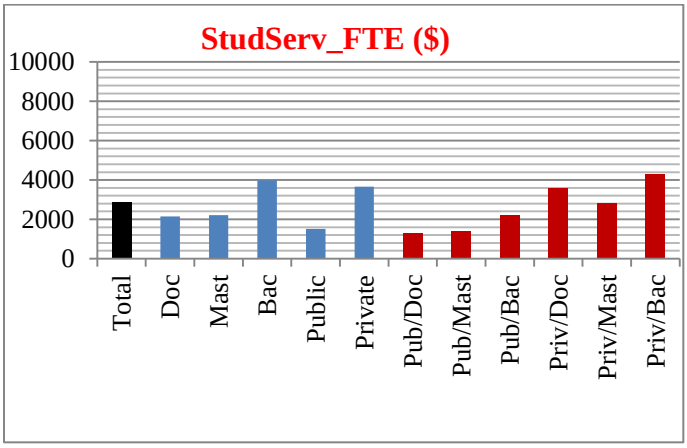

Figure 14. Mean values of student services expenditures ($ per FTE) in the twelve samples

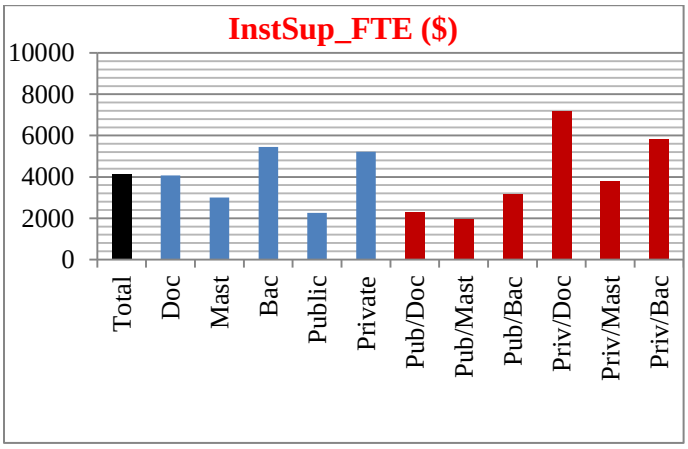

Figure 15. Mean values of institutional support expenditures ($ per FTE) in the twelve samples

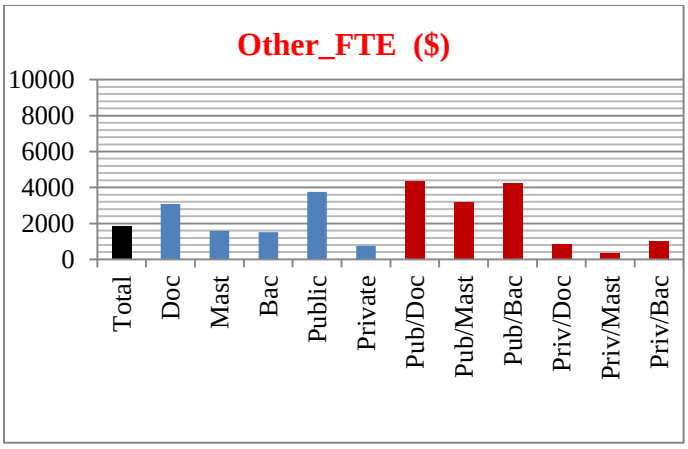

Figure 16. Mean values of other expenditures ($ per FTE) in the twelve samples

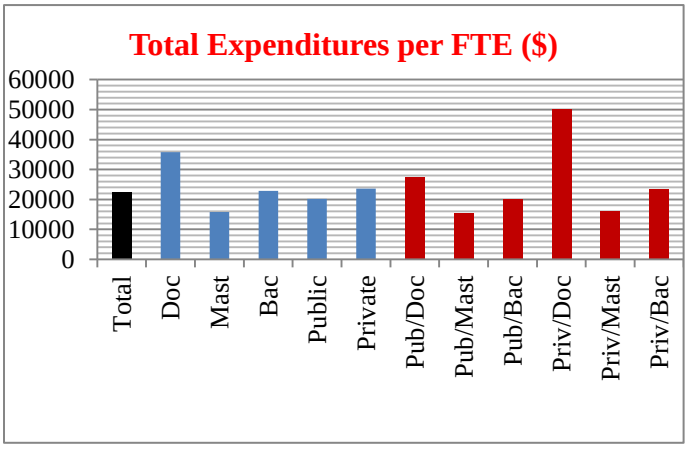

Figure 17. Mean values of total expenditures ($ per FTE) in the twelve samples

The following findings can be detected from Table 8 and Figures 10 to 17:

1. Private doctorate granting institutions spent the largest amount of dollars per FTE student for the expenditures components of instruction, research, academic support, and institutional support.
2. Private institutions spent more dollars per FTE student than their corresponding public ones for the expenditures components of instruction, academic support, student services, and institutional support.
3. Doctorate granting institutions spent considerable amount of dollars per FTE student on research expenditures compared to other institutions, as shown in Table 8 and Figure 11.
4. Public services expenditures were relatively small in all samples, with public doctorate institutions spending the largest amount of dollars on this expenditures component compared to other institutions, as shown in Table 8 and Figure 12.
5. Public institutions, in all categories, spent considerable amount of dollars per FTE student on the other expenditures component compared to private institutions, as shown in Table 8 and Figure 16.
6. The maximum total expenditures per FTE student was in private doctorate granting institutions while the minimum total was in public master's granting institutions, as shown in Figure 17.
7. Considering both forms of expenditures, as percent and per FTE student, provides more accurate representation of resource allocation in different institutions. For example, in order to differentiate between public doctorate, master's, and baccalaureate granting institutions based on instruction expenditures, one would find that public doctorate

granting institutions had the least percentages yet the largest amount of dollars per FTE student among the other public (see Figures 2 and 10).

Regression Models for Graduation Rates with Expenditures per FTE Student

Results of the stepwise multiple regression analyses conducted on the twelve samples of institutions are presented in this section. An alpha of .05 was used as the level of significance in the regression models. For clarity purposes, main results of each regression model are first presented then summary of all models outputs are collectively detailed in Table 9 at the end of this section.

For the **Total** sample of institutions (N = 1413), regression results indicated an overall model of six variables that significantly predicted graduation rates (R^2 = .326, R^2_{adj} = .323, F(6, 1406) = 113.48, p < .001). The six variables included in the model were: **Instruc_FTE** (ΔR^2 = .279, *Beta* = .490, p < .001), **StudServ_FTE** (ΔR^2 = .022, *Beta* = .164, p < .001), **AcadSup_FTE** (ΔR^2 = .009, *Beta* = .167, p < .001), **InstSup_FTE** (ΔR^2 = .008, *Beta* = -.125, p < .001), **Other_FTE** (ΔR^2 = .006, *Beta* = -.071, p = .002), and **Research_FTE** (ΔR^2 = .004, *Beta* = -.088, p = .006). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.35. These results indicated that the model accounted for 32.6% of the variance of graduation rates. Instruction, student services, and academic support expenditures had a positive relationship with graduation rates while institutional support, other, and research expenditures had a negative relationship with graduation rates in this sample.

For the **Doc** sample (public & private doctorate granting institutions, N = 271), regression results indicated an overall model of two variables that significantly predicted graduation rates

(R^2 = .336, R^2_{adj} = .331, F(2, 268) = 67.83, p < .001). The two variables included in the model were: **Instruc_FTE** (ΔR^2 = .318, *Beta* = .484, p < .001), and **AcadSup_FTE** (ΔR^2 = .018, *Beta* = .156, p = .008). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.73. These results indicated that the model accounted for 33.6% of the variance of graduation rates. Both instruction and academic support expenditures had a positive relationship with graduation rates in this sample.

For the **Mast** sample (public & private master's granting institutions, N = 598), regression results indicated an overall model of four variables that significantly predicted graduation rates (R^2 = .202, R^2_{adj} = .197, F(4, 593) = 37.62, p < .001). The four variables included in the model were: **Instruc_FTE** (ΔR^2 = .123, *Beta* = .293, p < .001), **Other_FTE** (ΔR^2 = .058, *Beta* = -.165, p < .001), **PubServ_FTE** (ΔR^2 = .015, *Beta* = -.112, p = .002), and **StudServ_FTE** (ΔR^2 = .007, *Beta* = .106, p = .027). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.58. These results indicated that the model accounted for 20.2% of the variance of graduation rates. Instruction and student services expenditures had a positive relationship with graduation rates while other and public services expenditures had a negative relationship with graduation rates in this sample.

For the **Bac** sample (public & private baccalaureate granting institutions, N = 544), regression results indicated an overall model of six variables that significantly predicted graduation rates (R^2 = .483, R^2_{adj} = .477, F(6, 537) = 83.57, p < .001). The six variables included in the model were: **Instruc_FTE** (ΔR^2 = .374, *Beta* = .457, p < .001), **StudServ_FTE** (ΔR^2 = .033, *Beta* = .187, p < .001), **InstSup_FTE** (ΔR^2 = .016, *Beta* = -.229, p < .001), **AcadSup_FTE**

(ΔR^2 = .032, *Beta* = .322, p < .001), **Other_FTE** (ΔR^2 = .022, *Beta* = -.149, p < .001), and **PubServ_FTE** (ΔR^2 = .006, *Beta* = -.082, p = .012). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.49. These results indicated that the model accounted for 48.3% of the variance of graduation rates. Instruction, student services, and academic support expenditures had a positive relationship with graduation rates while institutional support, other, and public services expenditures had a negative relationship with graduation rates in this sample.

For the **Public** sample (public institutions, N = 511), regression results indicated an overall model of four variables that significantly predicted graduation rates (R^2 = .331, R^2_{adj} = .326, $F(4, 506) = 62.59$, p < .001). The four variables included in the model were: **Instruc_FTE** (ΔR^2 = .281, *Beta* = .665, p < .001), **InstSup_FTE** (ΔR^2 = .037, *Beta* = -.192, p < .001), **Research_FTE** (ΔR^2 = .006, *Beta* = .124, p = .008), and **Other_FTE** (ΔR^2 = .008, *Beta* = -.120, p = .016). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.35. These results indicated that the model accounted for 33.1% of the variance of graduation rates. Instruction and research expenditures had a positive relationship with graduation rates while institutional support and other expenditures had a negative relationship with graduation rates in this sample.

For the **Private** sample (private institutions, N = 902), regression results indicated an overall model of seven variables that significantly predicted graduation rates (R^2 = .358, R^2_{adj} = .353, $F(7, 894) = 71.11$, p < .001). The seven variables included in the model were: **Instruc_FTE** (ΔR^2 = .291, *Beta* = .615, p < .001), **Research_FTE** (ΔR^2 = .019, *Beta* = -.204, p < .001), **AcadSup_FTE** (ΔR^2 = .022, *Beta* = .213, p < .001), **InstSup_FTE** (ΔR^2 = .006, *Beta* = -

.133, $p < .001$), **StuServ_FTE** ($\Delta R^2 = .011$, *Beta* = .126, $p < .001$), **PubServ_FTE** ($\Delta R^2 = .005$, *Beta* = -.074, $p = .011$), and **Other_FTE** ($\Delta R^2 = .004$, *Beta* = -.062, $p = .022$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.32. These results indicated that the model accounted for 35.8% of the variance of graduation rates. Instruction, academic support, and student services expenditures had a positive relationship with graduation rates while research, institutional support, public service, and other expenditures had a negative relationship with graduation rates in this sample.

For the **Pub/Doc** sample (public doctorate granting institutions, $N = 172$), regression results indicated an overall model of three variables that significantly predicted graduation rates ($R^2 = .322$, $R^2_{adj} = .310$, $F(3, 168) = 26.623$, $p < .001$). The three variables included in the model were: **Instruc_FTE** ($\Delta R^2 = .264$, *Beta* = .424, $p < .001$), **Research_FTE** ($\Delta R^2 = .035$, *Beta* = .327, $p < .001$) and **AcadSup_FTE** ($\Delta R^2 = .023$, *Beta* = .209, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.46. These results indicated that the model accounted for 32.2% of the variance of graduation rates. Instruction, research and academic support expenditures had a positive relationship with graduation rates in this sample.

For the **Pub/Mast** sample (public master's granting institutions, $N = 256$), regression results indicated an overall model of four variables that significantly predicted graduation rates ($R^2 = .127$, $R^2_{adj} = .113$, $F(4, 251) = 9.132$, $p < .001$). The four variables included in the model were: **Instruc_FTE** ($\Delta R^2 = .034$, *Beta* = .372, $p < .001$), **InstSup_FTE** ($\Delta R^2 = .050$, *Beta* = -.238, $p = .001$), **PubServ_FTE** ($\Delta R^2 = .027$, *Beta* = -.144, $p = .017$), and **Other_FTE** ($\Delta R^2 = .016$, *Beta* = -.142, $p = .034$). Collinearity statistics results did not indicate multicollinearity

among the independent variables with tolerance values greater than 0.68. These results indicated that the model accounted for 12.7% of the variance of graduation rates. Instruction expenditures had a positive relationship with graduation rates while institutional support, public service, and other expenditures had a negative relationship with graduation rates in this sample.

For the **Pub/Bac** sample (public baccalaureate granting institutions, $N = 83$), regression results indicated an overall model of two variables that significantly predicted graduation rates ($R^2 = .466$, $R^2_{adj} = .452$, $F(2, 80) = 34.87$, $p < .001$). The two variables included in the model were: **Instruc_FTE** ($\Delta R^2 = .438$, *Beta* = .666, $p < .001$) and **PubServ_FTE** ($\Delta R^2 = .027$, *Beta* = -.165, $p = .046$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.99. These results indicated that the model accounted for 46.6% of the variance of graduation rates. Instruction expenditures had a positive relationship with graduation rates while public service expenditures had a negative relationship with graduation rates in this sample.

For the **Priv/Doc** sample (private doctorate granting institutions, $N = 99$), regression results indicated an overall model of two variables that significantly predicted graduation rates ($R^2 = .416$, $R^2_{adj} = .404$, $F(2, 96) = 34.234$, $p < .001$). The two variables included in the model were: **Instruc_FTE** ($\Delta R^2 = .379$, *Beta* = .520, $p < .001$) and **AcadSup_FTE** ($\Delta R^2 = .038$, *Beta* = .216, $p = .014$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.80. These results indicated that the model accounted for 41.6% of the variance of graduation rates. Both instruction and academic support expenditures had a positive relationship with graduation rates in this sample.

For the **Priv/Mast** sample (private master's granting institutions, $N = 342$), regression results indicated an overall model of one variable that significantly predicted graduation rates ($R^2 = .135$, $R^2_{adj} = .132$, $F(1, 340) = 52.93$, $p < .001$). The one variable included in the model was: **Instruc_FTE** ($\Delta R^2 = .135$, *Beta* =.367, $p < .001$). These results indicated that the model accounted for 13.5% of the variance of graduation rates. Instruction expenditures had a positive relationship with graduation rates in this sample.

For the **Priv/Bac** sample (private baccalaureate granting institutions, $N = 461$), regression results indicated an overall model of five variables that significantly predicted graduation rates ($R^2 = .468$, $R^2_{adj} = .462$, $F(5, 455) = 79.95$, $p < .001$). The five variables included in the model were: **Instruc_FTE** ($\Delta R^2 = .359$, *Beta* = .470, $p < .001$), **AcadSup_FTE** ($\Delta R^2 = .029$, *Beta* = .331, $p < .001$), **InstSup_FTE** ($\Delta R^2 = .054$, *Beta* = -.297, $p = .001$), **StudServ_FTE** ($\Delta R^2 = .013$, *Beta* = .134, $p = .001$), and **Other_FTE** ($\Delta R^2 = .012$, *Beta* = -.113, $p = .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.48. These results indicated that the model accounted for 46.8% of the variance of graduation rates. Instruction, academic support, and student services expenditures had a positive relationship with graduation rates while institutional support and other expenditures had a negative relationship with graduation rates in this sample.

Collective summary of results for all regression models conducted for research question 2 are detailed in Table 9.

Table 9.

Summary of Results for Regression Models Conducted for Research Question 2

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Total (*N*=1413)	1	Instruc_FTE	.279	.278	.279	544.87	< .001	.490
	2	StudServ_FTE	.300	.299	.022	43.98	< .001	.164
	3	AcadSup_FTE	.309	.308	.009	17.64	< .001	.167
	4	InstSup_FTE	.317	.315	.008	16.43	< .001	-.125
	5	Other_FTE	.323	.320	.006	11.55	.002	-.071
	6	Research_FTE	.326	.323	.004	7.67	.006	-.088
Doc (*N* = 271)	1	Instruc_FTE	.318	.316	.318	125.61	< .001	.484
	2	AcadSup_FTE	.336	.331	.018	7.17	.008	.156
Mast (*N* = 598)	1	Instruc_FTE	.123	.122	.123	83.82	< .001	.293
	2	Other_FTE	.181	.178	.058	41.78	< .001	-.165
	3	PubServ_FTE	.196	.192	.015	11.08	.002	-.122
	4	StudServ_FTE	.202	.197	.007	4.89	.027	.106
Bac (*N* = 544)	1	Instruc_FTE	.374	.373	.374	323.67	< .001	.457
	2	StudServ_FTE	.406	.404	.033	29.66	< .001	.187
	3	InstSup_FTE	.423	.419	.016	15.03	< .001	-.229
	4	AcadSup_FTE	.455	.451	.032	31.71	< .001	.322
	5	Other_FTE	.477	.472	.022	22.71	< .001	-.149
	6	PubServ_FTE	.483	.477	.006	6.41	.012	-.082
Public (*N* = 511)	1	Instruc_FTE	.281	.279	.281	198.59	< .001	.665
	2	InstSup_FTE	.317	.315	.037	27.28	< .001	-.192
	3	Research_FTE	.323	.319	.006	4.43	.008	.124
	4	Other_FTE	.331	.326	.008	5.88	.016	-.120
Private (*N* = 902)	1	Instruc_FTE	.291	.290	.291	369.18	< .001	.615
	2	Research_FTE	.310	.308	.019	24.26	< .001	-.204
	3	AcadSup_FTE	.332	.330	.022	29.86	< .001	.213
	4	InstSup_FTE	.338	.335	.006	8.32	< .001	-.133
	5	StudServ_FTE	.349	.345	.011	14.81	< .001	.126
	6	PubServ_FTE	.354	.350	.005	7.22	.011	-.074
	7	Other_FTE	.358	.353	.004	5.24	.022	-.062

Table 9 "Cont."

Summary of Results for Regression Models Conducted for Research Question 2

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Pub/Doc (*N* = 172)	1	Instruc_FTE	.264	.260	.264	61.06	< .001	.424
	2	Research_FTE	.299	.291	.035	8.33	< .001	.327
	3	AcadSup_FTE	.322	.310	.023	5.79	.017	.209
Pub/Mast (*N* = 256)	1	Instruc_FTE	.034	.030	.034	8.91	< .001	.372
	2	InstSup_FTE	.084	.077	.050	13.79	.001	-.238
	3	PubServ_FTE	.111	.101	.027	7.74	.017	-.144
	4	Other_FTE	.127	.113	.016	4.56	.034	-.142
Pub/Bac (*N* = 83)	1	Instruc_FTE	.438	.432	.438	63.24	< .001	.666
	2	PubServ_FTE	.466	.452	.027	4.09	.046	-.165
Priv/Doc (*N* = 99)	1	Instruc_FTE	.379	.372	.379	59.09	< .001	.520
	2	AcadSup_FTE	.416	.404	.038	6.20	.014	.216
Priv/Mast (*N* = 342)	1	Instruc_FTE	.135	.132	.135	52.93	< .001	.367
Priv/Bac (*N* = 461)	1	Instruc_FTE	.359	.358	.359	257.12	< .001	.470
	2	AcadSup_FTE	.388	.385	.029	21.55	< .001	.331
	3	InstSup_FTE	.442	.439	.054	44.50	< .001	-.297
	4	StudServ_FTE	.455	.450	.013	10.90	.001	.134
	5	Other_FTE	.468	.462	.012	10.66	.001	-.113

Note: The dependent variable is six-year graduation rate (GradRate11)

Findings of Regression Models for Research Questions 1 & 2

Results of the regression models indicated that expenditures components, expressed in both forms as percentages of total core expenses and per FTE student, predicted graduation rates for the twelve samples of institutions examined. Figures 18 – 25 show results for R^2 of the regression models and ΔR^2 for the different expenditures components included in the models, as listed in Tables 7 and 9.

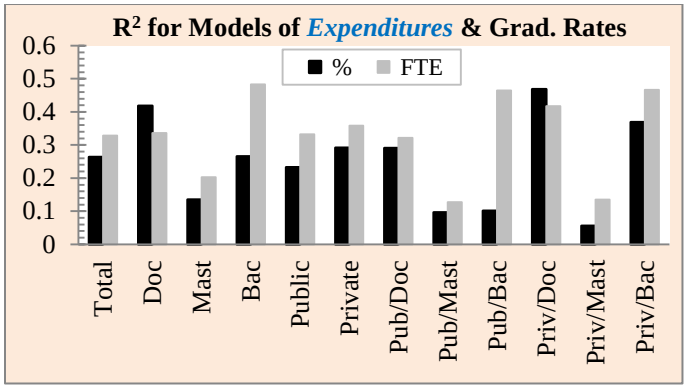

Figure 18. R^2 for regression models of expenditures predicting graduation rates

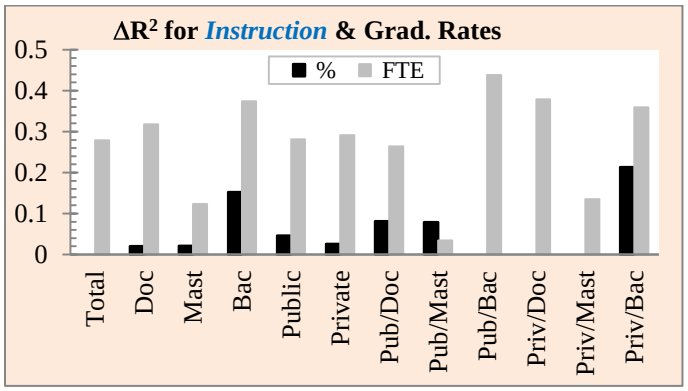

Figure 19. ΔR^2 for instruction expenditures predicting graduation rates in the twelve samples (Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

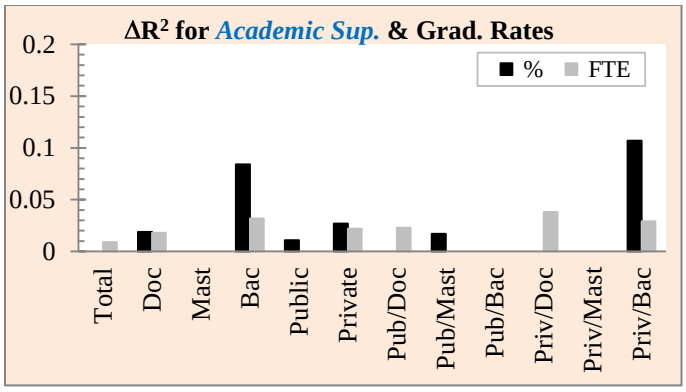

Figure 20. ΔR^2 for academic support expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

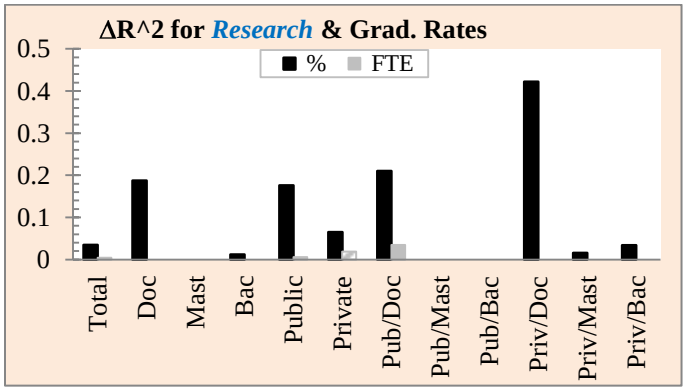

Figure 21. ΔR^2 for research expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

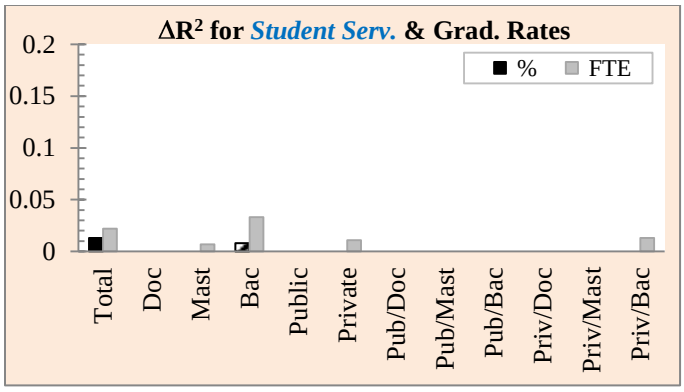

Figure 22. ΔR^2 for student services expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

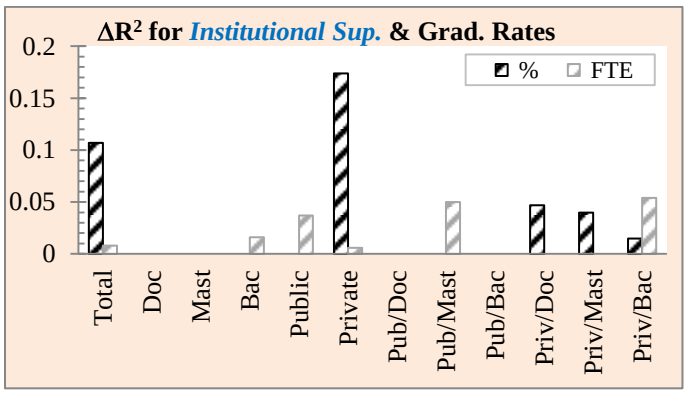

Figure 23. ΔR^2 for institutional support expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

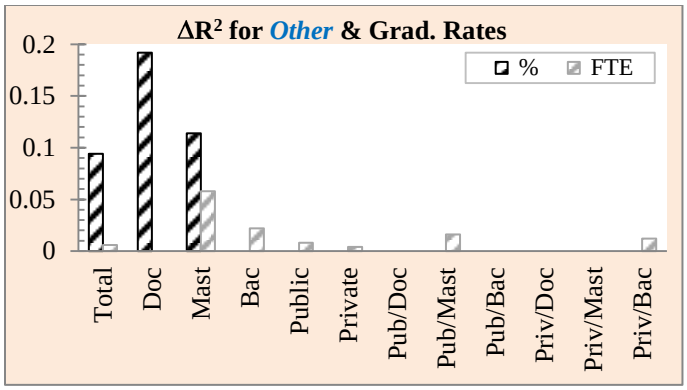

Figure 24. ΔR^2 for other expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

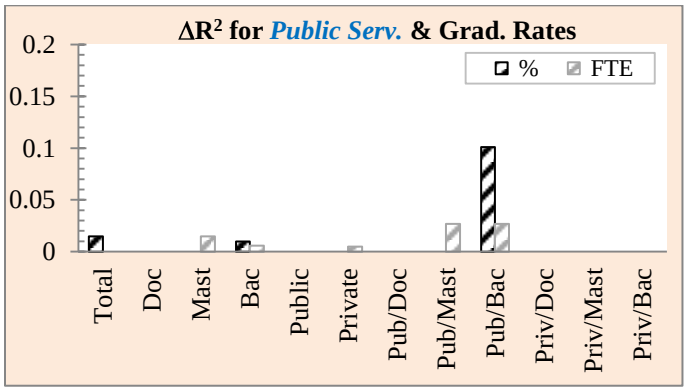

Figure 25. ΔR^2 for public service expenditures predicting graduation rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

The following findings can be detected from Tables 7 and 9 and from Figures 18-25:

1. Significant correlation existed between expenditures and graduation rates in all 24 regression models (12 models with expenditures expressed as percentages of total core expenses and 12 models with expenditures expressed per FTE student) regardless of the institutional characteristics of control (public or private) or Carnegie classification (doctoral, master's, or baccalaureate granting institutions). However, it should be mentioned that values of R^2, which indicate the amount of variance of graduation rates predicted by the regression model, varied among the samples, as shown in Figure 18 and Tables 7 and 9. In 18 models, the values of R^2 were more than 20% (with a maximum value of 48%) and they were less than 10% (with a minimum value of 5.6%) only in two models.
2. Results of the 24 regression models showed that there was a positive relationship between graduation rates and expenditures for instruction (in 20 models), academic support (in 13 models), research (in 11 models), and student services (in six models).
3. Results of the 24 regression models showed that there was a negative relationship between graduation rates and expenditures for institutional support (in 11 models), other (in 10 models), public services (in eight models), research (in two models), and student services (in one model).
4. Expenditures contributing more than 10% ($\Delta R^2 > .1$) to the regression models were: instruction (in 13 models), research (in four models), institutional support (in two models), other (in two models), academic support (in one model), and public service (in one model).

5. Instruction expenditures were found to have the highest positive contributions, ΔR^2, to graduation rates in majority of the regression models, as shown in Figure 19. It is worth mentioning also that instruction expenditures had the highest money allocation (as percentages of total core expenses or per FTE student) among all expenditures components in all twelve samples of institutions, as shown before in Tables 6 and 7.
6. In public and private doctoral granting institutions, research expenditures (as percentages of total core expenses) contributed strongly to graduation rates, as shown in Figure 21. It is worth mentioning that this type of institutions allocated the highest percentages of research expenditures compared to other institutions, as shown before in Table 6 and Figure 3.
7. Academic support expenditures were found to have modest positive contributions, $\Delta R^2 \leq$ 10% as shown in Figure 20, to graduation rates in majority of the regression models. It is worth mentioning also that, in all twelve samples of institutions, academic support expenditures ranged between 9% and 12% of the total expenditures, as shown before in Table 6, which may be considered low range compared to other expenditures such as institutional support and student services.
8. Student services expenditures were found to have no contributions to graduation rates in majority of the regression models while having low positive contributions, $\Delta R^2 \leq 5\%$, in six regression models, as shown in Figure 22. It is worth mentioning though that student services expenditures were allocated reasonable amount of money, especially at private institutions, as shown before in Figures 6 and 14.
9. Institutional expenditures were among the expenditures components that contributed negatively to graduation rates in the regression models, as shown in Figure 23. It is worth

mentioning that institutional expenditures were allocated considerable amount of money, especially at private institutions, as shown before in Figures 7 and 15.

10. Other expenditures, which are mainly scholarships and fellowships expenses in addition to uncharacterized other expenses, were found to contribute negatively to graduation rates in many of the regression models. In public institutions, which were found to allocate more money for other expenditures compared to private institutions as shown before in Figures 5 and 16, the regression models resulted in either negative or no contributions to graduation rates, as shown in Figure 24.
11. Public services expenditures were found to have no contributions to graduation rates in majority of the regression models while having low negative contributions, $\Delta R^2 \leq 5\%$, in seven regression models, as shown in Figure 25. It is worth mentioning though that public services expenditures were found to be typically allocated the least amount of money compared to other expenditures components in all institution samples, as shown before in Tables 6 and 7.

Results for Research Question 3

Research Question 3: Which combination, if any, of expenditure components (as percentages of total core expenses) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Descriptive Statistics

The dependent variable for this research question was first-year rates (RetRate06). The independent variables were: average instruction expenditures as percentage of total core expenses (Instruc05), research expenditures as percentage of total core expenses (Research05),

average public services expenditures as percentage of total core expenses (PubServ05), average academic support expenditures as percentage of total core expenses (AcadSup05), average student services expenditures as percentage of total core expenses (StudServ05), average institutional support expenditures as percentage of total core expenses (InstSup05), and average other expenditures as percentage of total core expenses (Other05). Descriptive statistics of mean values (*M*) and standard deviations (*SD*) for all variables are listed in Table 10 and Figure 26 shows the mean values of retention rates in the twelve samples.

Table 10.

Descriptive Statistics for Variables of Research Question 3

Variable Code		Total	Doc	Mast	Bac	Public	Private	Pub/Doc	Pub/Mast	Pub/Bac	Priv/Doc	Priv/Mast	Priv/Bac
	N	1405	270	595	540	509	896	172	254	83	98	341	457
Dependent Variable (%)													
RetRate06	***M***	73.9	81.0	72.3	72.2	73.0	74.4	78.9	71.1	66.7	84.6	73.2	73.1
	SD	12.1	10.8	9.8	13.7	10.7	12.9	9.4	9.2	11.8	12.3	10.2	13.8
Independent Variables (%)													
Instruc05	***M***	40.2	38.0	42.2	39.1	37.1	41.9	34.2	39.3	36.7	44.6	44.4	39.5
	SD	9.0	9.0	8.3	9.4	6.9	9.7	6.7	5.9	7.7	8.5	9.1	9.6
Research05	***M***	3.9	15.1	1.4	1.0	7.0	2.1	16.4	2.3	1.9	12.8	0.7	0.8
	SD	7.7	10.9	2.9	2.9	9.1	6.1	9.4	3.6	3.9	12.8	2.1	2.7
PubServ05	***M***	2.3	4.4	2.2	1.3	4.4	1.1	5.9	3.7	3.1	1.7	1.1	1.0
	SD	3.7	4.6	3.8	2.7	4.5	2.6	4.8	4.3	3.6	2.7	2.9	2.4
AcadSup05	***M***	9.7	10.0	9.9	9.4	9.0	10.2	8.9	9.1	8.7	11.9	10.6	9.5
	SD	4.5	4.7	4.3	4.5	3.0	5.1	2.8	3.1	3.5	6.5	5.0	4.6
StudServ05	***M***	13.7	6.7	13.4	17.4	7.6	17.1	5.1	8.5	10.0	9.5	17.1	18.7
	SD	7.4	4.1	6.4	7.2	3.6	6.8	2.6	3.1	4.1	4.8	5.6	6.9
InstSup05	***M***	19.3	11.9	18.7	23.7	11.2	24.0	8.3	12.1	14.2	18.1	23.7	25.4
	SD	9.3	6.7	8.1	9.2	4.6	8.1	3.2	4.1	5.5	6.8	6.7	8.6
Other05	***M***	11.0	14.0	12.2	8.2	23.9	3.7	21.2	25.1	25.6	1.5	2.6	5.0
	SD	12.6	10.8	12.9	12.6	6.7	8.8	5.7	6.3	8.1	3.7	6.8	10.5

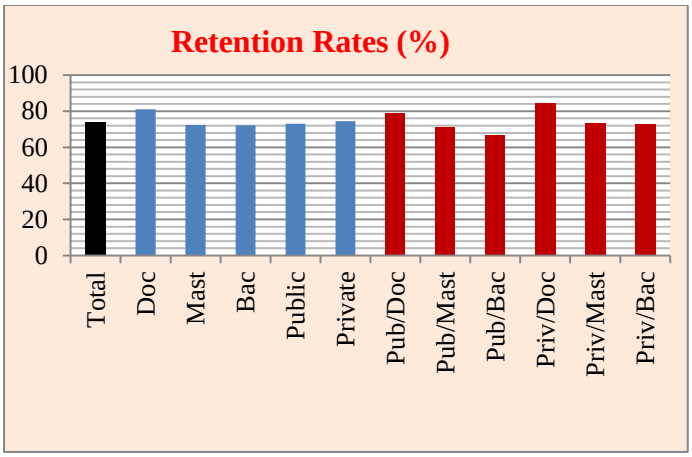

Figure 26. Mean values of retention rates (%) in the twelve samples

Based on the mean values of retention rates listed in Table 10 and shown in Figure 26, retention rates were higher than graduation rates in all samples. Private doctorate granting institutions had the highest retention rates percentages (84.6%) while public baccalaureate granting institutions had the lowest percentages (66.7%). Private institutions had higher retention rates compared to their corresponding public ones in all categories.

Regression Models for Retention Rates with Expenditures as Percentages of Total Core Expenses

Results of the stepwise multiple regression analyses conducted on the twelve samples of institutions are presented in this section. An alpha of .05 was used as the level of significance in the regression models. For clarity purposes, main results of each regression model are first presented then summary of all models outputs are collectively detailed in Table 11at the end of this section.

For the **Total** sample of institutions (N = 1405), regression results indicated an overall model of three variables that significantly predicted retention rates (R^2 = .234, R^2_{adj} = .232, F(3,

1401) = 142.44, $p < .001$). The three variables included in the model were: **Research05** (ΔR^2 = .113, *Beta* = .428, $p < .001$), **Instruc05** (ΔR^2 = .071, *Beta* = .282, $p < .001$), and **Acadsup05** (ΔR^2 = .049, *Beta* = .223, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.92. These results indicated that the model accounted for 23.4% of the variance of retention rates. Research, instruction, and academic support expenditures had a positive relationship with retention rates in this sample.

For the **Doc** sample (public & private doctorate granting institutions, $N = 270$), regression results indicated an overall model of four variables that significantly predicted retention rates (R^2 = .387, R^2_{adj} = .378, $F(4, 265) = 41.91$, $p < .001$). The four variables included in the model were: **Research05** (ΔR^2 = .243, *Beta* = .386, $p < .001$), **Other05** (ΔR^2 = .113, *Beta* = -.461, $p < .001$), **InstSup05** (ΔR^2 = .018, *Beta* = -.273, $p = .001$), and **PubServ05** (ΔR^2 = .013, *Beta* = -.128, p = .020). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.35. These results indicated that the model accounted for 38.7% of the variance of retention rates. Research expenditures had a positive relationship with retention rates while other, institutional support, and public service expenditures had a negative relationship with retention rates in this sample.

For the **Mast** sample (public & private master's granting institutions, $N = 595$), regression results indicated an overall model of two variables that significantly predicted retention rates (R^2 = .051, R^2_{adj} = .048, $F(2, 592) = 16.021$, $p < .001$). The two variables included in the model were: **Instruc05** (ΔR^2 = .031, *Beta* = .198, $p < .001$), and **AcadSup05** (ΔR^2 = .021, *Beta* = .145, $p < .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.97. These results indicated that the

model accounted for 5.1% of the variance of retention rates. Both instruction and academic support expenditures had a positive relationship with retention rates in this sample.

For the **Bac** sample (public & private baccalaureate granting institutions, $N = 540$), regression results indicated an overall model of three variables that significantly predicted retention rates ($R^2 = .197$, $R^2_{adj} = .193$, $F(3, 536) = 43.89$, $p < .001$). The three variables included in the model were: **Instruc05** ($\Delta R^2 = .105$, *Beta* = .315, $p < .001$), **AcadSup05** ($\Delta R^2 = .075$, *Beta* = .275, $p < .001$), and **Research05** ($\Delta R^2 = .017$, *Beta* = .131, $p = .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.98. These results indicated that the model accounted for 19.7% of the variance of retention rates. Instruction, academic support, and research expenditures had a positive relationship with retention rates in this sample.

For the **Public** sample (public institutions, $N = 509$), regression results indicated an overall model of four variables that significantly predicted retention rates ($R^2 = .216$, $R^2_{adj} = .210$, $F(4, 505) = 34.77$, $p < .001$). The four variables included in the model were: **Research05** ($\Delta R^2 = .173$, *Beta* = .531, $p < .001$), **PubServ05** ($\Delta R^2 = .024$, *Beta* = -.109, $p = .014$), **Instruc05** ($\Delta R^2 = .009$, *Beta* = .129, $p = .009$), and **AcadSup05** ($\Delta R^2 = .010$, *Beta* = .105, $p = .010$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.64. These results indicated that the model accounted for 21.6% of the variance of retention rates. Research, instruction, and academic support expenditures had a positive relationship with retention rates while public service expenditures had a negative relationship with retention rates in this sample.

For the **Private** sample (private institutions, $N = 896$), regression results indicated an overall model of four variables that significantly predicted retention rates ($R^2 = .261$, $R^2_{adj} = .258$, $F(4, 891) = 78.81$, $p < .001$). The four variables included in the model were: **Research05** ($\Delta R^2 = .136$, *Beta* = .347, $p < .001$), **Instruc05** ($\Delta R^2 = .067$, *Beta* = .234, $p < .001$), **AcadSup05** ($\Delta R^2 = .054$, *Beta* = .213, $p < .001$), and **InstSup05** ($\Delta R^2 = .004$, *Beta* = -.082, $p = .025$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.62. These results indicated that the model accounted for 26.1% of the variance of retention rates. Research, instruction, and academic support had a positive relationship with retention rates while institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Pub/Doc** sample (public doctorate granting institutions, $N = 172$), regression results indicated an overall model of two variables that significantly predicted retention rates ($R^2 = .268$, $R^2_{adj} = .259$, $F(2, 169) = 30.96$, $p < .001$). The two variables included in the model were: **Research05** ($\Delta R^2 = .220$, *Beta* = .670, $p < .001$) and **Instruc05** ($\Delta R^2 = .048$, *Beta* = .298, $p = .001$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.54. These results indicated that the model accounted for 26.8% of the variance of retention rates. Both research and instruction expenditures had a positive relationship with retention rates in this sample.

For the **Pub/Mast** sample (public master's granting institutions, $N = 254$), regression results indicated an overall model of two variables that significantly predicted retention rates ($R^2 = .082$, $R^2_{adj} = .074$, $F(2, 251) = 11.19$, $p < .001$). The two variables included in the model were: **PubServ05** ($\Delta R^2 = .065$, *Beta* = -.209, $p = .001$) and **Instruc05** ($\Delta R^2 = .016$, *Beta* = .136, $p =$

.035). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.88. These results indicated that the model accounted for 8.2% of the variance of retention rates. Instruction expenditures had a positive relationship with retention rates while public service expenditures had a negative relationship with retention rates in this sample.

For the **Pub/Bac** sample (public baccalaureate granting institutions, $N = 83$), regression results indicated an overall model of three variables that significantly predicted retention rates ($R^2 = .223$, $R^2_{adj} = .193$, $F(3, 79) = 7.55$, $p < .001$). The three variables included in the model were: **PubServ05** ($\Delta R^2 = .101$, *Beta* = -.363, $p = .0031$, **Instruc05** ($\Delta R^2 = .079$, *Beta* = .316, $p = .003$), and **StudServ05** ($\Delta R^2 = .043$, *Beta* = .213, $p = .041$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.88. These results indicated that the model accounted for 22.3% of the variance of retention rates. Instruction and student services expenditures had a positive relationship with retention rates while public service expenditures had a negative relationship with retention rates in this sample.

For the **Priv/Doc** sample (private doctorate granting institutions, $N = 98$), regression results indicated an overall model of three variables that significantly predicted retention rates ($R^2 = .491$, $R^2_{adj} = .475$, $F(3, 94) = 30.25$, $p < .001$). The three variables included in the model were: **Research05** ($\Delta R^2 = .420$, *Beta* = .539, $p < .001$), **InstSup05** ($\Delta R^2 = .047$, *Beta* = -.222, $p = .023$), and **AcadSup05** ($\Delta R^2 = .042$, *Beta* = .163, $p = .037$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.57. These results indicated that the model accounted for 49.1% of the variance of retention

rates. Research and academic support expenditures had a positive relationship with retention rates while institutional support had a negative relationship with retention rates in this sample.

For the **Priv/Mast** sample (private master's granting institutions, $N = 341$), regression results indicated an overall model of two variables that significantly predicted retention rates ($R^2 = .049$, $R^2_{adj} = .044$, $F(2, 338) = 8.78$, $p < .001$). The two variables included in the model were: **Research05** ($\Delta R^2 = .031$, *Beta* = .156, $p = .004$) and **InstSup05** ($\Delta R^2 = .018$, *Beta* = -.137, $p = .011$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.97. These results indicated that the model accounted for 4.9% of the variance of retention rates. Research expenditures had a positive relationship with retention rates while institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Priv/Bac** sample (private baccalaureate granting institutions, $N = 457$), regression results indicated an overall model of four variables that significantly predicted retention rates ($R^2 = .262$, $R^2_{adj} = .255$, $F(4, 452) = 40.01$, $p < .001$). The four variables included in the model were: **Instruc05** ($\Delta R^2 = .138$, *Beta* = .427, $p < .001$), **AcadSup05** ($\Delta R^2 = .080$, *Beta* = .315, $p < .001$), **Research05** ($\Delta R^2 = .031$, *Beta* = .189, $p < .001$), and **Other05** ($\Delta R^2 = .012$, *Beta* = .138, $p = .006$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.65. These results indicated that the model accounted for 26.2% of the variance of retention rates. Instruction, academic support, research, and other expenditures had a positive relationship with retention rates in this sample.

Collective summary of results for all regression models conducted for research question 3 are detailed in Table 11. Findings of the regression analyses for both research questions 3 and 4

are presented together in a separate section after presenting the results of research question 4 in order to perform a more comprehensive evaluation of the relationships between retention rates and the two forms of expenditures (as percentages of total core expenses and per FTE student).

Table 11.

Summary of Results for Regression Models Conducted for Research Question 3

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Total (*N*=1405)	1	Research05	.113	.113	.113	179.11	< .001	.428
	2	Instruc05	.184	.183	.071	122.24	< .001	.282
	3	AcadSup05	.234	.232	.049	90.34	< .001	.223
Doc (*N* = 270)	1	Research05	.243	.240	.243	86.18	< .001	.386
	2	Other05	.357	.352	.113	47.08	< .001	-.461
	3	InstSup05	.375	.368	.018	7.65	.001	-.273
	4	PubServ05	.387	.378	.013	5.51	.020	-.128
Mast (*N* = 595)	1	Instruc05	.031	.029	.031	18.80	< .001	.198
	2	AcadSup05	.051	.048	.021	12.86	< .001	.145
Bac (*N* = 540)	1	Instruc05	.105	.103	.105	62.99	< .001	.315
	2	AcadSup05	.180	.177	.075	49.42	< .001	.275
	3	Research05	.197	.193	.017	11.30	.001	.131
Public (*N* = 509)	1	Research05	.173	.171	.173	106.15	< .001	.531
	2	PubServ05	.196	.193	.024	14.88	.014	-.109
	3	Instruc05	.206	.201	.009	5.83	.009	.129
	4	AcadSup05	.216	.210	.010	6.65	.010	.105
Private (*N* = 896)	1	Research05	.136	.135	.136	140.52	< .001	.347
	2	Instruc05	.203	.201	.067	75.12	< .001	.234
	3	AcadSup05	.257	.255	.054	65.17	< .001	.213
	4	InstSup05	.261	.258	.004	5.06	.025	-.082
Pub/Doc (*N* = 172)	1	Research05	.220	.215	.220	47.88	< .001	.670
	2	Instruc05	.268	.259	.048	11.17	.001	.298
Pub/Mast (*N* = 254)	1	PubServ05	.065	.061	.065	17.62	.001	-.209
	2	Instruc05	.082	.074	.016	4.51	.035	.136
Pub/Bac (*N* = 83)	1	PubServ05	.101	.090	.101	9.12	.001	-.363
	2	Instruc05	.180	.160	.079	7.72	.003	-.316
	3	StudServ05	.223	.193	.043	4.33	.041	.213
Priv/Doc (*N* = 98)	1	Research05	.420	.414	.420	69.57	< .001	.539
	2	InstSup05	.467	.456	.047	8.35	.023	-.222
	3	AcadSup05	.491	.475	.024	4.47	.037	.163

Table 11 “Cont.”

Summary of Results for Regression Models Conducted for Research Question 3

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Priv/Mast	1	Research05	.031	.028	.031	10.85	.004	.156
(*N* = 341)	2	InstSup05	.049	.044	.018	6.54	.011	-.137
	1	Instruc05	.138	.136	.138	72.74	< .001	.427
Priv/Bac	2	AcadSup05	.218	.214	.080	46.36	< .001	.315
(*N* = 457)	3	Research05	.249	.244	.031	18.93	< .001	.189
	4	Other05	.262	.255	.012	7.60	.006	.138

Note: The dependent variable is first-year retention rate (RetRate05)

Results for Research Question 4

Research Question 4: Which combination, if any, of expenditure components (per FTE student) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Descriptive Statistics

The dependent variable for this research question was first-year retention rates (RetRate11). The independent variables were: instruction expenditures as dollar values per FTE student (Instruc05F), research expenditures as dollar values per FTE student (Research05F), public services expenditures as dollar values per FTE student (PubServ05F), academic support expenditures as dollar values per FTE student (AcadSup05F), student services expenditures as dollar values per FTE student (StudServ05F), institutional support expenditures as dollar values per FTE student (InstSup05F), and other expenditures as dollar values per FTE students (Other05F). Descriptive statistics of mean values (*M*) and standard deviations (*SD*) for all variables of this question are listed in Table 12 for the twelve samples of institutions.

Table 12.

Descriptive Statistics for Variables of Research Question 4

Variable Code		Total	Doc	Mast	Bac	Public	Private	Pub/Doc	Pub/Mast	Pub/Bac	Priv/Doc	Priv/Mast	Priv/Bac
	N	1405	270	595	540	509	896	172	254	83	98	341	457
Dependent Variable (%)													
RetRate 06	***M***	73.9	81.0	72.3	72.2	73.0	74.4	78.9	71.1	66.7	84.6	73.2	73.1
	SD	12.1	10.8	9.8	13.7	10.7	12.9	9.4	9.2	11.8	12.3	10.2	13.8
Independent Variables ($ per FTE Students)													
Instruc 05F	***M***	8210	12130	6149	8521	6565	9145	8333	5354	6607	18795	6742	8868
	SD	7083	11665	2785	6459	3821	8246	3393	1433	6999	16930	3346	6302
Research 05F	***M***	1555	6826	311	290	1996	1305	4899	534	458	10208	146	260
	SD	5847	11504	2089	988	3982	6668	4374	3133	1158	17752	509	952
PubServ 05F	***M***	512	1310	334	310	903	290	1634	534	518	742	184	272
	SD	1083	1754	618	837	1255	899	1703	687	745	1706	514	848
AcadSup 05F	***M***	3076	3275	1475	2138	1639	2324	2211	1251	1640	5143	1641	2228
	SD	2488	4449	985	2013	1150	2965	1159	532	1833	6855	1191	2033
StudServ 05F	***M***	2615	1903	1958	3697	1286	3371	1146	1158	1967	3232	2553	4011
	SD	2486	2139	1227	3203	1266	2686	537	490	2831	3062	1273	3168
InstSup 05F	***M***	3934	3612	2790	5355	2018	5022	1954	1702	3115	6521	3600	5762
	SD	4678	3835	1899	6494	2387	5274	855	893	5458	5107	2040	6589
Other 05F	***M***	2171	3558	1839	1844	4492	853	5246	3790	5078	594	385	1256
	SD	4152	3262	3786	4754	4604	3194	2720	5045	5857	1593	1067	4277

Regression Models for Retention Rates with Expenditures per FTE Student

Results of the stepwise multiple regression analyses conducted on the twelve samples of institutions are presented in this section. An alpha of .05 was used as the level of significance in the regression models. For clarity purposes, main results of each regression model are first presented then summary of all models outputs are collectively detailed in Table 13 at the end of this section.

For the **Total** sample of institutions (N = 1405), regression results indicated an overall model of three variables that significantly predicted retention rates (R^2 = .227, R^2_{adj} = .225, F(3, 1401) = 137.22, p < .001). The three variables included in the model were: **Instruc05F** (ΔR^2 = .186, *Beta* = .420, p < .001), **InstSup05F** (ΔR^2 = .018, *Beta* = -.199, p < .001), and **AcadSup05F** (ΔR^2 = .022, *Beta* = .196, p < .001). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.52. These results indicated that the model accounted for 22.7% of the variance of retention rates. Instruction and academic support expenditures had a positive relationship with retention rates while institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Doc** sample (public & private doctorate granting institutions, N = 270), regression results indicated an overall model of two variables that significantly predicted retention rates (R^2 = .291, R^2_{adj} = .285, F(2, 267) = 54.70, p < .001). The two variables included in the model were: **Instruc05F** (ΔR^2 = .274, *Beta* = .441, p < .001), and **AcadSup05F** (ΔR^2 = .017, *Beta* = .153, p = .013). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.71. These results indicated that the model

accounted for 29.1% of the variance of retention rates. Both instruction and academic support expenditures had a positive relationship with retention rates in this sample.

For the **Mast** sample (public & private master's granting institutions, $N = 595$), regression results indicated an overall model of three variables that significantly predicted retention rates ($R^2 = .072$, $R^2_{adj} = .068$, $F(3, 591) = 15.39$, $p < .001$). The three variables included in the model were: **Instruc05F** ($\Delta R^2 = .041$, *Beta* = .310, $p < .001$), **PubServ05F** ($\Delta R^2 = .021$, *Beta* = -.156, $p < .001$), and **InstSup05F** ($\Delta R^2 = .011$, *Beta* = -.145, $p = .008$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.52. These results indicated that the model accounted for 7.2% of the variance of retention rates. Instruction expenditures had a positive relationship with retention rates while public services and institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Bac** sample (public & private baccalaureate granting institutions, $N = 540$), regression results indicated an overall model of five variables that significantly predicted retention rates ($R^2 = .333$, $R^2_{adj} = .327$, $F(5, 534) = 53.38$, $p < .001$). The five variables included in the model were: **Instruc05F** ($\Delta R^2 = .211$, *Beta* = .387, $p < .001$), **InstSup05F** ($\Delta R^2 = .039$, *Beta* = -.317, $p < .001$), **AcadSup05F** ($\Delta R^2 = .062$, *Beta* = .430, $p < .001$), **Other05F** ($\Delta R^2 = .013$, *Beta* = -.115, $p = .002$), and **PubServ05F** ($\Delta R^2 = .009$, *Beta* = -.102, $p = .009$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.41. These results indicated that the model accounted for 33.3% of the variance of retention rates. Instruction and academic support expenditures had a positive

relationship with retention rates while institutional support, other, and public services expenditures had a negative relationship with retention rates in this sample.

For the **Public** sample (public institutions, $N = 509$), regression results indicated an overall model of four variables that significantly predicted retention rates ($R^2 = .261$, $R^2_{adj} = .256$, $F(4, 504) = 44.59$, $p < .001$). The four variables included in the model were: **Instruc05F** ($\Delta R^2 = .198$, *Beta* = .502, $p < .001$), **InstSup05F** ($\Delta R^2 = .026$, *Beta* = -.201, $p < .001$), **AcadSup05F** ($\Delta R^2 = .028$, *Beta* = .224, $p < .001$), and **StudServ05F** ($\Delta R^2 = .009$, *Beta* = -.123, $p = .014$). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.31. These results indicated that the model accounted for 26.1% of the variance of retention rates. Instruction and academic support expenditures had a positive relationship with retention rates while institutional support and student services expenditures had a negative relationship with retention rates in this sample.

For the **Private** sample (private institutions, $N = 896$), regression results indicated an overall model of five variables that significantly predicted retention rates ($R^2 = .248$, $R^2_{adj} = .244$, $F(5, 890) = 58.79$, $p < .001$). The five variables included in the model were: **Instruc05F** ($\Delta R^2 = .193$, *Beta* = .492, $p < .001$), **InstSup05F** ($\Delta R^2 = .021$, *Beta* = -.211, $p < .001$), **AcadSup05F** ($\Delta R^2 = .024$, *Beta* = .219, $p < .001$), **Research05F** ($\Delta R^2 = .005$, *Beta* = -.105, $p = .011$), and **Other05F** ($\Delta R^2 = .005$, *Beta* = -.073, $p = .012$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.37. These results indicated that the model accounted for 24.8% of the variance of retention rates. Instruction and academic support expenditures had a positive relationship with retention rates

while institutional support, research, and other expenditures had a negative relationship with retention rates in this sample.

For the **Pub/Doc** sample (public doctorate granting institutions, $N = 172$), regression results indicated an overall model of two variables that significantly predicted retention rates ($R^2 = .305$, $R^2_{adj} = .297$, $F(2, 169) = 37.16$, $p < .001$). The two variables included in the model were: **Instruc05F** ($\Delta R^2 = .268$, *Beta* = .327, $p < .001$) and **Research05F** ($\Delta R^2 = .038$, *Beta* = .272, $p = .003$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.50. These results indicated that the model accounted for 30.5% of the variance of retention rates. Both instruction and research expenditures had a positive relationship with retention rates in this sample.

For the **Pub/Mast** sample (public master's granting institutions, $N = 254$), regression results indicated an overall model of three variables that significantly predicted retention rates ($R^2 = .103$, $R^2_{adj} = .092$, $F(3, 250) = 9.55$, $p < .001$). The three variables included in the model were: **PubServ05F** ($\Delta R^2 = .060$, *Beta* = -.249, $p < .001$), **Instruc05F** ($\Delta R^2 = .018$, *Beta* = .268, $p = .001$), and **InstSup05F** ($\Delta R^2 = .025$, *Beta* = -.207, $p = .009$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.58. These results indicated that the model accounted for 10.3% of the variance of retention rates. Instruction expenditures had a positive relationship with retention rates while public service and institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Pub/Bac** sample (public baccalaureate granting institutions, $N = 83$), regression results indicated an overall model of three variables that significantly predicted retention rates

(R^2 = .484, R^2_{adj} = .464, F(3, 79) = 24.68, p < .001). The three variables included in the model were: **AcadSup05F** (ΔR^2 = .357, *Beta* = .536, p < .001), **PubServ05F** (ΔR^2 = .092, *Beta* = -.274, p = .002), and **StudServ05F** (ΔR^2 = .035, *Beta* = .224, p = .024). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.66. These results indicated that the model accounted for 48.4% of the variance of retention rates. Academic support and student services expenditures had a positive relationship with retention rates while public service expenditures had a negative relationship with retention rates in this sample.

For the **Priv/Doc** sample (private doctorate granting institutions, N = 98), regression results indicated an overall model of two variables that significantly predicted retention rates (R^2 = .343, R^2_{adj} = .329, F(2, 95) = 24.75, p < .001). The two variables included in the model were: **Instruc05F** (ΔR^2 = .314, *Beta* = .475, p < .001) and **AcadSup05F** (ΔR^2 = .029, *Beta* = .190, p = .045). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.79. These results indicated that the model accounted for 34.3% of the variance of retention rates. Both instruction and academic support expenditures had a positive relationship with retention rates in this sample.

For the **Priv/Mast** sample (private master's granting institutions, N = 341), regression results indicated an overall model of two variables that significantly predicted retention rates (R^2 = .061, R^2_{adj} = .056, F(2, 338) = 11.06, p < .001). The two variables included in the model were: **Instruc05F** (ΔR^2 = .045, *Beta* =.327, p < .001) and **InstSup05F** (ΔR^2 = .020175, *Beta* = -.173, p = .015). Collinearity statistics results did not indicate multicollinearity among the independent variables with tolerance values greater than 0.556. These results indicated that the model

accounted for 6.1% of the variance of retention rates. Instruction expenditures had a positive relationship with retention rates while institutional support expenditures had a negative relationship with retention rates in this sample.

For the **Priv/Bac** sample (private baccalaureate granting institutions, $N = 457$), regression results indicated an overall model of four variables that significantly predicted retention rates ($R^2 = .318$, $R^2_{adj} = .312$, $F(4, 452) = 52.58$, $p < .001$). The four variables included in the model were: **Instruc05F** ($\Delta R^2 = .188$, *Beta* = .358, $p < .001$), **InstSup05F** ($\Delta R^2 = .057$, *Beta* = -.379, $p = .001$), **AcadSup05F** ($\Delta R^2 = .059$, *Beta* = .398, $p < .001$), and **Other05F** ($\Delta R^2 = .013$, *Beta* = -.114, $p = .004$). Collinearity statistics results did not indicate multicollinearity among the independent variables, with tolerance values greater than 0.41. These results indicated that the model accounted for 31.8% of the variance of retention rates. Instruction and academic support expenditures had a positive relationship with retention rates while institutional support and other expenditures had a negative relationship with retention rates in this sample.

Collective summary of results for all regression models conducted for research question 4 are detailed in Table 13.

Table 13.

Summary of Results for Regression Models Conducted for Research Question 4

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
Total (*N*=1405)	1	Instruc05F	.186	.186	.186	321.33	< .001	.420
	2	InstSup05F	.205	.204	.018	32.23	< .001	-.199
	3	AcadSup05F	.227	.225	.022	40.71	< .001	.196
Doc (*N* = 270)	1	Instruc05F	.274	.271	.274	101.11	< .001	.441
	2	AcadSup05F	.291	.285	.017	6.30	.013	.153
Mast (*N* = 595)	1	Instruc05F	.041	.039	.041	25.10	< .001	.310
	2	PubServ05F	.061	.058	.021	13.09	< .001	-.156
	3	InstSup05F	.072	.068	.011	7.08	.008	-.145
Bac (*N* = 540)	1	Instruc05F	.221	.210	.211	143.94	< .001	.387
	2	InstSup05F	.250	.248	.039	28.11	< .001	-.317
	3	AcadSup05F	.312	.308	.062	48.14	< .001	.430
	4	Other05F	.325	.320	.013	10.02	.002	-.115
	5	PubServ05F	.333	.327	.009	6.81	.009	-.102
Public (*N* = 509)	1	Instruc05F	.198	.197	.198	125.30	< .001	.502
	2	InstSup05F	.224	.221	.026	17.00	< .001	-.201
	3	AcadSup05F	.252	.248	.028	19.04	< .001	.224
	4	StudServ05F	.261	.256	.009	6.13	.014	-.123
Private (*N* = 896)	1	Instruc05F	.193	.192	.193	213.43	< .001	.492
	2	InstSup05F	.213	.212	.021	23.41	< .001	-.211
	3	AcadSup05F	.238	.235	.024	28.49	< .001	.219
	4	Research05F	.243	.240	.005	6.22	.011	-.105
	5	Other05F	.248	.244	.005	6.29	.012	-.073
Pub/Doc (*N* = 172)	1	Instruc05F	.268	.263	.268	62.18	< .001	.327
	2	Research05F	.305	.297	.038	9.17	.003	.272
Pub/Mast (*N* = 254)	1	PubServ05F	.060	.056	.060	15.98	< .001	-.249
	2	Instruc05F	.078	.070	.018	4.92	.001	.268
	3	InstSup05F	.103	.092	.025	6.99	.009	-.207
Pub/Bac (*N* = 83)	1	AcadSup05F	.357	.349	.357	44.96	< .001	.536
	2	PubServ05F	.449	.435	.092	13.38	.002	-.274
	3	StudServ05F	.484	.464	.035	5.31	.024	.224

Table 13 "Cont."

Summary of Results for Regression Models Conducted for Research Question 4

Sample	Step	Variables	R^2	R^2_{adj}	ΔR^2	F_{chg}	*p*	*Beta*
	5	Other05F	.248	.244	.005	6.29	.012	-.073
Priv/Doc	1	Instruc05F	.314	.307	.314	43.93	< .001	.475
(*N* = 98)	2	AcadSup05F	.343	.329	.029	4.14	.045	.190
Priv/Mast	1	Instruc05F	.045	.042	.045	15.90	< .001	.327
(*N* = 341)	2	InstSup05F	.061	.056	.017	5.98	.015	-.173
	1	Instruc05F	.188	.187	.188	105.66	< .001	.358
Priv/Bac	2	InstSup05F	.246	.242	.057	34.44	< .001	-.379
(*N* = 457)	3	AcadSup05F	.305	.300	.059	38.50	< .001	.398
	4	Other05F	.318	.312	.013	8.46	.004	-.114

Note: The dependent variable is first-year retention rate (RetRate05)

Findings of Regression Models for Research Questions 3 & 4

Results of the regression models indicated that expenditures components, expressed in both forms as percentages of total core expenses and per FTE student, predicted graduation rates for the twelve samples of institutions examined. Figures 27 – 34 show results for R^2 of the regression models and ΔR^2 for the different expenditures components included in the models, as listed in Tables 11 and 13.

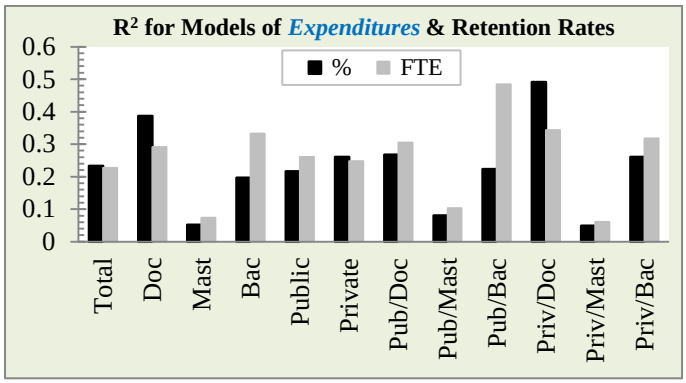

Figure 27. R^2 for regression models of expenditures predicting retention rates

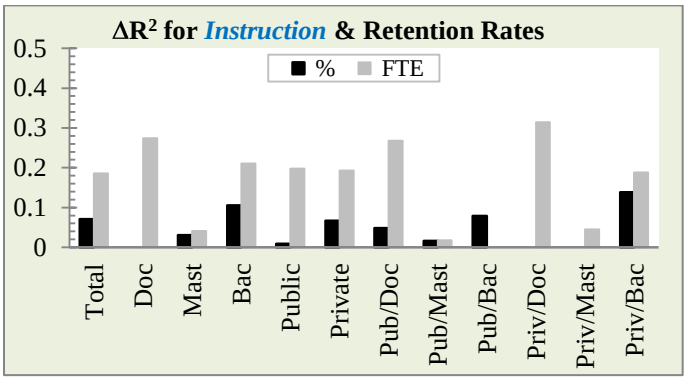

Figure 28. ΔR^2 for instruction expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

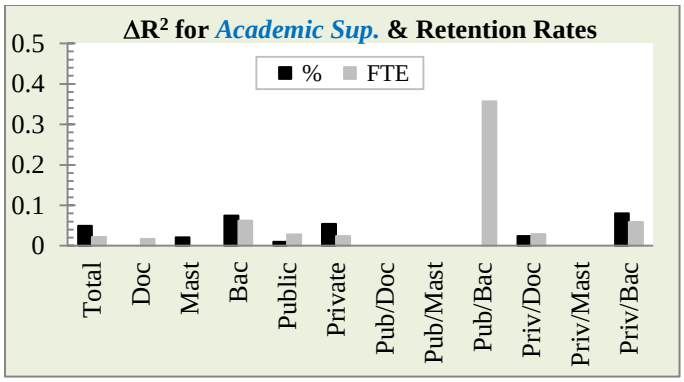

Figure 29. ΔR^2 for academic support expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

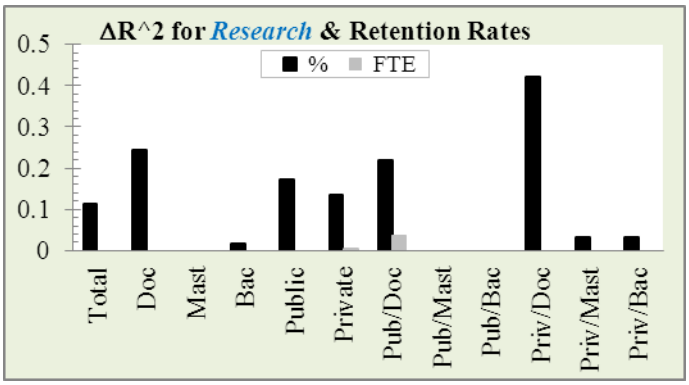

Figure 30. ΔR^2 for research expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

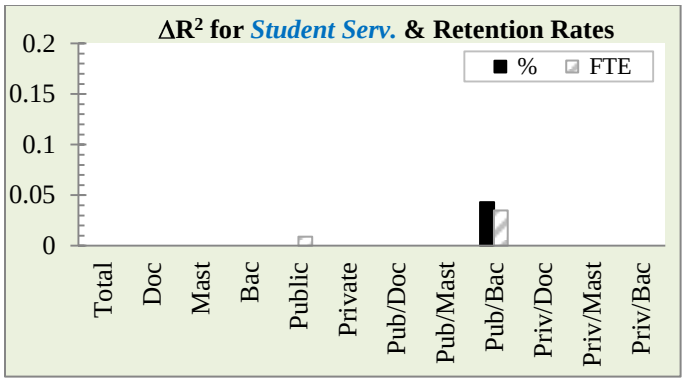

Figure 31. ΔR^2 for student services expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

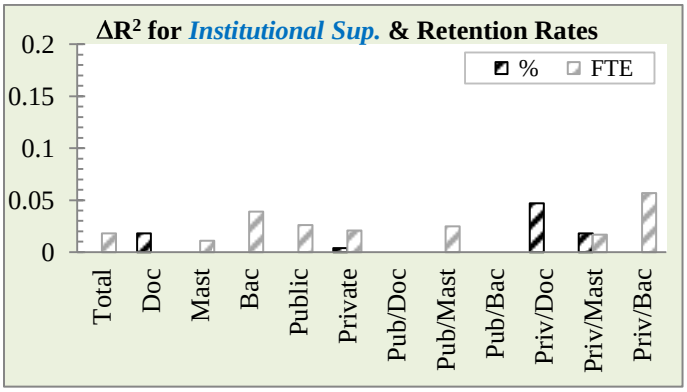

Figure 32. ΔR^2 for institutional support expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

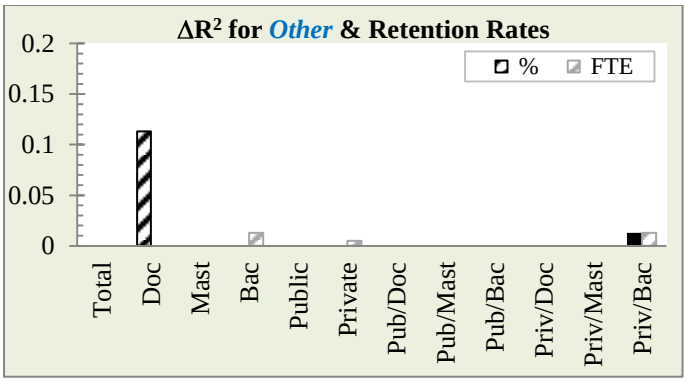

Figure 33. ΔR^2 for other expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

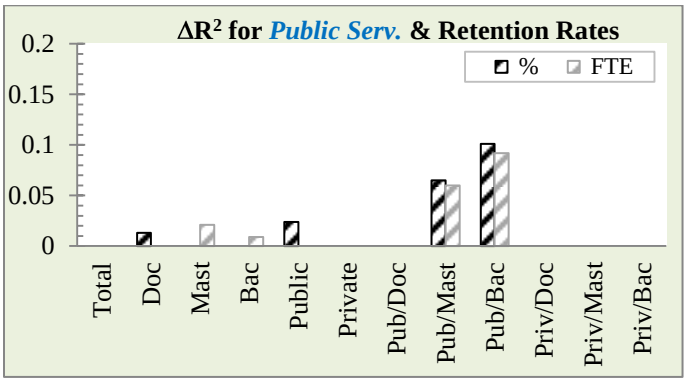

Figure 34. ΔR^2 for public service expenditures predicting retention rates in the twelve samples

(Note: solid fill is for +ve Betas and hatched fill is for –ve Betas)

The following findings can be detected from Tables 11 and 13 and from Figures 27-34:

1. Significant correlation existed between expenditures and retention rates in all 24 regression models (12 models with expenditures expressed as percentages of total core expenses and 12 models with expenditures expressed per FTE student) regardless of the institutional characteristics of control (public or private) or Carnegie classification (doctoral, master's, or baccalaureate granting institutions). However, it should be mentioned that the R^2, which indicates the amount of variance of retention rates predicted by the regression model, varied among the samples, as shown in Figure 36 and Tables 11 and 13. In 18 models, the values of R^2 were more than about 20% (with a maximum value of 49%) and they were less than 10% (with a minimum value of 5%) in six models.
2. Results of the 24 regression models showed that there was a positive relationship between retention rates and expenditures for instruction (in 20 models), academic support (in 15 models), research (in 10 models), student services (in one model), and other (in one model).
3. Results of the 24 regression models showed that there was a negative relationship between retention rates and expenditures for institutional support (in 12 models), public services (in eight models), other (in four models), student services (in two models), and research (in one model).
4. Expenditures contributing more than 10% ($\Delta R^2 > .1$) to the regression models were: instruction (in 10 models), research (in six models), academic support (in one model), other (in one model), and public service (in one model).
5. In public and private doctoral granting institutions, research expenditures (as percentages of total core expenses) contributed strongly to retention rates, as shown in Figure 30.

6. In general, it can be concluded that instruction, academic support, and research expenditures were found to contribute positively to retention rates while institutional support and public services contributed negatively to retention rates. Student services and other expenditures had weak and conflicting contributions to retention rates in few institutions samples, as shown in Figures 31 and 34.

Summary

This study explored the predictive relationships that might exist between the components of institutional expenditures (instruction, research, public service, academic support, student services, institutional support, and other expenditures) and six-year graduation and first-year retention rates at 4-year or above higher education institutions. To answer the four research questions of the study, statistical analyses were performed using stepwise regression analysis on twelve stratified samples of institutions characterized by institutional control (public and private-not-for profit) and Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions). Expenditures components were presented in these analyses as dollar amount per FTE students and as percentages of the total core expenses of the institution. Findings of the analyses indicated that institutional expenditures significantly predicted graduation and retention rates in all samples. Results of the regression models for the four research questions were listed in Tables 7, 9, 11, and 13.

CHAPTER 5: CONCLUSIONS

In the current environment of economic challenges and budgetary constraints, higher education institutions are required to carefully reconsider their patterns of resource allocation in order to be able to fulfill their missions and improve their institutional performance within the available financial resources. There are some measurable institutional goals that are commonly used as indicators of institutional success and improved institutional performance such as first-year retention and six-year graduation rates (Gansemer-Topf, 2004). Several studies have reported the existence of relationships between institutional expenditures and institutional success (Ryan, 2004; Gansemer-topf & Scuh, 2006; Powell, 2009; Weber & Ehrenberg, 2010; Webber, 2012; Promades, 2012; Umfress, 2010). Yet some of these studies in many cases have reached conflicting findings and conclusions probably due to the complex environment of higher education and the impact of different student and institutional characteristics on these studies. There is a need for more research investigating the relationships between institutional expenditures and institutional performance of higher education institutions while taking into consideration different institutional characteristics.

This study sought to fulfill this need and provide better understanding of resource allocation strategies that might be related to improved graduation and retention rates in different types of higher education institutions. Results of this study may be utilized as guidelines for new resource allocation strategies that help improving retention and graduation rates. The findings of

this study will provide powerful information that will help leaders and decision makers to optimize and justify allocation of resources within the institution.

The purpose of this study was to explore the predictive relationships that might exist between the components of institutional expenditures (instruction, research, public service, academic support, student services, institutional support, and other expenditures) and six-year graduation and first-year retention rates at 4-year or above higher education institutions. Expenditures components were presented in this study as dollar amount per FTE students and as percentages of the total core expenses of the institution. The study expanded on existing research by analyzing several samples of institutions characterized by institutional control (public and private-not-for profit) and Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate granting institutions) to recognize the effect, if any, of institutional characteristics on these relationships.

The Integrated Postsecondary Education Data Systems (IPEDS) provided the required data for this study. This study targeted 4-year higher education institutions granting baccalaureate or above degrees. Only institutions with complete data sets for the academic years 2005/2006 through 2010/2011 were considered in the analysis. For-profit institutions, community colleges, faith-related institutions, special-focus institutions, and tribal colleges were excluded from the sample since they typically have patterns of revenues, expenditures, completion, or academic programs that are different from the targeted sample.

The number of institutions in the total sample with complete data sets was 1413 institutions. In order to examine the effect of institutional characteristics on the relationship between expenditures and graduation and retention rates, the total sample was stratified into 11

additional samples based on institutional control and Carnegie classification 2010: public, private, Doctorate, Master's, Baccalaureate, public Doctorate, public Master's, public Baccalaureate, private Doctorate, private Master's, and private Baccalaureate institutions.

Stepwise multiple regression was utilized in this study to answer the research questions of this study regarding relationships between expenditures components, as percentages of total core expenses and per FTE student, and six-year graduation rates (research questions 1 and 2) and between expenditures components, as percentages of total core expenses and per FTE student, and first-year retention rates (research questions 3 and 4). For each of the four research questions in this study, twelve regression analyses were separately conducted on each of the twelve population samples of institutions using the Statistical Package for the Social Sciences (SPSS 17.0).

This chapter presents a summary of the major findings of this study, compares results with existing research, and proposes recommendations for future research.

Major Findings

Major Findings for Research Questions 1 & 2

Research Question1: Which combination, if any, of expenditure components (as percentages of total core expenses) best predict six-year graduation rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Research Question 2: Which combination, if any, of expenditure components (per FTE student) best predict six-year graduation rates in 4-year or above institutions characterized by institutional

control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Data analyses and results of the regression models produced the following major findings for research questions 1 and 2:

1. Considering both forms of expenditures, as percentages of total core expenses and per FTE student, provided more accurate representation of resource allocation in the different samples of institutions. Regression models showed that, in many cases, different predictors of graduation rates were produced when considering both forms of expenditures even within the same sample of institutions.
2. In general, private institutions allocate more resources than their corresponding public institutions for expenditures in the categories of instruction, academic support, student services, and institutional support. On the other hand, public institutions allocate more resources for public service, research, and other expenditures. Among the different expenditures components, instruction expenditures were typically the highest while public services expenditures were the lowest in almost all samples of institutions.
3. Graduation rates varied in percentages among the samples, with private doctorate granting institutions having the highest percentages and public baccalaureate granting institutions having the lowest percentages. In general, private institutions were found to have higher graduation rates compared to their corresponding public ones in all categories.
4. Significant correlation existed between expenditures and graduation rates in all 24 regression models (12 models for expenditures expressed as percentages of total core expenses and 12 models for expenditures expressed per FTE student) regardless of the

institutional characteristics of control (public or private) or Carnegie classification (doctoral, master's, or baccalaureate granting institutions). Yet, the amount of variance of graduation rates predicted by the regression models varied among the samples with majority of models predicting more than 30% of the variance in graduation rates.

5. There was a positive relationship between graduation rates and expenditures for instruction (in 20 models and was a predictor in all 12 samples), academic support (in 13 models and was not a predictor only in three samples: master's, private master's, and public baccalaureate institutions), research (in 11 models and was not a predictor only in three samples: master's, public master's, and public baccalaureate institutions), and student services (in six models and was a predictor in five samples: total, master's, baccalaureate, private, and private baccalaureate institutions).
6. There was a negative relationship between graduation rates and expenditures for institutional support (in 11 models and was not a predictor only in four samples: doctorate, master's, public doctorate, and public baccalaureate institutions), other (in 10 models and was not a predictor only in four samples: public doctorate, public baccalaureate, private doctorate, and private master's institutions), public services (in eight models and was not a predictor only in six samples: doctorate, public, public doctorate, private doctorate, private master's, and private baccalaureate institutions), research (in two models and was a predictor in two samples: total and private institutions), and student services (in one model in the baccalaureate institutions).
7. Expenditures contributing relatively high ($\Delta R^2 > .1$) to the regression models were: instruction (in 13 models), research (in four models), institutional support (in two

models), other (in two models), academic support (in one model), and public service (in one model).

8. Instruction expenditures were found to have the highest positive contributions to graduation rates in majority of the regression models.
9. In public and private doctoral granting institutions, research expenditures (as percentages of total core expenses) contributed strongly and positively to graduation rates. This type of institutions allocated the highest percentages of research expenditures compared to other institutions. It should be mentioned also that research expenditures in the regression models produced conflicting contributions in the total and private samples. While research expenditures as percentages contributed positively to the models, research expenditures per FTE student contributed negatively to the models. Yet the negative contribution in both cases were extremely small compared to the positive contribution which might suggest that, when assessing the impact of research expenditures in general on graduation rates, these two cases of negative contribution could be neglected.
10. Academic support expenditures were found to have modest positive contributions to graduation rates in majority of the regression models. It is worth mentioning also that, in general, academic support expenditures were allocated lower percentages compared to other expenditures such as institutional support and student services in most samples.
11. Student services expenditures were found to have no contributions to graduation rates in majority of the regression models while having low positive contributions in six regression models and even a low negative contribution of less significance in one regression model that might be neglected when evaluating the impact of student services expenditures in general on graduation rates.

12. Institutional expenditures were among the expenditures components that contributed negatively to graduation rates in the regression models. It is worth mentioning that institutional expenditures were allocated considerable amount of money, especially at private institutions.
13. Other expenditures, which are mainly scholarships and fellowships expenses in addition to uncharacterized other expenses, were found to contribute negatively to graduation rates in many of the regression models. In public institutions, which were found to allocate more money for other expenditures compared to private institutions, the regression models resulted in either negative or no contributions to graduation rates.
14. Public services expenditures were found to have no contributions to graduation rates in majority of the regression models while having low negative contributions in seven regression models. As mentioned above, public services expenditures were found to be typically allocated the least amount of money compared to other expenditures components in all institution samples.

Major Findings for Research Questions 3 & 4

Research Question 3: Which combination, if any, of expenditure components (as percentage of total core expenses) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Research Question 4: Which combination, if any, of expenditure components (per FTE student) best predict first-year retention rates in four-year or above institutions characterized by institutional control (public or private not-for-profit institutions) and/or Carnegie classification 2010 (Doctorate, Master's, and Baccalaureate institutions)?

Data analyses and results of the regression models produced the following major findings for research questions 3 and 4:

1. Retention rates were higher than graduation rates in all samples. Similar to the finding of graduation rates, private doctorate granting institutions had the highest retention rates percentages while public baccalaureate granting institutions had the lowest percentages. In general, private institutions had higher retention rates compared to their corresponding public ones in all categories.
2. Significant correlation existed between expenditures and retention rates in all 24 regression models. Yet, the amount of variance of retention rates predicted by the regression models varied among the samples with majority of models predicting more than 25% of the variance in retention rates.
3. There was a positive relationship between retention rates and expenditures for instruction (in 20 models and was a predictor in all 12 samples), academic support (in 15 models and was not a predictor only in two samples: public doctorate and public master's institutions), research (in 10 models and was not a predictor only in three samples: master's, public master's, and public baccalaureate institutions), student services (in one model in the public baccalaureate institutions), and other (in one model in the private baccalaureate institutions).
4. There was a negative relationship between retention rates and expenditures for institutional support (in 11 models and was not a predictor only in two samples: public doctorate and public baccalaureate institutions), public services (in eight models and was not a predictor only in six samples: total, private, public doctorate, private doctorate, private master's, and private baccalaureate institutions), other (in four models and was a

predictor in four samples: doctorate, baccalaureate, private, and private baccalaureate institutions), student services (in three models and was a predictor in two samples: public and public baccalaureate institutions), and research (in one model in the private institutions).

5. Expenditures contributing relatively high ($\Delta R^2 > .1$) to the regression models were: instruction (in 10 models), research (in six models), academic support (in one model), other (in one model), and public service (in one model).
6. In public and private doctoral granting institutions, research expenditures (as percentages of total core expenses) contributed strongly to retention rates.
7. In general, it can be observed that instruction, academic support, and research expenditures contributed positively to retention rates while institutional support and public services contributed negatively to retention rates in majority of the samples. Student services had no contribution to retention rates in majority of the samples and only weak and conflicting contributions in the public and public baccalaureate samples. Other expenditures also had no contribution to retention rates in majority of the samples and weak and conflicting contributions in the baccalaureate, private, and private baccalaureate samples. Only in the doctorate sample that the other expenditures had relatively high contribution to retention rates which may not be generalized to other types of institutions especially that in the two stratified samples of public doctorate and private doctorate, the other expenditures had no contribution to retention rates.

Conclusions

The findings of this study confirmed the existence of a relationship between institutional expenditures, as percentage of total core expenses and per FTE student, and graduation and

retention rates in four-year or above institutions. For all regression models produced in this study, institutional expenditures significantly predicted six-year graduation and first-year retention rates in twelve samples of four year or above institutions characterized by institutional control (public and private) and Carnegie classification 2010 (doctorate, master's, and baccalaureate granting institutions).

Instruction and academic support expenditures were found to have positive relationship with graduation and retention rates in almost all samples. Research expenditures were also found to have positive relationship with graduation and retention rates especially in public and private doctorate granting institutions. Student services expenditures were found to have weak conflicting positive and negative contributions to graduation and retention rates in few samples of institutions and no contribution in the majority of samples. On the other hand, institutional support expenditures were found to have negative relationship with graduation and retention rates in almost all samples. Public services and other expenditures were also found to have negative contribution to graduation and retention rates in some of the samples.

The findings of this study were in agreement with existing research on the relationship between institutional expenditures and graduation and retention rates. In many cases, findings of this study expanded the findings of existing research to different types of institutions. For example, results of Ryan (2004) on 363 baccalaureate institutions suggested positive relationship between instruction and academic support expenditures and graduation rates. Results of Gansemer-Topf and Schuh (2006) on 466 private baccalaureate institutions suggested positive relationship between instruction and academic support expenditures and graduation rates while institutional support expenditures had negative relationship to graduation rates. Also their results on retention rates suggested positive relationship with instruction expenditures and negative

relationship with student services expenditures. Results of Hamrick (2004) on 444 public institutions suggested positive relationship between instruction and academic support expenditures and graduation rates. Results of Webber and Ehrenberg (2010) on 1161 public and private institutions suggested positive relationship between instruction and student services expenditures and graduation rates. It should be mentioned however that there was inconsistency in some of the findings of this study and other existing research especially in regard to the relationship between student services expenditures and graduation and retention rates. Some studies could not verify the existence of a significant relationship between student services expenditures and graduation rates (Ryan, 2004). As for retention rates, some studies reported positive relationship (Umfress, 2010) while other studies (Gansemer-Topf and Schuh, 2006) reported negative relationship with student services expenditures. This could be attributed to the apparent fact, based on the findings of this study, that there could be a weak relationship between student services expenditures and graduation and retention rates that produced such fluctuating results of being positive, negative, or insignificant.

Implications for Practice

It should be mentioned that the implications for practice mentioned in this section are based on the assumption that improving graduation and retention rates is a priority of the institutions leaders and decision makers. It is understandable that the complex environment of higher education would force institutions to simultaneously strive to achieve several goals and reconsider priorities that might necessitate adopting strategies and means that could facilitate the achievement of some goals while creating obstacles to other ones. Also, it is important to understand that though the findings of this study suggested that institutional expenditures had an impact on graduation and retention rates, the findings also suggested that this impact is partial. In

fact, there could be other important parameters not examined in this study that might have more direct impact on graduation and retention rates other than institutional expenditures and were not considered in this study such as student engagement, teaching methods, institutional selectivity, and socio-economic factors.

Institutional Expenditures as Percentages of total core expenses and per FTE Student

The two forms of standardized institutional expenditures that have been typically utilized to compare between expenditures patterns among different institutions are expenditures as percentages of the total core expenses and expenditures per FTE student. While some of the existing research utilized only one of these two forms, findings of this study showed that considering only one of the two forms of expenditures might lead to results that would be different if the other form was utilized. In order for institutional leaders to make more informative decisions regarding allocation of financial resources, findings of this study suggested that both forms of expenditures should be utilized.

Instruction, Academic Support, and Institutional Support Expenditures

Findings of this study showed contribution of these three categories of expenditures to graduation and retention rates in majority of the institutions samples. Instruction expenditures contributed positively to gradation and retention rates in all samples while being the main predictor of gradation and retention rates among other expenditures in almost all regression models. Academic support expenditures also contributed positively to gradation and retention rates while institutional support contributed negatively in majority of institutions samples. Results also showed that private institutions allocate more resources (as percentages of total core expenses and per FTE student) to these three expenditures than their corresponding public

institutions in all categories. In addition, graduation and retention rates were higher in private institutions than in public institutions in all categories.

Institutional leaders, especially in public institutions, need to consider redirecting more financial resources to instruction and academic support expenditures while optimizing institutional support expenditures.

Research, Public Services, and Other Expenditures

Findings of this study suggested positive contribution of research expenditures to graduation and retention rates while public services and other expenditures were found to contribute negatively to graduation and retention rates. Yet there might be other important considerations that might restrict institutional leaders from fully utilizing these findings to improve graduation and retention rates in their institutions. Institutional resources allocated to research expenditures are considerably high only in doctorate granting institutions, which are usually known as research institutions, while other types of institutions do not allocate as much in accordance with the mission of these institutions which may not include intensive research activities.

Findings of this study showed that public services expenditures were allocated the least amount of money compared to all other expenditures in all types of institutions. Yet, the fact that all higher education institutions, especially public ones, have to provide some noninstructional services to the community as part of their missions, might requires institutional leaders to allocate more resources to this expenditures category despite its negative impact on graduation and retention rates.

The category of other expenditures mainly contains scholarships and fellowships expenses in addition to some unidentified other expenses. There are societal obligations that must be fulfilled by higher education institutions, especially the public ones, toward students from certain socio-economic groups who need considerable financial support in order to be able to pursue their degrees in higher education. However, institutional leaders may need to strengthen programs and activities targeting these students for the purpose of helping them overcome any obstacles that might prevent them complete their degree and graduate.

Student Services Expenditures

Findings of this study suggested that student services expenditures had weak conflicting positive and negative contributions to graduation and retention rates in few samples of institutions and no contribution in the majority of samples. Results also showed that, on the average, higher education institutions allocate about 14% of financial resources to student services expenditures which makes student services the third highest expenditures category after instruction and institutional support among all institutions in the samples. This unexpected small contribution of student services expenditures to graduation and retention rates despite the considerable amount of money allocated to this expenditures category deserves more attention from institutional leaders to adjust this unbalanced equation.

Student services expenditures includes expenses for activities that contribute to students overall well-being outside formal instructional programs (NCES, 2013). In 2004, the National Association of Student Personnel Administrators (NASPA) and the American College Personnel Association (ACPA) published an important report (NASPA/ACPA, 2004) about integrating the role of student affairs professionals in the education and preparation of the whole student in

higher education institutions. The report called for a form of transformed education that would allow a collaborative partnership between student affairs professional and academic faculty aiming at the development of student learning inside and outside class. Some of the educational goals of this collaboration included career planning, participatory involvement, practical leadership, informed decision-making, critical thinking, working in teams and groups, and evaluating sources of information (NASPA/ACPA, 2004). Findings of this study suggest that, ten years after that report, these educational goals have not been achieved and proper collaboration between student affairs professionals and academic faculty has not been effectively constructed. Institutional leaders may need to restructure programs and activities of student services that emphasize the acquired role of student services in student learning and student outcomes.

Recommendation for Future Research

This study investigated the relationship between institutional expenditures and graduation and retention rates in four-year or above institutions granting doctoral, master's, and baccalaureate degrees. This study may be repeated to investigate the existence of such relationship in other types of institutions such as for-profit institutions, community colleges, associate's granting institutions, faith-related institutions, and special-focus institutions.

Future research may also use the IPEDS database to examine the impact of more institutional characteristics, other than institutional control and Carnegie classification, on the relationship between expenditures and graduation and retention rates such as geographical region, degree of urbanization, and institution size category. In addition to institutional characteristics, some student characteristics may be also investigated such as gender, race, and

ethnicity. Such research would provide better understanding of the different factors that might influence the relationship between expenditures and graduation and retention rates.

Further research may build on the findings of this study by employing qualitative and quantitative methods to recognize the activities or expenses within some specific expenditures (such as instruction, academic support, institutional support, and student services) that might be linked to graduation and retention rates.

Institutional data sources, other than IPEDS, might provide more granular data required for future research relating institutional and student characteristics to graduation and retention rates. For example, institutional Common Data Sets (CDS) provide more detailed information on the institutions in different areas such as enrollment, transfer admission, academic offering, instructional faculty, disciplinary areas, class size, and student life. Utilizing such type of data would help fine-tune the findings of this study.

Summary

This study aimed at investigating the relationship, if any, between institutional expenditures and graduation and retention rates in different samples of four-year or above institutions characterized by institutional control (public and private-not-for-profit) and Carnegie classification 2010 (doctorate, master's, and baccalaureate granting institutions). Stepwise multiple regression was used to analyze the existing institutional data collected from IPEDS. Results of this study indicated that institutional expenditures significantly predicted graduation and retention rates in all samples. Instruction and academic support contributed positively to graduation and retention rates in majority of the samples while research expenditures contributed positively mainly in doctorate granting institutions. Institutional support expenditures contributed

negatively to graduation and retention rates in majority of the samples while, and to a less extent, public services and other expenditures contributed negatively in some of the samples. Student services expenditures showed weak and conflicted contribution to graduation and retention rates in few samples and no contribution in majority of the samples. Findings of this study have important implications for institutional leaders and decision makers in regard to adjusting resource allocation patterns and investing in areas that help improve graduation and retention rates.

REFERENCES

Archibald, R., & Feldman, D. (2008). Graduation Rates and Accountability: Regressions versus Production Frontiers. Research In Higher Education, 49(1), 80-100.

Astin, A. (1991). Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education. New York: American Council on Education/Macmillan.

Astin, A. (1997). How "Good" Is Your Institution's Retention Rate? Research In Higher Education, 38(6), 647-58.

Auguste, B., Cota, A., Jayaram, K., & Laboissière, M. (2010). Winning by degrees: The strategies of highly productive higher education institutions. Retrieved September 12, 2013 from http://mckinseyonsociety.com/winning-by-degrees/

Bordelon, E. (2012). Where Have We Been? Where Are We Going? The Evolution of American Higher Education. Procedia - Social and Behavioral Sciences, 55, 100 – 105.

Bound, J., Lovenheim, M., and Turner, S. (2009) Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources. Washington, D.C.: National Bureau of Economic Research, Working Paper 15566, available at: http://www.nber.org/papers/w15566 .

Bound, J., & Turner, S. (2006). Cohort crowding: how resources affect collegiate attainment. Washington, D.C.: National Bureau of Economic Research, Working Paper 12424, available at http://www.nber.org/papers/w12424

Cantrell, D. (2006). Allocating for graduation---A correlation analysis of institutional education and general expenditures and six-year graduation rates at all public, four-year or above degree-granting colleges and universities. (Order No. 3298769, Marshall University).

ProQuest Dissertations and Theses, , 87. Retrieved July 14, 2013 from: http://search.proquest.com/docview/304933543?accountid=8421 . (304933543).

Cook, B., & Hartle, T. (2011). Why Graduation Rates Matter-and Why They Don't. Retrieved September 15, 2013 from the American Council on Education website: http://www.acenet.edu/the-presidency/columns-and-features/Pages/Why-Graduation-Rates-Matter%E2%80%94and-Why-They-Don%E2%80%99t.aspx .

Cook, B., & Pullaro, B. (2010). College graduation rates: Behind the numbers. Retrieved September 15, 2013 from American Council on Education, Center for Policy Analysis website: http://www.acenet.edu/news-room/Documents/College-Graduation-Rates-Behind-the-Numbers.pdf .

Delta Cost Project on Postsecondary Costs, Productivity, and Accountability. (2009). Trends in college spending: Where does the money come from? Where does it go? Washington, DC: Author. Retrieved September 10, 2013 from: http://www.deltacostproject.org/resources/pdf/trends_in_spending-report.pdf

Department of Education, W. C. (2006). A Test of Leadership: Charting the Future of U.S. Higher Education. US Department Of Education.

Ehrenberg, R., & Webber, D. (2010). Student Service Expenditures Matter. Change: The Magazine Of Higher Learning, 42(3), 36-39.

Gansemer-Topf, A. (2004). Investing in student persistence: A regression analysis of institutional expenditure patterns and retention and graduation rates at private baccalaureate colleges and universities. (Order No. 3136313, Iowa State University). ProQuest Dissertations and

Theses, , 250-250 p. Retrieved July 14, 2013 from: http://search.proquest.com/docview/305170088?accountid=8421 . (305170088).

Gansemer-Topf, A., Saunders, K., Schuh, J., & Shelley, M. (2004, December). A study of resource expenditures and allocation at DEEP colleges: Is spending related to student engagement? Ames, IA: Iowa State University, Educational Leadership and Policy Studies. Retrieved September 10, 2013 from: http://nsse.iub.edu/pdf/DEEP_Expenditures_Schuh.pdf .

Gansemer-Topf, A., & Schuh, J. (2006). Institutional Selectivity and Institutional Expenditures: Examining Organizational Factors that Contribute to Retention and Graduation. Research In Higher Education, 47(6), 613-642.

Gold, L., & Albert, L. (2006). Graduation Rates as a Measure of College Accountability. Retrieved December 16, 2013 from the American Federation of Teacher website: http://www.aft.org/pdfs/highered/academic/march06/Gold.pdf .

Goldstein, P., Council of Higher Education Management Associations, W. C., EDUCAUSE, W. C., & APPA: Association of Higher Education Facilities Officers, A. A. (2006). A Report from The Council of Higher Education Management Associations. APPA: Association Of Higher Education Facilities Officers.

Hamrick, F., Schuh, J., & Shelley, M. (2004). Predicting Higher Education Graduation Rates from Institutional Characteristics and Resource Allocation. Education Policy Analysis Archives, 12 (19).

Hayek, J. (2001). A student-centered approach for identifying high-performing colleges and universities. (Order No. 3024295, Indiana University). ProQuest Dissertations and Theses,, 245-245 p. Retrieved December 15, 2013 from: http://search.proquest.com/docview/275889627?accountid=8421 . (275889627).

Horn, L., National Center for Education Statistics (ED), W. C., & MPR Associates, B. A. (2006). Placing College Graduation Rates in Context: How 4-Year College Graduation Rates Vary with Selectivity and the Size of Low-Income Enrollment. Postsecondary Education Descriptive Analysis Report. NCES 2007-161. National Center For Education Statistics.

Janson, P. & Bielak, D. (2008). Flex or Fail. Business Officer Magazine. Retrieved May 15, 2013 from: http://www.nacubo.org/Business_Officer_Magazine/Magazine_Archives/June_2008/Flex_or_Fail.html

Kelly, P., & Delta Project on Postsecondary Education Costs, P. (2009). The Dreaded "P" Word: An Examination of Productivity in Public Postsecondary Education. Delta Project On Postsecondary Education Costs, Productivity And Accountability.

Kelly, P., Jones, D., & National Center for Higher Education Management Systems, (2007). A New Look at the Institutional Component of Higher Education Finance: A Guide for Evaluating Performance Relative to Financial Resources. National Center For Higher Education Management Systems.

Knapp, L., Kelly-Reid, J., Ginder, S., & National Center for Education Statistics, (2011). Enrollment in Postsecondary Institutions, Fall 2009; Graduation Rates, 2003 & 2006

Cohorts; and Financial Statistics, Fiscal Year 2009. First Look. NCES 2011-230. National Center For Education Statistics.

Knapp, L., Kelly-Reid, J., Ginder, S., National Center for Education Statistics, & RTI, I. (2012). Enrollment in Postsecondary Institutions, Fall 2011; Financial Statistics, Fiscal Year 2011; and Graduation Rates, Selected Cohorts, 2003-2008: First Look (Provisional Data). NCES 2012-174rev. National Center For Education Statistics.

Mertler, C., & Vannatta, R. (2010). Advanced and Multivariate Statistical Methods, Pyrczak Publishing, Los Angeles, CA

National Center for Education Statistics (NCES), Integrated Postsecondary Education Data System (IPEDS). (2013). IPEDS data center [Data file and code book]. Retrieved July 14, 2013 from: http://nces.ed.gov/ipeds/datacenter/

NASPA/ACPA (2004, January). Learning reconsidered: A campus-wide focus on the student experience. Retrieved April 28, 2014 from: http://www.naspa.org/images/uploads/main/Learning_Reconsidered_Report.pdf

Nelson, L. (2013, February 13). On notice, again. Inside Higher Ed. Retrieved July 14, 2013 from: http://www.insidehighered.com/news/2013/02/13/obama-calls-more-attention-price-value-accreditation-state-union .

Peerenboom, J. (2012). What matters? exploring links among institutional expenditure patterns, undergraduate graduation rates, and time-to-degree at public, four-year colleges and universities. (Order No. 3539601, The Florida State University). ProQuest Dissertations and Theses, , 100. Retrieved July 14, 2013 from: http://search.proquest.com/docview/1095535058?accountid=8421 . (1095535058).

Pike, G., Kuh, G., McCormick, A., Ethington, C., & Smart, J. (2011). If and When Money Matters: The Relationships among Educational Expenditures, Student Engagement and Students' Learning Outcomes. Research In Higher Education, 52(1), 81-106.

Porter, S., (2012). Using Student Learning as a Measure of Quality in Higher Education. Context for Success. Retrieved September 15, 2013 from: http://www.hcmstrategists.com/contextforsuccess/papers/PORTER_PAPER.pdf .

Powell, B. (2009). Expenditures, efficiency, and effectiveness in U.S. undergraduate higher education: A national benchmark model. (Order No. 3373417, University of Arkansas at Little Rock). ProQuest Dissertations and Theses, , 165. Retrieved July 14, 2013 from: http://search.proquest.com/docview/305149731?accountid=8421 . (305149731).

Promades, F. (2012). Influencing graduation rates through resource allocation: A correlation analysis of institutional expenditures and six-year graduation rates at private colleges and universities in new england. (Order No. 3507787, Johnson & Wales University). ProQuest Dissertations and Theses, , 137. Retrieved July 14, 2013 from: http://search.proquest.com/docview/1016089815?accountid=8421 . (1016089815).

Reindl, T., & Reyna, R. (2011). Complete to Compete: From Information to Action: Revamping Higher Education Accountability Systems. National Governors Association, Education Division, NGA Center for Best Practices. Washington, DC: NGA Center for Best Practices.

Ryan, J. (2004). The Relationship between Institutional Expenditures and Degree Attainment at Baccalaureate Colleges. Research In Higher Education, 45(2), 97-114.

Ryan, J. (2005). Institutional Expenditures and Student Engagement: A Role for Financial Resources in Enhancing Student Learning and Development?. Research In Higher Education, 46(2), 235-249.

Shin, J. (2010).Impacts of performance-based accountability on institutional performance in the U.S. Higher Education, 60, 47–68.

Smart, J., Ethington, C., Riggs, R., & Thompson, M. (2002). Influences of institutional expenditure patterns on the development of students' leadership competencies. Research in Higher Education 43, 115–132.

Umfress, J. (2010). An analysis of expenditures on student affairs / services and college student retention at four-year colleges and universities in the United States. (Order No. 3402561, Clemson University). ProQuest Dissertations and Theses, , 108-n/a. Retrieved July 14, 2013 from http://search.proquest.com/docview/304676077?accountid=8421. (304676077).

Webber, D. (2012). Expenditures and Postsecondary Graduation: An Investigation Using Individual-Level Data from the State of Ohio. Economics Of Education Review, 31(5), 615-618.

Weber, D., & Ehrenberg, R. (2010). Do expenditures other than instructional expenditures affect graduation and persistence rates in American higher education? Economics of Education Review 29, 947-958.

Wegner, G., & National Center for Public Policy and Higher Education, C. A. (2008). Partnerships for Public Purposes: Engaging Higher Education in Societal Challenges of the 21st Century. National Center For Public Policy And Higher Education.

Wellman, J. (2010). Connecting the dots between learning and resources (NILOA Occasional Paper No. 3). National Institute for Learning Outcomes Assessment. Retrieved September 25, 2013 from: http://learningoutcomesassessment.org/documents/Wellman.pdf

APPENDIX A: Definition of Terms

TERM	DEFINITION (NCES, 2013)*
Doctorate granting Institutions	Institutions that award at least 20 doctoral degrees per year (excluding doctoral-level degrees that qualify recipients for entry into professional practice, such as the JD, MD, PharmD, DPT, etc.) Excludes Special Focus Institutions and Tribal Colleges.
Master's granting Institutions	Institutions that award at least 50 master's degrees per year. Excludes Special Focus Institutions and Tribal Colleges.
Baccalaureate granting Institutions	Institutions where baccalaureate degrees represent at least 10 percent of all undergraduate degrees and that award fewer than 50 master's degrees or fewer than 20 doctoral degrees per year. Excludes Special Focus Institutions and Tribal Colleges.
Retention rate	The percent of the (fall full-time cohort from the prior year minus exclusions from the fall full-time cohort) that re-enrolled at the institution as either full- or part-time in the current year
Graduation rate	The rate required for disclosure and/or reporting purposes under Student Right-to-Know. This rate is calculated as the total number of completers within 150% of normal time divided by the revised cohort minus any allowable exclusions.
Full-time equivalent enrollment (FTE)	This variable is derived from the enrollment by race/ethnicity section of the fall enrollment survey. The full-time equivalent of the institution's part-time enrollment is estimated and then added to the full-time enrollment of the institution.

Instruction Expenditures

A functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted. Includes general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions. Also includes expenses for both credit and non-credit activities. Excludes expenses for academic administration where the primary function is administration (e.g., academic deans). Information technology expenses related to instructional activities if the institution separately budgets and expenses information technology resources are included (otherwise these expenses are included in academic support).

Research Expenditures

A functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. The category includes institutes and research centers, and individual and project research. This function does not include non-research sponsored programs (e.g., training programs). Also included are information technology expenses related to research activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support.)

Public Service Expenditures

A functional expense category that includes expenses for activities established primarily to provide noninstructional services beneficial to individuals and groups external to the institution. Examples are conferences, institutes, general advisory service, reference bureaus, and similar services provided to particular sectors of the community.

This function includes expenses for community services, cooperative extension services, and public broadcasting services. Also includes information technology expenses related to the public service activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support).

Academic Support Expenditures A functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service. It includes the retention, preservation, and display of educational materials (for example, libraries, museums, and galleries); organized activities that provide support services to the academic functions of the institution (such as a demonstration school associated with a college of education or veterinary and dental clinics if their primary purpose is to support the instructional program); media such as audiovisual services; academic administration (including academic deans but not department chairpersons); and formally organized and separately budgeted academic personnel development and course and curriculum development expenses. Also included are information technology expenses related to academic support activities; if an institution does not separately budget and expense information technology resources, the costs associated with the three primary programs will be applied to this function and the remainder to institutional support.

Student Services Expenditures A functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well - being and to their intellectual, cultural, and social development outside the context of the formal instructional program. Examples include student activities, cultural events, student newspapers, intramural athletics, student

	organizations, supplemental instruction outside the normal administration, and student records. Intercollegiate athletics and student health services may also be included except when operated as self - supporting auxiliary enterprises. Also may include information technology expenses related to student service activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in institutional support.)
Institutional Support Expenditures	A functional expense category that includes expenses for the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. Also includes information technology expenses related to institutional support activities. If an institution does not separately budget and expense information technology resources, the costs associated with student services and operation and maintenance of plant will also be applied to this function.
Other Expenditures	Is equal to the sum of expenses for the following functions: Scholarships and fellowships expenses; Other expenses and deductions

* All definitions were quoted from the on line glossaries available on IPEDS (NCES, 2013)